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| **Benha University**  **Faculty of Science**  **Department of Mathematics** |
| **Computer Science B.Sc.**  **Program** |
| **2020/2021** |

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| **Contents** | Page |
| **A. Basic Information** | 1 |
| **B. Professional Information** | 1 |
| 1. Program Aims | 1 |
| 2. Intended Learning Outcomes (ILO's) | 1 |
| a. Knowledge and Understanding | 1 |
| b. Intellectual Skills | 2 |
| c. Professional and Practical Skills | 2 |
| d. General skills | 2 |
| 3. Academic standard of the program | 3 |
| 4. Reference indices (Benchmarks) | 3 |
| 5. Curriculum structure and contents of program | 3 |
| 6. Contents of the Courses | 7 |
| 7. Program admission requirements | 8 |
| 8. Regulations for progression and program completion | 8 |
| 9. Methods and rules of evaluation of graduates enrolled in the program | 10 |
| 10.Teaching and learning strategies used in the program | 11 |
| 11. Methods of program evaluation | 11 |
| **C. Appendices** | 12 |
| **Appendix 1:** National Academic Reference Standards for Computer Science | 13 |
| **Appendix 2:** Attributes of graduate in Computer Science NARS and  Program aims of Computer Science matrix | 18 |
| **Appendix 3:** Computer Science B.Sc. NARS ILOs & Computer Science  B.Sc. Program ILOs matrix | 21 |
| **Appendix 4:** Computer Science B.Sc. Program aims & ILOs matrix | 29 |
| **Appendix 5:** Vision & Mission & Program Aims | 34 |
| **Appendix 6:** Course Specification | 44 |
| **Appendix 7:** Computer Science Program Course ILOs’ Matrix | 322 |
| **Appendix 8:** Examination Systems | 326 |

**Computer Science Program Specification**

**A-** **Basic Information:**

**Program Title: Computer Science**

**Program Type: Major**

**Department Responsible: Mathematics**

**Coordinator: Dr. Eslam Ahmed Said Ahmed**

**Internal evaluator:**

**External evaluator:**

**Date of the most recent approval of program specification by the faculty council: 9/12/2019 No. (390) updated 2020/2021 No. (419)**

**B-** **Professional** **Information:**

**1-** **Program Aims**

**The overall aims of the program are to provide the graduate with:**

|  |  |
| --- | --- |
|  | The role of Basic Sciences in the development of society. |
|  | Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. |
|  | Scientific facts and theories to analyze and interpret practical data. |
|  | Collecting, analyzing, and presenting data using appropriate formats techniques. |
|  | Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. |
|  | Effective applying at information technology relevant to the field. |
|  | Effective participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. |
|  | Adopting self and long life-learning and participate effectively in research activities. |
|  | Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |
|  | Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. |
|  | Using computer science applications to solve mathematical and statistical problems. |

**2**- **Intended Learning Outcomes (ILOs):**

**a.** **Knowledge and understanding:**

By the end of the program, the graduate should be able to

|  |  |
| --- | --- |
|  | Know the related basic scientific facts, concepts, principles and techniques. |
|  | Describe the relevant theories and their applications. |
|  | Know the processes and mechanisms supporting the structure and function of the specific topics. |
|  | Identify the related terminology, nomenclature and classification systems. |
|  | Know the theories and methods applied for interpreting and analyzing data related to discipline. |
|  | Identify the progress of the program-related knowledge. |
|  | Identify the relation between the studied topics and the environment. |
|  | Record the core ideas of mathematics and statistics. |
|  | Define the programming concepts for various branches mathematics, probability, and statistics. |
|  | Identify the mathematical, statistical, and computer methods in solving different problems. |
|  | Know the hardware and software are integrate create computer systems and distinguish between selected forms of computer hardware architecture, and operating system technology. |
|  | Know the principles of mathematical, statistical modeling and application. |
|  | Select appropriate theories, practices, and tools for the specification, design, implementation, and evaluation of a computer-based system. |
|  | Describe the meaning of complicated statements using mathematical notation and language. |

**b.** **Intellectual Skills:**

**By the end of the program, the graduate should be able to**

|  |  |
| --- | --- |
|  | Compare different methods subject-related theories and assess their concepts and principles. |
|  | Interpret qualitatively and quantitatively science relevant data. |
|  | Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts. |
|  | Discover mechanisms and procedures to handle scientific problems. |
|  | Construct several related and integrated information to confirm, make evidence and test hypotheses. |
|  | Solve abstract and mathematical models of computer and communication systems. |
|  | Confirm the knowledge and understanding of the mathematical and statistical processes for modeling of real-world problems. |
|  | Develop appropriate knowledge and awareness of the importance and applications of mathematical and statistical assumptions. |
|  | Apply appropriate statistical and mathematical techniques to the development of software solutions. |
|  | Design the principles of effective information management, Information organization, and information-retrieval skills to various information systems. |

**c.** **Professional and Practical Skills:**

**By the end of the program, the graduate should be able to**

|  |  |
| --- | --- |
|  | Analyze the investigated data, using appropriate techniques and considering scientific guidance. |
|  | Show techniques and tools considering scientific ethics. |
|  | Solve problems using a range of formats and approaches. |
|  | Collect the different methods used in addressing subject related issues. |
|  | Show essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques. |
|  | Show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice. |
|  | Summarize of sources of numerical errors and usage of symbolic and numerical software as a part of practical computation. |
|  | Prepare competence in the use of statistical and mathematical methods in problem solving and modeling. |
|  | Examine computer-based systems. |
|  | Judge the social, professional, an ethical issue involved in the use of computer technology. |

**d.** **General skills**:

**By the end of the program, the graduate should be able to**

|  |  |
| --- | --- |
|  | Using internet and communication technology effectively. |
|  | Lifelong learning roles and responsibilities, and their performing manner. |
|  | Community linked thinking, set tasks and solve problems on scientific basis. |
|  | Workings in groups effectively; manage time, collaborate and communicate with others positively. |
|  | Community linked Thinking, ethics and traditions. |
|  | Life -long learning. |
|  | Computations scientific models, systems, and tools effectively. |
|  | Ethical behavior with scientific patents considering property right. |
|  | Communication with others. |
|  | Working in groups Identify us the roles and responsibilities, delegate tasks, and set clear guidelines and performance indicators. |
|  | Workings in groups effectively; manage time, collaborate and communicate with others positively. |
|  | Community linked thinking with considerable attention to the community ethics and traditions. |
|  | Ethical behavior rights legally and ethically. |

**3-** **Academic** **standard of the program**

The program outcomes are derived from the Egyptian National Academic Reference Standards (NARS).

**4-** **Reference indices (Benchmarks)**

Not utilized.

**5**- **Curriculum structure and contents of program**

1. **Program duration:-**

The period of study to obtain a B.Sc. degree is 4 academic years. The academic year is divided into two semesters. Each semester extends to 17 weeks.

A summer semester extended for 8 weeks is a subject for approval by the faculty council.

1. **Program structure:-**

No. of hours/No. of units:

**Compulsory** **116** **Elective**  **24**  **Total** **140**

|  |  |  |
| --- | --- | --- |
| **Program** | **Credit hours** | **Percentage** |
| **Basic sciences** | **39** | **27.86 %** |
| **Social sciences and humanities courses** | **5** | **3.57 %** |
| **Specialized courses** | **73** | **52.14%** |
| **Others (Discretionary)** | **12** | **8.57 %** |
| **Research and graduation project** | **2** | **1.43%** |
| **Computer and IT** | **9** | **6.43%** |
| **Total** | **140** | **100 %** |

training: 6 weeks (minimum 90 hours).

**c- Program courses (in credit hours system):**

Symbols in the list and their meanings

|  |  |  |  |
| --- | --- | --- | --- |
| **Connotation** | **Symbol** | **Connotation** | **Symbol** |
| University requirement | Ur | Geology | G |
| Faculty requirement | Fr | Entomology | E |
| Botany | B | Physics | Ph |
| Chemistry | Ch | Zoology | Z |
| Mathematics | M | Statistics | Ms |
| Computer science | Mc |  |  |

**Levels:-**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **First:** **University Requirements (8 cr.)** | | | | | | |
| **Course code or**  **course no.** | **Course title** | | **Pre-requisites** | **No. of hours weekly** | | |
| **L** | **P/T** | **C.H.** |
| **015 Ur** | **English (1)** | | **-** | **2** | **-** | **2** |
| **030 Ur** | **Computer science (1)** | | **-** | **2** | **2** | **3** |
| **040 Ur** | **Computer science (2)** | | **030 Ur** | **1** | **2** | **2** |
| **050 Ur** | **Human rights** | | **-** | **1** | **-** | **1** |
| **Total Credit Hrs.** | | | | | | **8** |
| **Second:** **اكتب نصًا أو عنوان موقع ويب أو** [**ترجم مستندًا.**](https://translate.google.com.eg/?tr=f&hl=ar)  **kullia**  **عرض الترجمة لـ** [***أولى* : مقررات متطلبات الجامعة**](javascript:void(0))  **الترجمة بدلاً من ذلك من** [**أولا : مقررات متطلبات الجامعة**](javascript:void(0))  **Faculty Requirements (24 cr.)**  **1- Compulsory Courses (18 cr.)** | | | | | | |
| **100 M** | **General mathematics (1)** | | **-** | **2** | **2** | **3** |
| **105 M** | **General mathematics (2)** | | **100 M** | **2** | **2** | **3** |
| **100 Ph** | **General physics (1)** | | **-** | **2** | **-** | **2** |
| **105 Ph** | **General physics (2)** | | **100Ph** | **2** | **-** | **2** |
| **181 Ph** | **Practical physics (1)** | | **-** | **-** | **3** | **1** |
| **180 Ph** | **Practical physics (2)** | | **181Ph** | **-** | **3** | **1** |
| **100 Ch** | **General chemistry (1)** | | **-** | **2** | **-** | **2** |
| **105 Ch** | **General chemistry (2)** | | **100Ch** | **2** | **-** | **2** |
| **181 Ch** | **Practical chemistry (1)** | | **-** | **-** | **3** | **1** |
| **180 Ch** | **Practical chemistry (2)** | | **181Ch** | **-** | **3** | **1** |
| **Total Credit Hrs.** | | | | | | **18** |
| **2- Elective Courses ( 4 c. + 2 cr.** **General Culture)** | | | | | | |
| **Course code or**  **course no.** | **Course title** | | **Pre-requisites** | **No. of hours weekly** | | |
| **L** | **P/T** | **C.H.** |
| **183 Ch** | **Applied non organic Chemistry (1)** | | **-** | **-** | **2** | **1** |
| **183 Ph** | **Applied Physic (1)** | | **-** | **-** | **2** | **1** |
| **185 Ch** | **Applied organic Chemistry (2)** | | **-** | **-** | **2** | **1** |
| **185 Ph** | **Applied Physic (2)** | | **-** | **-** | **2** | **1** |
| **100 Z** | **General zoology (1)** | | **-** | **1** | **2** | **2** |
| **105 Z** | **General zoology (2)** | | **100 Z** | **1** | **2** | **2** |
| **100 B** | **General botany (1)** | | **-** | **1** | **2** | **2** |
| **105 B** | **General botany (2)** | | **100 B** | **1** | **2** | **2** |
| **100 G** | **General geology (1)** | | **-** | **1** | **2** | **2** |
| **105 G** | **General geology (2)** | | **100 G** | **1** | **2** | **2** |
| **111 E** | **General entomology (1)** | | **-** | **1** | **2** | **2** |
| **112 E** | **General entomology (2)** | | **111 E** | **1** | **2** | **2** |
| **11 Fr** | **Business administration** | | **-** | **2** | **-** | **2** |
| **12 Fr** | **History of science** | | **-** | **2** | **-** | **2** |
| **13 Fr** | **Healthy nutrition** | | **-** | **2** | **-** | **2** |
| **14 Fr** | **Scientific thinking** | | **-** | **2** | **-** | **2** |
| **17 Fr** | **Principles of labor law** | | **-** | **1** | **-** | **1** |
| **19 Fr** | **Selected topics from the history of modern Egypt** | | **-** | **1** | **-** | **1** |
| **Total Credit Hrs.** | | | | | | **6** |
| **Second Level:**  **Compulsory** **30** **Elective**  **6**  **Total** **36** | | | | | | |
| **1St semester** | | | | | | |
| **Course code or**  **course no.** | **Course title** | | **Pre-requisites** | **No. of hours weekly** | | |
| **L** | **P/T** | **C.H.** |
| **211 M** | **High Calculus** | | **100 M** | **2** | **2** | **3** |
| **223 M** | **Real analysis (1)** | | **105 M** | **3** | **-** | **3** |
| **225 M** | **Discrete Mathematics** | | **211 M** | **2** | **2** | **3** |
| **231 M** | **Newtonian Mechanics** | | **105 M** | **2** | **2** | **3** |
| **251 Mc** | **Object-oriented programming** | | **40 Ur** | **2** | **2** | **3** |
| **361 Mc** | **Logic Circuits** | **One elective course** | **30 Ur** | **2** | **2** | **3** |
| **363 Mc** | **System Evaluation** | **251 Mc** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | **18** |
| **2nd semester** | | | | | | |
| **212 M** | **Differential Equations(1)** | | **105 M** | **2** | **2** | **3** |
| **224 M** | **Linear Algebra &Geometry** | | **105 M** | **2** | **2** | **3** |
| **232 M** | **Analytical mechanics** | | **231 M** | **2** | **2** | **3** |
| **242 Ms** | **Probability (1)** | | **105 M** | **2** | **2** | **3** |
| **252 Mc** | **Data Structure** | | **40 Ur** | **2** | **2** | **3** |
| **226 Ph** | **Electricity and AC Current** | **One elective course** | **105Ph** | **2** | **2** | **3** |
| **367 Mc** | **Formal Language and**  **Automata** | **252 Mc** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | **18** |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Third level:**  **Compulsory** **32** **Elective**  **6**  **Total** **38** | | | | | | |
| **1St semester** | | | | | | |
| **Course code or**  **course no.** | **Course title** | | **Pre-requisites** | **No. of hours weekly** | | |
| **L** | **P/T** | **C.H.** |
| **323 M** | **Numerical Analysis (1)** | | **105 M** | **3** | **2** | **4** |
| **351 Mc** | **Operating Systems** | | **40 Ur** | **2** | **2** | **3** |
| **353 Mc** | **Algorithms** | | **223 M,**  **252Mc** | **2** | **2** | **3** |
| **355 Mc** | **Special Topics in Computer Science (1)** | |  | **2** | **2** | **3** |
| **357 Mc** | **Databases** | | **252Mc** | **2** | **2** | **3** |
| **350 Ph** | **Introduction to Solid state physics** | **One elective course** |  | **2** | **3** | **3** |
| **325 Mc** | **Accurate treatments** | **40 Ur** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | **19** |
| **2nd semester** | | | | | | |
| **326 M** | **Operation Research (1)** | | **211 M** | **3** | **2** | **4** |
| **352 Mc** | **Artificial Intelligence** | | **223 M,**  **252Mc** | **2** | **2** | **3** |
| **354 Mc** | **Computer Networks** | | **351 Mc** | **2** | **2** | **3** |
| **356 Mc** | **Introduction to Scientific Computations** | | **223 M,**  **252Mc** | **2** | **2** | **3** |
| **368 Mc** | **Computer Applications in Statistics** | | **242Ms,**  **252Mc** | **2** | **2** | **3** |
| **366 Mc** | **Image Processing** | **One elective course** | **353 Mc** | **2** | **2** | **3** |
| **364 Mc** | **Programming Languages Theory** | **252 Mc** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | **19** |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Fourth level:**  **Compulsory** **28** **Elective**  **6**  **Total** **34** | | | | | | | |
| **1St semester** | | | | | | | |
| **Course code or**  **course no.** | **Course title** | | | **Pre-requisites** | **No. of hours weekly** | | |
| **L** | **P/T** | **C.H.** |
| **451 Mc** | **Scientific Computations (1)** | | | **356 Mc** | **2** | **2** | **3** |
| **453 Mc** | **Computer Security** | | | **354 Mc** | **2** | **-** | **2** |
| **457 Mc** | **Theory of Computation** | | | **323 M,**  **353Mc** | **2** | **-** | **2** |
| **461 Mc** | **Computer Graphics** | | | **351 Mc** | **2** | **2** | **3** |
| **463 Mc** | **Data Communications** | | | **354 Mc** | **2** | **2** | **3** |
| **455 Mc** | **Special Topics in Computer Science(2)** | **One elective course** | |  | **2** | **2** | **3** |
| **467 Mc** | **Software Design and Engineering** |  | | **351 Mc** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | | **16** |
| **2nd semester** | | | | | | | |
| **400 Mc** | **Research project/Article** | | |  | **2** | **-** | **2** |
| **452 Mc** | **Distributed Computing** | | | **323 M,**  **354Mc** | **2** | **-** | **2** |
| **458 Mc** | **Compilers** | | | **357Mc** | **2** | **-** | **2** |
| **464 Mc** | **Data Mining** | | | **352Mc** | **2** | **2** | **3** |
| **466 Mc** | **Cryptography** | | | **354Mc** | **2** | **2** | **3** |
| **362 Mc** | **Systems Simulation** | | | **252Mc** | **2** | **2** | **3** |
| **426 M** | **Operations Research (2)** | | **One elective course** | **326 M** | **3** | **-** | **3** |
| **462 Mc** | **Scientific Computations (2)** | | **451 Mc** | **2** | **2** | **3** |
| **Total Credit Hrs.** | | | | | | | **18** |

**6.** **Contents of courses**

Course code or course no.:

Course title:

Contents:

See course specification forms (Appendix 6)

**7-** **Program admission requirements**

The criteria for admitting students BSC program in science is the total score in the national secondary school examination (usually to exceed 88%) as well as a geographic factor: ad-mission criteria are essentially set by the Higher Education authorities.

The number of students to attend the program in its first year (preparatory year is 650 students),(credit hours). It has been ratified by the Higher Education authorities.The faculty pro-gram duration is 4 years (8 semesters at least). i.e 4 years, autumn and spring.

The final secondary school degree (Thanaweya Amma), the mathematics section and science section) or their equivalent is a prerequisite for admission to faculty of science. Admission to Benha University is restricted to students living in some neighboring districts. The number of students legible to apply for admission to faculty programs is about 738.Among those, a maximum of number of xxx are admitted to the faculty .Students at any of the programs varied among the faculty programs.

**8-** **Regulations for progression and program completion:**

Administration and acceptance produces the plan of registration and its procedure, list of students, admitted to the course of the desired program, study groups, schedule of program, and distribution of the academic advisor and approved his\her role. The total courses for each individual student provided in cards and academic record data are introduced into special documents and approved by the faculty. The academic advisor helps and guides the students on the process and appropriate selection based on the desired of each student. The student can be registered from the week before the start of first semester, and admitted to the program at the first week of the semester. When the student registered for any course at any level, he or she should have been succeeded in the prerequisite course. The course can be study coincidently with the request course. The student how failed to register, due to any urgent reason, can be register during the second week provide the approval of the faculty dean. In case of the student registered for the essay and research course in any of the double programs, he or she should be free (eligible) to choose it from any of these programs

* **Joining the Program:**

A - Vice Dean for Education and Student Affairs supervises on the implementation of the registration rules and procedures and prepare menus for each of the study groups, schedule, distribute students gentlemen academic advisers, processing cards courses for students which is about cards individual for each course as well as cards total for each student, that academic record data in accredited private records, and the completion of enrollment of students in the first week of the start of the semester.

B - Students may register early, after announcing the results of the end of the spring.

C - Take into account when you log decision student success in Prerequisite if any.

D - A student who was not able to register for compelling reasons approved by the

Student Affairs Committee and approved by the College Board to register record late in the additional period for registration (the second week).

E - Student selects one branch to research and essay from two specialized branches.

* **Study load:**

Students are allowed to register in at least 14 credit hours and no more than 19 credit hours per semester. With the exception of the following cases:

A - A student can superior (who has a cumulative average of 3 or more) that adds to two hours, certified in one semester and a maximum of 8 credit hours throughout the study period in decisions, additional optional requirements, specialization departments, college different, that is added appreciation where to CGPA It is not permitted to be an elective requirement for another decision.

B-The College Board may increase the maximum for the academic workload in the last semester of the student up to a maximum of four credit hours to complete graduation requirements.

C - Not allows the student who has a cumulative rate (1) to register in more than 12 credit hours in a semester.

* **Additions, deletions, withdraw and modify the path:**

A - Any student after the approval of the academic advisor to add or delete scheduled or two until the end of the second week only study and without prejudice to the burden stipulated.

B - Student may withdraw from the study any decision until the end of the seventh week of the start of registration for the semester with the approval of the academic advisor. The record of this decision in the student's academic record estimate "withdrawn" on the condition that the student does not have absenteeism overruns before the withdrawal. And cases before the forced withdrawal over this period the Commission Education and Student Affairs for consideration and approval of the Faculty Council on the withdrawal shall be without prejudice boarding school student.

C - A student may alter the course of the specialization subject to the completion of the requirements of specialization desirable and not counting credit hours, which the student obtained by not located in the area of the requirements of the new specialization and after the approval of the academic advisor and the Committee on Education and Student Affairs and the College Board on this amendment.

* **Stop registration or drop out**

A - Stop registration: the student can apply to stop his registration for one semester and a maximum of four separate classes are connected and for compelling reasons approved by the College Board.

B - Dropout: the student can re-record if he dropouts for maximum two semesters and for compelling reasons approved by the College Board.

* **Attendance:**

A - The instructor shall register the presence of students at the start of each lecture theory or process in a practical period Prepared for by the Student Affairs and delivers this record at the end of the semester to manage the affairs of Students.

B - When the student exceeds the absence of 10% of the scheduled hour's instructor shall notify the Department of Affairs Students to guide the first warning to the student.

C - When the student exceeds the proportion of the absence of 20% of the scheduled hour's instructor shall notify the Department Student Affairs to direct second and final warning to the student.

D - If increased absenteeism 25% of the total scheduled hours and the absence of a student without an acceptable excuse Student Affairs Committee and approved by the College Board, student records estimate'' deprived'' decision and intervention as a result of failure to calculate the cumulative average of the student.

E - If increased absenteeism was 25% and the absence of the student excuse acceptable to the Commission, Education and Student Affairs and approved by the College Board, student records withdraw from the course.

F -In the case of a request student add a new decision attendance is calculated from the date of registration**.**

**9-** **Methods and rules of evaluation of students in rolled in the program:**

The exam is evaluated each courses at 100 degrees and distributed degrees scheduled as follows:

**a. Courses which did not include the part "practical"**

|  |  |  |
| --- | --- | --- |
| **Method of Assessment** | **Weighting** | **learning outcomes assessed** |
| Midterm exam & Semester work | 10% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10), professional (c1 to c10) and general (d1 to d13) skills. |
| Final Oral Exam | 10 % | Measure knowledge and understanding (a1 to a14) and intellectual (b1 to b10) skills. |
| Final Term Examination | 80% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10) and professional (c1 to c10) skills. |

**b. Courses practical separate**

|  |  |  |
| --- | --- | --- |
| **Method of Assessment** | **Weighting** | **learning outcomes assessed** |
| Midterm exam & Semester work | 20% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10), professional (c1 to c10) and general (d1 to d13) skills. |
| Final Oral Exam | 20 % | Measure knowledge and understanding (a1 to a14) and intellectual (b1 to b10) skills. |
| Final practical Examination | 60% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10) and professional (c1 to c10) skills. |

**c. Courses which include part "practical"**

|  |  |  |
| --- | --- | --- |
| **Method of Assessment** | **Weighting** | **learning outcomes assessed** |
| Midterm exam & Semester work | 14% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10), professional (c1 to c10) and general (d1 to d13) skills. |
| Final Oral Exam | 14% | Measure knowledge and understanding (a1 to a14) and intellectual (b1 to b10) skills. |
| Final practical Examination | 24% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10) and professional (c1 to c10) skills. |
| Final Term Examination | 48% | Measure knowledge and understanding (a1 to a14), intellectual (b1 to b10) and professional (c1 to c10) skills. |

50% of the total score lecture semester work for final oral exam.

**d. Course search and essay**

- 50% of the total score for the course of the various activities carried out by the student during his study of the course.

- 50% of the total scores for the course of the discussion session.

**e. Estimated grades and points obtained by the student in each course as follows:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Grades** | **Symbols** | **No. of points** | **Mark** |
| **Excellent** | **A** | **4** | **90% ــــ 100%** |
| **A-** | **3.7** | **85% ــــ <90%** |
| **Very Good** | **B+** | **3.3** | **80% ــــ <85%** |
| **B** | **3** | **75% ــــ <80%** |
| **Good** | **B-** | **2.7** | **70% ــــ <75%** |
| **C+** | **2.3** | **65% ــــ <70%** |
| **Pass** | **C** | **2** | **60% ــــ <65%** |
| **Fail** | **F** | **0** | **<60%** |
| **Absent** | **F-** | **0** | **ــــ** |

**10.** **Teaching and learning strategies used in the program:**

1. Direct instruction strategy.
2. Indirect instruction strategy.
3. Interactive instruction strategy.
4. Experiential learning strategy.
5. Individual study strategy.

**11.** **Methods of program evaluation:**

|  |  |  |
| --- | --- | --- |
| **Evaluator** | **Tool** | **Sample** |
| **1- Senior Students** | Questionnaire | Not less than 25% |
| **2- Alumni** | Questionnaire | Not less than 25% |
| **3- Stakeholders** | Questionnaire, workshops, seminars, conferences | Representative for all sectors |
| **4- External Evaluators** | Reports | Report 1-2 |
| **5- Internal Evaluators** | Reports | Report 1-2 |

|  |  |  |
| --- | --- | --- |
| **Program Coordinator:**  Name: **Dr. Eslam Ahmed Said Ahmed** | **Signature:** | **Date: 9/12/2019 updated 2020/2021** |
| **Head of the Department:**  **Prof. Dr. Reda Gamal Abd El Rahman** | **Signature:** | **Date: 9/12/2019 updated 2020/2021** |

Appendices

Appendix 1

National Academic Reference Standards for Computer Science

**National Academic Reference Standards for Computer Science**

**Attributes of Computer Science Graduate**

**The Computer Science graduate must be able to:**

1. Recognize the role of Basic Sciences in the development of society.
2. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
3. Utilize scientific facts and theories to analyze and interpret practical data.
4. Collect, analyze, and present data using appropriate formats and techniques.
5. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
6. Apply effectively information technology relevant to the field.
7. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
8. Adopt self and long life-learning and participate effectively in research activities.
9. Deal with scientific data in Arabic, English or other languages.
10. Demonstrate knowledge and competence in fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems.
11. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design, implementation, evaluation and evolution of computer-based systems.
12. Apply knowledge of mathematics and science to real world problems; as well as to analyze and interpret data.
13. Demonstrate the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches.
14. Understand and apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique.
15. Understand and apply a wide range of principles and tools of natural language processing and data mining
16. Have a solid understanding of the used concepts in computer science to be able to pursue further learning, whether as graduate students or on their own.
17. Demonstrate an understanding of algorithms and data structures, computer organization and architecture, programming language concepts, compilers, networks, artificial intelligence, graphics, human computer interfaces, and databases, and identify and define the computing requirements for its solution.
18. Design, implement, and evaluate a computer-based systems, process, component or program.
19. Use knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.

**Knowledge and Understanding**

**The Computer Science graduate must acquire knowledge and understanding of:**

1. The related basic scientific facts, concepts, principles and techniques.
2. The relevant theories and their applications.
3. The processes and mechanisms supporting the structure and function of the specific topics.
4. The related terminology, nomenclature and classification systems.
5. The theories and methods applied for interpreting and analyzing data related to discipline.
6. The developmental progress of the program-related knowledge.
7. The relation between the studied topics and the environment.
8. Understand the essential mathematics relevant to computer science.
9. Use high-level programming languages.
10. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics.
11. Interpret and analyzing data qualitatively and/or quantitatively.
12. Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, natural language processing, data mining, databases and computer graphics.
13. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition.
14. Understand the fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems, compilers, parallel and distributed computing, systems and software tools.
15. Select advanced topics to provide a deeper understanding of some aspects of the subject, such as hardware systems design, object-oriented analysis and design, and artificial intelligence, and parallel and concurrent computing.

**Intellectual skills**

**The Computer Science graduate must be able to:**

1. Differentiate between subject-related theories and assess their concepts and principles.
2. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.
3. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
4. Postulate and deduce mechanisms and procedures to handle scientific problems.
5. Construct several related and integrated information to confirm, make evidence and test hypotheses.
6. Define traditional and nontraditional problems, set goals towards solving them, and. observe results.
7. Perform comparisons between (algorithms, methods, techniques...etc).
8. Perform classifications of (data, results, methods, techniques, algorithms, etc.).
9. Identify attributes, components, relationships, patterns, main ideas, and errors.
10. Summarize the proposed solutions and their results.
11. Restrict solution methodologies upon their results.
12. Establish criteria, and verify solutions.
13. Identify a range of solutions and critically evaluate and justify proposed design solutions.
14. Solve computer science problems with pressing commercial or industrial constraints.
15. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints.

**Practical and Professional skills**

**The Computer Science graduate must be able to:**

1. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.
2. Apply techniques and tools considering scientific ethics.
3. Solve problems using a range of formats and approaches.
4. Identify and criticize the different methods used in addressing subject related issues.
5. Use appropriate programming languages, web-based systems and tools, design methodologies, and knowledge and database systems.
6. Communicate effectively by oral, written and visual means.
7. Perform independent information acquisition and management, using the scientific literature and Web sources.
8. Prepare and present seminars to a professional standard.
9. Perform independent information acquisition and management, using the scientific literature and Web sources.
10. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy.
11. Specify, design, and implement computer-based systems.
12. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem.
13. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video.
14. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems.
15. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context.
16. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.

**General Skills**

**The Computer Science graduate must be able to:**

1. Use information and communication technology effectively.
2. Identify roles and responsibilities, and their performing manner.
3. Think independently, set tasks and solve problems on scientific basis.
4. Work in groups effectively; manage time, collaborate and communicate with

others positively.

1. Consider community linked problems, ethics and traditions.
2. Acquire self- and long life–learning.
3. Apply scientific models, systems, and tools effectively.
4. Deal with scientific patents considering property right.
5. Exhibit the sense of beauty and neatness

Appendix 2

Attributes of graduate in Computer Science NARS and Program aims of Computer Science matrix

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Attributes of graduate in Computer Science NARS and Program aims of Computer Science matrix** | | | | | | | | | | | |
|  | **Attributes of graduate in Computer Science NARS** | **Program aims of Computer Science** | | | | | | | | | | |
|  | **a** | **b** | **c** | **d** | **e** | **f** | **g** | **h** | **i** | **j** | **k** |
|  | 1. Recognize the role of Basic Sciences in the development of society. | x |  |  |  |  |  |  |  |  |  |  |
|  | 2. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. |  | x |  |  |  |  |  |  |  |  |  |
|  | 3. Utilize scientific facts and theories to analyze and interpret practical data. |  |  | x |  |  |  |  |  |  |  |  |
|  | 4. Collect, analyze, and present data using appropriate formats and techniques. |  |  |  | x |  |  |  |  |  |  |  |
|  | 5. Postulate concepts and choose appropriate solutions to solve problems on scientific basis. |  |  |  |  | x |  |  |  |  |  |  |
|  | 6. Apply effectively information technology relevant to the field. |  |  |  |  |  | x |  |  |  |  |  |
|  | 7. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. |  |  |  |  |  |  | x |  |  |  |  |
|  | 8. Adopt self and long life-learning and participate effectively in research activities. |  |  |  |  |  |  |  | x |  |  |  |
|  | 9. Deal with scientific data in Arabic, English or other languages. | x |  |  |  |  |  |  |  |  |  |  |
|  | 10. Demonstrate knowledge and competence in fundamental areas of computer science such as: algorithms, design and analysis, computational theory, computer architecture and software based systems. |  |  |  |  |  |  |  |  | x |  |  |
|  | 11. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design, implementation, evaluation and evolution of computer-based systems. |  |  |  |  |  |  |  |  |  | x |  |
|  | 12. Apply knowledge of mathematics and science to real world problems; as well as to analyze and interpret data. |  | x |  |  |  |  |  |  |  |  |  |
|  | 13. Demonstrate the analytic skills necessary to effectively evaluate the relative merits of software and computer systems, and algorithmic approaches. |  |  |  |  |  |  |  |  |  | x |  |
|  | 14. Understand and apply a wide range of principles and tools of software engineering, such as design methodologies, choice of algorithm, language, software libraries and user interface technique. |  |  |  |  |  | x |  |  |  |  |  |
|  | 15. Understand and apply a wide range of principles and tools of natural language processing and data mining |  |  |  |  |  | x |  |  |  |  |  |
|  | 16. Have a solid understanding of the used concepts in computer science to be able to pursue further learning, whether as graduate students or on their own. |  |  |  |  |  |  |  |  |  |  | x |
|  | 17. Demonstrate an understanding of algorithms and data structures, computer organization and architecture, programming language concepts, compilers, networks, artificial intelligence, graphics, human computer interfaces, and databases, and identify and define the computing requirements for its solution. |  |  |  |  | x |  |  |  |  |  |  |
|  | 18. Design, implement, and evaluate a computer-based systems, process, component or program. |  | x |  |  |  |  |  |  |  |  |  |
|  | 19. Use knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |  |  |  |  |  |  |  |  | x |  |  |

Appendix 3

Computer Science B.Sc. NARS ILOs & Computer Science B.Sc. Program ILOs matrix

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | | | | | |
| **Computer Science B.Sc. NARS ILOs** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | | | | | |
| Knowledge and Understanding | Knowledge and Understanding | | | | | | | | | | | | | |
| a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | a9 | a  10 | a 11 | a  12 | a  13 | a  14 |
| 1. The related basic scientific facts, concepts, principles and techniques. |  |  |  |  |  |  |  |  |  | x |  |  |  | x |
| 1. The relevant theories and their applications. |  |  |  |  |  | x |  |  | x |  | X |  | x |  |
| 1. The processes and mechanisms supporting the structure and function of the specific topics. |  |  |  |  |  |  |  | x |  |  |  | x |  |  |
| 1. The related terminology, nomenclature and classification systems. |  |  |  |  | x |  |  |  |  |  |  |  |  |  |
| 1. The theories and methods applied for interpreting and analyzing data related to discipline. | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. The developmental progress of the program-related knowledge. |  |  |  |  |  |  | x |  |  | x |  |  |  |  |
| 1. The relation between the studied topics and the environment. |  |  |  | x |  |  |  |  |  |  | X |  |  |  |
| 1. Understand the essential mathematics relevant to computer science. |  |  | x |  |  |  |  |  |  |  |  |  | x |  |
| 1. Use high-level programming languages. |  |  |  | x |  |  |  |  | x |  |  |  |  |  |
| 1. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics and statistics. |  | x |  |  |  |  |  |  |  |  |  |  |  | X |
| 1. Interpret and analyzing data qualitatively and/or quantitatively. | x |  |  |  |  |  |  | x |  |  |  |  |  |  |
| 1. Know and understand the principles and techniques of a number of application areas informed by the research directions of the subject, such as artificial intelligence, natural language processing, data mining, databases and computer graphics. |  |  | x |  |  |  |  |  |  |  | X |  |  |  |
| 1. Show a critical understanding of the principles of artificial intelligence, image, and pattern recognition. |  |  |  | x |  |  |  |  | x |  |  | x |  |  |
| 1. Understand the fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems, compilers, parallel and distributed computing, systems and software tools. |  | x |  |  |  |  |  | x |  |  |  |  |  |  |
| 1. Select advanced topics to provide a deeper understanding of some aspects of the subject, such as hardware systems design, object-oriented analysis and design, and artificial intelligence, and parallel and concurrent computing. |  |  |  |  | x |  |  |  |  |  |  | x |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | |
| **Computer Science B.Sc. NARS ILOs** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | |
| Intellectual Skills | Intellectual Skills | | | | | | | | | |
| **b1** | **b2** | **b3** | **b4** | **b5** | **b6** | **b7** | **b8** | **b9** | **b**  **10** |
| 1. Differentiate between subject-related theories and assess their concepts and principles. |  |  |  |  |  | x |  |  |  |  |
| 1. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data. |  |  |  |  |  |  |  |  |  | x |
| 1. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts. |  |  |  |  |  |  |  |  |  | x |
| 1. Postulate and deduce mechanisms and procedures to handle scientific problems. |  | x |  |  |  |  |  |  |  |  |
| 1. Construct several related and integrated information to confirm, make evidence and test hypotheses. |  |  |  | x |  |  |  |  |  |  |
| 1. Define traditional and nontraditional problems, set goals towards solving them, and. observe results. |  |  |  |  |  |  | x |  |  |  |
| 1. Perform comparisons between (algorithms, methods, techniques...etc). |  |  |  |  | x |  |  |  |  |  |
| 1. Perform classifications of (data, results, methods, techniques, algorithms, etc.) | x |  |  |  |  |  |  |  | X |  |
| 1. Identify attributes, components, relationships, patterns, main ideas, and errors. |  |  |  |  |  | x |  |  |  |  |
| 1. Summarize the proposed solutions and their results. |  |  | x |  |  |  |  | x |  |  |
| 1. Restrict solution methodologies upon their results. |  | x |  |  |  |  | x |  |  |  |
| 1. Establish criteria, and verify solutions. |  |  | x |  |  |  |  |  |  | x |
| 1. Identify a range of solutions and critically evaluate and justify proposed design solutions. | x |  |  |  |  |  |  | x |  |  |
| 1. Solve computer science problems with pressing commercial or industrial constraints. |  |  |  |  | x |  |  |  | X |  |
| 1. Generate an innovative design to solve a problem containing a range of commercial and industrial constraints. |  |  |  | x |  |  |  | x |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | |
| **Computer Science B.Sc. NARS ILOs** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | |
| Professional and Practical Skills | Professional and Practical Skills | | | | | | | | | |
| **c1** | **c2** | **c3** | **c4** | **c5** | **c6** | **c7** | **c8** | **c9** | **c**  **10** |
| 1. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance. |  |  |  |  |  |  |  |  | x |  |
| 1. Apply techniques and tools considering scientific ethics. |  |  |  |  | x |  |  |  |  |  |
| 1. Solve problems using a range of formats and approaches. |  | x |  |  |  |  |  |  |  |  |
| 1. Identify and criticize the different methods used in addressing subject related issues. | x |  |  |  |  |  |  |  |  |  |
| 1. Use appropriate programming languages, web-based systems and tools, design methodologies, and knowledge and database systems. | x |  |  |  |  |  |  |  |  |  |
| 1. Communicate effectively by oral, written and visual means. |  |  |  |  | x |  |  |  |  |  |
| 1. Perform independent information acquisition and management, using the scientific literature and Web sources. |  |  |  |  |  | x |  |  |  |  |
| 1. Prepare and present seminars to a professional standard. |  |  |  |  |  |  |  |  |  | x |
| 1. Perform independent information acquisition and management, using the scientific literature and Web sources. |  |  |  | x |  |  |  |  |  |  |
| 1. Prepare technical reports, and a dissertation, to a professional standard; use IT skills and display mature computer literacy. |  |  | x |  |  |  | x | x |  |  |
| 1. Specify, design, and implement computer-based systems. |  |  |  |  |  |  |  |  |  |  |
| 1. Evaluate systems in terms of general quality attributes and possible tradeoffs presented within the given problem. | x |  |  |  | x |  |  |  |  |  |
| 1. Apply the principles of effective information management, information organization, and information-retrieval skills to information of various kinds, including text, images, sound, and video. |  | x |  |  |  | x |  |  | x |  |
| 1. Apply the principles of human-computer interaction to the evaluation and construction of a wide range of materials including user interfaces, web pages, and multimedia systems. |  |  | x |  |  |  |  |  |  | x |
| 1. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context. |  | x |  |  | x |  |  |  |  |  |
| 1. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems. | x |  |  |  |  |  |  |  | x |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | | | | |
| **Computer Science B.Sc. NARS ILOs** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | | | | |
| **General Skills** | **General Skills** | | | | | | | | | | | | |
| **d1** | **d2** | **d3** | **d4** | **d5** | **d6** | **d7** | **d8** | **d9** | **d**  **10** | **d**  **11** | **d**  **12** | **d**  **13** |
| 1. Use information and communication technology effectively. | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 2. Identify roles and responsibilities, and their performing manner. |  | x |  |  |  |  |  |  |  | x |  |  |  |
| 3. Think independently, set tasks and solve problems on scientific basis. |  |  | x |  |  |  |  |  |  |  |  |  |  |
| 4. Work in groups effectively; manage time, collaborate and communicate with others positively. |  |  |  | x |  |  |  |  |  |  | x |  |  |
| 5. Consider community linked problems, ethics and traditions. |  |  |  |  | x |  |  |  |  |  |  | x |  |
| 6. Acquire self- and long life–learning. |  |  |  |  |  | X |  |  |  |  |  |  |  |
| 7. Apply scientific models, systems, and tools effectively. |  |  |  |  |  |  | x |  |  |  |  |  |  |
| 8. Deal with scientific patents considering property right. |  |  |  |  |  |  |  | x |  |  |  |  | x |
| 9. Exhibit the sense of beauty and neatness |  |  |  |  |  |  |  |  | x |  |  |  |  |

Appendix 4

Computer Science B.Sc. Program aims

ILOs matrix&

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program aims & ILOs matrix** | | | | | | | | | | | | | | |
| **Computer Science B.Sc. Program aims** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | | | | | |
| Knowledge and Understanding | | | | | | | | | | | | | |
| a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | a9 | a  10 | a  11 | a  12 | a  13 | a  14 |
| 1. The role of Basic Sciences in the development of society. |  |  |  |  |  |  | x | x |  |  |  |  |  |  |
| 1. Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. |  |  |  |  |  | x |  |  |  |  |  |  |  |  |
| 1. Scientific facts and theories to analyze and interpret practical data. | x | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Collecting, analyzing, and presenting data using appropriate formats a techniques. |  |  |  |  | x |  |  |  |  |  |  |  |  |  |
| 1. Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. |  |  |  |  |  |  |  |  | x | x |  |  |  |  |
| 1. Effective Applying at information technology relevant to the field. |  |  |  | x |  |  |  |  |  |  |  | x |  |  |
| 1. Effective Participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. | x |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Adopting self and long life-learning and participate effectively in research activities. |  |  | x |  |  |  |  |  |  |  |  |  |  |  |
| 1. Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |  |  |  |  |  |  |  |  |  |  |  |  | x |  |
| 1. Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. |  |  |  |  |  |  |  |  |  | x | x | x |  | x |
| 1. Using computer science applications to solve mathematical and statistical problems. |  |  |  |  |  |  |  |  |  |  |  |  | x |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | |
| **Computer Science B.Sc. Program aims** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | |
| I**ntellectual Skills** | | | | | | | | | |
| **b1** | **b2** | **b3** | **b4** | **b5** | **b6** | **b7** | **b8** | **b9** | **b**  **10** |
| 1. The role of Basic Sciences in the development of society. |  |  | X |  |  |  |  | x |  |  |
| 1. Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. |  |  | X |  |  |  |  |  |  |  |
| 1. Scientific facts and theories to analyze and interpret practical data. | x |  |  |  |  |  |  |  |  |  |
| 1. Collecting, analyzing, and presenting data using appropriate formats a techniques. |  | x |  |  |  |  |  |  |  |  |
| 1. Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. |  |  |  | x |  |  |  |  |  |  |
| 1. Effective Applying at information technology relevant to the field. |  |  |  |  |  |  |  |  |  | x |
| 1. Effective Participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. |  |  |  |  | x |  |  |  |  |  |
| 1. Adopting self and long life-learning and participate effectively in research activities. |  |  |  |  | x |  |  |  |  |  |
| 1. Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |  |  |  |  |  |  | x |  |  |  |
| 1. Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. |  |  |  |  |  |  |  |  | x |  |
| 1. Using computer science applications to solve mathematical and statistical problems. |  |  |  |  |  | x |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | |
| **Computer Science B.Sc. Program aims** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | |
| Professional and Practical Skills | | | | | | | | | |
| **c1** | **c2** | **c3** | **c4** | **c5** | **c6** | **c7** | **c8** | **c9** | **c10** |
| 1. The role of Basic Sciences in the development of society. |  | x |  |  |  |  |  |  |  | x |
| 1. Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. | x |  |  |  |  |  |  |  |  |  |
| 1. Scientific facts and theories to analyze and interpret practical data. |  |  | X |  |  |  |  |  |  |  |
| 1. Collecting, analyzing, and presenting data using appropriate formats a techniques. | x |  |  |  |  |  |  |  |  |  |
| 1. Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. |  |  |  |  | x |  |  |  |  |  |
| 1. Effective Applying at information technology relevant to the field. |  |  |  |  |  |  |  |  |  | x |
| 1. Effective Participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. |  |  | X | x |  |  |  |  |  |  |
| 1. Adopting self and long life-learning and participate effectively in research activities. |  |  |  |  | x |  |  |  |  |  |
| 1. Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |  |  |  |  |  |  |  |  | x |  |
| 1. Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. |  |  |  |  |  |  | x | x |  |  |
| 1. Using computer science applications to solve mathematical and statistical problems. |  |  |  |  |  | x |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Computer Science B.Sc. Program ILOs matrix & Computer Science B.Sc. NARS ILOs** | | | | | | | | | | | | | |
| **Computer Science B.Sc. Program aims** | **Computer Science B.Sc. Program ILOs** | | | | | | | | | | | | |
| **General Skills** | | | | | | | | | | | | |
| **d1** | **d2** | **d3** | **d4** | **d5** | **d6** | **d7** | **d8** | **d9** | **d**  **10** | **d**  **11** | **d**  **12** | **d**  **13** |
| 1. The role of Basic Sciences in the development of society. |  |  |  |  |  |  |  |  |  | x |  |  |  |
| 1. Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. |  |  |  | x |  |  |  |  |  |  | x |  |  |
| 1. Scientific facts and theories to analyze and interpret practical data. |  |  |  |  | X |  |  |  |  |  |  | x |  |
| 1. Collecting, analyzing, and presenting data using appropriate formats a techniques. |  | x |  |  |  |  |  |  |  |  |  |  |  |
| 1. Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Effective Applying at information technology relevant to the field. | x |  |  |  |  |  |  |  |  |  |  |  |  |
| 1. Effective Participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. |  |  |  |  |  |  |  |  | x |  |  |  |  |
| 1. Adopting self and long life-learning and participate effectively in research activities. |  |  |  |  |  | x |  | x |  |  |  |  | x |
| 1. Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. |  |  | x |  |  |  |  |  |  |  |  |  |  |
| 1. Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. |  |  | x |  |  |  |  |  |  |  |  |  |  |
| 1. Using computer science applications to solve mathematical and statistical problems. |  |  |  |  |  |  | x |  |  |  |  |  |  |

Appendix 5

Mission & Program Aims

**Faculty mission vs. Computer Science program design matrix**

1. **Program attributes vs. faculty mission**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Faculty mission**  **The Faculty of Science, Benha University, confesses and admits to:** | | | **Program Aims:**  **The overall aims of the program are to provide the graduate with:** | |
| recruit human resources and applied research to provide training services and scientific consultation for environmental issues and society development | conduct high-value scientific research that deserves regional and international awareness and publication | promote a distinct graduate who will be able to conduct research and innovation that will help him in the labor market competition, taking into account the ethics of the profession, |
| **√** |  | **√** | The role of Basic Sciences in the development of society. | a) |
| **√** |  | **√** | Developing scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements. | b) |
| **√** | **√** | **√** | Scientific facts and theories to analyze and interpret practical data. | c) |
|  | **√** | **√** | Collecting, analyzing, and presenting data using appropriate formats techniques. | d) |
| **√** |  | **√** | Postulating concepts and choosing appropriate solutions to solve problems on scientific basis. | e) |
|  | **√** |  | Effective applying at information technology relevant to the field. | f) |
| **√** | **√** |  | Effective participation in a multidisciplinary teamwork and binge flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. | g) |
| **√** |  | **√** | Adopting self and long life-learning and participate effectively in research activities. | h) |
| **√** | **√** | **√** | Using such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. | i) |
| **√** |  | **√** | Applying mathematical, statistical, computing knowledge and skills to the solution of real life problems. | j) |
|  | **√** |  | Using computer science applications to solve mathematical and statistical problems. | k) |

1. **Program Intended Learning Outcomes( ILOs) vs. the faculty mission**

**a) Knowledge and Understanding**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Faculty mission**  **The Faculty of Science, Benha University, confesses and admits to:** | | | **Program Aims:**  **The overall aims of the program are to provide the graduate with:** | |
| recruit human resources and applied research to provide training services and scientific consultation for environmental issues and society development | conduct high-value scientific research that deserves regional and international awareness and publication | promote a distinct graduate who will be able to conduct research and innovation that will help him in the labor market competition, taking into account the ethics of the profession, |
|  | **√** | **√** | Know the related basic scientific facts, concepts, principles and techniques. | a.1 |
|  | **√** | **√** | Describe the relevant theories and their applications. | a.2 |
| **√** |  | **√** | K0now the processes and mechanisms supporting the structure and function of the specific topics. | a.3 |
|  | **√** | **√** | Identify the related terminology, nomenclature and classification systems. | a.4 |
| **√** |  | **√** | Know the theories and methods applied for interpreting and analyzing data related to discipline. | a.5 |
| **√** | **√** | **√** | Identify the progress of the program-related knowledge. | a.6 |
|  | **√** | **√** | Identify the relation between the studied topics and the environment. | a.7 |
| **√** | **√** | **√** | Record the core ideas of mathematics and statistics. | a.8 |
| **√** | **√** |  | Define the programming concepts for various branches mathematics, probability, and statistics. | a.9 |
|  | **√** | **√** | Identify the mathematical, statistical, and computer methods in solving different problems. | a.10 |
| **√** | **√** | **√** | Know the hardware and software are integrate create computer systems and distinguish between selected forms of computer hardware architecture, and operating system technology. | a.11 |
| **√** |  | **√** | Know the principles of mathematical, statistical modeling and application. | a.12 |
|  | **√** | **√** | Select appropriate theories, practices, and tools for the specification, design, implementation, and evaluation of a computer-based system. | a.13 |
| **√** |  | **√** | Describe the meaning of complicated statements using mathematical notation and language. | a.14 |

**b) Intellectual Skills**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Faculty mission**  **The Faculty of Science, Benha University, confesses and admits to:** | | | **Program Aims:**  **The overall aims of the program are to provide the graduate with:** | |
| recruit human resources and applied research to provide training services and scientific consultation for environmental issues and society development | conduct high-value scientific research that deserves regional and international awareness and publication | promote a distinct graduate who will be able to conduct research and innovation that will help him in the labor market competition, taking into account the ethics of the profession, |
| **√** |  | **√** | Compare different methods subject-related theories and assess their concepts and principles. | b.1 |
| **√** | **√** | **√** | Interpret qualitatively and quantitatively science relevant data. | b.2 |
|  |  | **√** | Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts. | b.3 |
|  | **√** | **√** | Discover mechanisms and procedures to handle scientific problems. | b.4 |
| **√** | **√** | **√** | Construct several related and integrated information to confirm, make evidence and test hypotheses. | b.5 |
| **√** |  | **√** | Solve abstract and mathematical models of computer and communication systems. | b.6 |
|  | **√** | **√** | Confirm the knowledge and understanding of the mathematical and statistical processes for modeling of real-world problems. | b.7 |
| **√** |  | **√** | Develop appropriate knowledge and awareness of the importance and applications of mathematical and statistical assumptions. | b.8 |
| **√** | **√** |  | Apply appropriate statistical and mathematical techniques to the development of software solutions. | b.9 |
| **√** |  | **√** | Design the principles of effective information management, Information organization, and information-retrieval skills to various information systems. | b.10 |

**c) Professional and Practical Skills**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Faculty mission**  **The Faculty of Science, Benha University, confesses and admits to:** | | | **Program Aims:**  **The overall aims of the program are to provide the graduate with:** | |
| recruit human resources and applied research to provide training services and scientific consultation for environmental issues and society development | conduct high-value scientific research that deserves regional and international awareness and publication | promote a distinct graduate who will be able to conduct research and innovation that will help him in the labor market competition, taking into account the ethics of the profession, |
| **√** | **√** | **√** | Analyze the investigated data, using appropriate techniques and considering scientific guidance. | c1. |
| **√** | **√** | **√** | Show techniques and tools considering scientific ethics. | c2. |
|  |  | **√** | Solve problems using a range of formats and approaches. | c3. |
|  | **√** | **√** | Collect the different methods used in addressing subject related issues. | c4. |
| **√** | **√** | **√** | Show essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques. | c5. |
|  | **√** | **√** | Show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice. | c6. |
| **√** |  | **√** | Summarize of sources of numerical errors and usage of symbolic and numerical software as a part of practical computation. | c7. |
|  |  | **√** | Prepare competence in the use of statistical and mathematical methods in problem solving and modeling. | c8. |
|  |  | **√** | Examine computer-based systems. | c9. |
| **√** | **√** |  | Judge the social, professional, an ethical issue involved in the use of computer technology. | c10. |

**d) General Skills**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Faculty mission**  **The Faculty of Science, Benha University, confesses and admits to:** | | | **Program Aims:**  **The overall aims of the program are to provide the graduate with:** | |
| recruit human resources and applied research to provide training services and scientific consultation for environmental issues and society development | conduct high-value scientific research that deserves regional and international awareness and publication | promote a distinct graduate who will be able to conduct research and innovation that will help him in the labor market competition, taking into account the ethics of the profession, |
|  |  | **√** | Using internet and communication technology effectively. | d1. |
| **√** | **√** | **√** | Lifelong learning roles and responsibilities, and their performing manner. | d2. |
|  | **√** | **√** | Community linked thinking, set tasks and solve problems on scientific basis. | d3. |
| **√** | **√** | **√** | Workings in groups effectively; manage time, collaborate and communicate with others positively. | d4. |
| **√** |  | **√** | Community linked Thinking, ethics and traditions. | d5. |
| **√** | **√** | **√** | Life -long learning. | d6. |
|  |  |  | Computations scientific models, systems, and tools effectively. | d7. |
| **√** |  | **√** | Ethical behavior with scientific patents considering property right. | d8. |
|  | **√** | **√** | Communication with others. | d9. |
|  | **√** |  | Working in groups Identify us the roles and responsibilities, delegate tasks, and set clear guidelines and performance indicators. | d10. |
| **√** |  | **√** | Workings in groups effectively; manage time, collaborate and communicate with others positively. | d11. |
| **√** | **√** | **√** | Community linked thinking with considerable attention to the community ethics and traditions. | d12 |
| **√** | **√** | **√** | Ethical behavior rights legally and ethically. | d13. |

Appendix 6

Course Specification

***FIRST LEVEL***

***FIRST SEMESTER***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | Mathematics | | | | |
| **Department offering the course:** | | Mathematics | | | | |
| **Academic year/level:** | | First level / First Semester | | | | |
| **Date of specifications approval:** | | 9/12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Computer Science (1)** | | **Code:**  **30 UR** | | **Year/level:**  First level / First Semester | | |
|  | | **Lectures: 2** **h/week** | | **Tutorial: ــــ** | | |
|  | | **Practical: 2h/week** | | **Total C. Hrs.:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **At the end of this course, the students must be able to**  **Reveal wide background knowledge related to different branches of computer science. Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrate comprehension of tradeoff involved in design choices.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Identify how the hardware and software are integrated to create computer systems and distinguish between selected forms of computer hardware architecture and operating system technology.** 2. **Explain the definitions and the relation between the distinct numerical systems.** 3. **Memories the programming concepts and the types of variables.** 4. **Write a program using a selected language for solving a mathematical problem.**  |  | | --- | |  | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the knowledge and understanding of the Computer-Science processes for modeling of real-world problems.** 2. **Construct abstract and mathematical models of computer and communications systems.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Prepare a program using a programming language for solving a real problems in professional practice.** 2. **Investigate competence in the use of programming in problem solving.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Community linked thinking and solve problems on scientific basis.** 2. **Working in groups effectively; manage time, collaborate and communicate with others positively.** 3. **Ethical behavior with property rights,** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Fundamentals of programming and computer languages (1)** | | | **2** | | - | **2** |
| **Fundamentals of programming and computer languages (2)** | | | **2** | | - | **2** |
| **Fundamentals of programming and computer languages (3)** | | | **2** | | - | **2** |
| **Algorithm and Flowcharts (1)** | | | **2** | | - | **2** |
| **Algorithm and Flowcharts (2)** | | | **2** | | - | **2** |
| **Elements of Language under case** | | | **2** | | - | **2** |
| **Revision and Mid-Term Exam** | | | **2** | | - | **2** |
| **Basic Instructions in Language under case (1)** | | | **2** | | - | **2** |
| **Basic Instructions in Language under case (2)** | | | **2** | | - | **2** |
| **Control Instructions (1)** | | | **2** | | **-** | **2** |
| **Control Instructions (2)** | | | **2** | | **-** | **2** |
| **Functions and Some applications** | | | **2** | | **-** | **2** |
| **Subprograms** | | | **2** | | **-** | **2** |
| **Applications** | | | **2** | | **-** | **2** |
| **Total hours** | | | **28** | | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Identify how the hardware and software are integrated to create computer systems and distinguish between selected forms of computer hardware architecture and operating system technology.** | **🗸** |  |  | |  | **🗸** |  |
| **a2-** | **Explain the definitions and the relation between the distinct numerical systems.** |  | **🗸** |  | |  | **🗸** |  |
| **a3-** | **Memories the programming concepts and the types of variables.** | **🗸** |  |  | |  | **🗸** |  |
| **a4-** | **Write a program using a selected language for solving a mathematical problem** | **🗸** |  |  | |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Apply the knowledge and understanding of the Computer-Science processes for modeling of real-world problems.** |  |  |  | **🗸** | |  | **🗸** |
| **b2** | **Construct abstract and mathematical models of computer and communications systems.** |  |  |  | **🗸** | |  | **🗸** |
| **Practical and professional skills** | **c1-** | **Prepare a program using a programming language for solving a real problems in professional practice.** | **🗸** |  |  | |  | **🗸** |  |
| **c2-** | **Investigate competence in the use of programming in problem solving.** | **🗸** |  |  | |  | **🗸** |  |
| **General Skills** | **d1-** | **Community linked thinking and solve problems on scientific basis..** |  | **🗸** | **🗸** | |  |  |  |
| **d2-** | **Working in groups effectively; manage time, and communicate with others positively.** |  | **🗸** | **🗸** | |  |  |  |
| **d3-** | **Ethical behavior with property rights.** |  | **🗸** | **🗸** | |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2, b1,d1** | **Week 7** | **14%** |
| **Oral exam** | **a1, a2, a3,d2,d3** | **Week 15** | **14 %** |
| **Practical exams** | **c1, c2** | **Week 15** | **14 %** |
| **Written exam** | **a1,a2,a3,a4,** **b1**, **b2** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6 – Course Matrix** | | | | | | | | | | | |
| **Topic** | **Knowledge & Understanding** | | | | **Intellectual Skills** | | **Practical and professional skills** | | **General Skills** | | |
| **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **c1** | **c2** | **d1** | **d2** | **d3** |
| **Fundamentals of programming and computer languages (1)** | **x** |  |  |  | **x** |  | **x** |  |  |  | **x** |
| **Fundamentals of programming and computer languages (2)** | **x** | **x** |  |  |  |  |  | **x** | **x** |  |  |
| **Fundamentals of programming and computer languages (3)** |  | **x** |  |  | **x** |  |  | **x** |  |  |  |
| **Algorithm and Flowcharts (1)** |  |  |  | **x** |  |  |  |  | **x** |  |  |
| **Algorithm and Flowcharts (2)** |  |  | **x** |  |  | **x** | **x** |  |  |  |  |
| **Elements of Language under case** |  | **x** |  |  |  | **x** |  |  | **x** |  |  |
| **Revision and Mid-Term Exam** | **x** |  |  | **x** |  |  |  | **x** |  |  | **x** |
| **Basic Instructions in Language under case (1)** |  | **x** |  |  |  | **x** |  |  |  | **x** |  |
| **Basic Instructions in Language under case (2)** |  |  | **x** | **x** |  |  | **x** |  |  |  |  |
| **Control Instructions (1)** |  | **x** |  | **x** |  | **x** |  |  |  |  |  |
| **Control Instructions (2)** |  |  |  |  |  |  |  |  |  | **x** |  |
| **Functions and Some applications** |  |  |  | **x** |  | **x** |  |  |  |  |  |
| **Subprograms** |  |  |  |  |  | **x** |  |  |  | **x** |  |
| **Applications** |  | **x** |  |  |  |  | **x** |  | **x** |  | **x** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **7- List of references:** | | | | |
| **7-1 Course notes**  **-Notes approved by Math. Department**   * 1. **Required books.**   [**J. Glenn Brookshear**](http://en.bookfi.org/g/J.%20Glenn%20Brookshear)**, D. Smith and D. Brylow,**[***Computer Science: An Overview***](http://en.bookfi.org/book/436945)**, *11th Edition*, Marquette University Faculty, 2012.**  **7-3 Recommended books.**  **T.H. Cormen, C. E. Leiserson, R.L. Rivest and C. Stein,** [***Introduction to Algorithms, Second Edition***](http://www.amazon.com/Introduction-Algorithms-Second-Edition-Thomas/dp/0262032937/ref=cm_lmf_tit_3/182-4276557-0906207)**, McGraw-Hill Book Company, 2001.**   * 1. **Periodicals, Web sites, etc.**   **https://en.wikiversity.org/wiki/Introduction\_to\_Computer\_Science** | | | | |
| **8- Facilities required for teaching and learning:** | | |
| **Black board, white board and data show.** | | |
| **Course coordinator:** | | | **Dr.** **Mosab Hassan**  **Dr.** **Abeer Al-Fishawy**  **Dr.** **Gamal Ahmed**  **Dr.** **Ahmed Mohamed** |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | | | **Updated 2020/2021** |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **First level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **General Mathematics (1)** | | **Code:**  **100 M** | | **Year/level:**  **First level / First Semester** | | |
| **Teaching Hours: 42 h** | | **Lectures: 2** **h/week** | | **Tutorial: 2** **h/week** | | |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **At the end of this course, the students must be able to**  **Postulate concepts and choose appropriate solutions to solve problems on scientific basis, apply mathematical knowledge and skills to the solution of real life problems.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **To know Mathematical knowledge in solving different problems.** 2. **Determine knowledge of the principles of mathematical modeling and applications.** 3. **Explain the meaning of complicated statements using mathematical notations and language.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the knowledge of the mathematical processes for modeling of real-world problems.** 2. **Develop appropriate knowledge and awareness of the importance and applications of mathematical assumption.** 3. **Confirm wide background knowledge related to the different branches of Mathematics.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Analyze the concepts and methods of mathematics to the solution of the real problems in professional practice.** 2. **Examine competence in the use of mathematical methods in problem solving.** 3. **Investigate confidence in their abilities to use mathematics.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Community linked thinking and solve problems on scientific basis.** 2. **Working in groups effectively; manage time, and communicate with others positively.** 3. **Ethical behavior with property rights .** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Mathematical induction** | | | **2** | | **2** | **-** |
| **partial fractions** | | | **2** | | **2** | **-** |
| **Polynomials** | | | **2** | | **2** | **-** |
| **Determinants** | | | **2** | | **2** |  |
| **Matrices** | | | **2** | | **2** | **-** |
| **Linear systems** | | | **2** | | **2** | **-** |
| **Mid Term Exam and Series** | | | **2** | | **2** | **-** |
| **Taylor series** | | | **2** | | **2** |  |
| **Limits** | | | **2** | | **2** |  |
| **Continuity** | | | **2** | | **2** | **-** |
| **Differentiation of Real valued functions** | | | **2** | | **2** | **-** |
| **Applications on Differentiation** | | | **2** | | **2** | **-** |
| **Integration** | | | **2** | | **2** | **-** |
| **Finite integral** | | | **2** | | **2** | **-** |
| **Total hours** | | | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **To know** **Mathematical knowledge in solving different problems.** | **🗸** |  |  | |  | **🗸** |  |
| **a2-** | **Determine knowledge of the principles of mathematical modeling and applications.** | **🗸** |  |  | |  | **🗸** |  |
| **a3-** | **Explain the meaning of complicated statements using mathematical notations and language.** | **🗸** |  |  | |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Apply the knowledge of the mathematical processes for modeling of real-world problems.** |  |  | **🗸** |  | |  | **🗸** |
| **b2** | **Develop appropriate knowledge and awareness of the importance and applications of mathematical assumption.** |  |  | **🗸** |  | |  | **🗸** |
|  | **b3** | **Confirm wide background knowledge related to the different branches of Mathematics.** | **🗸** |  |  |  | | **🗸** |  |
| **Practical and professional skills** | **c1-** | **Analyze the concepts and methods of mathematics to the solution of the real problems in professional practice.** | **🗸** |  |  | |  | **🗸** |  |
| **c2-** | **Examine competence in the use of mathematical methods in problem solving.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c3-** | **Investigate confidence in their abilities to use mathematics.** | **🗸** |  |  | |  | **🗸** |  |
| **General Skills** | **d1-** | **Community linked thinking and solve problems on scientific basis.** |  | **🗸** | **🗸** | | **🗸** |  |  |
| **d2-** | **Working in groups effectively; manage time, and communicate with others positively.** |  | **🗸** | **🗸** | |  |  |  |
| **d3-** | **Ethical behavior with property rights .** |  | **🗸** | **🗸** | |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2,b2,b3,c3** | **Week 7** | **10 %** |
| **Oral exam** | **a1, a2, c1, c2,a3,d3,d2** | **Week 15** | **10 %** |
| **Written exam** | **a1, a2, c1, c2, d1,b1** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix** | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | | **c3** | **d1** | **d2** | **d3** |
| **Mathematical induction** | **x** |  |  | **x** |  |  |  | **x** |  | |  |  | **x** |
| **partial fractions** |  | **x** | **x** |  |  | **x** |  |  |  | | **x** |  |  |
| **Polynomials** | **x** |  |  |  |  | **x** |  |  |  | |  |  | **x** |
| **Determinants** |  |  | **x** |  |  |  |  |  |  | | **x** |  |  |
| **Matrices** |  | **x** |  |  | **x** |  |  | **x** |  | |  |  |  |
| **Linear systems** | **x** |  |  |  |  |  | **x** |  |  | |  |  | **x** |
| **Mid Term Exam and Series** |  | **x** |  | **x** |  |  |  |  |  | | **x** |  |  |
| **Taylor series** | **x** |  |  |  |  |  |  |  | **x** | |  |  | **x** |
| **Limits** |  | **x** |  |  |  | **x** |  |  | **x** | |  | **x** |  |
| **Continuity** | **x** |  |  | **x** |  |  |  |  |  | |  |  |  |
| **Differentiation of Real valued functions** |  |  |  |  | **x** |  |  | **x** |  | |  |  |  |
| **Applications on Differentiation** |  |  | **x** |  |  |  | **x** |  |  | |  | **x** | **x** |
| **Integration** | **x** | **x** |  |  |  | **x** |  |  |  | | **x** |  |  |
| **Finite integral** | **x** |  |  | **x** | **x** |  |  |  |  | |  | **x** |  |

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| |  |  |  |  |  | | --- | --- | --- | --- | --- | | **7- List of references:**  **7-1 Course notes**  **-Notes approved by Math. Department.**  **7-2 Required books.**  **- Virgil Snyder, Elementary textbook on the calculus.** [**New York,**](https://archive.org/search.php?query=publisher%3A%22New+York%2C+Cincinnati%2C+American+Book+co%22)  **(1912).**  **7-3 Recommended books.**  **- WWL Chen, Notes on first-year calculus, (web edition, 2008).**  **7-4 Periodicals, Web sites, etc.**  [https://cims.nyu.edu/~kiryl/Calculus/Section\_5.3--Evaluating\_Definite\_Integrals/RSimpson- Lecture24.pdf](https://cims.nyu.edu/~kiryl/Calculus/Section_5.3--Evaluating_Definite_Integrals/RSimpson-%20%20Lecture24.pdf)  <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.368.2271&rep=rep1&type=pdf>  <http://www.maths.manchester.ac.uk/~bespalov/teaching/2E1_LA_notes_1.pdf>  <https://people.richland.edu/james/lecture/m116/matrices/> | | | | | | **8- Facilities required for teaching and learning:**  **Black board and white board** | | | |  | | | | **Course coordinator:** | | | **Dr. Nahed Al-Mohammadi**  **Dr. Ahmed Abd Al Khaleq**  **Dr.** **Mohamed Abdel-Aal**  **Dr.** **Mohamed Abdel-Gawad** | | **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** | | **Date: 9 /12 /2019** | | | **updated 2020/2021** | |

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| **Course Specification**  **General Physics (1): 100 Ph** | | | | | |
| **A- Affiliation** | | | | | |
| **Relevant program:** | Computer Science | | | | |
| **Department offering the program:** | | | Mathematics | | |
| **Department offering the course:** | | | Department of Physics | | |
| **Academic year/level:** | | | First level | | |
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| **Dates of program specifications approval: The most recent date of the program specification approval: 9/12/2020 (Faculty council; meeting number, 390) updated in 2021/2022, meeting number 419.** | | | | | |
| B - Basic information | | **Code:** 100 Ph | | | **Year/level:** First level |
| **Teaching Hours:** | | **Lectures: 2** | | | **Tutorial: 1** |
|  | | **Practical:0** | | | **Total:** 2 h/week |
| **C - Professional information** | | | | | |
| **1 – Course Learning Objectives:**  The objective of this course enable the student to collect and recognize a lot of knowledge about the main topics of the Properties of Matter and Heat, such as the elasticity and plasticity of material, the different types of stresses and strains , moment of inertia , simple harmonic motion in addation to the different types of wave equation and interference of waves and some basics of fluid dynamics. Study Unary phase digrame of matter, types of thermometers and temprature scales, heat conduction and radiation, methods of specific heat measurments and Gas laws and thermodynamics . This will supported by some applications in each field . | | | | | |
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| **2 - Intended Learning Outcomes (ILOS)** | | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should be able to:  a.1- Understande the concept of matter, Heate , Simple harmonic motion , fluid dynamics , types of heat counductions and thermodynamics.  a.2- Describe the moment of inertia of rigid body and phase digram.  a.3- Recognize the different types of wave motion such as simple pindulumn,oscillating spring and ,wave equation and interference of waves.  a.4- Memorize the different types of stresses – strains of matter, thermometers and temperature scales. | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to:  b.1- Create over view about the dimension theory, waves nature, heat transform and thermodynamics.  b.2- deduce some models to exam the validity of physical low.  b.3- develop appropriate judgment in accordance with physical meaning of course topics.  b.4- Differentiate between the physical properties for different types of materials. | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to: | | | | | |
| c.1- Sketch the phase diagram stress- strain curve for different types of materials.  c.2- Analyze the output data from each technique.  c.3- Extract physical properties from tables and graphs.    **d - General skills:**  On successful completion of the course, the student should be able to:  d.1- Work in team to synthesis and studying some physical properties of some materials.  d.2- Apply scientific models to solve physical problems.  d.3- Collect data from internet and wrighting reports in the application of some topics.    **3**- **Contents** | | | | | |

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| **No.** | **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| 1 | Physical quantity. | **2** | **1** | **0** |
| 2 | Dimension theory. | **2** | **1** | **0** |
| 3 | Units. | **2** | **1** | **0** |
| 4 | balance equation. | **2** | **1** | **0** |
| 5 | Types of motion. | **2** | **1** | **0** |
| 6 | Motion in different directions. | **2** | **1** | **0** |
| 7 | **Mid- Term Exam & review.** | **2** | **1** | **0** |
| 8 | Second newton low of motion. | **2** | **1** | **0** |
| 9 | Work and energy. | **2** | **1** | **0** |
| 10 | Introduction in heat. | **2** | **1** | **0** |
| 11 | Heat and heat transfer. | **2** | **1** | **0** |
| 12 | Kinetic theory of gases. | **2** | **1** | **0** |
| 13 | Specific heat of gases. | **2** | **1** | **0** |
| 14 | First law of thermodynamics. | **2** | **1** | **0** |
| **Total hours** | | **28** | **14** | **0** |

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| **4 - Teaching and Learning methods:** |

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| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Understanding the concept of matter, Heate, Simple harmonic motion, fluid dynamics, types of heat counductions and thermodynamics. | x | 0 | 0 | x | x | 0 |
| a.2 | Describe the moment of inertia of rigid body and phase digram. | x | 0 | 0 | x | 0 | x |
| a.3 | Recognize the different types of wave motion such as simple pendulumn, oscillating spring, wave equation and interference of waves. | x | x | 0 | x | x | 0 |
| a.4 | Memorize the different types of stresses – strains of matter, thermometers and temperature scales**.** | x | 0 | 0 | x | x | 0 |
| **Intellectual Skills** | b.1 | Create over view about the dimension theory, waves nature, heat transform and thermodynamics. | x | 0 | 0 | x | 0 | 0 |
| b.2 | Deduce some models to exam the validity of physical law. | x | x | 0 | x | 0 | x |
| b.3 | Develop appropriate judgment in accordance with physical meaning of course topics. | x | 0 | 0 | x | x | 0 |
| b.4 | Differentiate between the physical properties for different types of materials. | x | 0 | 0 | x | 0 | 0 |
| **Practical and professional skills** | c.1 | Sketch the phase diagram stress- strain curve for different types of materials and | x | 0 | 0 | x | x | 0 |
| c.2 | Analyze the output data from each technique. | x | x | 0 | x | x | 0 |
| c.3 | Extract physical properties from tables and graphs. | x | 0 | 0 | x | 0 | 0 |
| **General Skills** | d.1 | Work in team to synthesis and studying some physical properties of some materials | x | 0 | 0 | x | x | x |
| d.2 | Apply scientific models to solve physical problems. | x | 0 | 0 | x | 0 | 0 |
| d.3 | Collect data from internet and wrighting reports in the application of some topics. | x | 0 | 0 | x | x | x |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | To Measure | **Time schedule** | **Grading** |
| Semester Work | a.1, a.2, a.4, b.1, b.2, c.1, c.2, d.2, d.2 and d.3. | Fifth week | 5% |
| Mid-Term Exam | a.1, a.3, a.4, b.3, b.4, d.2, c.3 and d.3. | Seventh week | 5% |
| Oral exam | a.1, a.3, a.4, b.3, b.4, c.3, and d.3. | Fifteenth week | 10% |
| Written exam | a.1 to a.4, b.1 to b.4, c.1 to c.3 and d2. | sixteenth week | 80% |
| Total | | | 100 % |

**6- List of references:**

**6-1 Course notes**

Lecture notes approved by Physics department.

* 1. **Required books.**

1. Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011).
2. Physics for Scientists and Engineers 9th Edition by Raymond A. Serway.
   1. **Recommended books.**

1. General Physics and heat (G.A. Grant) Published by Edward Arnold, 1977

ISBN 10: [071312623X](http://www.abebooks.co.uk/products/isbn/9780713126235?cm_sp=bdp-_-9780713126235-_-isbn10) / ISBN 13: [9780713126235](http://www.abebooks.co.uk/products/isbn/9780713126235?cm_sp=bdp-_-9780713126235-_-isbn13).

* 1. **Periodicals, Web sites, etc.**

1. <https://www.amazon.com/Physics-Scientists-Eng…/…/ref=sr_1_5…>
2. http://www. Physics2000.
3. http://www. Physics today.

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| **7- Facilities required for teaching and learning:** |
| * Using a microphone in lectures. * Using a black board. * Group Discussions. * Data show. |

**Course coordinator Head of the Department**

Prof. Dr. Saed Abed Elghany Prof. Dr. Mohamed Ali

Dr. Mohammed Ali

**Date:** 2020 /2021

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| **Course Specification**  **Practical physics (1): 180 Ph** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | | | Mathematics | | |
| **Department offering the course:** | | | | Department of Physics | | |
| **Academic year/level:** | | | | First level | | |
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| **Dates of program specifications approval: The most recent date of the program specification approval: 9/12/2020 (Faculty council; meeting number, 390) updated in 2021/2022, meeting number 419.** | | | | | | |
| B - Basic information | | **Code:** 180 Ph | | | **Year/level:** First level | |
| **Teaching Hours:** | | **Lectures:** 0 | | | **Tutorial: 0** | |
|  | | **Practical:** 3 | | | **Total:** 1 h/week | |
| **C - Professional information** | | | | | | |
| **1 – Course Learning Objectives:**  By Finishing of this course the graduate will able to understand the experimental method to identify and measure some physical quantity related to the properties of material and heat. Able to verify the physical lows. How to calculate the mathematical errors and use the suitable units. Work in teem to collect data and writing an assay. knows some applications of physics in the industry. | | | | | | |
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| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a- Knowledge and understanding:**  On successful completion of the course, the student should able to:  a.1- Recognize the concept of physical quantity and physical phenomena  a.2- Investigate some physical lows  a.3- tell about the physical principles and experiments | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to:  b.1- Compare between the applications of each physical apparatus.  b.2- Interpret the output data from experimental systems.  b.3- Construct simple systems to verify the physical lows. | | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c.1- Sketch the practical data.  c.2- Use the laboratory equipment and instruments  c.3- Analyze data form each techniques and tools considering scientific ethics | | | | | | |
| **d - General skills:**  On successful completion of the course, the student should be able to.  d.1- Solve problems and bulding experimental physical system.  d.2- Communicate to work efficiently in a team or separately.  d.3- Collect data and wrighting reports in the different physical topics. | | | | | | |

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| **3 – Contents** | | | | |
| **No.** | **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| 1 | Introduction in the units, tools, errors and precise measurements. | **0** | **0** | **3** |
| 2 | Archimedes experiment. | **0** | **0** | **3** |
| 3 | Newton law of cooling. | **0** | **0** | **3** |
| 4 | Specific heat of solid materials. | **0** | **0** | **3** |
| 5 | Simple pendulum. | **0** | **0** | **3** |
| 6 | Viscosity of liquid. | **0** | **0** | **3** |
| 7 | **Mid-Term Exam** | **0** | **0** | **3** |
| 8 | Melting point. | **0** | **0** | **3** |
| 9 | Surface tension. | **0** | **0** | **3** |
| 10 | Hook law. | **0** | **0** | **3** |
| 11 | Velocity of sound. | **0** | **0** | **3** |
| 12 | Joule experiment. | **0** | **0** | **3** |
| 13 | Linear expansion. | **0** | **0** | **3** |
| 14 | Review and summary | **0** | **0** | **3** |
|  | **Total hours** | **0** | **0** | **42** |

**4- Teaching and Learning methods:**

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| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Recognize the concept of physical Quantity and physical phenomena. | 0 | 0 | 0 | x | x | 0 |
| a.2 | Investigate some physical lows. | 0 | x | 0 | x | 0 | x |
| a.3 | Understand the physical principles and experiments. | 0 | 0 | x | x | x | 0 |
| **Intellectual Skills** | b1 | Compare between the applications of each physical apparatus. | 0 | x | 0 | x | 0 | 0 |
| b.2 | Analyze the output data from experimental systems. | 0 | 0 | x | x | x | x |
| b.3 | Construct simple systems to verify the physical lows. | 0 | 0 | x | x | 0 | 0 |
| **Practical and professional skills** | c.1 | Sketch the practical data. | 0 | 0 | 0 | x | x | 0 |
| c.2 | Use the laboratory equipment and instruments. | 0 | 0 | 0 | x | x | 0 |
| c.3 | Analyze data form each techniques and tools considering scientific ethics. | 0 | x | x | x | 0 | 0 |
| **General Skills** | d.1 | Solve problems and bulding experimental physical system. | 0 | 0 | 0 | x | x | x |
| d.2 | Communicate to work efficiently in a team or separately. | 0 | 0 | x | x | 0 | 0 |
| d.3 | Collect data and wrighting reports in the different physical topics. | 0 | x | 0 | x | x | x |

**5- Students’ Assessment Methods and Grading:**

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| **Tools:** | To Measure | **Time schedule** | **Grading** |
| Semester Work | a.1, a.2, a.3, b.1, b.2, c.1, c.2, d.1 and d.2. | Fifth week | 10% |
| Mid-Term Exam | a.1, a.3, b.2, b.3, d.2, c.3, and d.3. | Seventh week | 10% |
| Oral exam | a.2, a.3, b.2, b.3, c.3, and d.3. | Fifteenth week | 20% |
| Final exam | a.1 to a.3, b.1 to b.3, c.1 to c.3 and d1. | Sixteenth week | 60% |
| Total | | | 100 % |
| **6- List of references:** | | | |
| **6-1 Course notes**  Practical notes approved by Physics department.  **6-2 Required books.**  1- The concepts and theories of modern physics by John Bernhard Stallo, BiblioBazaar (2009).   * 1. **Recommended books.**   1-Ancient and Modern Physics by Thomas E. Willson HardPress Publishing (2010).  2-Physics: for Scientists and Engineers with Modern Physics, 3rd Ed by Paul M. Fishbane and ‎ Stephen Gasiorowicz.  **6-4 Periodicals, Web sites, etc.**  1-<https://www.amazon.com/Physics-Scientists-En…/…/ref=sr_1_12…>  2-http://www. Physics2000.  3-http://www. Physics today. | | | |

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| **7- Facilities required for teaching and learning:** | | |
| * Using a black board. * Group Discussions. * Data show. * Equipements.   **Course coordinator Head of the Department**  Ass. Prof. Mohamed abd Elmonem Prof. Dr. Mohamed Ali  Dr. Asmaa Jaber | | |
| **Date: 2020/2021** | |  |
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| **Course Specification**  **Applied Physics (1): 183 Ph** | | | | | | | | | | |
| **A- Affiliation** | | | | | | | | | | |
| **Relevant program:** | | Computer Science. | | | | | | | | |
| **Department offering the program:** | | | | Mathematics | | | | | | |
| **Department offering the course:** | | | | Department of Physics | | | | | | |
| **Academic year/level:** | | | | First level | | | | | | |
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| Date of specifications approval by the faculty council: The most recent Date of specifications approval by the faculty council: The most recent date of the program specification approval: 9/12/2020 (Faculty council; meeting number, 390) updated in 2021/2022, meeting number 419.B - Basic information | | | | | | | | | | |
| **Title:** applied Physics **(1)** | | | **Code:** 183 Ph | | | | | **Year/level:** First level | | |
| **Teaching Hours:** | | | **Lectures: 0** | | | | | **Tutorial: 2** | | |
|  | | | **Practical:0** | | | | | **Total:** 1 h/week | | |
| C - Professional information | | | | | | | | | | |
| **1 – Course Learning Objectives:**  The objective of this course enable the student to collect and recognize a lot of knowledge about the main topics of the Properties of Matter and Heat, such as the elasticity and plasticity of material, the different types of stresses and strains, moment of inertia, simple harmonic motion in addation to the different types of wave equation and interference of waves and some basics of fluid dynamics. Study Unary phase digrame of matter, types of thermometers and temprature scales, heat conduction and radiation, methods of specific heat measurments and Gas laws and thermodynamics. This will supported by some applications in each field. | | | | | | | | | | |
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| **2 - Intended Learning Outcomes (ILOS)** | | | | | | | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should demonstrate knowledge and understanding of:  a.1- Understanding the concept of matter, Heat, Simple harmonic motion, fluid dynamics, types of heat counductions and thermodynamics.  a.2- Describe the moment of inertia of rigid body and phase digram.  a.3- Recognize the different types of wave motion such as simple pindulumn, oscillating spring, and wave equation and interference of waves.  a.4- Memorize the different types of stresses – strains of matter, thermometers and temperature scales. | | | | | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Create over view about the dimension theory, waves nature, heat transform and thermodynamics.  b.2- Deduce some models to exam the validity of physical low.  b.3- Develop appropriate judgment in accordance with physical meaning of course topics.  b.4- Differentiate between the physical properties for different types of materials. | | | | | | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to: | | | | | | | | | | |
| c.1- Sketch the phase diagram stress- strain curve for different types of materials.  c.2- Analyze the output data from each technique.  c.3- Extract physical properties from tables and graphs.  **d - General skills:**  On successful completion of the course, the student should be able to:  d.1- Work in team to synthesis and studying some physical properties of some materials.  d.2- Apply scientific models to solve physical problems.  d.3- Collect data from internet and wrighting reports in the application of some topics.  **3**- **Contents** | | | | | | | | | | |
| **No.** | **Topic** | | | | **Lecture hours** | | **Tutorial hours** | | **Practical hours** |
| 1 | Application on Physical quantity. | | | | 0 | | 1 | | 0 |
| 2 | Application on Dimension theory. | | | | 0 | | 1 | | 0 |
| 3 | Application on Unites. | | | | 0 | | 1 | | 0 |
| 4 | Application on balance equation. | | | | 0 | | 1 | | 0 |
| 5 | Application on Types of motion. | | | | 0 | | 1 | | 0 |
| 6 | Application on Motion in different directions. | | | | 0 | | 1 | | 0 |
| 7 | **Mid- Term Exam & review** | | | | 0 | | 1 | | 0 |
| 8 | Application on second Newton low of motion. | | | | 0 | | 1 | | 0 |
| 9 | Application on Work and energy. | | | | 0 | | 1 | | 0 |
| 10 | Application on Introduction in heat. | | | | 0 | | 1 | | 0 |
| 11 | Application on Heat and heat transfer. | | | | 0 | | 1 | | 0 |
| 12 | Application on Kinetic theory of gases. | | | | 0 | | 1 | | 0 |
| 13 | Application on Specific heat of gases. | | | | 0 | | 1 | | 0 |
| 14 | Application on First law of thermodynamics. | | | | 0 | | 1 | | 0 |
| **Total hours** | | | | | 0 | | 14 | | 0 |

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| **4 - Teaching and Learning methods:** |

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| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Understanding the concept of matter, Heat, Simple harmonic motion, fluid dynamics, types of heat counductions and thermodynamics. | x | 0 | 0 | x | x | 0 |
| a.2 | Describe the moment of inertia of rigid body and phase digram. | x | 0 | 0 | x | 0 | x |
| a.3 | Recognize the different types of wave motion such as simple pindulumn, oscillating spring, wave equation and interference of waves. | x | x | 0 | x | x | 0 |
| a.4 | Memorize the different types of stresses – strains of matter, thermometers and temperature scales**.** | x | 0 | 0 | x | x | 0 |
| **Intellectual Skills** | b.1 | Create over view about the dimension theory, waves nature, heat transform and thermodynamics. | x | 0 | 0 | x | 0 | 0 |
| b.2 | Deduce some models to exam the validity of physical low. | x | x | 0 | x | 0 | x |
| b.3 | Develop appropriate judgment in accordance with physical meaning of course topics. | x | 0 | 0 | x | x | 0 |
| b.4 | Differentiate between the physical properties for different types of materials. | x | 0 | 0 | x | 0 | 0 |
| **Practical and professional skills** | c.1 | Sketch the phase diagram stress- strain curve for different types of materials. | x | 0 | 0 | x | x | 0 |
| c.2 | Analyze the out put data from each technique. | x | x | 0 | x | x | 0 |
| c.3 | Extract physical properties from tables and graphs. | x | 0 | 0 | x | 0 | 0 |
| **General Skills** | d.1 | Work in team to synthesis and studying some physical properties of some materials. . | x | 0 | 0 | x | x | x |
| d.2 | Apply scientific models to solve physical problems. | x | 0 | 0 | x | 0 | 0 |
| d.3 | Collect data from internet and wrighting reports in the application of some topics. | x | 0 | 0 | x | x | x |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | To Measure | **Time schedule** | **Grading** |
| Semester Work | a.1, a.2, a.4, b.1, b.2, c.1, c.2, d.2, d.2 and d.3. | Fifth week | **5%** |
| Mid-Term Exam | a.1, a.3, a.4, b.3, b.4, d.2, c.3 and d.3. | Seventh week | 5% |
| Oral exam | a.1, a.3, a.4, b.3, b.4, c.3, and d.3. | Fifteenth week | 10% |
| Written exam | a.1 to a.4, b.1 tob.4, c.1 to c.3 and d2. | sixteenth week | 80% |
| Total | | | 100 % |

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| **6- List of references:** |
| **6-1 Course notes**  Lecture notes approved by Physics department.    **6-2 Required books.**  1-Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011).   * 1. **Recommended books.**  1. General Physics and heat (G.A. Grant) Published by Edward Arnold, 1977   BN 10: [071312623X](http://www.abebooks.co.uk/products/isbn/9780713126235?cm_sp=bdp-_-9780713126235-_-isbn10) / ISBN 13: [9780713126235](http://www.abebooks.co.uk/products/isbn/9780713126235?cm_sp=bdp-_-9780713126235-_-isbn13).   1. Physics for Engineers and Scientists 3rd ed by Hans C. Ohanian and John T. Markert.    1. **Periodicals, Web sites, etc.** 2. [https://www.amazon.com/…/…/0393930033/ref=la\_B001IQW79W\_1\_2…](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.amazon.com%2FPhysics-Engineers-Scientists-Third-Vol%2Fdp%2F0393930033%2Fref%3Dla_B001IQW79W_1_2%3Fs%3Dbooks%26ie%3DUTF8%26qid%3D1515033184%26sr%3D1-2&h=ATPv9yyXL6SpjIMGsgZPMBPVpuv73I0DI7y7eZV8s-TFl0ap7Qu2rlMnDdkGuRaK3f3x7Ng5HB26KXh9dO7_S2xnWz1jrc2sNHUuPgZ7rDtiohLYi7_Nc7YhWyaB78WEUOLfVwYWNVwHq-LwMELS1A1QvlnJ4Y3KTO1e-FgTjNmQQFNO6UUurYWx0U5fAlMrLD4qTSjDQM2QfOPjAxmH_yaom8Ehy7Rp0CYHJMdvRh0KSznmeZAykLiqt34IFb_MEEeEA_qKClq9gxXsSnDC3lECH5ZXyM6PN7IbRCHMesm8) 3. http://www. Physics2000. 4. http://www. Physics today. |

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| **7- Facilities required for teaching and learning:** |
| |  | | --- | | 1. Using a microphone in lectures. 2. Using a black board. 3. Group Discussions. 4. Data show. |   **Course coordinator Head of the Department**  Dr/. Mostafa Ismail Prof. Dr. Mohamed Ali  Dr. Al-Mashad |

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| **Course Specification**  **015 Ur: English** | | | | | |
| **A- Affiliation** | | | | | |
| **Relevant program:** | Computer Science | | | | |
| **Department offering the program:** | | | Mathematics | | |
| **Department offering the course:** | | | Faculty of Arts | | |
| **Academic year/level: Date of specifications approval:**  **Course coordinator:** Prof. Dr. Ghada | | | First level **9/12/2019 (faculty member council meeting no. 390), updated 2020/2021 (Faculty council; meeting number, 419).** | | |
| **B - Basic information** | | | | | |
| **Title:** English | | **Code:** 015 Ur | | **Year/level:** First level | |
| **Teaching Hours:** | | **Lectures:** 2 h/week | | **Tutorial:** 0 | |
|  | | **Practical:** 0 **Course marks:** 100 marks | | **Total:** 2 h/week | |
| **C - Professional information** | | | | | |
| **1 – Overall aim of the course:** | | | | | |
| This course aims to enhance the students' capabilities on English Language in both writing and speaking. The courses focus on using appropriate grammatical structures and verb tenses. They present an integrated programmer of speaking and writing in English for students of Faculty of Science. They also help the student to understand terminology and provide the correct spelling and words most commonly used in scientific writing. | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should be able to:  a1- Know new scientific vocabulary  a2- Identify English grammar  a3- Know how to translate from English into Arabic and vice versa as well as to know writing skills. | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to:  b1- Construct the scientific sentences  b2- Interpret the scientific paragraph  b3- Apply on grammatical rule  b4 - Develop students proficiency of English and terminology | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c1 – Collect the new vocabulary  c2- Summarize the equivalents, opposites adjectives and nouns of the new words | | | | |
| **d - General skills:**  On successful completion of the course, the student should be able to:  d1- Communicate with others  d2- Work in group | | | | |

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| **3 – Contents** | | | |  |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** | **% of total** |
| 1. Reading comprehension part (1) | 2 | 0 | 0 | 7.14% |
| 1. Reading comprehension part (2) | 2 | 0 | 0 | 7.14% |
| 1. Reading comprehension part (3) | 2 | 0 | 0 | 7.14% |
| 1. Grammar part (1) | 2 | 0 | 0 | 7.14% |
| 1. Grammar part (2) | 2 | 0 | 0 | 7.14% |
| 1. Grammar part (3) | 2 | 0 | 0 | 7.14% |
| 1. Mid-term exam | 2 | 0 | 0 | 7.14% |
| 1. Grammar part (4) | 2 | 0 | 0 | 7.14% |
| 1. Grammar part (5) | 2 | 0 | 0 | 7.14% |
| 1. Translation part (1) | 2 | 0 | 0 | 7.14% |
| 1. Translation part (2) | 2 | 0 | 0 | 7.14% |
| 1. Writing skills part (1) | 2 | 0 | 0 | 7.14% |
| 1. Writing skills part (2) | 2 | 0 | 0 | 7.14% |
| 1. Revision | 2 | 0 | 0 | 7.14% |
| **Total hours** | **28** | 0 | 0 | 100% |

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| **4 - Teaching and Learning methods against course ILOS:** | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a1 | Know new scientific vocabulary | X | x | x | 0 | 0 |
| a2 | Identify English grammar | X | x | x | 0 | 0 |
| a3 | Know how to translate from English into Arabic and vice versa | X | x | x | x | 0 |
| a4 | Know writing skill | x | x | x | x | x |
| **Intellectual Skills** | b1 | Construct the scientific sentences | X | x | x | 0 | 0 |
| b2 | Interpret the Scientific paragraph | X | 0 | x | x | x |
| b3 | Apply on grammatical rule. | X | 0 | x | x | x |
| b4 | Develop student's proficiency of English and terminology. | X | x | x | 0 | 0 |
| **Practical and professional skills** | c1 | Collect the new vocabulary | 0 | 0 | 0 | x | x |
| c2 | Summarize the equivalents, opposites adjectives and nouns of the new words | X | x | x | x | x |
| **General Skills** | d1 | Communicate with others | 0 | 0 | x | x | 0 |
| d2 | Work in group. | 0 | 0 | x | x | 0 |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools** | **To Measure** | **Time schedule** | **Grading** |
| Mid-Term Exam | a1, a2, b1 to b4,c1 and c2 | Seventh week | **10 %** |
| Oral exam | a1 to a4, b1 to b4,c1,c2 and d1 | Fifteenth week | **10 %** |
| Written exam | a1 to a4 and b1 to b4 | Sixteenth week | **80 %** |
| Total | | | **100 %** |

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| **Course matrix** | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | **Practical and professional skills** | | **General Skills** | |
| **a1** | **a2** | **a3** | **a 4** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **d1** | **d2** |
| 1. Reading comprehension part (1) | x |  |  |  |  |  |  |  | x | x | x |  |
| 1. Reading comprehension part (2) | x |  |  |  |  |  |  |  | x |  |  | x |
| 1. Reading comprehension part (3) | x |  |  |  |  | x |  | x | x |  |  |  |
| 1. Grammar part (1) |  | x |  |  |  |  | x |  |  | x | x |  |
| 1. Grammar part (2) |  | x |  |  |  |  | x | x |  |  |  | x |
| 1. Grammar part (3) |  | x |  |  |  |  | x | x |  |  |  |  |
| 1. Mid-term exam | x | x |  |  | x |  |  | x | x | x |  |  |
| 1. Grammar part (4) |  | x |  |  |  | x |  |  |  |  | x |  |
| 1. Grammar part (5) |  | x |  |  |  |  |  |  |  | x |  | x |
| 1. Translation part (1) |  |  | X |  |  | x |  | x |  |  | x |  |
| 1. Translation part (2) |  |  | X |  |  |  |  |  |  | x |  | x |
| 1. Writing skills part (1) |  |  |  | x | X | x |  |  |  | x |  | x |
| 1. Writing skills part (2) |  |  |  | x | X |  |  | x |  | x | x | x |
| 1. Revision | x | x |  | x | X |  | x | x | x |  |  |  |

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| **6- List of references:**  **6-1 Course notes**  Manual notes handle of University textbook  **6-2 Required books**  -English Grammar in Use by Raymond Murphy  **6-3 Recommended books**  - Longman (2003): Active Study Dictionary  - A practical English Grammar by A.J. Thomson and A.V. Martinent  **6-4 Periodicals, Web sites, etc.**  www.google.com | |
| **7- Facilities required for teaching and learning:**   * Data show * Using a black board | |
| **Course coordinator: Head of the Department:** | Ms. Dr.Ghada  Prof. Dr. |
| **Date:** | **2020/2021** |

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| **Course Specification**  **100 Ch: General Chemistry (1)** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | Computer Science | | | |
| **Department offering the program:** | | | Mathematics | |
| **Department offering the course:** | | | Department of Chemistry | |
| **Academic year/level: Date of specifications approval: Course co-coordinator:** | | | First level  **9/12/2019 (faculty member council meeting no. 390), updated 2020/2021 (Faculty council; meeting number, 419).**  Prof. Dr. Ibrahim El Sayed  Dr. Maher EL Nagar | |
| **B - Basic information** | | | | |
| **Title: General Chemistry** | | **Code:** 100 Ch | | **Year/level:** First level |
| **Teaching Hours:** | | **Lectures:** 2 | | **Tutorial:** 0 |
|  | | **Practical: 0 Course marks:** 100 marks | | **Total:** 2 h/week |
| **C - Professional information** | | | | |
| **1 – Overall aim of the course:** | | | | |
| This course aims to enable the students to study the atomic structures, gases laws, Chemical bonding, geometrical configuration, and state of matter. Also to enable the differentiate between acidic and basic radicals. | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should demonstrate knowledge and understanding of:  a.1- Identify chemical formulae of inorganic and units of some parameters.  a.2- Describe characteristics of different states of the matter and practical elements including trends within the periodic table and related theories. | | | | |
| a.3- Define the chemical concepts of inorganic and physical chemistry . | | | | |
| a.4- Know theories of chemical bonding and molecular orbital diagram for diatomic molecules. | | | | |
| a.5- State the principles of thermochemistry. | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties.  b.2-Solve chemical problems using computational. | | | | |
| b.3- Analyze collected chemical data using some data processing skills.  b.4- Point out different concepts in inorganic and physical chemistry.  b.5- Analyze chemical data to identify the compositions and chemical structures of inorganic and organic compounds.  b.6- Determine the properties of different states of matter (gases, liquids and solids).  b.7- predict the different shapes of different inorganic materials. | | | | |
|  | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c1- Determine the chemical formulae and geometrical shapes of organic and inorganic molecules.  c2-Apply the knowledge that the student studied to propose the molecular  Structures of the molecules.  c3- Investigate and identify the acidic and basic radicals. | | | | |

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| **d - General skills:**  On successful completion of the course, the student should be able to:  d1- Use computers and internet for information and communication technology  effectively related to uses of this instruments.  d2- Solve problems on the scientific basis taught in this course.  d3- Work in a team effectively, manage time, collaborate and communicate with  others positively.  d4- Help raising public awareness of the benefits of conserving intellectual  property rights and scientific patents on the individuals and communities. |

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| **3 – Contents** | | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** | **% of total** |
| 1. Introduction to General Chemistry and the Units | 2 | 0 | 0 | 17.4% |
| 1. Identify chemical formulae of inorganic | 2 | 0 | 0 | 17.4% |
| 1. Characteristics of different states of the matter and elements including trends within the periodic table and related theories. | 2 | 0 | 0 | 17.4% |
| 1. Study the chemical bonding | 2 | 0 | 0 | 17.4% |
| 1. State the principles of electrochemistry. | 2 | 0 | 0 | 17.4% |
| 1. Study the molecular orbital diagram for diatomic molecules. | 2 | 0 | 0 | 17.4% |
| 1. Mid Term Exam. | 2 | 0 | 0 | 17.4% |
| 1. Molecular structure | 2 | 0 | 0 | 17.4% |
| 1. Study the state of matter | 2 | 0 | 0 | 17.4% |
| 1. Thermochemistry study | 2 | 0 | 0 | 17.4% |
| 1. Stoichiometric study. | 2 | 0 | 0 | 17.4% |
| 1. Atomic structure | 2 | 0 | 0 | 17.4% |
| 1. Hybridization | 2 | 0 | 0 | 17.4% |
| 1. Revision | 2 | 0 | 0 | 17.4% |
| **Total hours** | **28** | 0 | 0 | **100%** |

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| **4 - 4 - Teaching and Learning methods against course ILOS:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** **Practical** | **Problem solving** | **Brain storming** | |
| **Knowledge & Understanding** | a1 | Identify chemical formulae of inorganic and units of some parameters. | x | 0 | x | 0 | 0 | x | |
| a2 | Describe characteristics of different states of the matter and practical elements including trends within the periodic table and related theories. | x | 0 | 0 | 0 | x | 0 | |
| a3 | Define the chemical concepts of inorganic and physical chemistry. | x | x | x | 0 | X | x | |
| a4 | Recognize theories of chemical bonding and molecular orbital diagram for diatomic molecules. | x | x | x | 0 | X | x | |
| a5 | State the principles of thermochemistry. | x | 0 | 0 | 0 | 0 | x | |
| **Intellectual Skills** | b1 | Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties. | **x** | x | x | **0** | **X** | **x** | |
| b2 | Solve chemical problems using computational. | **x** | 0 | x | **0** | **X** | **x** | |
| b3 | Explain the bond lengths, geometries, magnetism, and color of the transition metal complexes depending on understanding of their bonding theories. | x | x | x | **0** | **X** | **x** | |
| **Practical and professional skills** | c1 | Determine the chemical formulae and geometrical shapes of organic and inorganic molecules. | x | 0 | x | 0 | X | x | |
| c2 | Apply the knowledge that the student studied to propose the molecular structures of the molecules. | x | 0 | x | 0 | X | x | |
| **General Skills** | d1 | Use computers and internet for information and communication technology effectively related to uses of these instruments. | x | 0 | 0 | 0 | 0 | x | |
| d2 | Solve problems on the scientific basis taught in this course. | x | 0 | x | 0 | X | x | |
| d3 | Work in a team effectively, manage time, collaborate and communicate with others positively. | x | 0 | x | x | 0 | x | |
| d4 | Help raising public awareness of the benefits of conserving intellectual property rights and scientific patents on the individuals and communities. | x | 0 | 0 | 0 | 0 | x | |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools** | **To Measure** | **Time schedule** | **Grading** |
| Semester Work | a1, a2, a3, b2, and d1 | Fifth week | **5 %** |
| Mid-Term Exam | a1, a2, a3, a4, and b2 | seventh week | **5 %** |
| Oral exam | a1, a2, a3, a4, b1, b2, b3, c2 and d4 | Fifteenth week | **10 %** |
| Written exam | a1 to a5, b1, b2 and b3. | Sixteenth week | **80 %** |
| Total | | | **100 %** |

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| **Course matrix** | | | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General Skills** | | | | |
| **a1** | **a2** | **a3** | **a4** | **a5** | | **b1** | **b2** | **b3** | | **c1** | **c2** | | **d1** | **d2** | **d3** | **d4** |
| 1. Introduction to general Chemistry and the Units | **x** |  |  |  |  | |  |  |  | |  |  | | **x** |  | **x** | **x** |
| 1. Identify chemical formulae of inorganic |  | **x** |  |  |  | | **x** | **x** |  | |  | **x** | |  | **x** |  |  |
| 1. Characteristics of different states of the matter and elements including trends within the periodic table and related theories. |  | **x** |  |  |  | |  |  | **x** | |  |  | | **x** |  | **x** |  |
| 1. Study the chemical bonding |  |  |  | **x** |  | | **x** |  |  | | **x** |  | |  |  |  |  |
| 1. State the principles of electrochemistry. |  |  | **x** |  |  | |  |  |  | |  |  | |  |  |  | **x** |
| 1. Study the molecular orbital diagram for diatomic molecules. |  |  |  | **x** |  | |  |  | **x** | | **x** |  | | **x** |  | **x** |  |
| 1. Mid Term Exam. | **x** | **x** | **x** | **x** |  | |  | **x** |  | |  |  | |  |  |  |  |
| 1. Molecular structure |  |  |  | **x** |  | | **x** | **x** | **x** | | **x** | **x** | |  | **x** |  |  |
| 1. Study the state of matter |  |  | **x** |  |  | | **x** |  |  | |  |  | |  |  |  |  |
| 1. Thermochemistry study |  |  |  |  | **x** | |  |  |  | |  |  | | **x** |  | **x** |  |
| 1. Stoichiometric study. |  |  | **x** |  |  | | **x** |  | **x** | |  | **x** | |  | **x** |  |  |
| 1. Atomic structure |  |  | **x** |  |  | | **x** |  |  | |  |  | | **x** |  |  |  |
| 1. Hybridization |  |  | **x** |  |  | |  |  |  | | **x** |  | |  | **x** |  | **x** |
| 1. Revision | **x** | **x** | **x** |  | **x** | |  | **x** | **x** | |  |  | |  |  |  |  |

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| **6- List of references:** |
| **6-1 Course notes**  Lecture notes approved by Chemistry Department.  **6-2 Required books**  Peter Atkin, Loretta Jones, Leroy Laverman, Chemical Principle, Sixth Edition, W.H. Freeman, 2012.   * 1. **Recommended books**   1- J.D. Lee, Concise Inorganic Chemistry, 5th Edn. Blackwell Science, Australia, 1996.  2- N.N. Greenwood, A. EarnShaw, Chemistry of Elements,2nd Edn, Butterworth  Heinemann, USA 1997.   * 1. **Periodicals, Web sites, etc**   *Journal* of *Chemical Education* (ACS)  Inorganic Chemistry (ACS)  http://www.public.asu.edu/~jpbirk/CHM-115\_BLB/Chpt24/  http://ocw.mit.edu/courses/chemistry/5-112-principles-of-chemical-science-fall-2005/ |
| http://www.docbrown.info/page07/appendixtrans11.htm |

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| **7- Facilities required for teaching and learning:** | | |
| Using a microphone in lectures  Using a black board  Group Discussions  Data show | | |
| **Course coordinator:** | Prof. Dr. Ibrahim S. Ahmed  Dr. Maher EL Nagar |  |
| **Head of the Department:** | Prof. Dr. Alaa S. Amine |  |
| **Date:** | **2020/2021** |  |

**Course Specification**

**181 Ch:** **Practical Chemistry (1)**

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| **A- Affiliation** | | | | |
| **Relevant program:** | Computer Science | | | |
| **Department offering the program:** | | | Mathematics | |
| **Department offering the course:** | | | Department of Chemistry | |
| **Academic year/level: Date of specifications approval: Course co-coordinator:** | | | First level **9/12/2019 (faculty member council meeting no. 390), updated 2020/2021 (Faculty council; meeting number, 419).** | |
| **B - Basic information** | | | | |
| **Title: Qualitative analysis for acidic and basic radicals of inorganic salts** | | **Code:** 181 Ch | | **Year/level:** First level |
| **Teaching Hours:** | | **Lectures:** 0 | | **Tutorial:** 0 |
|  | | **Practical:**3 **Course marks:**100 marks | | **Total:** 1 h/week |
| **C - Professional information** | | | | |
| **1 – Overall aim of the course:** | | | | |
| This course aims to enable the students to understand the classification of different groups of acidic and basic radicals of inorganic salts. Also, teach students how to identify unknown inorganic salts and how to separate between mixed basic radicals. | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should demonstrate knowledge and understanding of:  a.1-Investigate the qualitative analytical method for identifying different unknown salts.  a.2- explain different classification of analytical chemistry. | | | | |
| a.3- Name different inorganic salts (acid and base radicals). | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b1- Interpret the given chemical data to identify the unknown inorganic salts.  b2- Differentiate between different types of acidic and basic radicals. | | | | |
| b3- Apply the qualitative analytical procedures to identify acidic and basic radicals of unknown salts . | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c1- investigate the acidic and basic radicals of unknown inorganic salts.  c2-identify and distinguish between different mixed basic radicals. | | | | |
| **d - General skills:**  On successful completion of the course, the student should be able to:  d1- Use computers and internet for information and communication technology  effectively.  d2- Solve problems on the scientific basis taught in this course.  d3- Work in a team effectively, manage time, collaborate and communicate with  others positively.  d4- Help raising public awareness of the benefits of conserving intellectual  property rights and scientific patents on the individuals and communities. | | | | |

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| **3 – Contents** | | | |  |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** | **% of total** |
| 1. Introduction to qualitative analysis and the classification of different groups of acidic and basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (I) of acidic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (II) of acidic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (III) of acidic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (I) of basic radical | 0 | 0 | 3 | 17.4% |
| 1. Midterm exam | 0 | 0 | 3 | 17.4% |
| 1. Introduction for basic radicals | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (I) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (II) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (III) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (IV) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (V) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Qualitative analysis for gp (VI) of basic radicals. | 0 | 0 | 3 | 17.4% |
| 1. Revision | 0 | 0 | 3 | 17.4% |
| **Total hours** | 0 | 0 | **42** | **100%** |

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|  | **4 - Teaching and Learning methods against course ILOS:** | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | | **Brain storming** |
| **Knowledge & Understanding** | | a1 | Investigate the qualitative analytical method for identifying different unknown salts. | | | x | 0 | x | | x | 0 | | x |
| a2 | Explain different classification of analytical chemistry. | | | x | 0 | 0 | | x | 0 | | 0 |
| a3 | Name different inorganic salts (acid and base radicals). | | | x | 0 | x | | x | x | | x |
| **Intellectual Skills** | | b1 | Interpret the given chemical data to identify the unknown inorganic salts. | | | **x** | 0 | x | | **x** | **x** | | **x** |
| b2 | Differentiate between different types of acidic and basic radicals. | | | **x** | 0 | x | | **x** | **x** | | **x** |
| b3 | Apply the qualitative analytical procedures to identify acidic and basic radicals of unknown salts. | | | x | 0 | x | | x | **x** | | **x** |
| **Practical and professional skills** | | c1 | Investigate the acidic and basic radicals of unknown inorganic salts. | | | x | 0 | x | | x | x | | x |
| c2 | Identify and distinguish between different mixed basic radicals. | | | x | 0 | x | | x | x | | x |
| **General Skills** | | d1 | Use computers and internet for information and communication technology effectively. | | | x | 0 | 0 | | x | 0 | | x |
| d2 | Solve problems on the scientific basis taught in this course. | | | x | 0 | x | | x | x | | x |
| d3 | Work in a team effectively, manage time, collaborate and communicate with others positively. | | | x | 0 | x | | x | 0 | | x |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | |
| **Tools** | | | | **To Measure** | **Time schedule** | | | | **Grading** | | |
| Semester Work | | | | a1, a2, a3, b2, d1 and d3 | Fifth week | | | | **20 %** | | |
| Midterm exam | | | | a2, a3, b1, b2 and c1 | Seventh week | | | |  | | |
| Oral exam | | | | a1, a2, a3, b2, d1, and d2 | Thirteenth week | | | | **20%** | | |
| Practical exam | | | | a1, a2, a3, b1, b2, b3, c1, and c2 | Fourteenth week | | | | **60 %** | | |
| Total | | | | | | | | | **100 %** | | |

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| **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | **General Skills** | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | **d1** | **d2** | d3 |
| 1. Introduction to qualitative analysis and the classification of different groups of acidic and basic radicals. | **x** | **x** |  |  | **x** | **x** | **x** |  | **x** |  |  |
| 1. Qualitative analysis for gp (I) of acidic radicals. |  |  | **x** | **x** | **x** |  | **x** |  | **x** | **x xx** | **x** |
| 1. Qualitative analysis for gp (II) of acidic radicals. |  |  | **x** | **x** |  |  | **x** |  |  |  | **x** |
| 1. Qualitative analysis for gp (III) of acidic radicals. |  |  | **x** | **x** |  |  | **x** |  |  |  | **x** |
| 1. Qualitative analysis for gp (I) of basic radical |  |  | **x** | **x** |  |  | **x** |  |  |  | **x** |
| 1. Midterm exam |  | **x** | **x** | **x** | **x** |  | **x** |  |  |  |  |
| 1. Introduction for basic radicals | **x** |  |  |  | **x** | **x** | **x** |  | **x** | **x xx** |  |
| 1. Qualitative analysis for gp (I) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** | **x** |  | **x** |
| 1. Qualitative analysis for gp (II) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** |  |  | **x** |
| 1. Qualitative analysis for gp (III) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** |  |  | **x** |
| 1. Qualitative analysis for gp (IV) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** |  |  | **x** |
| 1. Qualitative analysis for gp (V) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** |  |  | **x** |
| 1. Qualitative analysis for gp (VI) of basic radicals. |  |  | **x** | **x** |  |  |  | **x** |  |  | **x** |
| 1. Revision | **x** | **x** | **x** |  | **x** | **x** | **x** |  |  |  |  |

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| **6- List of references:** | | |
| **6-1 Course notes**  Lecture note approved by Department of Chemistry  **6-2 Required books**  Zumdahl, S. S. *Chemical Principles, 4th Ed.*; Houghton-Mifflin: New York, 2002, chapter 8.   * 1. **Recommended books**   1- Wismer, Robert K. *Qualitative Analysis with Ionic Equilibrium*; Macmillan Publishing Company: New York, 1991.   * 1. **Periodicals, Web sites, etc.**   *Journal* of *Chemical Education* (ACS)  Inorganic Chemistry (ACS)  http://www.public.asu.edu/~jpbirk/CHM-115\_BLB/Chpt24/  http://ocw.mit.edu/courses/chemistry/5-112-principles-of-chemical-science-fall-2005/ | | |
| http://www.docbrown.info/page07/appendixtrans11.htm | | |
| **7- Facilities required for teaching and learning:** | | |
| Using a microphone in lectures  Using of slit overhead projector  Using a black board  Group Discussions  Data show | | |
| **Course coordinator:** | Abd EL Raziq Asker |  |
| **Head of the Department:** | Prof. Dr. Alaa S. Amine | |
| **Date:** | **2020/2021** |  |

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| **Course Specification**  **183 Ch:** **Applied Inorganic chemistry (1)** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | Computer Science | | | |
| **Department offering the program:** | | | Mathematics | | |
| **Department offering the course:** | | | Department of Chemistry | | |
| **Academic year/level: Date of specifications approval: Course coordinator:** | | | First level **9/12/2019 (faculty member council meeting no. 390), updated 2020/2021 (Faculty council; meeting number, 419).**  Dr. Saher Mohamed | | |
| ***B - Basic information*** | | | | |
| **Title: Applied Inorganic chemistry** | | **Code:** 185 Ch | | **Year/level:** first level |
| **Teaching Hours:** | | **Lectures:** 0 | | **Tutorial:** 2 |
|  | | **Practical:** 0 **Course marks:** 100 marks | | **Total:** 2 h/week |
| ***C - Professional information*** | | | | |
| **1 – Overall aim of the course:** | | | | |
| This course aims to enable the students to learn and study the general properties for inorganic materials and the difference between organic and inorganic compounds. Students study the properties of some inorganic compounds (such as water, sodium hydroxide, metals,etc). Students also study the preparation of inorganic compounds and their application in various industries such as metals sodium hydroxide, ammonia, sulphuric acid, fertilizers and other. | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should demonstrate knowledge and understanding of: | | | | |
| a.1- Define chemical concepts of inorganic chemistry. | | | | |
| a.2- Identify the chemical formula of inorganic materials | | | | |
| a.3- knows the various inorganic compounds that used in different applications. | | | | |
| a.4- Describe the preparation of inorganic materials which used in different industries | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to. | | | | |
| b1- Compare between the physical and chemical properties of inorganic materials. | | | | |
| b2- Modify the method for extraction metal from its ores. | | | | |
| b3- Report the different inorganic compounds and their applications. | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to: | | | | |
| c1- Collect the knowledge about various inorganic material in different applications | | | | |
| c2- Prepare the different inorganic materials | | | | |
| **d - General skills:**  On successful completion of the course, the student should be able to: | | | | |
| d1- Use computers and internet for information and communication technology effectively | | | | |
| d2- Effectively manage tasks, time, and resources. | | | | |
| d3- Cooperate and communicate with others members of teamwork positively. | | | | |

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| **3 – Contents** | | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** | **% of total** |
| 1. Introduction to inorganic chemistry | 0 | 2 | 0 | 17.4% |
| 1. Classify inorganic compounds and their applications | 0 | 2 | 0 | 17.4% |
| 1. Extractive of copper metal from its ores | 0 | 2 | 0 | 17.4% |
| 1. Refine copper metal and its applications | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of Sodium Hydroxide and chlorine using chlor-alkali and their applications | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of Sodium Hydroxide and chlorine using diaphragm and membrane cells | 0 | 2 | 0 | 17.4% |
| 1. Mid-term exam | 0 | 2 | 0 | 17.4% |
| 1. Raw Materials, nitrogen fixation and application of ammonia | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of ammonia using Haber and Carl Bosch process | 0 | 2 | 0 | 17.4% |
| 1. Raw Materials, production of sulphur trioxide and application of sulphuric acid | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of sulphuric acidusinglead-chamber process | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of sulphuric acid using contact process | 0 | 2 | 0 | 17.4% |
| 1. Manufacture of nitrogen, potassium, phosphate, and NPK Fertilizers | 0 | 2 | 0 | 17.4% |
| 1. Reversion | 0 | 2 | 0 | 17.4% |
| **Total hours** | **0** | **28** | **0** | **100%** |

**4 - Teaching and Learning methods against course ILOS:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a1 | Define chemical concepts of inorganic chemistry. | x | 0 | x | 0 | 0 | x |
| a2 | Identify the chemical formula of inorganic materials | x | x | x | 0 | 0 | 0 |
| a3 | Know the various inorganic compounds which used in different applications. | x | x | x | 0 | 0 | x |
| a4 | Describe the preparation of inorganic materials which used in different industries | x | x | x | 0 | x | x |
| **Intellectual Skills** | b1 | Compare between the physical and chemical properties of inorganic materials. | x | x | 0 | 0 | x | x |
| b2 | Modify the method for extraction metal from its ores | x | 0 | x | 0 | x | x |
| b3 | Report the different inorganic compounds and their applications. | x | x | x | 0 | x | x |
| **Practical and professional skills** | c1 | Collect the knowledge about various inorganic material in different applications | x | 0 | x | 0 | x | x |
| c2 | Prepare the different inorganic materials | x | 0 | x | 0 | x | x |
| **General Skills** | d1 | Use computers and internet for information and communication technology effectively | x | 0 | 0 | x | 0 | x |
| d2 | Effectively manage tasks, time, and resources. | x | 0 | x | x | x | x |
| d3 | Cooperate and communicate with others members of teamwork positively. | x | 0 | x | 0 | 0 | x |

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| **5- Students’ Assessment Methods and Grading:** |

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| **Tools** | **To Measure** | **Time schedule** | **Grading** |
| Semester Work | a1, a2, a3, b2, c1, d1, d2 and d3 | Fifth week | **5 %** |
| Mid-Term Exam | a1, a2, a3, a4, b2,c1, and c2 | Seventh week | **5 %** |
| Oral exam | a1, a2, a3, a4, b1, and b2 | Fifteenth week | **10 %** |
| Written exam | a1, a2, a3, a4, b1, b2 and b3 | Sixteenth week | **80 %** |
| Total | | | **100 %** |

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| **Course matrix** | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | **Practical and professional skills** | | **General Skills** | | |
| **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **c1** | **c2** | **d1** | **d2** | **d3** |
| 1. Introduction to inorganic chemistry | **x** |  | **x** |  | **x** | **x** |  | **x** |  | **x** |  | **x** |
| 1. Classify inorganic compounds and their applications |  | **x** | **x** |  |  |  |  | **x** |  |  | **X** |  |
| 1. Extractive of copper metal from its ores |  |  |  | **x** |  |  |  |  | **x** |  |  |  |
| 1. Refine copper metal and its applications |  |  |  | **x** |  |  |  | **x** | **x** | **x** |  | **x** |
| 1. Manufacture of Sodium Hydroxide and chlorine using chlor-alkali and their applications |  |  |  | **x** |  |  |  | **x** | **x** |  |  |  |
| 1. Manufacture of Sodium Hydroxide and chlorine using diaphragm and membrane cells |  |  |  | **x** |  |  |  |  | **x** | **x** |  | **x** |
| 1. Mid-term exam | **x** | **x** | **x** | **x** |  | **x** |  | **x** | **x** |  |  |  |
| 1. Raw Materials, nitrogen fixation and application of ammonia |  |  |  | **x** |  |  |  | **x** |  |  | **X** |  |
| 1. Manufacture of ammonia using Haber and Carl Bosch process |  |  |  | **x** |  |  |  |  | **x** |  |  |  |
| 1. Raw Materials, production of sulphur trioxide and application of sulphuric acid |  |  |  | **x** |  |  |  | **x** |  | **x** |  | **x** |
| 1. Manufacture of sulphuric acidusinglead-chamber process |  |  |  | **x** |  |  |  |  | **x** |  | **X** |  |
| 1. Manufacture of sulphuric acid using contact process |  |  |  | **x** |  |  |  | **x** | **x** |  |  |  |
| 1. Manufacture of nitrogen, potassium, phosphate, and NPK Fertilizers |  |  |  | **x** |  |  |  | **x** | **x** | **x** | **X** |  |
| 1. Revision | **x** | **x** | **x** |  | **x** | **x** | **x** | **x** | **x** |  |  |  |

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| **7- Facilities required for teaching and learning:** | | |
| Using a microphone in lectures  Using a black board  Group Discussions  Data show | | |
| **Course coordinator:** | Dr. Saher Mohamed |  |
| **Head of the Department:** | Prof. Dr. Alaa Amin | |
| **Date:** | **2020/2021** |  |

***FIRST LEVEL***

***SECOND SEMESTER***

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| **Course Specification** | | | |
| **A- Affiliation** | | | |
| **Relevant program:** | Computer Science | | |
| **Department offering the program:** | | Mathematics | |
| **Department offering the course:** | | Mathematics | |
| **Academic year/level:** | | First level / Second Semester | |
| **Date of specifications approval:** | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | |
| B - Basic information | | | |
| **Title:**  **Computer Science (2)** | | **Code:**  **40 UR** | **Year/level:**  **First level/Second Semester** |
|  | | **Lectures: 1** **h/week** | **Tutorial: ـــ** |
|  | | **Practical: 2** **h/week** | **Total:** **2 h/week** |
| C - Professional information | | | |
| **1 – Course Learning Objectives:** | | | |
| **: At the end of this course, the students must be able to**  **This subject is aimed at students with little programming experience. It aims to provide students with an understanding of the role computation can play in solving problems. It also aims to help students, regardless of their major, to feel justifiably confident of their ability to write small programs that allow them to accomplish useful goals. The class will use a programming language, complementing to course 30 U.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Outline the computer terms from the textbook, lecture, and readings** 2. **Explain the fundamental programming concepts such as variables , functions , loops and subroutines in a programming language** 3. **Identify application algorithm and use programming language** 4. **Write programs of real world applications** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Construct programming in a selected programming language.** 2. **Develop code in programming language and adapt other people's code.** 3. **Organize a detailed algorithmic solution to a well defined problem.** 4. **Design program to solve application problem.** | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Show the language syntax in programming problems.** 2. **Recommended programming language to develop more reliable programs.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively and independently.** 2. **Using internet to learn information and communication technology effectively.** | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Basics of programming.** | **1** | **-** | **2** |
| **Algorithms and flowcharts.** | **1** | **-** | **2** |
| **Basics of the programming language** | **1** | **-** | **2** |
| **Types of variables** | **1** | **-** | **2** |
| **Control statements (1)** | **1** | **-** | **2** |
| **Control statements (2)** | **1** | **-** | **2** |
| **Revision and mid-term exam** | **1** | **-** | **2** |
| **Loop statements (1)** | **1** | **-** | **2** |
| **Loop statements (2)** | **1** | **-** | **2** |
| **Array (1)** | **1** | **-** | **2** |
| **Array (1)** | **1** | **-** | **2** |
| **Functions (1)** | **1** | **-** | **2** |
| **Functions (2)** | **1** | **-** | **2** |
| **Some Applications.** | **1** | **-** | **2** |
| **Total hours** | **14** | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Outline the computer terms from the textbook, lecture, and readings** | **🗸** |  |  | |  |  | **🗸** |
| **a2-** | **Explain the fundamental programming concepts such as variables , functions , loops and subroutines in a programming language** | **🗸** |  |  | |  |  | **🗸** |
| **a3-** | **Identify application algorithm and use programming language** | **🗸** | **🗸** | **🗸** | |  | **🗸** |  |
| **a4-** | **Write programs of real world applications** | **🗸** |  |  | | **🗸** |  |  |
| **Intellectual Skills** | **b1** | **Construct programming in a selected programming language.** | **🗸** |  |  | **🗸** | |  | **🗸** |
| **b2** | **Develop code in programming language and adapt other people's code.** | **🗸** |  |  | **🗸** | |  | **🗸** |
|  | **b3** | **Organize a detailed algorithmic solution to a well defined problem.** | **🗸** |  |  | **🗸** | |  | **🗸** |
|  | **b4** | **Design program to solve application problem.** | **🗸** | **🗸** |  | **🗸** | |  | **🗸** |
| **Practical and professional skills** | **c1-** | **Show the language syntax in programming problems.** |  |  |  | | **🗸** |  | **🗸** |
| **c2-** | **Recommended programming language to develop more reliable programs.** |  |  |  | | **🗸** |  | **🗸** |
| **General Skills** | **d1-** | **Working in groups effectively and independently..** | **🗸** |  |  | | **🗸** |  | **🗸** |
| **d2-** | **Using internet to learn information and communication technology effectively** | **🗸** |  |  | | **🗸** |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b1, b2** | **Week 7** | **14%** |
| **Oral exam** | **a1, a2, a3,d1** | **Week 15** | **14 %** |
| **Practical exams** | **c1, c2,c3,d2** | **Week 15** | **14 %** |
| **Written exam** | **a1,a2,a3,a4,** **b1**, **b2,b3,b4** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6 – Course Matrix** | | | | | | | | | | | | |
| **Topic** | **Knowledge & Understanding** | | | | **Intellectual Skills** | | | | **Practical and professional skills** | | **General Skills** | |
| **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **d1** | **d2** |
| **Basics of programming.** | **x** | **x** |  |  | **x** |  |  |  | **x** |  |  | **x** |
| **Algorithms and flowcharts.** |  |  |  |  | **x** |  | **x** |  |  | **x** |  | **x** |
| **Basics of the programming language** |  | **x** | **x** |  |  |  |  |  | **x** |  |  |  |
| **Types of variables** |  |  |  |  | **x** |  |  |  |  |  |  |  |
| **Control statements (1)** |  | **x** |  |  |  |  |  | **X** | **x** |  |  | **x** |
| **Control statements (2)** |  |  | **x** |  |  |  |  |  |  | **x** | **x** |  |
| **Revision and mid-term exam** | **x** |  |  |  |  | **x** |  | **X** |  |  |  | **x** |
| **Loop statements (1)** |  |  | **x** |  | **x** |  |  |  |  |  |  |  |
| **Loop statements (2)** |  |  |  |  |  |  |  |  |  |  | **x** | **x** |
| **Array (1)** |  |  |  | **x** |  |  | **x** |  | **x** |  |  |  |
| **Array (1)** |  |  | **x** |  |  | **x** |  |  |  |  | **x** |  |
| **Functions (1)** |  |  | **x** |  |  |  |  |  | **x** |  |  |  |
| **Functions (2)** |  |  |  |  |  |  |  |  |  | **x** | **x** |  |
| **Some Applications.** |  | **x** |  |  |  | **x** |  |  |  |  |  | **x** |

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| **7- List of references**  **7-1 Course notes**  **-Notes approved by Math. Department.**   * 1. **Required books.**  B. H. Flowers, *An Introduction to Numerical Methods in C++* , Oxford, 2000. **7-3 Recommended books.**  **B. Stroustrup, *The C++ Programming Language, 3rd- Edition*, Addison-Wesley, 1997.**   * 1. **Periodicals, Web sites, etc.**   **http://www.cplusplus.com/doc/tutorial/** |

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| **8- Facilities required for teaching and learning:** | |
| **Black board, white board and data show.** | |
| **Course coordinator:** | **Dr. Shaima Ezzat**  **Dr. Gamal Ahmed Musa** |
| **Head of the Department:** | **Prof. Dr.**   **Reda Gamal Abd El Rahman** |
| **Date: 9 /12 / 2019** | **Updated 2020/2021** |

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| **Course Specification** | | | |
| **A- Affiliation** | | | |
| **Relevant program:** | **Computer Science** | | |
| **Department offering the program:** | | **Mathematics** | |
| **Department offering the course:** | | **Mathematics** | |
| **Academic year/level:** | | **First level / Second Semester** | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| B - Basic information | | | |
| **Title:**  **General Mathematics (2)** | | **Code:**  **105 M** | **Year/level:**  **First level / Second** **Semester** |
| **Teaching Hours: 42 h** | | **Lectures: 2** **h/week** | **Tutorial: 2** **h/week** |
|  | | **Practical: ــــ** | **Total:** **3 h/week** |
| C - Professional information | | | |
| **1 – Course Learning Objectives:** | | | |
| **: At the end of this course, the students must be able to**  **Postulate concepts and choose appropriate solutions to solve problems on scientific basis, apply mathematical knowledge and skills to the solution of real life problems, complementing to course 100 M.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **To know Mathematical knowledge in solving different problems.** 2. **Determine knowledge of the principles of mathematical modeling and applications.** 3. **Explain the meaning of complicated statements using mathematical notations and language.** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the knowledge of the mathematical processes for modeling of real-world problems.** 2. **Develop appropriate knowledge and awareness of the importance and applications of mathematical assumption.** 3. **Confirm wide background knowledge related to the different branches of Mathematics.** | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Analyze the concepts and methods of mathematics to the solution of the real problems in professional practice.** 2. **Examine competence in the use of mathematical methods in problem solving** 3. **Collect wide background knowledge related to the different branches of Mathematics.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Community linked thinking and solve problems on scientific basis.** 2. **Working in groups effectively; manage time, collaborate and communicate with others positively.** 3. **Ethical behavior with property rights.** | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Integration** | **2** | **2** | **-** |
| **Finite Integration** | **2** | **2** | **-** |
| **Integration Methods (1)** | **2** | **2** | **-** |
| **Integration Methods (2)** | **2** | **2** | **-** |
| **Integration Methods (3)** | **2** | **2** |  |
| **Applications of Finite Integration.** | **2** | **2** | **-** |
| **Mid-Term Exam, Introduction in Plan geometry** | **2** | **2** | **-** |
| **Straight Line** | **2** | **2** | **-** |
| **Circle** | **2** | **2** | **-** |
| **Conic sections (1)** | **2** | **2** | **-** |
| **Conic sections (2)** | **2** | **2** | **-** |
| **Space geometry** | **2** | **2** | **-** |
| **Geometric transformations** | **2** | **2** | **-** |
| **Surfaces** | **2** | **2** | **-** |
| **Total hours** | **28** | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Know** **Mathematical knowledge in solving different problems.** | **🗸** |  |  | |  | **🗸** |  |
| **a2-** | **Determine knowledge of the principles of mathematical modeling and applications.** | **🗸** |  |  | |  | **🗸** |  |
| **a3-** | **State and explain the meaning of complicated statements using mathematical notations and language.** | **🗸** |  |  | |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Apply the knowledge of the mathematical processes for modeling of real-world problems.** |  |  | **🗸** | **🗸** | |  | **🗸** |
| **b2** | **Develop appropriate knowledge and awareness of the importance and applications of mathematical assumption.** |  |  | **🗸** |  | |  | **🗸** |
|  | **b3** | **Confirm wide background knowledge related to the different branches of Mathematics.** |  | **🗸** |  |  | |  |  |
| **Practical and professional skills** | **c1-** | **Analyze the concepts and methods of mathematics to the solution of the real problems in professional practice.** | **🗸** |  |  | |  | **🗸** |  |
| **c2-** | **Examine competence in the use of mathematical methods in problem solving.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **C3** | **Collect wide background knowledge related to the different branches of Mathematics.** |  | **🗸** |  | |  |  |  |
| **General Skills** | **d1-** | **Community linked thinking and solve problems on scientific basis.** |  | **🗸** | **🗸** | | **🗸** |  |  |
| **d2-** | **Working in groups effectively; manage time, collaborate and communicate with others positively.** |  | **🗸** | **🗸** | |  |  |  |
| **d3-** | **Ethical behavior with property rights .** |  | **🗸** | **🗸** | |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2,a3,** | **Week 7** | **10 %** |
| **Oral exam** | **a1, c1, c2,b2,b3,d2,d3** | **Week 15** | **10 %** |
| **Written exam** | **a1, a2, c1, c2, d1,b1,c3,d1** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix** | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | | **c3** | **d1** | **d2** | **d3** |
| **Integration** | **x** |  |  | **x** |  |  |  | **x** |  | | **x** |  |  |
| **Finite Integration** |  |  | **x** |  |  | **x** |  |  |  | |  |  | **x** |
| **Integration Methods (1)** | **x** |  |  |  |  | **x** |  |  |  | |  |  |  |
| **Integration Methods (2)** |  |  | **x** |  |  |  |  |  |  | | **x** |  |  |
| **Integration Methods (3)** |  | **x** |  |  | **x** |  |  | **x** |  | |  |  |  |
| **Applications of Finite Integration.** | **x** |  |  |  |  |  | **x** |  |  | |  |  | **x** |
| **Mid-Term Exam, Introduction in Plan geometry** |  | **x** |  | **x** |  |  |  |  |  | | **x** |  |  |
| **Straight Line** | **x** |  | **x** | **x** |  |  |  |  | **x** | |  |  | **x** |
| **Circle** |  | **x** |  |  |  |  | **x** |  |  | |  |  |  |
| **Conic sections (1)** |  |  |  | **x** |  |  |  |  |  | |  | **x** |  |
| **Conic sections (2)** |  | **x** |  |  |  |  |  | **x** |  | | **x** |  |  |
| **Space geometry** |  |  | **x** |  | **x** |  |  |  |  | |  |  | **x** |
| **Geometric transformations** | **x** |  |  |  |  | **x** |  |  |  | | **x** |  |  |
| **Surfaces** | **x** |  |  |  |  |  |  |  | **x** | |  | **x** |  |

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| **7- List of references:**  **7-1 Course notes**  **-Notes approved by Math. Department.**  **7-2Required books.**  **- Virgil Snyder, Elementary textbook on the calculus.** [**New York,**](https://archive.org/search.php?query=publisher%3A%22New+York%2C+Cincinnati%2C+American+Book+co%22)  **(1912).**  **7-3 Recommended books.**  **- WWL Chen, Notes on first-year calculus, (web edition, 2008).**  **-George R., The Elements of Plane Analytic Geometry, BiblioBazaar ( 2008).**  **7-4 Periodicals, Web sites, etc.**  <https://en.wikipedia.org/wiki/Conic_section>  <http://www.stewartcalculus.com/data/ESSENTIAL%20CALCULUS%20Early%20Transcendentals/upfiles/ess-reviewofconics.pdf>  <http://www.intmath.com/methods-integration/methods-integration-intro.php>  <http://www.intmath.com/methods-integration/7-integration-by-parts.php>  [https://en.wikipedia.org/wiki/Line\_(geometry](https://en.wikipedia.org/wiki/Line_(geometry))(  <http://www.mathsisfun.com/geometry/circle.html> | | | | |
| **8- Facilities required for teaching and learning:**  **Black board and white board** | | |
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| **Course coordinator:** | | | **Dr. Galal Al-Salamouni**  **Dr. Mustafa Hassan**  **Dr. Hoda Abd el Bary** |
| **Head of the Department:** | | | **Prof. Dr Reda Gamal Abd El Rahman** |
| **Date: 9 /12 /2019** | | | **updated 2020/2021** |

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| **Course Specification**  **General Physics (2): 105 Ph** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | | | Mathematics | | |
| **Department offering the course:** | | | | Department of Physics | | |
| **Academic year/level:** | | | | First level | | |
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| **Dates of program specifications approval: The most recent date of the program specification approval: 9/12/2019 (Faculty council; meeting number, 390) updated in 2020/2021, meeting number 419.** | | | | | | |
| **B - Basic information** | | **Code:** 105 Ph | | | **Year/level:** First level | |
| **Teaching Hours:** | | **Lectures:** 2 | | | **Tutorial:** 1 | |
|  | | **Practical:** 0 | | | **Total:**  2 h/week | |
| **C - Professional information** | | | | | | |
| **1 – Course Learning Objectives:**  By Finishing of this course the graduate will able to collect a lot of scientific information about theories of light and their applications in optical instruments. Study some of the the physical properties for mirrors and lenses . Tell about the eye and farsightedness and nearsightedness. Discover the different types of optical instruments. Understanding the electric and magnetic forces and diffrentiate among field ,potential and electromagnetic force . memorize the types of capacitores and dielectric materials . skach some of the electric circuites | | | | | | |
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| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a- Knowledge and understanding:**  On successful completion of the course, the student should able to:  a.1 Memorise a lot of scientific information about theories of light and electromagnetic field and the applications of each other.  a.2- Understand magnetic and electric field nature in addition to mirror and lenses equations.  a.3- Tell about the function of eye, electric circuits and capacitors. | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Interpret data from each optical or electromagnetic systems.  b.2- Assess according to beam reflection what is nature of surface and wave, and according to Electromagnetic induction what is the nature of source.  b.3- Design optical and electromagnetic system by logic way.  b.4- Compare between the use of microscope, telescope, lenses, mirrors and their applications. | | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c.1- Conduct some experiments using lenses in addition to mirrors and electric circuits.  c.2- Analyze the output data from optical and electromagnetic techniques. | | | | | | |
| c.3- Apply the optical and electromagnetic phenomena in modern area applications**.**  **d - General skills:**  On successful completion of the course, the student should be able to:  d.1- Solve problems concerning to the course topics.  d.2- Communicate to work efficiently in a team or separately.  d.3- Collect data and wrighting reports in the different model and fields. | | | | | | |

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| **3 – Contents** | | | | |
| **No.** | **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| 1 | The nature and propagation of light | **2** | **1** | **0** |
| 2 | Reflection and refraction of spherical wave at plane and spherical surfaces | **2** | **1** | **0** |
| 3 | Mirrors and Lenses | **2** | **1** | **0** |
| 4 | The structure of the eye | **2** | **1** | **0** |
| 5 | Cameras, microscopes and Telescopes | **2** | **1** | **0** |
| 6 | Colom's Low and continuity of Colom's low. | **2** | **1** | **0** |
| 7 | **Mid-Term Exam** | **2** | **1** | **0** |
| 8 | Electrostatic field and potential | **2** | **1** | **0** |
| 9 | Capacitors | **2** | **1** | **0** |
| 10 | Dielectric materials | **2** | **1** | **0** |
| 11 | Electric Current and DC Circuits | **2** | **1** | **0** |
| 12 | Kirchhoff Low and electric circuit analysis | **2** | **1** | **0** |
| 13 | Magnetic field and forces | **2** | **1** | **0** |
| 14 | Electromagnetic induction | **2** | **1** | **0** |
|  | **Total hours** | **28** | **14** | **0** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Memorise a lot of scientific information about theories of light and electromagnetic field and the applications of each other. | x | 0 | 0 | x | x | 0 |
| a.2 | Understanding magnetic and electric field nature in addition to mirror and lenses equations. | x | 0 | 0 | x | 0 | x |
| a.3 | Tell about the function of eye, electric circuits and capacitors. | x | x | 0 | x | 0 | x |
| **Intellectual Skills** | b1 | Interpret data from each optical or electromagnetic systems. | x | 0 | 0 | x | 0 | 0 |
| b.2 | Assess according to beam reflection what is nature of surface and wave, and according to Electromagnetic induction what is the nature of source. | x | x | 0 | x | 0 | x |
| b.3 | Design optical and electromagnetic system by logic way. | x | 0 | 0 | x | 0 | x |
| b.4 | Compare between the use of microscope and telescope and lenses and mirrors and application. | x | x | 0 | x | 0 | x |
| **Practical and professional skills** | c.1 | Conduct some experiments using lenses in addition to mirrors and electric circuits. | x | 0 | 0 | x | 0 | 0 |
| c.2 | Analyze the output data from optical and electromagnetic techniques. | x | 0 | 0 | x | x | 0 |
| c.3 | Apply the optical and electromagnetic phenomena in modern area applications. | x | 0 | 0 | x | 0 | x |
| **General Skills** | d.1 | Solve problems concerning to the course topics. | x | x | 0 | x | x | x |
| d.2 | Communicate to work efficiently in a team or separately. | x | 0 | 0 | x | 0 | 0 |
| d.3 | Collect data and wrighting reports in the different model and fields. | x | 0 | 0 | x | 0 | x |

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| |  |  |  |  | | --- | --- | --- | --- | | **5- Students’ Assessment Methods and Grading:** | | | | | **Tools** | **To Measure** | **Time schedule** | | | Semester Work | a.1, a.2, b.1, b.2, c.1, c.2, d.1, and d.2. | Fifth week | | | Mid-Term Exam | a.1, a.3, b.3, b.4, d.2, c.3, and d.3. | Seventh week | | | Oral exam | a.1, a.3, b.2, b.3, b.4, c.3, and d.3. | Fifteenth week | | | Written exam | a.1 to a.3, b.1 to b.4, c.1 to c.3 and d1. | Sixteenth week | | | Total | | | | | |  | | --- | | **6- List of references:** | | **6-1 Course notes**  Lecture notes approved by Physics department.  **6-2 Required books.**   1. Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011)   **6-3 Recommended books.**   1. General Physics, 2nd Edition by [Morton M. Sternheim](http://www.amazon.com/Morton-M.-Sternheim/e/B001IU0X6M/ref=ntt_athr_dp_pel_1) and [Joseph W. Kane](http://www.amazon.com/s/ref=ntt_athr_dp_sr_2?_encoding=UTF8&field-author=Joseph%20W.%20Kane&search-alias=books&sort=relevancerank) , John Willy and sons. Inc., (1991). 2. Physics for Engineers and Scientists 3rd ed by Hans C. Ohanian and John T. Markert.   **6-4 Periodicals, Web sites, etc.**   1. http://www. Physics2000. 2. http://www. Physics today. 3. [https://www.amazon.com/…/…/0393930033/ref=la\_B001IQW79W\_1\_2…](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.amazon.com%2FPhysics-Engineers-Scientists-Third-Vol%2Fdp%2F0393930033%2Fref%3Dla_B001IQW79W_1_2%3Fs%3Dbooks%26ie%3DUTF8%26qid%3D1515033184%26sr%3D1-2&h=ATPv9yyXL6SpjIMGsgZPMBPVpuv73I0DI7y7eZV8s-TFl0ap7Qu2rlMnDdkGuRaK3f3x7Ng5HB26KXh9dO7_S2xnWz1jrc2sNHUuPgZ7rDtiohLYi7_Nc7YhWyaB78WEUOLfVwYWNVwHq-LwMELS1A1QvlnJ4Y3KTO1e-FgTjNmQQFNO6UUurYWx0U5fAlMrLD4qTSjDQM2QfOPjAxmH_yaom8Ehy7Rp0CYHJMdvRh0KSznmeZAykLiqt34IFb_MEEeEA_qKClq9gxXsSnDC3lECH5ZXyM6PN7IbRCHMesm8) | | | | | | | **7- Facilities required for teaching and learning:** | | | | | | * Using a microphone in lectures. * Using a black board. * Group Discussions. * Data show.   **Course coordinator Head of the Department**  Prof. Dr. Saed Abed Elghany Prof. Dr. Mohammed Ali  **Date: 2020/2021** | | | | | |  | | | |

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| **Course Specification**  **Practical physics (2): 181 Ph** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | | | Mathematics | | |
| **Department offering the course:** | | | | Department of Physics | | |
| **Academic year/level:** | | | | First level | | |
|  | | |  | | |
| **B - Basic information** | | | | | | |
| **Title:** Practical Physics (2) | | **Code:** 181 Ph | | | **Year/level:** Firstlevel | |
| **Teaching Hours:** | | **Lectures:** 0 | | | **Tutorial: 0** | |
|  | | **Practical:** 3 | | | **Total:**- 1 h/week | |
| **C - Professional information** | | | | | | |
| **1 – Course Learning Objectives:**  By Finishing of this course the graduate will able to Understand the experimental method to identify and measure some physical quantity related to the electricity-magnetism and optics. Also, it will be able to verify the physical lows and how to calculate the mathematical errors and use the suitable measurement units. He can work in teem to collect data and write an assay, beside knows some applications of physics in the industry | | | | | | |
|  | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a- Knowledge and understanding:**  On successful completion of the course, the student should able to:  a.1- Recognize the concept of physical quantity and physical phenomena.  a.2- Memorize some physical lows.  a.3- Understand the physical principles and experiments. | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Compare between the applications of each physical apparatus.  b.2- Analyze the output data from experimental systems.  b.3 Construct simple systems to verify the physical low. | | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c.1- Sketch the practical data.  c.2- Identify the measuring method and system. | | | | | | |
| c.3- Apply techniques and tools considering scientific ethics.    **d - General skills:**  On successful completion of the course, the student should be able to:  d.1- Solve problems and bulding experimental physical system.  d.2- Communicate to work efficiently in a team or separately.  d.3- Collect data and wrighting reports in the different physical topics. | | | | | | |

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| **3 – Contents** | | | | |
| **No.** | **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| 1 | Introduction in the measurement unites, tools, Eros and Precise measurements. | **0** | **0** | **3** |
| 2 | Ohm’s Law. | **0** | **0** | **3** |
| 3 | The Metric Bridge. | **0** | **0** | **3** |
| 4 | The tangent galvanometer. | **0** | **0** | **3** |
| 5 | Meld’s experiment. | **0** | **0** | **3** |
| 6 | Comparison of magnetic moment of two magnets. | **0** | **0** | **3** |
| 7 | **Mid-Term Exam** | **0** | **0** | **3** |
| 8 | Concave Mirror. | **0** | **0** | **3** |
| 9 | Convex Lens. | **0** | **0** | **3** |
| 10 | Concave Mirror. | **0** | **0** | **3** |
| 11 | Convex Lens. | **0** | **0** | **3** |
| 12 | Newton’s formula of the lenses. | **0** | **0** | **3** |
| 13 | Verification of Kirchhoff’s law. | **0** | **0** | **3** |
| 14 | Review and summary. | **0** | **0** | **3** |
|  | **Total hours** | **0** | **0** | **42** |

**4 - Teaching and Learning methods:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Recognize the concept of physical quantity and physical phenomena. | 0 | 0 | 0 | x | x | 0 |
| a.2 | Memorize some physical lows. | 0 | 0 | 0 | x | 0 | x |
| a.3 | Understand the physical principles and experiments. | 0 | 0 | x | x | x | 0 |
| **Intellectual Skills** | b.1 | Compare between the applications of each physical apparatus. | 0 | 0 | 0 | x | 0 | 0 |
| b.2 | Analyze the output data from experimental systems. | 0 | 0 | x | x | x | x |
| b.3 | Construct simple systems to verify the physical lows. | 0 | 0 | 0 | x | 0 | 0 |
| **Practical and professional skills** | c.1 | Sketch the practical data. | 0 | 0 | 0 | x | x | 0 |
| c.2 | Identify the measuring method and system. | 0 | 0 | x | x | x | 0 |
| c.3 | Apply techniques and tools considering scientific ethics. | 0 | 0 | x | x | 0 | 0 |
| **General Skills** | d.1 | Solve problems and bulding experimental physical system. | 0 | 0 | 0 | x | x | x |
| d.2 | Communicate to work efficiently in a team or separately. | 0 | 0 | x | x | 0 | 0 |
| d.3 | Collect data and wrighting reports in the different physical topics. | 0 | 0 | x | x | x | x |

**5- Students’ Assessment Methods and Grading:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Tools:** | To Measure | **Time schedule** | **Grading** |
| Semester Work | a.1, a.2, a.3, b.1, b.2, c.1, c.2, d.1 and d.2. | Fifth week | 10% |
| Mid-Term Exam | a.1, a.3, b.2, b.3, d.2, c.3, and d.3. | Seventh week | 10% |
| Oral exam | a.2, a.3, b.2, b.3, c.3, and d.3. | Fifteenth week | 20% |
| Final exam | a.1 to a.3, b.1 to b.3, c.1 to c.3 and d1. | Sixteenth week | 60% |
| Total | | | 100 % |
|  | | | | |
| |  | | --- | | **6- List of references:** | | **6-1 Course notes**  Practical notes approved by Physics department.  **6-2 Required books.**   1. Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011)   **6-3 Recommended books.**   1. Physics: for Scientists and Engineers with Modern Physics, 3rd Ed by Paul M. Fishbane and ‎ Stephen Gasiorowicz.   **6-4 Periodicals, Web sites, etc.**   1. [https://www.amazon.com/Physics-Scientists-En…/…/ref=sr\_1\_12…](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.amazon.com%2FPhysics-Scientists-Engineers-Modern-Third%2Fdp%2F0130352993%2Fref%3Dsr_1_12%3Fs%3Dbooks%26ie%3DUTF8%26qid%3D1515032790%26sr%3D1-12%26keywords%3DPhysics%2Bfor%2BScientists%2B%2526%2BEngineers%2Bwith%2BModern%2BPhysics&h=ATPcPqe3giBfYgivljOYA2JmfVfTOFp65X4dWCeUNgnGjYIlAXjG-njPjfdZETCMVne9TEKtxacANH11fB_Q7ZmbM9_OVsrkviPYAs4fuH2wkW8Hr_AH85Xec9No6WmArFvJ43y1TLZdMx0iD8BLp3fBke3T2_QT9MncZOVkhl5akckyE9COy55TIo7Bg5Ei8PA53MvjutxUm-aDMefyX9rPD6nS0UBA-48sdS81ygT39rfPs9jlBfNSkCbgZxRn5lpM4nTT4uF1L5ax9QsWCal7C0CZccl2C1rv7D58DbCe) 2. http://www. Physics2000. 3. http://www. Physics today. | | | | | |

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| **7- Facilities required for teaching and learning:** |
| |  | | --- | | * Using a black board. * Group Discussions. * Data show. * Equipements. |   **Course coordinator Head of the Department**  Dr. Mohammed Abdel-Moneim Prof. Dr. Mohammed Ali  **Date**: **2020/2021** |

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| **Course Specification**  **Applied Physics (2): 185 Ph** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | | | Mathematics | | |
| **Department offering the course:** | | | | Department of Physics | | |
| **Academic year/level:** | | | | First level | | |
|  | | |  | | |
| **Title:** Applied Physics (2) | | **Code:** 185 Ph | | | **Year/level:** First level | |
| **Teaching Hours:** | | **Lectures:** 0 | | | **Tutorial: 2** | |
|  | | **Practical:** 0 | | | **Total:**  1h/week | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:**  By Finishing of this course the graduate will able to collect a lot of scientific information about theories of light and their applications in optical instruments. Study some of the the physical properties for mirrors and lenses.Understand the eye and far sightedness and near sightedness. Discover the different types of optical instruments. Understanding the electric and magnetic forces and diffrentiate among field ,potential and electromagnetic force. Memorize the types of capacitores and dielectric materials . skach some of the electric circuites. | | | | | | |
|  | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a- Knowledge and understanding:**  On successful completion of the course, the student is able to:  a.1- Memorise a lot of scientific information about theories of light and electromagnetic field and the applications of each other.  a.2- Understanding the magnetic and electric field nature in addition to mirror and lenses equations.  a.3- Know the function of eye, electric circuits and capacitors. | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Interpret data from each optical or electromagnetic systems.  b.2- Assess according to beam reflection what is nature of surface and wave, and according to Electromagnetic induction what is the nature of source.  b.3- Design optical and electromagnetic system by logic way.  b.4- compare between the use of microscope and telescope, lenses and mirrors, and their applications. | | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to:  c.1- Conduct some experiments using lenses in addition to mirrors and electric circuits.  c.2-. Analyze the output data from optical and electromagnetic techniques. | | | | | | |
| c.3- Apply the optical and electromagnetic phenomena in modern area applications**.**  **d - General skills:**  On successful completion of the course, the student should be able to:  d.1- Solve problems concerning to the course topics.  d.2- Communicate to work efficiently in a team or separately.  d.3- Collect data and wrighting reports in the different model and fields. | | | | | | |

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| **3 – Contents** | | | | |
| **No.** | **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| 1 | Application on The nature and propagation of light | 0 | 1 | 0 |
| 2 | Application on Reflection and refraction of spherical wave at plane and spherical surfaces | 0 | 1 | 0 |
| 3 | Application on Mirrors and Lenses. | 0 | 1 | 0 |
| 4 | Application on the structure of the eye. | 0 | 1 | 0 |
| 5 | Application on Cameras, microscopes and Telescopes. | 0 | 1 | 0 |
| 6 | Colomb's Low and & continuity of Colom's low. | 0 | 1 | 0 |
| 7 | **Mid-Term Exam** | 0 | 1 | 0 |
| 8 | Application on Electrostatic field and potential**.** | 0 | 1 | 0 |
| 9 | Application on Capacitors. | 0 | 1 | 0 |
| 10 | Application on Dielectric materials. | 0 | 1 | 0 |
| 11 | Application on Electric Current and DC Circuits. | 0 | 1 | 0 |
| 12 | Application on Kirchhoff Low and electric circuit analysis. | 0 | 1 | 0 |
| 13 | Application on Magnetic field and forces. | 0 | 1 | 0 |
| 14 | Application on Electromagnetic induction. | 0 | 1 | 0 |
|  | **Total hours** | **0** | 14 | **0** |

**4 - Teaching and Learning methods:**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Memorise a lot of scientific information about theories of light and electromagnetic field and the applications of each other. | x | 0 | 0 | x | x | 0 |
| a.2 | Understanding the magnetic and electric field nature in addition to mirror and lenses equations. | x | 0 | 0 | x | 0 | x |
| a.3 | Understanding the function of eye, electric circuits and capacitors. | x | x | 0 | x | 0 | x |
| **Intellectual Skills** | b1 | Interpret data from each optical or electromagnetic systems. | x | 0 | 0 | x | 0 | 0 |
| b.2 | Assess according to beam reflection what is nature of surface and wave, and according to Electromagnetic induction what is the nature of source | x | x | 0 | x | 0 | x |
| b.3 | Design optical and electromagnetic system by logic way. | x | 0 | 0 | x | 0 | x |
| b.4 | compare between the use of microscope and telescope and lenses and mirrors and application. | x | x | 0 | x | 0 | x |
| **Practical and professional skills** | c.1 | Counduct some experiments using lenses in addition to mirrors and electric circuits. | x | 0 | 0 | x | 0 | 0 |
| c.2 | Analyze the output data from optical and electromagnetic techniques. | x | 0 | 0 | x | x | 0 |
| c.3 | Apply the optical and electromagnetic phenomena in modern area applications | x | 0 | 0 | x | 0 | x |
| **General Skills** | d.1 | Solve problems concerning to the course topics. | x | x | 0 | x | x | x |
| d.2 | Communicate to work efficiently in a team or separately. | x | 0 | 0 | x | 0 | 0 |
| d.3 | Collect data and wrighting reports in the different model and fields. | x | 0 | 0 | x | 0 | x |

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| **5- Students’ Assessment Methods and Grading:** | | | | |
| **Tools** | **To Measure** | **Time schedule** | **Grading** | |
| Semester Work | a.1, a.2, b.1, b.2, c.1, c.2, d.1 and d.2. | Fifth week | 5 % | |
| Mid-Term Exam | a.1, a.3, b.3, b.4, d.2, c.3, and d.3. | Seventh week | 5 % | |
| Oral exam | a.1, a.3, b.2, b.3, b.4, c.3, and d.3. | Fifteenth week | 10 % | |
| Written exam | a.1 to a.3, b.1 tob.4, c.1 to c.3 and d1. | Sixteenth week | 80 % | |
| Total | | | 100 % | |
|  | | | | |
| |  | | --- | | **6- List of references:** | | **6-1 Course notes**  Lecture notes approved by Physics department.  **6-2 Required books.**  1-Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011)   * 1. **Recommended books.**  General Physics, 2nd Edition by [Morton M. Sternheim](http://www.amazon.com/Morton-M.-Sternheim/e/B001IU0X6M/ref=ntt_athr_dp_pel_1) and [Joseph W. Kane](http://www.amazon.com/s/ref=ntt_athr_dp_sr_2?_encoding=UTF8&field-author=Joseph%20W.%20Kane&search-alias=books&sort=relevancerank) , John Willy and sons. Inc., (1991)  1. Physics for Engineers and Scientists 3rd ed by Hans C. Ohanian and John T. Markert.   **6-4 Periodicals, Web sites, etc.**   1. [https://www.amazon.com/…/…/0393930033/ref=la\_B001IQW79W\_1\_2…](https://l.facebook.com/l.php?u=https%3A%2F%2Fwww.amazon.com%2FPhysics-Engineers-Scientists-Third-Vol%2Fdp%2F0393930033%2Fref%3Dla_B001IQW79W_1_2%3Fs%3Dbooks%26ie%3DUTF8%26qid%3D1515033184%26sr%3D1-2&h=ATPv9yyXL6SpjIMGsgZPMBPVpuv73I0DI7y7eZV8s-TFl0ap7Qu2rlMnDdkGuRaK3f3x7Ng5HB26KXh9dO7_S2xnWz1jrc2sNHUuPgZ7rDtiohLYi7_Nc7YhWyaB78WEUOLfVwYWNVwHq-LwMELS1A1QvlnJ4Y3KTO1e-FgTjNmQQFNO6UUurYWx0U5fAlMrLD4qTSjDQM2QfOPjAxmH_yaom8Ehy7Rp0CYHJMdvRh0KSznmeZAykLiqt34IFb_MEEeEA_qKClq9gxXsSnDC3lECH5ZXyM6PN7IbRCHMesm8) 2. http://www. Physics2000 3. http://www. Physics today | | | | | |
| |  | | --- | |  | | | | | |
| **7- Facilities required for teaching and learning:** | | | |
| 1. Using a microphone in lectures. 2. Using a black board. 3. Group Discussions. 4. Data show. | | | |

**Course coordinator Head of the Department**

Prof. Dr/ Mohamed Ali Prof. Dr. Mohamed Ali

**Dr. Mustafa Ismael**

**Second Level**

**First Semester**

**Course Specification**

**A- Affiliation**

|  |  |  |  |
| --- | --- | --- | --- |
| Relevant program: | Computer Science | | |
| Department offering the program: | | **Mathematics** | |
| Department offering the course: | | **Mathematics** | |
| Academic year/level: | | **Second Level/First Semester** | |
| Date of specifications approval: | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| B - Basic information | | | |
| Title:  High Calculus | | **Code:**  **211M** | **Year/level:**  **Second Level / First Semester** |
| Teaching Hours: | | **Lectures: 2** **h/week** | **Tutorial: 2 h/week** |
|  | | **Practical: ــــ** | **Total:** **3 h/week** |
| C - Professional information | | | |
| 1 – Course Learning Objectives: | | | |
| At the end of this course, the students must be able to:-  Provide an overview of standard methods of the calculus of functions of  than one variable and (Multiple -Trible) integrals, with some applications. | | | |
| 2 - Intended Learning Outcomes (ILOS) | | | |
| a - Knowledge and understanding:  At the end of this course, the students must be able to:-   1. To know certain methods limits and continuity the functions of several variables. 2. Record knowledge some the applications for the partial derivatives 3. Record knowledge some the applications for the multiple integrals (double – triple). 4. State methods on the line and surface integrals (Gauss-Stokes Theorem ). 5. Explain the different methods, graphs some Surfaces and calculate some integrals using Mathematics and Matlab programs. | | | |
| b - Intellectual skills:  At the end of this course, the students must be able to:   1. Solve some problems of the limits and continuity functions of several variables. 2. Apply the basic skills of continuity and differentiability of functions of two variables. 3. Apply the basic techniques of Multiple (Double-Trible) and linear integrals 4. Create discussions on resolving the exercises. | | | |
| c - Practical and professional skills:  At the end of this course, the students must be able to:   1. Solve some problems in advanced calculus. 2. Compare different methods for calculating area under curves. 3. Assess some methods for solving problems in different fields .   d - General skills:  At the end of this course, the students must be able to:   1. Community linked thinking and solve problems on a scientific basis. 2. Working in groups effectively; manage time, collaborate and communicate with others positively. 3. Using internet and library. | | | |

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| --- | --- | --- | --- | --- |
| **3 – Contents** | | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | | **Practical hours** |
| **Introduction to Functions of several variables** | **2** | | **2** |  |
| **Functions of several variables** | **2** | | **2** |  |
| **Limits and continuity of functions of several variables** | **2** | | **2** |  |
| **Partial Derivatives** | **2** | | **2** |  |
| **Applications on Partial Derivatives** | **2** | | **2** |  |
| **Integrals Line and Surface**. | **2** | | **2** |  |
| **Lagrange multipliers.** | **2** | | **2** |  |
| **Normal lines and tangent planes – Extreme** | **2** | | **2** |  |
| **Double integrals** | **2** | | **2** |  |
| **Triple integrals** | **2** | | **2** | **-** |
| **Transformation of coordinates** | **2** | | **2** | **-** |
| **Change of variables in multiple** | **2** | | **2** | **-** |
| **Using Mathematica programs for graphing some Surfaces and calculate some integrals** | **2** | | **2** | **-** |
| **Using Matlab programs for graphing some Surfaces and calculate some integrals** | **2** | | **2** | **-** |
| **Total hours** | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1** | **Know certain methods limits and continuity the functions of several variables.** | **🗸** |  |  |  | **🗸** |  |
| **a2** | **Record knowledge some the applications for the partial derivative** | **🗸** |  |  | **🗸** | **🗸** | **🗸** |
| **a3** | **Record knowledge some the applications for the multiple integrals (double – triple).** | **🗸** |  |  |  | **🗸** |  |
| **a4** | **State methods on the line and surface integrals (Gauss-Stokes Theorem ).** | **🗸** |  |  |  | **🗸** |  |
| **a5** | **Explain the different methods, graphs some Surfaces and calculate some integrals using Mathematics and Matlab programs.** | **🗸** | **🗸** |  |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Solve some problems of the limits and continuity functions of several variables.** | **🗸** |  | **🗸** |  | **🗸** |  |
| **b2** | **Apply the basic skills of continuity and differentiability of functions of two variables.** | **🗸** |  |  |  | **🗸** |  |
| **b3** | **Apply the basic techniques of Multiple (Double-Trible) and linear integrals.** | **🗸** |  |  |  | **🗸** |  |
| **b4** | **Create discussions on resolving the exercises.** | **🗸** |  |  |  | **🗸** |  |
| **Practical and professional skills** | **c1** | **Solving some problems in advanced calculus.** | **🗸** |  | **🗸** |  |  | **🗸** |
| **c2** | **Compare between different methods for calculating area under curves.** | **🗸** |  |  |  | **🗸** |  |
| **c3** | **Assess some methods for solving problems in different fields .** | **🗸** |  |  |  | **🗸** |  |
| **General Skills** | **d1** | **Community linked thinking and solve problems on a scientific basis.** | **🗸** | **🗸** |  |  | **🗸** |  |
| **d2** | **Working in Groups effectively; manage time, collaborate and communicate with others positively.** | **🗸** |  |  |  | **🗸** |  |
| **d3** | **Using internet and library.** |  |  | **🗸** |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1 , a2, b1, b4 , c2, c3** | **Week 7** | **10 %** |
| **Oral exam** | **a3, a4, a5, b1,b2,c1,d2,d3** | **Week 15** | **10 %** |
| **Written exam** | **a5,b3, b2,a1,a3,d1** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix** | | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | | | **Practical and professional skills** | | | **General**  **skills** | | |
| **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **b3** | **b4** | **c1** | | **c2** | **c3** | **d1** | **d2** | **d3** |
| **Introduction to Functions of several variables** | **x** |  |  | **x** |  |  |  |  |  | **x** | |  | **x** |  |  |  |
| **Functions of several variables** | **x** |  |  |  |  | **x** |  |  |  |  | |  |  |  | **x** |  |
| **Limits and continuity of functions of several variables** |  |  |  |  | **x** |  |  |  | **x** |  | |  |  |  |  | **x** |
| **Partial Derivatives** |  | **x** |  | **x** |  |  |  | **x** |  |  | |  |  |  |  |  |
| **Applications on Partial Derivatives** |  |  |  |  |  | **x** |  |  |  |  | | **x** |  |  |  |  |
| **Integrals Line and Surface** |  | **x** |  |  |  |  |  |  |  |  | |  |  |  |  |  |
| **Lagrange multipliers.** |  |  |  |  | **x** |  |  |  | **x** |  | |  |  | **x** |  |  |
| **Normal lines and tangent planes – Extreme** |  |  | **x** |  |  |  |  | **x** |  |  | |  |  |  | **x** |  |
| **Double integrals** |  |  | **x** |  |  | **x** |  |  |  |  | |  | **x** |  |  |  |
| **Triple integrals** |  |  |  |  |  |  |  |  | **x** |  | |  |  |  |  |  |
| **Transformation of coordinates** |  |  |  | **x** |  | **x** |  |  |  |  | |  |  |  | **x** |  |
| **Change of variables in multiple** |  |  | **x** |  |  |  |  | **x** |  |  | |  | **x** |  |  |  |
| **Using Mathematica programs for graphing some Surfaces and calculate some integrals** | **x** |  |  |  |  | **x** |  |  |  |  | | **x** |  |  | **x** |  |
| **Using Matlab programs for graphing some Surfaces and calculate some integrals** |  | **x** |  |  | **x** |  |  |  |  |  | |  | **x** |  |  | **x** |

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| **7- List of references:**  **7-1 Course notes**  **-Notes were approved by the Math Department.**  **7-2Required books.**  **- C. H Edwards, Elementary differential equations with boundary value problems, Pearson Prentice Hall, 2004**  **7-3 Recommended books.**  **1-****J .Amazigo and L. Rubenfeld:" Advanced Calculus", John Willey, New York**  **1980.**  **2- Salas S. Hille E.and Anderson J. : " Calculus of One and Several Variables "**  **Second Editions, John Willey and Sons 1986**  **7-4 Periodicals, Web sites, etc.**  [**http://ocw.mit.edu/courses/mathematics/18-022-calculus-of-several-variables-fall-2010/lecture-notes/**](http://ocw.mit.edu/courses/mathematics/18-022-calculus-of-several-variables-fall-2010/lecture-notes/)  [**https://www.youtube.com/watch?v=9ndmazucbpc**](https://www.youtube.com/watch?v=9ndmazucbpc)  **8- Facilities required for teaching and learning** | | |
| **­ Black board and white board** | | |
| **Course coordinator:** | | **Dr. Ahmed Mohamed** |
| **Head of the Department:** | | **Prof. Dr** **Reda Gamal Abd El Rahman** |
| **Date: 9/ 12 /2019** | | **Updated 2020/2021** |

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| **Course Specification**  **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Second Level/First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Real analysis (1)** | | **Code:**  **223M** | | **Year/level:**  **Second Level/First Semester** | | |
| **Teaching Hours: 42** | | **Lectures: 3** **h/week** | | **Tutorial: -** | | |
|  | | **Practical: ــــ** | | **Total:** **3h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Be familiar with the fundamental concepts of Real analysis 1, such as, real numbers, real sequences, sequence of functions continuous functions, Differentiation, Riemann integral, and measure on the real numbers.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know basic definitions and Theories of the course.** 2. **State the properties of the real numbers system.** 3. **Identify on the real sequences.** 4. **To know continuous functions, uniform continuity, and monotone functions.** 5. **Memorize differentiation, the chain rule, Roll's Theorem and the mean value theorem, L'Hospitale rule.** 6. **Define The Riemann Integral, and it's properties.** 7. **Describe the fundamental theorem of calculas.** 8. **Explain measuring on Real numbers.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the role of Real analysis1 in different Mathematical branches.** 2. **Compare the different methods on the behavior of the sequences.** 3. **Discover The fundamental differences between continuous and non continuos functions.** 4. **Interpret the meaning of differentiable , Integration, and measuring on Real numbers.** 5. **Apply Real analysis (1) to other fields both within and without mathematics.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **C1-Solve problems using various methods and forms.**   1. **Make logical proofs to construct convincing mathematical arguments.** 2. **Apply Real analysis (1) to solve problems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific bases.** 3. **Using internet effectively.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Real number system** | | | **3** | | **-** | **-** |
| **Real sequences (1)** | | | **3** | | **-** | **-** |
| **Real sequences (2)** | | | **3** | | **-** | **-** |
| **Continuous functions (1)** | | | **3** | | **-** | **-** |
| **Continuous functions (2)** | | | **3** | | **-** | **-** |
| **Continuous functions (3)** | | | **3** | |  |  |
| **Differentiation (1) + Mid-Term Exam** | | | **3** | | **-** | **-** |
| **Differentiation (2)** | | | **3** | |  |  |
| **Differentiation (3)** | | | **3** | |  |  |
| **Rimann integral (1)** | | | **3** | |  |  |
| **Rimann integral (2)** | | | **3** | | **-** | **-** |
| **Measure on the real number** | | | **3** | | **-** | **-** |
| **Improper integrals (1)** | | | **3** | |  |  |
| **Improper integrals (2)** | | | **3** | |  |  |
| **Total hours** | | | **42** | | **-** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| ***Knowledge & Understanding*** | **a1-** | **Know basic definitions and Theories of the course** | **🗸** |  | **🗸** |  | **🗸** |  |
| **a2-** | **State the real numbers system** | **🗸** | **🗸** | **🗸** |  | **🗸** | **🗸** |
| **a3-** | **Identify on the real sequences** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **a4-** | **To know continuous functions, uniform continuity, and monotone functions** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **a5-** | **Memorize on differentiation, the chain rule, Roll's Theorem and the mean value Theorem, L'Hospitale rule** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **a6-** | **Define The Riemann Integral, and it's properties.** | **🗸** |  | **🗸** | **🗸** | **🗸** | **🗸** |
| **a7-** | **Describe the fundamental theorem of calculas.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **a8-** | **Explain measuring on Real numbers.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **Intellectual Skills** | **b1-** | **Apply the role of real analysis (1) in different Mathematical branches.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **b2-** | **Compare the different methods the behavior of the sequences** |  |  | **🗸** |  | **🗸** | **🗸** |
| **b3-** | **Discover The fundamental differences between continuous and non continuos functions** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **b4-** | **Interpret, the meaning of differentiable , Integration, and measuring on Real numbers** | **🗸** |  | **🗸** | **🗸** | **🗸** | **🗸** |
| **b5-** | **Apply Real analysis 1 to other fields both within and without mathematics.** | **🗸** | **🗸** | **🗸** |  | **🗸** | **🗸** |
| **Practical and professional skills** | **c1-** | **Solve problems using various methods and forms.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **c2-** | **Make logical proofs to construct convincing mathematical arguments.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **c3-** | **Apply Real analysis (1) to solve problems** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **General Skills** | **d1-** | **Working in groups effectively.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **d2-** | **Community linked thinking, set tasks and solve problems on scientific bases.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **d3-** | **Using internet effectively.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a4 –a5,a6-b1-c1- d1- d2 .b3,b4** | **Week 7** | **10 %** |
| **Oral exam** | **a1-b1- d1,a7,a8,b5,c2,c3,d1,d3** | **Week 15** | **10 %** |
| **Practical exams** |  |  |  |
| **Written exam** | **a1 –a2- a3 -c1- d2,b1,b2** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course matrix** | | | | | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | | | | **Intellectual skills** | | | | | **Practical and professional skills** | | | **General**  **skills** | | |
| **a1** | **a2** | **a3** | **a4** | **a5** | **a6** | **a7** | **a8** | **b1** | **b2** | **b3** | **b4** | **b5** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** |
| **Real number system** | **x** |  |  |  | **x** |  |  |  |  |  |  |  | **x** | **x** |  |  |  |  |  |
| **Real sequences (1)** |  |  | **x** |  |  |  |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |  |
| **Real sequences (2)** | **x** |  |  |  |  |  | **x** |  |  |  |  |  |  |  |  | **x** |  |  | **x** |
| **Continuous functions (1)** |  |  |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  |  | **x** |  |  |
| **Continuous functions (2)** |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  |  | **x** |  |  |  |  |
| **Continuous functions (3)** | **x** |  |  | **x** |  |  |  |  |  |  | **x** |  |  |  |  |  |  | **x** |  |
| **Differentiation (1) + Mid-Term Exam** |  |  |  |  |  |  |  | **x** |  |  | **x** |  |  |  |  | **x** |  |  | **x** |
| **Differentiation (2)** |  |  | **x** |  |  | **x** |  |  |  |  | **x** |  | **x** |  |  |  |  | **x** |  |
| **Differentiation (3)** |  |  | **x** |  | **x** |  |  |  |  | **x** |  |  |  | **x** |  |  | **x** |  |  |
| **Rimann integral (1)** | **x** |  |  |  |  | **x** |  |  |  |  |  |  | **x** |  |  | **x** |  |  |  |
| **imann integral (2)** |  | **x** |  |  |  |  | **x** |  | **x** |  |  | **x** |  |  |  |  |  | **x** |  |
| **Measure on the real number** |  | **x** |  | **x** |  |  |  |  |  |  |  | **x** |  |  |  |  |  |  | **x** |
| **Improper integrals (1)** | **x** |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |
| **Improper integrals (2)** |  |  | **x** |  |  |  |  |  |  |  |  |  | **x** |  | **x** |  |  |  |  |

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| **7- List of references:** | | | | | | |
| **7-1 Course notes**  **-Notes were approved by the Math Department.**   * 1. **Required books.**   **-Elementary Linear Algebra, William L. Perry, 1988.**  **7-3 Recommended books.**  **-Introduction To Mathematical Analysis, William R. Parznski Philip and W. Zipse**  **7-4 Periodicals, Web sites, etc.**  http://www.gettextbooks.com/isbn\_9780070494312.htmlhttps://books.google.com.eg/books/about/Introduction\_to\_Mathematical\_Analysis.html?id=7nlyAAAACAAJ&redir\_esc=y | | | | | | |
| **8- Facilities required for teaching and learning:**  **Data show- White board**  **­** | | | | | | |
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| **Course coordinator:** | | **Dr. Amira Masoud** | |
| **Head of the Department:** | | | **Prof. Dr**. **Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | **Updated 2020/2021** | |

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| **Course Specification**  **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Second level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Discrete Mathematics** | | **Code:**  **225 M** | | **Year/level:**  **Second** **level / First** **Semester** | | |
| **Teaching Hours: 42 h** | | **Lectures: 2** **h/week** | | **Tutorial: 2** **h/week** | | |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Recognize the basic concepts , of discrete mathematics such as, sets, Groups, Relations, Equivalence classes , Mappings , Binary operations , Counting , Graph theory , Multiple charts , Charts planar, Coloring and trees , Mathematical Logic , Boolean algebra , Bilateral , Basic theories , and gates and logic circuits.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know discrete mathematics, algorithms, and combinatorial abilities in order to solve problems of finite character and enumerate sets without direct counting.** 2. **Define the sets , groups, Graph theory, Boolean algebra and logic circuits**. 3. **Identify core of analysis, algebra and applied mathematics.** 4. **Describe the relation between the studied topics and the environment.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Discover the validity of mathematical results.** 2. **Interpret the fundamental differences between mathematical objects.** 3. **Develop appropriate methods of proof.** 4. **Solve critically evaluate and justify proposed design solutions.** 5. **Create criteria, and verify solutions of Mathematical Logic and Boolean algebra.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Summarize problems using various formats.** 2. **Solve related problems in sets, groups, Graph theory and Boolean algebra.** 3. **Analyze basic the logic principles.** 4. **Investigate logical techniques to construct convincing** **mathematical arguments.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific bases.** 3. **Ethical behavior with property rights.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Mathematical logic** | | | **2** | | **2** | **-** |
| **Sets** | | | **2** | | **2** | **-** |
| **Relations** | | | **2** | | **2** | **-** |
| **Equivalence relations** | | | **2** | | **2** | **-** |
| **Mappings** | | | **2** | | **2** | **-** |
| **Counting – Rules of inference** | | | **2** | | **2** | **-** |
| **Mid-Term Exam, Introduction in Graph theory** | | | **2** | | **2** | **-** |
| **Graphs and multigraphs** | | | **2** | | **2** | **-** |
| **Planar graphs** | | | **2** | | **2** | **-** |
| **Colorations** | | | **2** | | **2** | **-** |
| **Trees** | | | **2** | | **2** | **-** |
| **Binary operations – Boolean Algebra** | | | **2** | | **2** | **-** |
| **Duality – Basic** **theorems** | | | **2** | | **2** | **-** |
| **logic Gates and Circuits.** | | | **2** | | **2** | **-** |
| **Total hours** | | | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Know discrete mathematics, algorithms, and combinatorial abilities in order to solve problems of finite character and enumerate sets without direct counting.** | | **🗸** |  |  | **🗸** |  |  |
| **a2-** | **Define the sets, groups, Graph theory, Boolean algebra and logic circuits.** | | **🗸** |  |  |  | **🗸** |  |
| **a3-** | **Identify core of analysis, algebra and applied mathematics.** | | **🗸** |  |  |  | **🗸** |  |
| **a4-** | **Describe the relation between the studied topics and the environment.** | | **🗸** |  |  |  | **🗸** |  |
| **Intellectual Skills** | **b1** | | **Discover the validity of mathematical results.** |  | **🗸** |  |  |  | **🗸** |
| **b2** | | **Interpret the fundamental differences between mathematical objects.** |  | **🗸** |  |  |  | **🗸** |
| **b3** | | **Develop appropriate methods of proof.** |  | **🗸** | **🗸** | **🗸** |  |  |
|  | **b4** | | **Solve critically evaluate and justify proposed design solutions.** | **🗸** |  |  |  | **🗸** |  |
|  | **b5** | | **Create criteria, and verify solutions of Mathematical Logic and Boolean algebra.** | **🗸** |  |  |  | **🗸** | **🗸** |
| **Practical and professional skills** | **c1-** | **Summarize problems using various formats.** | | **🗸** |  |  | **🗸** | **🗸** |  |
| **c2-** | **Solve related problems in sets, groups, Graph theory and Boolean algebra.** | | **🗸** |  |  | **🗸** | **🗸** |  |
| **c3-** | **Analyze basic the logic principles.** | | **🗸** |  |  |  | **🗸** |  |
| **c4-** | **Investigate logical techniques to construct convincing** **mathematical arguments.** | | **🗸** |  |  |  | **🗸** |  |
| **General Skills** | **d1** | | **Working in groups effectively.** |  | **🗸** | **🗸** |  | **🗸** |  |
| **d2** | | **Community linked thinking, set tasks and solve problems on scientific bases.** |  | **🗸** | **🗸** |  | **🗸** |  |
| **d3** | | **Ethical behavior with property rights .** | **🗸** | **🗸** | **🗸** |  |  |  |

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| 5- Students’ Assessment Methods and Grading: | | | | | | |
| Tools: | **To Measure** | | **Time schedule** | | **Grading** | |
| Mid-Term Exam | **a1, a2,a3,a4,b1,b2,c4** | | **Week 7** | | **10 %** | |
| Oral exam | **a1, a2, c1, c2, d1,b3,b5,d3** | | **Week 15** | | **10 %** | |
| Written exam | **a1, a2, c3, c2,b4,d2** | | **Start of 16th week** | | **80 %** | |
| Total | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course matrix** | | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | | **Practical and professional skills** | | | | **General**  **skills** | | | | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **b5** | **c1** | **c2** | **c3** | **c4** | **d1** | **d2** | **d3** | | **Mathematical logic** | **x** |  |  |  |  |  |  |  | **x** |  |  |  | **x** |  |  |  | | **Sets** |  | **x** |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |  | | **Relations** | **x** |  |  |  |  |  | **x** |  |  |  |  |  |  |  |  | **x** | | **Equivalence relations** |  | **x** |  |  |  |  |  | **x** |  |  |  |  | **x** |  |  |  | | **Mappings** |  |  |  | **x** |  | **x** |  |  |  |  | **x** |  |  |  |  |  | | **Counting – Rules of inference** | **x** |  |  |  |  |  | **x** |  |  |  |  |  |  |  | **x** |  | | **Mid-Term Exam, Introduction in Graph theory** |  |  | **x** |  |  |  | **x** |  |  |  |  | **x** |  |  |  | **x** | | **Graphs and multigraphs** |  |  | **x** |  |  |  | **x** |  | **x** |  |  |  | **x** |  | **x** |  | | **Planar graphs** |  |  | **x** |  |  |  |  | **x** |  | **x** |  |  |  |  |  | **x** | | **Colorations** | **x** |  |  |  |  |  |  |  | **x** |  |  | **x** |  |  |  |  | | **Trees** |  | **x** |  |  | **x** |  |  |  |  |  |  |  |  |  | **x** |  | | **Binary operations – Boolean Algebra** |  |  |  | **x** |  |  |  | **x** |  |  |  |  |  | **x** |  |  | | **Duality – Basic theorems** | **x** | **x** |  |  |  |  | **x** |  |  |  | **x** |  |  |  |  | **x** | | **logic Gates and Circuits.** |  |  | **x** |  |  |  |  |  | **x** |  |  | **x** |  |  | **x** |  | | | | | | | |
| 7- List of references:  7-1 Course notes  Notes were approved by the Math. Department.  7-2 Required books.  R.Garnier, J. Taylor, Discrete Mathematics for New Technology, Institute of Physics Publishing, London, (1992).  7-3 Periodicals, Web sites, etc.  <https://en.wikipedia.org/wiki/Discrete_mathematics>  <http://faculty.atu.edu/mfinan/main2.pdf>  <http://www.cims.nyu.edu/~regev/teaching/discrete_math_fall_2005/dmbook.pdf> | | | | | | |
| 8- Facilities required for teaching and learning:  ­ | | | | | |
| Black board and white board | | | | | |
| Course coordinator: | | **Dr. Islam Ahmed** | |
| Head of the Department: | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| Date: 9/12/2019 | | **updated 2020/2021** | |

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| **Course Specification**  **A- Affiliation** | | | |
| **Relevant program:** | **Computer science** | | |
| **Department offering the program:** | | **Mathematics** | |
| **Department offering the course:** | | **Mathematics** | |
| **Academic year/level:** | | **Second level / First Semester** | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| B - Basic information | | | |
| **Title:**  **Newtonian Mechanics** | | **Code:**  **231 M** | **Year/level:**  **Second level / First Semester** |
| **Teaching Hours: 42 h** | | **Lectures: 2** **h/week** | **Tutorial: 2 h/week** |
|  | | **Practical: -** | **Total:** **3 h/week** |
| C - Professional information | | | |
| **1 – Course Learning Objectives:** | | | |
| **: At the end of this course, the students must be able to**  **Know the motion related to different coordinates; on the other hand the student must study the motion of a particle in a straight line and in a plane by using different coordinates. Finally, they must study some physical phenomena's which concerns with Newtonian mechanics.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know the related basic scientific facts, relevant theories and mechanisms supporting the structure concerned with the velocity and acceleration in different coordinates.** 2. **Explain the theories and methods; demonstrate basic knowledge and understanding programming concepts in order deal with Dynamics.** 3. **Describe the relation between the studied topics and environment by studying some dynamical systems that have physical feedback.** 4. **Identify the meaning of some dynamical operators using some mathematical notations.** 5. **Memorize what was studying in the previous courses.** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Discover the difference between qualitatively the theories and basic principles of Newtonian Mechanics.** 2. **Develop high lines and deduce procedures to handle dynamical problems.** 3. **Construct abstract and mathematical models for real world dynamical problems.** 4. **Apply the principles of effective information management to various information dynamical systems.** | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Relate between topics.** 2. **Investigate techniques and tools considering scientific ethics.** 3. **Analyze dynamical problems using some different approaches.** 4. **Show the concepts and methods of computer science.** 5. **Make the competence in the use of mathematical methods in dynamical systems.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Life-long learning, Identify roles and their performing manner.** 2. **Computing set tasks, model problems and solve scientific basis.** 3. **Working in groups effectively.** 4. **Computing scientific models.** 5. **Set clear guidelines.** 6. **Communication with other positively.** 7. **Ethical behavior the sense of neatness and beauty.** | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **-Vector analysis (1)** | **2** | **2** |  |
| **-Vector analysis (2)** | **2** | **2** |  |
| **-The motion on a circle and the simple pendulum (1)** | **2** | **2** |  |
| **-The motion on a circle and the simple pendulum (2)** | **2** | **2** |  |
| **-The motion on a circle and the simple pendulum (3)** | **2** | **2** |  |
| **-The restrictive motion (1)** | **2** | **2** |  |
| **-The restrictive motion (2)+Mid term exam** | **2** | **2** |  |
| **-The variable mass (1)** | **2** | **2** |  |
| **-The variable mass (2)** | **2** | **2** |  |
| **-The projectiles (1)** | **2** | **2** |  |
| **-The projectiles (2)** | **2** | **2** |  |
| **-Simple harmonic motion (1)** | **2** | **2** |  |
| **-Simple harmonic motion (2)** | **2** | **2** |  |
| **-Simple harmonic motion (3)** | **2** | **2** |  |
| **Total hours** | **28** | **28** |  |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | | **Brain storming** |
| **Knowledge & Understanding** | **a1. Know the related basic scientific facts, relevant theories and mechanisms supporting the structure concerned with the velocity and acceleration in different coordinates.** | **🗸** |  | **🗸** |  | **🗸** | |  |
| **a2. Explain the theories and methods; demonstrate basic knowledge and understanding programming concepts in order deal with Dynamics.** | **🗸** |  | **🗸** |  | **🗸** | | **🗸** |
| **a3. Describe the relation between the studied topics and environment by studying some dynamical systems that have physical feedback.** | **🗸** |  | **🗸** |  | **🗸** | | **🗸** |
| **a4. Identify the meaning of some dynamical operators using some mathematical notations.** | **🗸** |  |  |  |  | | **🗸** |
| **a5. Memorize what was studying in the previous courses.** | **🗸** |  | **🗸** |  |  | |  |
| **Intellectual Skills** | **b1. Discover the difference between qualitatively the theories and basic principles of Newtonian Mechanics.** | **🗸** |  |  |  | **🗸** | **🗸** | |
| **b2. Develop high lines and deduce procedures to handle dynamical problems.** | **🗸** |  |  |  | **🗸** |  | |
| **b3. Construct abstract and mathematical models for real world dynamical problems.** | **🗸** |  |  |  | **🗸** | **🗸** | |
| **b4. Apply the principles of effective information management to various information dynamical systems.** | **🗸** |  |  |  | **🗸** |  | |
| **Practical and professional skills** | 1. **Relate between topics.** | **🗸** |  |  |  |  | |  |
| 1. **Investigate techniques and tools considering scientific ethics.** | **🗸** |  |  |  |  | |  |
| 1. **Analyze dynamical problems using some different approaches.** | **🗸** |  |  |  | **🗸** | |  |
| 1. **Show the concepts and methods of computer science.** | **🗸** | **🗸** |  |  |  | |  |
| 1. **Make the competence in the use of mathematical methods in dynamical systems.** | **🗸** |  |  | **🗸** |  | |  |
| **General Skills** | **d1. Life-long learning, Identify roles and their performing manner.** | **🗸** | **🗸** | **🗸** |  | **🗸** | |  |
| **d2. Computing set tasks, model problems and solve scientific basis.** | **🗸** |  | **🗸** |  | **🗸** | |  |
| **d3. Working in groups effectively.** | **🗸** |  | **🗸** |  | **🗸** | |  |
| **d4. Computing scientific models.** | **🗸** | **🗸** | **🗸** |  | **🗸** | |  |
| **d5. Set clear guidelines.** | **🗸** |  | **🗸** |  | **🗸** | |  |
| **d6. Communication with other positively.** | **🗸** | **🗸** | **🗸** |  | **🗸** | |  |
| **d7. Ethical behavior the sense of neatness and beauty.** | **🗸** |  | **🗸** |  | **🗸** | |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **(c5, a.2, a.3, b.1,b.2,c3,c4,d4,d5)** | **Week 7** | **10 %** |
| **Oral exams** | **(d6, d7, a.3, b.1,b.2,c.1,d3)** | **Week 15** | **10%** |
| **Written exam** | **(a.1, a.2, a.3, a.4, a.5, b.1,b.2, b.3,b.5,c.1,c.2, d1,d2)** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6 – Course matrix** | | | | | | | | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | | | **General Skill** | | | | | | |
| **a1** | **a2** | **a3** | | **a4** | **a5** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | **c4** | **c5** | **d1** | **d2** | **d3** | **d4** | **d5** | **d6** | **d7** |
| **-Vector analysis (1)** | **x** |  |  | |  |  | **x** |  |  |  |  |  |  | **x** |  | **x** |  |  |  |  | **x** |  |
| **-Vector analysis (2)** |  | **x** |  | | **x** |  |  |  | **x** |  |  | **x** |  |  |  |  |  |  | **x** |  |  |  |
| **-The motion on a circle and the simple pendulum (1)** | **x** |  |  | |  |  |  | **x** |  |  | **x** |  | **x** |  |  |  |  |  |  |  |  | **x** |
| **-The motion on a circle and the simple pendulum (2)** |  |  |  | | **x** |  |  |  |  |  |  |  |  |  | **x** |  |  | **x** |  |  | **x** |  |
| **-The motion on a circle and the simple pendulum (3)** |  | **x** |  | |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |  |  | **x** |  |  |
| **-The restrictive motion (1)** | **x** |  |  | |  |  |  |  |  |  | **x** |  |  |  |  |  |  |  |  |  | **x** |  |
| **-The restrictive motion (2)+Mid term exam** |  | **x** |  | |  |  |  |  |  | **x** |  |  |  |  |  | **x** |  | **x** |  |  | **x** |  |
| **-The variable mass (1)** | **x** |  |  | |  | **x** | **x** |  |  |  |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |
| **-The variable mass (2)** |  |  |  | | **x** |  |  |  | **x** |  |  |  | **x** |  |  |  |  |  |  |  |  |  |
| **-The projectiles (1)** | **x** |  |  | |  |  | **x** |  |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |  |
| **-The projectiles (2)** |  |  | **x** | |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  |  |  |  |  |  |
| **-Simple harmonic motion (1)** | **x** |  |  | |  |  |  |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  |  |  |
| **-Simple harmonic motion (2)** |  | **x** |  | |  |  |  |  |  |  |  | **x** |  |  |  |  |  |  |  | **x** |  |  |
| **-Simple harmonic motion (3)** | **x** |  |  |  | |  |  | **x** |  |  |  |  |  |  |  |  | **x** |  |  |  |  | **x** |

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| **7- List of references:**  **7-1 Course notes**  **-Notes were approved by the Math Department.**  **7-2 Required books.**  [**Lecture Notes on Classical Mechanics**](http://www.freebookcentre.net/physics-books-download/Lecture-Notes-on-Classical-Mechanics.html) by **Daniel Arovas**  **7-3 Recommended books.**    **Classical Mechanics by Tom W.B. Kibble and Frank H. Berkshire** | | | |
| **7-4Periodicals, Web sites, etc.**  http://www.google.com **(http://www.freebookcentre.net/Physics/Classical-Mechanics-Books.html)** | | | |
| **8- Facilities required for teaching and learning:**  **White and black board**  **Course coordinator: Dr. Abeer Al-Fishawy** | | |
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| **Head of the Department:** | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | **Updated 2020/2021** |

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| **Course Specification**  **A- Affiliation** | | | | | | | |
| **Relevant program:** | | **Computer science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | | |
| **Department offering the course:** | | **Mathematics** | | | | | |
| **Academic year/level:** | | **Second level / First Semester** | | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | | |
| B - Basic information | | | | | | | |
| **Title:**  **Object-Oriented Programming** | | | **Code:**  **251 MC** | | **Year/level:**  **Second level / First Semester** | | |
| **Teaching Hours: 42h** | | | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  |  | | **Practical: 2h/week** | | **Total:** **3 h/week** | | |
| C - Professional information **1 – Course Learning Objectives:** | | | | | | | |
| **At the end of this course, the students must be able to:**  **Apply computing knowledge and skills to the solution of real life problem. Use computer science applications to solve mathematical and statistical problems. Apply effectively information technology relevant to the field. Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.** | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know the developmental progress of the program related knowledge.** 2. **The relation between the studied topics and the environment.** 3. **Select computing knowledge in solving different problems.** 4. **Determine the relevant theories and their applications.** 5. **Explain programming concepts for various branches of mathematics, probability and statistics.** | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Solve abstract and mathematical models of computer and communication system.** 2. **Apply appropriate statistical and computing techniques to the development of software solutions.** | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Examine problems using a range of formats and approaches.** 2. **Prepare the concepts and methods of computer science, mathematics and statistics to the solution of the real problems in professional practice.** 3. **Design computer-based systems.** | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Using internet and information effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific basis.** 3. **Working in groups effectively, manage time, and communicate with others positively.** 4. **Life-long learning.** | | | | | | | |
| **3 – Contents** | | | | | | | |
| **Topic** | | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction to Computers and Programming** | | | | **2** | |  | **2** |
| **Introduction Java** | | | | **2** | |  | **2** |
| **Selection Statements, Loops and Function** | | | | **2** | |  | **2** |
| **Arrays** | | | | **2** | |  | **2** |
| **Strings and Text I/O** | | | | **2** | |  | **2** |
| **Strings and Text I/O** | | | | **2** | |  | **2** |
| **Mid-Term Examination and Objects and Classes** | | | | **2** | |  | **2** |
| **Objects and Classes** | | | | **2** | |  | **2** |
| **Objects and Classes** | | | | **2** | |  | **2** |
| **Inheritance and Polymorphism** | | | | **2** | |  | **2** |
| **Inheritance and Polymorphism** | | | | **2** | |  | **2** |
| **Abstract Classes and Interfaces** | | | | **2** | |  | **2** |
| **Object Oriented Design** | | | | **2** | |  | **2** |
| **Getting Started with GUI Programming and Creating User Interfaces** | | | | **2** | |  | **2** |
| **Total hours** | | | | **28** | |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brainstorming** |
| **Knowledge & Understanding** |  | **Know the developmental progress of the program related knowledge.** | **🗸** | **🗸** | **🗸** | | **🗸** |  |  |
|  | **The relation between the studied topics and the environment.** | **🗸** | **🗸** | **🗸** | | **🗸** |  |  |
|  | **Select computing knowledge in solving different problems.** | **🗸** | **🗸** |  | | **🗸** |  |  |
|  | **Determine the relevant theories and their applications.** | **🗸** | **🗸** | **🗸** | | **🗸** |  |  |
|  | **Explain programming concepts for various branches of mathematics, probability and statistics.** | **🗸** | **🗸** |  | | **🗸** |  |  |
| **Intellectual Skills** |  | **Solve abstract and mathematical models of computer and communication system.** |  | **🗸** | **🗸** | **🗸** | | **🗸** | **🗸** |
|  | **Apply appropriate statistical and computing techniques to the development of software solutions.** | **🗸** |  | **🗸** | **🗸** | | **🗸** |  |
| **Practical and professional skills** |  | **Examine problems using a range of formats and approaches.** | **🗸** |  | **🗸** | |  | **🗸** | **🗸** |
|  | **Prepare the concepts and methods of computer science, mathematics and statistics to the solution of the real problems in professional practice.** | **🗸** |  | **🗸** | |  | **🗸** | **🗸** |
|  | **Design computer-based systems.** | **🗸** |  | **🗸** | |  | **🗸** | **🗸** |
| **Genetal Skills** |  | **Using internet and information effectively.** |  | **🗸** |  | | **🗸** |  |  |
|  | **Community linked thinking, set tasks and solve problems on scientific basis.** |  | **🗸** | **🗸** | | **🗸** |  |  |
|  | **Working in groups effectively, manage time, and communicate with others positively.** |  | **🗸** | **🗸** | | **🗸** |  |  |
|  | **Life-long learning.** | **🗸** | **🗸** |  | | **🗸** | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2, c2, d2, d4** | **Week 7** | **14 %** |
| **Oral exam** | **a5, c1, b1, d2, d3,d4** | **Week 15** | **14 %** |
| **Practical exams** | **a3, b2, c3, d1** | **Week 15** | **24 %** |
| **Written exam** | **a4, a5, b1, c3, d2** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6 – Course Matrix** | | | | | | | | | | | | | | |
| **Topic** | **Knowledge & Understanding** | | | | | **Intellectual Skills** | | **Practical and professional skills** | | | **General Skills** | | | |
| **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | **d4** |
| **Introduction to Computers and Programming** |  | **x** |  |  |  |  | **x** |  | **x** |  | **x** |  |  |  |
| **Introduction Java** |  |  |  |  | **x** | **x** |  | **x** |  |  |  |  |  | **x** |
| **Selection Statements, Loops and Function** | **x** |  | **X** |  |  | **x** |  |  |  | **x** |  |  | **x** |  |
| **Arrays** | **x** |  |  |  |  |  | **x** |  |  | **x** |  |  |  |  |
| **Strings and Text I/O** |  | **x** |  |  |  |  |  |  | **x** |  | **x** |  |  |  |
| **Strings and Text I/O** |  |  |  | **x** |  | **x** |  |  |  | **x** |  |  |  |  |
| **Mid-Term Examination and Objects and Classes** |  |  | **X** |  |  |  |  |  | **x** |  |  |  |  | **x** |
| **Objects and Classes** |  |  |  | **x** |  |  | **x** |  |  |  |  |  | **x** |  |
| **Objects and Classes** | **x** |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |
| **Inheritance and Polymorphism** |  | **x** |  |  |  | **x** |  |  |  |  |  | **x** |  |  |
| **Inheritance and Polymorphism** | **x** |  |  |  |  |  |  |  |  |  |  |  | **x** |  |
| **Abstract Classes and Interfaces** |  |  |  |  | **x** | **x** |  |  | **x** |  |  | **x** |  |  |
| **Object Oriented Design** |  |  |  | **x** |  | **x** |  |  |  |  |  |  |  | **x** |
| **Getting Started with GUI Programming and Creating User Interfaces** |  |  |  |  | **x** |  | **x** |  |  | **x** |  |  | **x** |  |

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| **7- List of references:** | | | | |
| **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Arnow, D. and Weiss, G. (2002). *Arnow, D. and Weiss, G. (2000). Introduction to programming using Java. Reading, Mass.: Addison Wesley*. 2nd ed. Reading, Mass: Addison Wesley.**   **7-3 Recommended books.**   * **Kendal, S. (2009). *Object Oriented Programming using Java*. Denmark: Ventus Publishing ApS, p.216.**   **7-4 Periodicals, Web sites, etc.**   * <http://www.tutorialspoint.com/java/index.htm>[Accessed 29 Oct. 2015]. * **http://www.javatpoint.com/java-tutorial** [Accessed 29 Oct. 2015]. | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | |
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| **Course coordinator:** | | | **Dr. Mosab Hassan** |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9/ 12 / 2019** | | | Updated 2020/2021 |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Second level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Logic Circuits** | | **Code:**  **361 MC** | | **Year/level:**  **Second** **level / First** **Semester** | | |
| **Teaching Hours: 42 h** | | **Lectures: 2** **h/week** | | **Tutorial: 2** **h/week** | | |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Numeral Systems , Mathematical Logic , Boolean algebra , and gates and logic circuits, K-map and minimizations, Combinational circuits, Half Adder, Full Adder, Subtractor .** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know numeral systems.** 2. **Define Boolean algebra and logic circuits.** 3. **State circuits by different types of gates.** 4. **Describe the relation between the studied topics and the environment.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the validity of mathematical results.** 2. **Interpret the fundamental differences between mathematical objects.** 3. **Develop appropriate methods of proof.** 4. **Formulate Critically evaluate and justify proposed design solutions.** 5. **Construct criteria, and verify solutions of Mathematical Logic and** 6. **Boolean algebra.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Solve problems using various formats.** 2. **Examine related problems in sets, groups, Graph theory and Boolean algebra.** 3. **Analyze basic the logic principles.** 4. **Investigate logical techniques to construct convincing mathematical arguments.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific bases.** 3. **Ethical behavior with property rights .** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Mathematical logic** | | | **2** | | **2** | **-** |
| **Number systems** | | | **2** | | **2** | **-** |
| **Operations on number systems** | | | **2** | | **2** | **-** |
| **Boolean functions** | | | **2** | | **2** | **-** |
| **Sum of products and product of sums** | | | **2** | | **2** | **-** |
| **Canonical forms and standard forms** | | | **2** | | **2** | **-** |
| **Mid-Term Exam** | | | **2** | | **2** | **-** |
| **K-map** | | | **2** | | **2** | **-** |
| **Nand and Nor gates** | | | **2** | | **2** | **-** |
| **Combinational circuits** | | | **2** | | **2** | **-** |
| **Half adder** | | | **2** | | **2** | **-** |
| **Full Adder** | | | **2** | | **2** | **-** |
| **Examples** | | | **2** | | **2** | **-** |
| **Applications** | | | **2** | | **2** | **-** |
| **Total hours** | | | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Tutorial** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Know numeral systems.** | | **🗸** |  |  | **🗸** |  |  |
| **a2-** | **Define Boolean algebra and logic circuits**. | | **🗸** |  |  |  | **🗸** |  |
| **a3-** | **State circuits by different types of gates.** | | **🗸** |  |  |  | **🗸** |  |
| **a4-** | **Describe the relation between the studied topics and the environment.** | | **🗸** |  |  |  | **🗸** |  |
| **Intellectual Skills** | **b1** | | **Apply the validity of mathematical results.** |  | **🗸** |  |  |  | **🗸** |
| **b2** | | **Interpret the fundamental differences between mathematical objects.** |  | **🗸** |  |  |  | **🗸** |
| **b3** | | **Develop appropriate methods of proof.** |  | **🗸** | **🗸** | **🗸** |  |  |
|  | **b4** | | 1. **Formulate Critically evaluate and justify proposed design solutions.** | **🗸** |  |  |  | **🗸** |  |
|  | **b5** | | **Construct criteria, and verify solutions of Mathematical Logic and Boolean algebra.** | **🗸** |  |  |  | **🗸** | **🗸** |
| **Practical and professional skills** | **c1-** | **Solve problems using various formats.** | | **🗸** |  |  | **🗸** | **🗸** |  |
| **c2-** | **Examine related problems in Boolean algebra.** | | **🗸** |  |  | **🗸** | **🗸** |  |
| **c3-** | **Analyze basic the logic principles.** | | **🗸** |  |  |  | **🗸** |  |
| **c4-** | **Investigate logical techniques to construct convincing** **mathematical arguments.** | | **🗸** |  |  |  | **🗸** |  |
| **General Skills** | **d1** | | **Working in groups effectively.** |  | **🗸** | **🗸** |  | **🗸** |  |
| **d2** | | **Community linked thinking, set tasks and solve problems on scientific bases.** |  | **🗸** | **🗸** |  | **🗸** |  |
| **d3** | | **Ethical behavior with property rights.** | **🗸** | **🗸** | **🗸** |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | |
| **Tools:** | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | **a3, a4,b1,b3,b4** | | **Week 7** | | **10 %** | |
| **Oral exam** | **a1, a2, c3, c4, d1,d3,b2,b5** | | **Week 15** | | **10 %** | |
| **Written exam** | **a1, a2, c1, c2,d2** | | **Start of 16th week** | | **80 %** | |
| **Total** | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course matrix** | | | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | | **Practical and professional skills** | | | | **General**  **skills** | | | | | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **b5** | **c1** | **c2** | **C3** | **c4** | | **d1** | **d2** | **d3** | | **Mathematical logic** | **x** |  |  |  |  |  | **x** |  |  | **x** |  |  |  | |  |  | **x** | | **Number systems** | **x** |  |  |  |  | **x** |  |  |  |  |  |  |  | |  | **x** |  | | **Operations on number systems** | **x** |  |  |  |  |  |  |  | **x** |  |  |  |  | |  |  |  | | **Boolean functions** |  | **X** |  |  |  |  |  | **x** |  |  |  | **x** |  | |  |  |  | | **Sum of products and product of sums** |  |  |  |  | **X** |  |  | **x** |  |  |  |  | **x** | |  |  | **x** | | **Canonical forms and standard forms** | **x** |  |  |  |  |  |  |  |  |  | **X** |  |  | |  |  |  | | **programmable logic arrays and memories** |  |  |  | **x** |  |  |  |  |  |  |  |  |  | | **x** |  | **x** | | **Mid-Term Exam** |  |  | **x** |  |  |  |  |  |  |  |  |  |  | |  | **x** |  | | **K-map** |  |  | **x** |  |  | **x** |  |  |  | **x** |  |  | **x** | |  |  | **x** | | **Nand and Nor gates** |  |  |  |  |  |  |  |  | **x** | **x** |  | **x** |  | |  |  |  | | **Combinational circuits** | **x** |  |  |  |  |  |  |  | **x** |  |  | **x** |  | |  | **x** |  | | **Half adder** |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  | **x** | | **Full Adder** |  | **X** |  | **x** |  |  |  | **x** |  |  |  |  | **x** | |  |  |  | | **Examples** | **x** |  | **x** |  |  |  |  |  | **x** |  |  | **x** |  | |  |  |  | | **Applications** |  | **X** |  |  | **X** |  |  |  |  | **x** |  |  | **x** | |  |  |  | | | | | | | |
| **7- List of references:**  **7-1 Course notes**  **Notes were approved by the Math. Department.**   * 1. **Required books.**   **R.Garnier, J. Taylor, DiscreteMathematics for New Technology, Institute of Physics Publishing, London, (1992).**   * 1. **Periodicals, Web sites, etc.**   [**https://en.wikipedia.org/wiki/Discrete\_mathematics**](https://en.wikipedia.org/wiki/Discrete_mathematics)  [**http://faculty.atu.edu/mfinan/main2.pdf**](http://faculty.atu.edu/mfinan/main2.pdf)  <http://www.cims.nyu.edu/~regev/teaching/discrete_math_fall_2005/dmbook.pdf> | | | | | | |
| **8- Facilities required for teaching and learning:**  **­** | | | | | |
| **Black board and white board** | | | | | |
| **Course coordinator:** | | **Dr. Ahmed Mohamed** | |
| **Head of the Department:** | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | **Updated 2020/2021** | |

**Second Level**

**Second Semester**

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| **Course Specification**  **A- Affiliation** | | | | |
| **Relevant program:** | Computer Science | | | |
| **Department offering the program:** | | | Mathematics | |
| **Department offering the course:** | | Mathematics | | |
| **Academic year/level:** | | Second Level/ Second Semester | | |
| **Date of specifications approval:** | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | |
| B - Basic information | | | | |
| **Title:**  **Differential Equations(1)** | | **Code:**  **212M** | | **Year/level:**  **Second Level/Second Semester** |
| **Teaching Hours:28** | | **Lectures: 2** **h/week** | | **Tutorial: 2 h/week** |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** |
| C - Professional information | | | | |
| **1 – Course Learning Objectives:** | | | | |
| Provide an overview of standard methods for the solution of single ordinary differential equations and systems of equations, with an introduction to some of the underlying theory and calculus of functions of more than one variable. | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:-**   1. **Know the implications of existence and uniqueness theorems.** 2. **Determine continuity and differentiability of functions of two or more variables.** 3. **Explain the different methods between graphs some Surfaces and** 4. **calculate some integrals using Mathematics and Matlab programs.** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Develop skills in the use of computer tools for solving differential equations and integration.** 2. **Create differential equations from physical experiments.** 3. **Discover new methods for solving second order differential equations.** 4. **Apply the basic skills of continuity and differentiability of functions of two variables.** | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Label the first and second order ODEs** 2. **Solve linear ODEs using standard methods.** 3. **Show further studies in more advanced branches of modern mathematics: functional analysis, topology, optimization and nonlinear analysis**   **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Community linked thinking and solve problems on a scientific basis.** 2. **Working in groups effectively; manage time, collaborate and communicate with others positively.** 3. **Using internet and library.** | | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Definitions. First order differential eq** | **2** | **2** | **-** |
| **First order differential eq. linear, separable, exact and homogenous** | **2** | **2** | **-** |
| **Equations of first order but not of the first**  **Degree** | **2** | **2** | **-** |
| [**Riccati Equations**](http://www.sosmath.com/diffeq/first/riccati/riccati.html) | **2** | **2** | **-** |
| [**Integrating Factor technique**](http://www.sosmath.com/diffeq/first/intfactor/intfactor.html) | **2** | **2** | **-** |
| [**Numerical Technique: Euler's Method**](http://www.sosmath.com/diffeq/first/numerical/numerical.html) | **2** | **2** | **-** |
| [**Picard Iterative Process**](http://www.sosmath.com/diffeq/first/picard/picard.html) | **2** | **2** | **-** |
| [**Linear Independence and the Wronskian**](http://www.sosmath.com/diffeq/second/linearind/linearind.html) | **2** | **2** | **-** |
| [**Reduction of Order**](http://www.sosmath.com/diffeq/second/reduction/reduction.html) | **2** | **2** | **-** |
| [**Euler-Cauchy Equations**](http://www.sosmath.com/diffeq/second/euler/euler.html) | **2** | **2** | **-** |
| **Linear equations of second order and with out**  **constant coefficients** | **2** | **2** | **-** |
| **Linear equations of second order and with**  **constant coefficient** | **2** | **2** | **-** |
| **System of differential equations** | **2** | **2** | **-** |
| **Application and modeling** | **2** | **2** | **-** |
| **Total hours** | **28** | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1** | **Know the implications of existence and uniqueness theorems.** | **🗸** |  |  |  | **🗸** |  |
| **a2** | **Determine continuity and differentiability of functions of two or more variables.** | **🗸** |  |  |  | **🗸** | **🗸** |
| **a3** | **Explain the different methods between graphs some Surfaces and calculate some integrals using Mathematics and Matlab programs.** | **🗸** | **🗸** |  |  | **🗸** |  |
| **a4** | **Calculate some integrals using Mathematics and Matlab programs.** | **🗸** |  |  |  |  | **🗸** |
| **Intellectual Skills** | **b1** | **Develop skills in the use of computer tools for solving differential equations and integration.** | **🗸** |  | **🗸** |  | **🗸** |  |
| **b2** | **Create differential equations from physical experiments.** | **🗸** |  |  | **🗸** | **🗸** |  |
| **b3** | **Discover new methods for solving second order differential equations.** | **🗸** |  |  |  | **🗸** |  |
| **b4** | **Apply the basic skills of continuity and differentiability of functions of two variables.** | **🗸** |  |  |  | **🗸** |  |
| **Practical and professional skills** | **c1** | **Classify the first and second order ODEs** | **🗸** |  | **🗸** |  |  | **🗸** |
| **c2** | **Solve linear ODEs using standard methods.** | **🗸** |  |  |  | **🗸** |  |
| **c3** | **Show further studies in more advanced branches of modern mathematics: functional analysis, topology, optimization and nonlinear analysis** | **🗸** |  |  |  | **🗸** |  |
| **General Skills** | **d1** | **Community linked thinking and solve problems on a scientific basis.** | **🗸** | **🗸** |  |  | **🗸** |  |
| **d2** | **Working in groups effectively; manage time, and communicate with others positively.** | **🗸** |  |  |  | **🗸** |  |
| **d3** | **Using internet and library.** |  |  | **🗸** |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1 , a2, b1, b3 , c2, c3,d1,d3** | **Week 7** | **10 %** |
| **Oral exam** | **a3, b1,b2,c1,d2** | **Week 15** | **10 %** |
| **Written exam** | **b3, b4,a1** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6-Course matrix** | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General**  **Skills** | | |
| **a1** | **a2** | **a3** | **a4** | | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** |
| **Definitions. First order differential eq** | **x** |  |  |  |  | |  | **x** |  | **x** |  |  |  |  |  |
| **First order differential eq. linear, separable, exact and homogenous** | **x** |  |  |  |  | | **x** |  |  |  | **x** |  | **x** |  |  |
| **Equations of first order but not of the first**  **Degree** | **x** |  |  |  | **x** | |  | **x** |  |  |  | **x** |  |  | **X** |
| [**Riccati Equations**](http://www.sosmath.com/diffeq/first/riccati/riccati.html) |  | **X** |  |  |  | |  |  |  |  |  | **x** |  |  |  |
| [**Integrating Factor technique**](http://www.sosmath.com/diffeq/first/intfactor/intfactor.html) |  |  |  |  | **x** | |  |  |  |  | **x** |  |  |  |  |
| [**Numerical Technique: Euler's Method**](http://www.sosmath.com/diffeq/first/numerical/numerical.html) | **x** | **X** |  | **x** |  | |  |  | **x** |  |  |  |  |  |  |
| [**Picard Iterative Process**](http://www.sosmath.com/diffeq/first/picard/picard.html) |  |  |  |  |  | |  | **x** |  |  |  |  | **x** |  | **X** |
| [**Linear Independence and the Wronskian**](http://www.sosmath.com/diffeq/second/linearind/linearind.html) |  |  | **x** |  |  | |  |  |  |  |  | **x** |  | **x** |  |
| [**Reduction of Order**](http://www.sosmath.com/diffeq/second/reduction/reduction.html) |  |  | **x** |  |  | | **x** |  |  | **x** |  |  |  |  | **X** |
| [**Euler-Cauchy Equations**](http://www.sosmath.com/diffeq/second/euler/euler.html) |  |  |  |  |  | |  |  |  | **x** |  |  |  |  |  |
| **Linear equations of second order and with out constant coefficients** |  |  |  |  | **x** | |  |  |  |  | **x** |  |  | **x** |  |
| **Linear equations of second order and with constant coefficient** | **x** |  | **x** |  |  | | **x** |  |  |  |  | **x** |  |  | **X** |
| **System of differential equations** |  |  |  |  |  | |  | **x** |  |  |  |  |  | **x** |  |
| **Application and modeling** |  | **X** |  |  | **x** | |  |  |  |  | **x** |  |  |  | **X** |

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| **7- List of references:**  **7-1 Course notes**  **-Notes were approved by the Math Department.**  **7-2 Required books.**  **- C. H Edwards, Elementary differential equations with boundary value problems, Pearson Prentice Hall, 2004**  **7-3 Recommended books.**  **- W.E. Boyce & R.C. Di Prima, "Elementary Differential Equations and**  **Boundary Value Problems", Wiley**  - **M. Braun, "Differential Equations and their Applications", Springer-Verlag.**  **- C.H. Edwards & D.E. Penney, "Elementary ifferential Equations with**  **Boundary Value Problems", Prentice Hall.**  **- R.K. Nagle & E.B. Saff, & A.D. Snider, "Fundamentals of Differential**  **Equations and Boundary Value Problems", Addison-Wesley6-4 Periodicals,**  **Web sites, etc.**  **http://www.sosmath.com/diffeq/diffeq.html**  **https://www.youtube.com/watch?v=HKvP2ESjJbA&list=PLwIFHT1FWIUJYuP5y6YEM4WWrY4kEmIuS** | | |
| **8- Facilities required for teaching and learning:**  **Black board and white board** | | |
| **Course coordinator:** | | **Dr. Abd El Karim Suleiman** |
| **Head of the Department:** | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9/ 12 /2019** | | **updated 2020/2021** |

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| **Course Specification** | | | | | | | |
| **A- Affiliation** | | | | | | | |
| **Relevant program:** | | **Computer Science** | | | | | |
| **Department offering the program:** | | | **Mathematics** | | | | |
| **Department offering the course:** | | | **Mathematics** | | | | |
| **Academic year/level:** | | | **Second level / Second Semester** | | | | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | | |
| **Title:**  **Analytical Mechanics** | | | **Code:**  **232 M** | | **Year/level:**  **Second level / Second Semester** | | |
| **Teaching Hours: 42** | | | **Lectures: 2** **h/week** | | **Tutorial: 2** **h/week** | | |
|  | | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | | |
| **At the end of this course, the students must be able to**  **Recognize the basic concepts of Analytical Mechanics such as the rules of**  **analytical mechanics, be aware of the notions of vector integration, and moment of**  **inertia and define the Lagrange, Hamilton and Routh functions.** | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **State definitions, expressions and Dynamical laws in vector notations.** 2. **Explain mechanical quantities in vector and scalar form.** 3. **Define the general theory for the systems of particles and rigid bodies** 4. **Identify some mechanical equation such as Euler`s equations, Lagrang`s equations and Hamilton-Jacobi equation.** | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply the methods of Lagrange and Hamilton to simple systems of particles and rigid bodies.** 2. **Solve problems of motion and forces using vector analysis.** 3. **Interpret conserved quantities and use them to simplify the analysis of the motion.** 4. **Confirm the analytical mechanics theorems.** | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Prepare mathematical analysis for a system representing the physical phenomenon under consideration.** 2. **Make a piece of independent research adopting some problems of analytical mechanics.** 3. **Show the difference between the equations in analytical mechanics.** | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Using Internet and Library to get information** 2. **Working in a groups** 3. **Computing mechanical problem** | | | | | | | |
| **3 – Contents** | | | | | | | |
| **Topic** | | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Dynamics of a particles in three dimensions, Rotating axes and Components of velocity** | | | | **2** | | **2** | **-** |
| **acceleration in different coordinate systems and Faucolt's pendulum** | | | | **2** | | **2** | **-** |
| **Dynamics of rigid body in three dimensions and Eulerian angles.** | | | | **2** | | **2** | **-** |
| **Moment of inertia** | | | | **2** | | **2** | **-** |
| **Equations of motin and Euler`s equations** | | | | **2** | | **2** | **-** |
| **Impulsive motion** | | | | **2** | | **2** | **-** |
| **Motion of a system of particles and Constraints** | | | | **2** | | **2** | **-** |
| **Generalized Coordinates, Lagrange`s equations** | | | | **2** | | **2** |  |
| **Hamilton`s canonical equations, Ignorable or cyclic coordinates** | | | | **2** | | **2** |  |
| **Routh`s equations** | | | | **2** | | **2** |  |
| **Phase space and Liouville`s theorem** | | | | **2** | | **2** |  |
| **Hamilton`s principle of least action** | | | | **2** | | **2** |  |
| **Canonical or contact transformation** | | | | **2** | | **2** |  |
| **Invariants and Hamilton-Jacobi equation.** | | | | **2** | | **2** |  |
| **Total hours** | | | | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **State definitions, expressions and Dynamical laws in vector notations.** | **🗸** |  |  |  | **🗸** |  |
| **a2-** | **Explain mechanical quantities in vector and scalar form.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **a3-** | **Define the general theory for the systems of particles and rigid bodies** | **🗸** |  |  |  | **🗸** | **🗸** |
| **a4-** | **Identify some mechanical equation such as Euler`s equations, Lagrang`s equations and Hamilton-Jacobi equation.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **Intellectual Skills** | **b1-** | **Apply the methods of Lagrange and Hamilton to simple systems of particles and rigid bodies.** | **🗸** |  |  |  | **🗸** | **🗸** |
| **b2-** | **Solve problems of motion and forces using vector analysis.** | **🗸** |  |  |  | **🗸** |  |
| **b3-** | **Interpret conserved quantities and use them to simplify the analysis of the motion. and prove the analytical mechanics theorems.** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **b4** | **Confirm the analytical mechanics theorems**. | **🗸** |  |  |  |  |  |
| **Practical and professional skills** | **c1-** | **Prepare mathematical analysis for a system representing the physical phenomenon under consideration** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **c2-** | **Make a piece of independent research adopting some problems of analytical mechanics.** | **🗸** |  |  |  | **🗸** |  |
| **c3-** | **Show the difference between the equations in analytical mechanics.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1-** | **Using Internet and Library to get information** | **🗸** |  |  | **🗸** | **🗸** | **🗸** |
| **d2-** | **Working in a groups** | **🗸** |  | **🗸** |  | **🗸** |  |
| **d3-** | **Computing mechanical problem** | **🗸** |  |  |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **(a.1, a.2, b.1,b.2,d1)** | **Week 7** | **10 %** |
| **Oral exam** | **(a.3, a.4, b.3,c.1, c.2,d3,d2)** | **Week 15** | **10 %** |
| **Written exam** | **(b.1,b3, b4, c.3)** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix** | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | | **d1** | **d2** | **d3** |
| **Dynamics of a particles in three dimensions, Rotating axes and Components of velocity** | **x** |  |  |  | **x** |  |  |  |  | **x** | |  |  |  | **x** |
| **acceleration in different coordinate systems and Faucolt's pendulum** |  | **x** |  |  |  |  | **X** |  |  | **x** | |  | **x** |  |  |
| **Dynamics of rigid body in three dimensions and Eulerian angles.** |  |  |  | **x** |  |  |  | **x** |  |  | |  |  |  | **x** |
| **Moment of inertia** |  |  | **x** |  |  |  |  |  |  |  | |  | **x** |  |  |
| **Equations of motin and Euler`s equations** |  | **x** |  |  |  |  |  | **x** |  | **x** | |  |  |  |  |
| **Impulsive motion** | **x** |  |  | **x** |  |  |  |  | **x** |  | |  |  |  | **x** |
| **Motion of a system of particles and Constraints** |  | **x** |  |  |  | **x** |  |  |  |  | |  | **x** |  |  |
| **Generalized Coordinates,Lagrange`s equations** | **x** |  |  |  |  |  |  |  |  | **x** | |  |  |  |  |
| **Hamilton`s canonical equations, Ignorable or cyclic coordinates** |  | **x** |  |  | **x** |  |  |  |  |  | | **x** |  | **x** |  |
| **Routh`s equations** | **x** |  |  |  |  |  |  | **x** |  |  | |  |  | **x** |  |
| **Phase space and Liouville`s theorem** |  | **x** |  |  |  | **x** |  |  |  | **x** | |  | **x** |  |  |
| **Hamilton`s principle of least action** |  |  | **x** |  |  | **x** |  |  | **x** |  | |  |  |  | **x** |
| **Canonical or contact transformation** |  | **x** |  |  |  |  | **X** |  |  |  | |  | **x** |  |  |
| **Invariants and Hamilton-Jacobi equation.** | **x** |  |  |  |  |  |  | **x** |  |  | |  |  | **X** |  |

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| **7. List of References**  **7-1 Course notes**  **-Notes were approved by Mathematics Department.**  **7-2 Required books.**  **- G.R. Fowles and G.L. Cassiday, Analytical Mechanics, 6th Ed, Harcourt Brace, 1999.**  **7-3 Recommended books.**  **- M. D. Ardema, Analytical Dynamics Theory and Applications, Kluwer Academic / Plenum Publishers, Newyork, 2005.**  **7-4Periodicals, Web sites, etc.**  **http://www.google.com**  [**http://www.Sciencedirect.com**](http://www.Sciencedirect.com)  [**http://www.Dbworld.com**](http://www.Dbworld.com) | | | | |
| **8- Facilities required for teaching and learning:**  **White and black board** | | |
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| **Course coordinator:** | | | **Dr. Ahmed Mostafa** |
| **Head of the Department:** | | | **Prof. Dr Reda Gamal Abd El Rahman** |
| **Date: 9/ 12 /2019** | | | **Updated 2020/2021** |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | Mathematics | | | | |
| **Department offering the course:** | | Mathematics | | | | |
| **Academic year/level:** | | Second level / Second Semester | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Linear Algebra &Geometry** | | **Code:**  **224 M** | **Year/level:**  **Second level / Second Semester** | | | |
| **Teaching Hours: 42 h** | | **Lectures:2h/week** | **Tutorial: 2 h/week** | | | |
|  | | **Practical: ــــ** | **Total:** **3 h/week** | | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Be familiar with the fundamental concepts of linear algebra; such as,** **algebra of matrices,** **systems of linear equations, vector spaces, linear transformations and operators and their properties, inner product spaces, quadratic forms** **and their applications.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Memorize the fundamental operations on matrices.** 2. **Know the systems of homogeneous and nonhomogeneous linear equations.** 3. **State linear transformations and its properties.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Apply tools of vector space in geometry.** 2. **Discover the role of linear algebra in different mathematical branches.** 3. **Construct some of the spaces, using a suitable basis.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Solve problems using various methods and forms.** 2. **Assess logical proofs to construct convincing mathematical arguments.** 3. **Criticize the ability to solve problems using linear algebra.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific bases.** 3. **Using internet effectively.** | | | | | | |
| **3 – Contents** | | | | | | | | |
| **Topic** | | | | | **Lecture hours** | **Tutorial hours** | **Practical hours** | |
| **Matrices.** | | | | | **2** | **2** | **-** | |
| **Systems of linear equations (1),** | | | | | **2** | **2** | **-** | |
| **Systems of linear equations (2).** | | | | | **2** | **2** | **-** | |
| **Linear transformations.** | | | | | **2** | **2** | **-** | |
| **Linear spaces (vectors) (1),** | | | | | **2** | **2** | **-** | |
| **Linear spaces (vectors) (2).** | | | | | **2** | **2** | **-** | |
| **Linear operators (1) + Mid-Term Exam.** | | | | | **2** | **2** | **-** | |
| **Linear operators (2).** | | | | | **2** | **2** | **-** | |
| **Eigenvalues and eigenvectors of linear operators (1),** | | | | | **2** | **2** | **-** | |
| **Eigenvalues and eigenvectors of linear operators (2).** | | | | | **2** | **2** | **-** | |
| **Inner product spaces (1),** | | | | | **2** | **2** | **-** | |
| **Inner product spaces (2).** | | | | | **2** | **2** | **-** | |
| **Quadratic forms and their applications (1),** | | | | | **2** | **2** | **-** | |
| **Quadratic forms and their applications (2).** | | | | | **2** | **2** | **-** | |
| **Total hours** | | | | | **28** | **28** | **-** | |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brain storming** | |
| **Knowledge & Understanding** | | **a1- Memorize the fundamental**  **operations on matrices.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **a2-** **Know the systems of homogeneous**  **and nonhomogeneous linear equations.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **a3- State linear transformations and its**  **properties.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **Intellectual Skills** | | **b1- Apply tools of vector space in geometry.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **b2-** **Discover the role of linear algebra in**  **different mathematical branches.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **b3-** **Construct some of the spaces, using**  **a suitable basis.** | | | | **🗸** | **🗸** |  | **🗸** | **🗸** | |
| **Practical and professional skills** | | **c1- Solve problems using various methods and**  **forms.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **c2- Assess logical proofs to construct**  **convincing mathematical arguments.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **c3- Criticize the ability to solve problems**  **using linear algebra.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **General Skills** | | **d1- Working in groups effectively.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **d2-** **Community linked thinking, set tasks and solve problems on scientific bases.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **d3-** **Using internet and communication technology effectively.** | | | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | |
| **Tools:** | | | **To Measure** | **Time schedule** | | | | **Grading** | |
| **Mid-Term Exam** | | | **a1 ,c2, b2, b3, d2.** | **Week 7** | | | | **10 %** | |
| **Oral exam** | | | **a2 , d1 , c3, d3.** | **Week 15** | | | | **10 %** | |
| **Written exam** | | | **a3 ,b1, / c1 .`** | **Start of 16th week** | | | | **80 %** | |
| **Total** | | | | | | | | **100 %** | |

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| **6- Course Matrix** | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | | **c3** | **d1** | **d2** | **d3** |
| **Matrices.** | **x** |  |  | **X** |  |  |  | **x** |  | | **x** |  | **X** |
| **Systems of linear equations (1),** |  | **x** |  | **X** |  |  |  | **x** |  | |  |  |  |
| **Systems of linear equations (2).** | **x** |  |  |  |  | **x** |  |  |  | |  |  | **x** |
| **Linear transformations.** |  |  | **x** |  |  |  |  |  |  | | **x** |  |  |
| **Linear spaces (vectors) (1),** |  | **x** |  |  | **x** |  |  | **x** |  | |  |  |  |
| **Linear spaces (vectors) (2).** | **x** |  |  |  |  |  | **x** |  |  | |  |  | **x** |
| **Linear operators (1) + Mid-Term Exam.** |  | **x** |  |  | **x** |  |  |  |  | | **x** |  |  |
| **Linear operators (2).** | **x** |  |  |  |  |  |  |  |  | |  |  | **x** |
| **Eigenvalues and eigenvectors of linear operators (1),** |  | **x** |  | **X** |  | **x** |  |  | **x** | |  | **x** |  |
| **Eigenvalues and eigenvectors of linear operators (2).** | **x** |  | **x** | **X** |  |  |  |  |  | |  | **x** |  |
| **Inner product spaces (1),** |  | **x** |  |  | **x** |  |  | **x** |  | | **x** |  |  |
| **Inner product spaces (2).** | **x** |  |  |  |  |  | **x** |  |  | |  |  | **x** |
| **Quadratic forms and their applications (1),** |  | **x** |  |  |  | **x** |  |  |  | | **x** |  |  |
| **Quadratic forms and their applications (2).** | **x** |  |  | **X** |  |  |  |  | **x** | |  | **x** |  |

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| **7. List of references**  **7-1 Course notes**   * **Notes approved by Math. Department.**   **7-2Required books.**   * **Elementary Linear Algebra, William L. Perry, 1988.**   **7-3 Recommended books.**  **- Higher Algebra, A. Kurosh, 1972.**  **- Elementary Linear Algebra, Bernard Kolman, 1977.**  **- Elementary Linear Algebra Applications Version Howard Anton,**  **Chris Rorres, 1994.**  **7-4Periodicals, Web sites, etc.**  **http://joshua.smcvt.edu/linearalgebra**  **http://www.math.unl.edu/~tshores1/linalgtext.html**  <http://www.math.niu.edu/courses/> | | | |
| **8- Facilities required for teaching and learning:**  **Personal computer, Data show, Power point application, White board, Whiteboard marker.** | | | |
| **Course coordinator:** | | **Dr. Mohamed Saad Sanad** |

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| **Head of the Department:** | **Prof. Dr. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 /12 /2019** | **updated 2020/2021** |

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| **Course Specification**  **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Second level / Second Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Data Structures** | | **Code:**  **252 MC** | | **Year/level:**  **Second level / Second Semester** | | |
|  | | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  | | **Practical: 2** **h/week** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Use computer science applications to solve mathematical and statistical problems and apply computing knowledge and skills to the solution of real life problem**  **and apply effectively information technology relevant to the field and use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Know the developmental progress of the program related knowledge.** 2. **The relation between the studied topics and the environment.** 3. **Explain use computing knowledge in solving different problems.** 4. **Define the relevant theories and their applications.** 5. **Identify programming concepts for various branches of mathematics, probability and statistics.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Design and solve mathematical models of computer and communication system.** 2. **Apply appropriate statistical and computing techniques to the development of software solutions.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Solve problems using a range of formats and approaches.** 2. **Apply the concepts and methods of computer science, mathematics and statistics to the solution of the real problems in professional practice.** 3. **Make computer-based systems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Using internet effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific basis.** 3. **Working in groups effectively, manage time, collaborate and communicate with others positively.** 4. **Life-long learning.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Instance of data(1)** | | | **2** | |  | **2** |
| **Instance of data(2)** | | | **2** | |  | **2** |
| **Arrays** | | | **2** | |  | **2** |
| **Different types of queues** | | | **2** | |  | **2** |
| **Linked lists** | | | **2** | |  | **2** |
| **Binary trees, trees** | | | **2** | |  | **2** |
| **Mid-Term Exam** | | | **2** | |  | **2** |
| **Trees** | | | **2** | |  | **2** |
| **building researched using queuing theory** | | | **2** | |  | **2** |
| **Turn the tree into an expression** | | | **2** | |  | **2** |
| **Kinds of expressions** | | | **2** | |  | **2** |
| **Design a user's computer environment** | | | **2** | |  | **2** |
| **Design of forms and re-used(1)** | | | **2** | |  | **2** |
| **Design of forms and re-used(2)** | | | **2** | |  | **2** |
| **Total hours** | | | **28** | |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-Know the developmental progress of the program related knowledge.** | **🗸** |  |  | | **🗸** |  |  |
| **a2-The relation between the studied topics and the environment.** | **🗸** |  |  | | **🗸** |  |  |
| **a3-Explain use computing knowledge in solving different problems.** | **🗸** |  |  | | **🗸** |  |  |
| **a4- Define the relevant theories and their applications.** | **🗸** |  |  | | **🗸** |  |  |
| **a5-Identify programming concepts for various branches of mathematics, probability and statistics.** | **🗸** |  |  | | **🗸** |  |  |
| **Intellectual Skills** | **b1-Design and solve mathematical models of computer and communication system.** |  | **🗸** |  | **🗸** | | **🗸** |  |
| **b2-Apply appropriate statistical and computing techniques to the development of software solutions.** | **🗸** |  |  | **🗸** | | **🗸** |  |
| **Practical and professional skills** | **c1-Solve problems using a range of formats and approaches.** | **🗸** |  |  | |  | **🗸** |  |
| **c2-Apply the concepts and methods of computer science, mathematics and statistics to the solution of the real problems in professional practice.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c3-Make computer-based systems.** | **🗸** |  |  | | **🗸** | **🗸** | **🗸** |
| **General Skills** | **d1-Using internet effectively.** |  | **🗸** | **🗸** | |  |  |  |
| **d2-Community linked thinking, set tasks and solve problems on scientific basis.** |  | **🗸** | **🗸** | |  |  |  |
| **d3-Working in groups effectively, manage time, collaborate and communicate with others positively.** |  | **🗸** | **🗸** | |  |  |  |
| **d4-Life-long learning.** |  | **🗸** | **🗸** | |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b1, d4, d3,a3,a4** | **Week 7** | **14 %** |
| **Oral exam** | **b2, c2, d3,a5,d1** | **Week 15** | **14 %** |
| **Practical exams** | **c1, d2, c3** | **Week 15** | **24 %** |
| **Written exam** | **a2,c2.** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6 – Course Matrix** | | | | | | | | | | | | | | |
| **Topic** | **Knowledge & Understanding** | | | | | **Intellectual Skills** | | **Practical and professional skills** | | | **General Skills** | | | |
| **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | **d4** |
| **Instance of data(1)** |  | **x** |  |  |  |  | **X** |  | **x** |  | **x** |  |  |  |
| **Instance of data(2)** |  |  |  |  |  | **x** |  | **X** |  |  |  |  |  | **x** |
| **Arrays** | **x** |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |
| **Different types of queues** |  |  | **x** |  |  |  |  |  |  |  |  | **x** |  |  |
| **Linked lists** |  | **x** |  |  | **x** |  | **X** |  | **x** |  |  |  |  |  |
| **Binary trees, trees** | **x** |  |  |  |  |  |  |  |  | **x** |  |  | **x** |  |
| **Mid-Term Exam** |  |  |  |  | **x** |  |  |  |  |  |  | **x** |  |  |
| **Trees** |  |  | **x** |  |  |  | **X** |  | **x** |  |  |  | **x** |  |
| **building researched using queuing theory** | **x** |  |  |  |  | **x** |  |  |  | **x** |  |  |  |  |
| **Turn the tree into an expression** |  | **x** |  |  | **x** |  |  |  | **x** |  |  | **x** |  | **x** |
| **Kinds of expressions** |  |  |  | **x** |  |  |  |  |  |  |  |  | **x** |  |
| **Design a user's computer environment** |  | **x** |  |  |  | **x** |  |  | **x** |  |  | **x** |  |  |
| **Design of forms and re-used(1)** | **x** |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |
| **Design of forms and re-used(2)** |  |  | **x** |  |  |  |  |  |  |  |  |  |  | **x** |

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| **7- List of references:** | | | | |
| **7-1 Course notes**  **- Notes from the Department**  **7-2 Required books.**  **-A Complete Guide to Programming in C++ Ulla Kirch-Prinz Peter Prinz JONES AND BARTLETT PUBLISHERS 2012 .**  **7-3 Recommended books.**  **- Visual C++ 2012 Tutorial course material and tutorial training for Introduction to Programming with C++.**  **7-4 Periodicals, Web sites, etc.**  **http://www.tutorialspoint.com/cplusplus/cpp\_tutorial.** | | | | |
| **http://www.tutorialspoint.com/cplusplus/cpp\_object\_oriented.htm.**  **8- Facilities required for teaching and learning:** | | |
|  | | |
| **Course coordinator:** | | | **Dr. Mona Arafa** |
| **Head of the Department:** | | | **Prof. Dr. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 / 2019** | | | Updated 2020/2021 |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Second level / Second Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019 No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Probability (1)** | | **Code:**  **242 MS** | | **Year/level:**  **Second level / Second Semester** | | |
| **Teaching Hours:** | | **Lectures: 2** **h/week** | | **Tutorial: 2** **h/week** | | |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Recognize the basic concepts , of Probability such as Sample Space, Random Variables, Some Discrete Distributions, Some Continuous Distributions, Bivariate and Multivariate Random Variables and Some special bivariate Distributions** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **State the Probability theory.** 2. **Define difficulties with Sample Space and Random Variables.** 3. **Explain Postulates of Some Discrete Distributions - Some Continuous Distributions** 4. **Describe the Bivariate and Multivariate Random Variables - Some special bivariate Distributions** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Interpret the validity of mathematical statistics results.** 2. **Create the fundamental differences between mathematical statistics objects.** 3. **Apply lines of argument and appropriate judgments in accordance with scientific theories and concepts.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Prepare confidence in their abilities to use mathematics.** 2. **Solve problems using various formats.** 3. **Summarize logical techniques to construct convincing mathematical statistics arguments.** 4. **Analyze required mathematics statistics and other technical information independently.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups effectively.** 2. **Community linked thinking, set tasks and solve problems on scientific bases.** 3. **Using internet and communication technology effectively.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Sample Space (1)** | | | **2** | | **2** | **-** |
| **Sample Space(2)** | | | **2** | | **2** |  |
| **Random Variables (1)** | | | **2** | | **2** |  |
| **Random Variables (2)** | | | **2** | | **2** |  |
| **Some Discrete Distributions(1)** | | | **2** | | **2** | **-** |
| **Some Discrete Distributions(2)** | | | **2** | | **2** |  |
| **Revision and mid term exam** | | | **2** | | **2** |  |
| **Some Continuous Distributions(1)** | | | **2** | | **2** |  |
| **Some Continuous Distributions(2)** | | | **2** | | **2** |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(1)** | | | **2** | | **2** |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(2)** | | | **2** | | **2** |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(3)** | | | **2** | | **2** |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(4)** | | | **2** | | **2** | **-** |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(5)** | | | **2** | | **2** |  |
| **Total hours** | | | **28** | | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | | | | | | | | **Lecture** | | **Presentations & Movies** | | **Discussions & Seminars** | | | | **Practical** | | **Problem solving** | | | **Brain storming** |
| **Knowledge & Understanding** | | | **a1-** | **State the Probability theory.** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | |  |
| **a2-** | **Define difficulties with Sample Space and Random Variables.** | | | | | | | | | **🗸** | |  | | **🗸** | | | |  | | **🗸** | | |  |
| **a3-** | **Explain Postulates of Some Discrete Distributions - Some Continuous Distributions** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | | **🗸** |
| **a4-** | **Describe the Bivariate and Multivariate Random Variables - Some special bivariate Distributions** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | |  |
| **Intellectual Skills** | | | **b1-** | **Interpret the validity of mathematical statistics results.** | | | | | | | | | **🗸** | | **🗸** | |  | | | |  | | **🗸** | | |  |
| **b2-** | **Create the fundamental differences between mathematical statistics objects.** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | | **🗸** |
| **b3-** | **Apply lines of argument and appropriate judgments in accordance with scientific theories and concepts.** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | |  |
| **Practical and professional skills** | | | **c1-** | **Prepare confidence in their abilities to use mathematics.** | | | | | | | | | **🗸** | |  | | **🗸** | | | |  | | **🗸** | | |  |
| **c2-** | **Solve problems using various formats.** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | |  |
| **c3-** | **Sumarize logical techniques to construct convincing** **mathematical statistics arguments.** | | | | | | | | | **🗸** | |  | | **🗸** | | | |  | | **🗸** | | |  |
| **c4-** | **Analyze required mathematics statistics and other technical information** **independently.** | | | | | | | | | **🗸** | | **🗸** | |  | | | |  | | **🗸** | | |  |
| **General Skills** | | | **d1-** | **Working in groups effectively.** | | | | | | | | | **🗸** | |  | |  | | | |  | | **🗸** | | | **🗸** |
| **d2-** | **Community linked thinking , set tasks and solve problems on scientific bases..** | | | | | | | | | **🗸** | |  | | **🗸** | | | |  | | **🗸** | | |  |
| **d3-** | **Using internet and communication technology effectively.** | | | | | | | | | **🗸** | |  | |  | | | | **🗸** | | **🗸** | | | **🗸** |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Tools:** | | | | | **To Measure** | | | | | | **Time schedule** | | | | | | | | | | **Grading** | | | | | |
| **Mid-Term Exam** | | | | | **a1, a2,c1,c2,b1,b2,d2,d3** | | | | | | **Week 7** | | | | | | | | | | **10 %** | | | | | |
| **Oral exam** | | | | | **d1, d2,d1** | | | | | | **Week 15** | | | | | | | | | | **10 %** | | | | | |
| **Written exam** | | | | | **a3,a4,c3,c4, b3** | | | | | | **Start of week16** | | | | | | | | | | **80 %** | | | | | |
| **Total** | | | | | | | | | | | | | | | | | | | | | **100 %** | | | | | |
| **6 – Course Matrix** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Topic** | | | | | | | **Knowledge & Understanding** | | | | | **Intellectual Skills** | | | | | | **Practical and professional skills** | | | | | | | **General Skills** | | | | |
| **a1** | **a2** | **a3** | **a4** | | **b1** | | **b2** | | **b3** | | **c1** | | **c2** | | **c3** | | **c4** | **d1** | | | **d2** | **d3** |
| **Sample Space (1)** | | | | | | | **x** |  |  |  | | **x** | |  | |  | | **x** | |  | |  | |  |  | | | **x** |  |
| **Sample Space(2)** | | | | | | |  | **x** |  |  | |  | |  | |  | |  | |  | |  | |  |  | | |  | **x** |
| **Random Variables (1)** | | | | | | |  | **x** |  |  | | **x** | |  | |  | |  | |  | |  | |  | **x** | | |  |  |
| **Random Variables (2)** | | | | | | |  |  | **x** |  | |  | |  | |  | |  | |  | | **x** | |  |  | | |  |  |
| **Some Discrete Distributions(1** | | | | | | |  |  | **x** |  | | **x** | |  | |  | | **x** | |  | |  | |  |  | | |  |  |
| **Some Discrete Distributions(2)** | | | | | | |  | **x** |  |  | |  | |  | |  | |  | |  | |  | |  |  | | | **x** |  |
| **Revision and mid term exam** | | | | | | |  |  |  | **x** | |  | |  | |  | |  | |  | |  | |  |  | | |  | **x** |
| **Some Continuous Distributions(1)** | | | | | | |  |  |  |  | |  | | **x** | |  | |  | |  | |  | |  |  | | | **x** |  |
| **Some Continuous Distributions(2)** | | | | | | | **x** |  | **x** |  | |  | |  | |  | | **x** | |  | |  | |  | **x** | | |  |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(1)** | | | | | | |  | **x** |  |  | | **x** | |  | |  | | **x** | |  | |  | |  |  | | |  | **x** |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(2)** | | | | | | |  | **x** |  |  | |  | | **x** | |  | |  | |  | | **x** | |  |  | | | **x** |  |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(3)** | | | | | | |  | **x** |  |  | | **x** | |  | |  | |  | |  | | **x** | |  |  | | |  | **x** |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(4)** | | | | | | |  |  | **x** |  | |  | |  | | **X** | |  | |  | |  | | **x** |  | | |  | **x** |
| **Bivariate and Multivariate Random Variables Some special bivariate Distributions(5)** | | | | | | | **x** |  |  |  | |  | | **x** | |  | |  | |  | |  | | **x** |  | | |  | **x** |
|  | | | | | | | | | | | | | | | | | | | | | | | | | |
| **7- List of references**  **7-1 Course notes**  **-Notes were approved by the Math Department.**   * 1. **Required books.**  - Joeseph McKean and Allen T Craig , Introduce to the probability theory, (2001) **7-3 Recommended books.**  **- W.D.McGlinn, "Introduction to probability theory ", John. Hopkins Univ. Press, (2003).**   * 1. **Periodicals, Web sites, etc.**   **1-**[**https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf**](https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf)  **2-http://www4.ncsu.edu/~rsmith/MA797V\_S10/Statistics.pdf** | | | | | | | | | | | | | | | | | | | | | | | | | |
| **8- Facilities required for teaching and learning:**  **1-Data show**  **2-white board** | | | | | | | | | | | | | | | | | | | | | | | | | |
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| **Course coordinator:** | | | | | | **Dr. Al Sayed Hamed** | | | | | | | | | | | | |
| **Head of the Department:** | | | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | | | | | | | | | | | | |
| |  |  | | --- | --- | | **Date: 9/ 12 /2019** | **Updated 2018** | | | | | | | **Updated 2020/2021** | | | | | | | | | | | | |

**Course Specification**

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| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | | | Mathematics | | |
| **Department offering the course:** | | | | Department of physics | | |
| **Academic year/level:** | | | | Second level | | |
|  | | |  | | | |
| B - Basic information | | | | | | |
| **Title**: Electricity and alternating current | | **Code:** 226 Ph | | | **Year/level:** Second level | |
| **Teaching Hours:** | | **Lectures:2** | | | **Tutorial: 0** | |
|  | | **Practical:3** | | | **Total:** -3 h/week | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:**  By Finishing of this course the graduate will able to know the difference between AC and DC. Study RL ,RC and RLC circuits in series and in parallel. Identify the resonance in RLC circuit in series. Analysis of AC circuits using complex numbers. | | | | | | |
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| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  On successful completion of the course, the student should demonstrate knowledge and understanding of:  a.1- Define the difference between the direct and alternating current  a.2- Investigate ac circuits by complex numbers  a.3- Memorise RL ,RC and RLC circuits in parallel and series | | | | | | |
| **b - Intellectual skills:**  On successful completion of the course, the student should be able to.  b.1- Compare between Dc and AC  b.2- Construct the different Ac circuits.  b.3-Deduce the mechanisms and procedures to handel scientific problems related to the topics . | | | | | |
| **c - Practical and professional skills:**  On successful completion of the course, the student should be able to. | | | | | | |
| c.1 – Analyze AC and DC circuits.  c.2- Compare between the applications of the different electric circuits.  c.3- Identify the impedance and phase angle of the different circuits.  **d - General skills:**  On successful completion of the course, the student should be able to.  d.1- Use the Internet to search for Ac and electromagnetic information’s.  d.2- Work in team to synthesis and studying some Ac circuits.  d.3- Estimate the applied voltage in each series circuit | | | | | | |

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| **3 – Contents** | | | | | |
| **No** | **Topic** | **Lecture hours** | **Tutorial hours** | | **Practical hours** |
| 1 | RL Circuit | 2 | 0 | | 0 |
| 2 | RC Circuit | 2 | 0 | | 0 |
| 3 | Stored energy | 2 | 0 | | 0 |
| 4 | RL , RC in series. | 2 | 0 | | 0 |
| 5 | RLC in series | 2 | 0 | | 0 |
| 6 | RL , RC in parallel | 2 | 0 | | 0 |
| 7 | **Mid-Term Exam & some application of RLC Circuits** | 2 | 0 | | 0 |
| 8 | Power and resonance in RLC circuit | 2 | 0 | | 0 |
| 9 | complex numbers | 2 | 0 | | 0 |
| 10 | analysis ac circuits by complex numbers | 2 | 0 | | 0 |
| 11 | AC RL Circuit | 2 | 0 | | 0 |
| 12 | AC RC Circuit | 2 | 0 | | 0 |
| 13 | RLC Circuit | 2 | 0 | | 0 |
| 14 | AC and DC Circuit in a comparison | 2 | 0 | | 0 |
| 1 | Introduction in the unites , tools , Errors and Precise measurements | 0 | | 0 | 3 |
| 2 | Anderson Bridge | 0 | | 0 | 3 |
| 3 | Capacitors | 0 | | 0 | 3 |
| 4 | Kerry Fosters bridge | 0 | | 0 | 3 |
| 5 | The mutual induction and solenoid | 0 | | 0 | 3 |
| 6 | Constriction of Ohmmeter | 0 | | 0 | 3 |
| 7 | **Mid-Term Exam and Oscilloscope** | 0 | | 0 | 3 |
| 8 | Solar cell | 0 | | 0 | 3 |
| 9 | Temperature coefficient of resistance | 0 | | 0 | 3 |
| 10 | The magnetic flux density of a long wire | 0 | |  | 3 |
| 11 | Thevenine theorem | 0 | | 0 | 3 |
| 12 | Cutting of cables | 0 | | 0 | 3 |
| 13 | Biot-Savart Law | 0 | | 0 | 3 |
| 14 | Internal resistance of potential source | 0 | | 0 | 3 |
|  | **Total hours** | **28** | | 0 | **42** |

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| **4 - Teaching and Learning methods:** |

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| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | a.1 | Define the difference between the direct and alternating current | x | 0 | X | x | 0 | 0 |
| a.2 | Investigate ac circuits by complex numbers | x | X | 0 | x | x | 0 |
| a.3 | Memorise RL ,RC and RLC circuits in parallel and series | x | 0 | 0 | x | 0 | x |
| **Intellectual Skills** | b.1 | compare between Dc and AC. | x | 0 | 0 | x | x | 0 |
| b.2 | Construct the different Ac circuits. | x | 0 | 0 | x | 0 | x |
| b.3 | Deduce the mechanisms and procedures to handel scientific problems related to the topics | x | 0 | X | x | 0 | 0 |
| Practical and professional skills | c.1 | Analyze AC and DC circuits | x | 0 | X | x | 0 | x |
| c.2 | Compare between the applications of the different electric circuits.. | x | X | 0 | x | 0 | 0 |
| c.3 | Identify the impedance and phase angle of the different circuits | x | 0 | 0 | x | x | 0 |
| **General Skills** | d.1 | Use the Internet to search for Ac and electromagnetic information’s. | x | X | 0 | x | x | 0 |
| d.2 | Work in team to synthesis and studying some Ac circuits. | x | 0 | X | x | 0 | 0 |
| d.3 | Estimate the applied voltage in each series circuit | x | 0 | X | x | 0 | 0 |

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| **5- Students’ Assessment Methods and Grading:** |

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| **Tools:** | To Measure | **Time schedule** | **Grading** |
| Semester work | a.1,a.3,b.2,c.1,c.3,d.1and d.2 | Fifth week | **12 %** |
| Mid-Term Exam | a.1,a.2,b.3, c.1,c.2,d.1and d.3 | Seventh week | 8% |
| Oral exam | a.3,b.2, c.2, d.3 and d.2 | Fifteenth week | 8% |
| Practical exams | c.1,c.2,c.3 | Sixteenth week | 24 % |
| Written exam | a.1 to a.3, b.1 to b.3, c.1 to c.3 and d.3 | Sixteenth week | 48% |
| Total | | | 100 % |

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| **6- List of references:** |
| **6-1 Course notes**  Lecture notes approved by Physics department.   * 1. **Required books.**  1. Serway and Beichner physics for scientists and engineers 2000    1. **Recommended books.**   1- Fundamentals of Physics Extended, 9th Edition, David Halliday, Robert Resnick, Jearl Walker (2011)  **6-4 Periodicals, Web sites, etc.**  http://www. Physics2000 |

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| **7- Facilities required for teaching and learning:** |
| Using a microphone in lectures  Using a black board  Group Discussions  Data show |

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| **Course coordinator:** | Dr.. Karima El Sayed | |
| **Head of the Department:** | Prof. Mohamed Ali |
| **Date: 9/12/2019** | Updated 2020/2021 |

**Third Level**

**First Semester**

|  |  |  |  |  |  |  |
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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Third level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Numerical Analysis (1)** | | **Code:**  **323 M** | | **Year/level:**  **Third level /** First **Semester** | | |
| **Teaching Hours:42** | | **Lectures: 3** **h/week** | | **Tutorial: -** | | |
|  | | **Practical: ــــ** | | **Total:** **3**  **h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course the students must be able to**  **-be aware of “errors” and their types in numerical analysis, distinguish between direct and indirect methods for solving system of linear equations, approximate a function by a polynomial, compute derivatives and integration of a function numerically and get the rootes of a non linear equation by iteration methods.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Define basic concepts and facts of numerical analysis** 2. **Know some methods for solving a system of linear equations** 3. **Identify methods solving non linear equations** 4. **Define polynomial approximation of a function by different methods** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Compare between different types of errors arising of numerical methods** 2. **Develop and improve numerical methods to get more accurate solutions.** 3. **Apply appropriate methods to find solutions of non-linear equations** 4. **Create forms to evaluate integration of a function and test its order of convergence.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1-Solving problems using various approaches.**  **c2- Develop confidence in their abilities to use mathematics.**  **c3- Criticize the different methods used in solving problems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Using internet effectively.**  **d2- Time management.**  **d3- Community linked thinking** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction to numerical analysis Solutions of non-linear equations. (1)** | | | **3** | | **-** | **-** |
| **Introduction to numerical analysis Solutions of non-linear equations. (2)** | | | **3** | | **-** | **-** |
| **Errors in numerical computation (1)** | | | **3** | | **-** | **-** |
| **Errors in numerical computation (2)** | | | **3** | | **-** | **-** |
| **Interpolation and polynomial approximations. (1)** | | | **3** | | **-** | **-** |
| **Interpolation and polynomial approximations. (2)** | | | **3** | | **-** | **-** |
| **Numerical integration (1)** | | | **3** | | **-** | **-** |
| **Numerical integration (2)** | | | **3** | | **-** | **-** |
| **Direct and iterative methods for solving linear systems (1)** | | | **3** | | **-** | **-** |
| **Direct and iterative methods for solving linear systems (2)** | | | **3** | | **-** | **-** |
| **Direct and iterative methods for solving linear systems (3)** | | | **3** | | **-** | **-** |
| **Numerical differentiation (1)** | | | **3** | | **-** | **-** |
| **Numerical differentiation (2)** | | | **3** | | **-** | **-** |
| **Numerical differentiation (3)** | | | **3** | | **-** | **-** |
| **Total hours** | | | **42** | | **-** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | | **Problem solving** | | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Define basic concepts and facts of numerical analysis** | | | **🗸** |  |  |  | |  | |  |
| **a2-** | **Know some methods for solving a system of linear equations** | | | **🗸** |  |  |  | | **🗸** | |  |
| **a3-** | **Identify methods solving non linear equations** | | | **🗸** |  |  |  | | **🗸** | |  |
| **a4-** | **Define polynomial approximation of a function by different methods** | | | **🗸** |  |  |  | | **🗸** | |  |
| **Intellectual Skills** | **b1-** | **Compare between different types of errors arising of numerical methods** | | |  | **🗸** |  |  | |  | **🗸** | |
| **b2-** | **Develop and improve numerical methods to get more accurate solutions.** | | | **🗸** |  |  | **🗸** | |  |  | |
| **b3-** | **Apply appropriate methods to find solutions of non-linear equations** | | |  | **🗸** |  |  | | **🗸** |  | |
| **b4-** | **Formulate forms to evaluate integration of a function and test its order of convergence.** | | |  | **🗸** |  | **🗸** | |  |  | |
| **Practical and professional skills** | **c1-** | **Analyze problems using various approaches.** | | | **🗸** |  |  |  | | **🗸** | |  |
| **c2-** | **Investigate confidence in their abilities to use mathematics.** | | | **🗸** |  |  |  | | **🗸** | |  |
| **c3-** | **Criticize the different methods used in solving problems.** | | | **🗸** |  |  |  | | **🗸** | |  |
| **General Skills** | **d1-** | **Using internet effectively.** | | |  | **🗸** |  |  | |  | **🗸** | |
| **d2-** | **Time management** | | |  | **🗸** |  |  | | **🗸** |  | |
| **d3-** | **Community linked thinking** | | | **🗸** |  | **🗸** |  | | **🗸** |  | |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | | |
| **Tools:** | | | **To Measure** | **Time schedule** | | | | | **Grading** | | | |
| Mid-Term Exam | | | **b1,c3,b3,d1, a1** | **Week 7** | | | | | **10 %** | | | |
| Oral exam | | | **d3,d2, b2, c2** | **Week 15** | | | | | **10 %** | | | |
| Practical exams | | |  |  | | | | |  | | | |
| Written exam | | | **c1,a2, a3, a4, b4** | **Start of 16th week** | | | | | **80 %** | | | |
| **Total** | | | | | | | | | **100 %** | | | |

**6 – Course Matrix**

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| **Topic** | **Knowledge & Understanding** | | | | **Intellectual Skills** | | | | **Practical and professional skills** | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b2** | **b4** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** |
| **Introduction to numerical analysis Solutions of non-linear equations. (1)** | **x** |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |  |
| **Introduction to numerical analysis Solutions of non-linear equations. (2)** |  | **x** |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |
| **Errors in numerical computation (1)** |  | **x** |  |  | **x** |  |  | **x** |  |  |  | **x** |  |  |
| **Errors in numerical computation (2)** |  |  | **x** |  |  |  |  |  |  |  |  |  |  | **x** |
| **Interpolation and polynomial approximations. (1)** |  |  | **x** |  | **x** |  |  |  |  |  |  |  |  | **x** |
| **Interpolation and polynomial approximations. (2)** |  | **x** |  |  |  | **x** |  |  |  |  |  |  | **x** |  |
| **Numerical integration (1)** |  |  |  | **x** |  |  |  |  |  | **x** |  |  |  | **x** |
| **Numerical integration (2)** |  |  |  | **x** |  | **x** |  |  |  | **x** |  |  | **x** |  |
| **Direct and iterative methods for solving linear systems (1)** | **x** |  | **x** |  |  |  |  |  | **x** |  |  | **x** |  |  |
| **Direct and iterative methods for solving linear systems (2)** |  | **x** |  |  | **x** |  |  |  | **x** |  |  |  |  | **x** |
| **Direct and iterative methods for solving linear systems (3)** |  |  |  |  |  | **x** |  |  |  |  | **x** |  | **x** |  |
| **Numerical differentiation (1)** |  | **x** |  |  | **x** |  |  |  |  |  | **x** |  |  | **x** |
| **Numerical differentiation (2)** |  |  | **x** |  |  |  |  | **x** |  |  |  |  |  |  |
| **Numerical differentiation (3)** | **x** |  |  |  |  | **x** |  |  |  | **x** |  |  |  | **x** |

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|  | | **7- List of references**  **7-1 Course notes**  **-Notes were approved by the Math Department.**   * 1. **Required books.**   - **Joeseph McKean and Allen T Craig , Introduce to the probability theory, (2001)**  **7-3 Recommended books.**  **- W.D.McGlinn, "Introduction to probability theory ", John. Hopkins Univ. Press, (2003).**   * 1. **Periodicals, Web sites, etc.**   **1-**[**https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf**](https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf)  **2-http://www4.ncsu.edu/~rsmith/MA797V\_S10/Statistics.pdf** | | | | | |
|  | | **8- Facilities required for teaching and learning:**  **1-Data show**  **2-white board** | | | | |
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| **Course coordinator:** |  | **Dr. Aml Elpitar** |
| **Head of the Department:** |  | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** |  | **Updated 2020/2021** |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Third Level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Operating System** | | **Code:**  **351 MC** | | **Year/level:**  **Third Level / First Semester** | | |
|  | | **Lectures: 2 h/week** | | **Tutorial: ــــ** | | |
|  | | **Practical: 2h/week** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **To teach the concepts and mechanisms employed in modern operating systems, including the use of concurrent processing and provide students with experience of programming using an OS application programming interface and To provide a foundation for further study in distributed systems.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1-Explain operating systems structure & components**  **a2-Define Inter-process communication**  **a3-Name an account on multithreading & concurrency**  **a4-Explain application programming interfaces**  **a5-State OS case studies** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1-Critisize OS design alternatives**  **b2-Apply appropriate OS API services** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1**-**Examine C programs that use the UNIX/LINUX API**  **c2-Analize programs that communicate via IPC**  **c3-Investigate multithreaded programs**  **c4-Mke multithreaded & concurrent programs** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Computing problems**  **d2- Working in groups**  **d3- Time management** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction** | | | **2** | | **-** | **2** |
| **Computer-System Structure** | | | **2** | | **-** | **2** |
| **Operating- System Structure** | | | **2** | | **-** | **2** |
| **Processes(1)** | | | **2** | | **-** | **2** |
| **Processes(2)** | | | **2** | | **-** | **2** |
| **Threads(1)** | | | **2** | | **-** | **2** |
| **Midterm and Revision** | | | **2** | | **-** | **2** |
| **Threads(2)** | | | **2** | | **-** | **2** |
| **CPU Scheduling(1)** | | | **2** | | **-** | **2** |
| **CPU Scheduling(2)** | | | **2** | | **-** | **2** |
| **Processes Synchronization(1)** | | | **2** | | **-** | **2** |
| **Processes Synchronization(2)** | | | **2** | | **-** | **2** |
| **Deadlocks(1)** | | | **2** | | **-** | **2** |
| **Deadlocks** | | | **2** | | **-** | **2** |
| **Total hours** | | | **28** | | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. Explain operating systems structure & components** | **🗸** |  |  | **🗸** |  | **🗸** |
| **a2. Define Inter-process communication** | **🗸** |  | **🗸** |  |  | **🗸** |
| **a3. Name an account on multithreading & concurrency** | **🗸** |  |  | **🗸** |  | **🗸** |
| **a4. Explain application programming interfaces** | **🗸** |  |  |  |  | **🗸** |
| **a5. State OS case studies** | **🗸** | **🗸** |  |  |  | **🗸** |
| **Intellectual Skills** | **b1. Criticize OS design alternatives** | **🗸** |  |  | **🗸** |  | **🗸** |
| **b2. Apply appropriate OS API services** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **Practical and professional skills** | **c1. Examine C programs that use the UNIX/LINUX API** | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **c2. Analyze programs that communicate via IPC** | **🗸** |  |  | **🗸** |  | **🗸** |
| **c3. Investigate multithreaded programs** | **🗸** | **🗸** |  |  | **🗸** | **🗸** |
| **c4. Make multithreaded & concurrent programs** | **🗸** |  |  | **🗸** |  |  |
| **General Skills** | **d1. Computing problems** | **🗸** |  | **🗸** |  |  | **🗸** |
| **d2. Working in groups** | **🗸** |  | **🗸** | **🗸** | **🗸** | **🗸** |
| **d3. Time management** |  | **🗸** | **🗸** |  |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | | | |
| **Tools:** | **To Measure** | | **Time schedule** | **Grading** | |
| **Mid-Term Exam** | **a1, b2, c1, a2,d3** | | **Week 7** | **14 %** | |
| **Oral exam** | **b1, c2, c3,a4, a5** | | **Week 15** | **14 %** | |
| **Practical exams** | **c4, d2,a3** | | **Week 15** | **24 %** | |
| **Written exam** | **c3, d1, d3** | | **Start of 16th week** | **48 %** | |
| **Total** | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course Matrix** | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | **Practical and professional skills** | | | | **General**  **skills** | | | | | **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **c1** | **c2** | **c3** | **c4** | **d1** | **d2** | **d3** | | **Introduction** | **x** |  |  |  |  |  |  |  |  |  |  |  |  |  | | **Computer-System Structure** |  | **X** |  | **x** |  |  |  |  |  |  | **X** |  |  |  | | **Operating- System Structure** |  |  | **x** |  |  |  |  |  | **x** |  |  |  |  |  | | **Processes(1)** |  |  |  |  |  | **x** |  |  |  |  |  |  |  |  | | **Processes(2)** |  |  | **x** |  |  |  |  |  |  |  |  | **X** |  |  | | **Threads(1)** |  |  |  |  | **x** |  |  | **x** |  |  |  |  |  | **x** | | **Midterm and Revision** |  |  |  |  |  |  | **x** |  |  |  |  |  |  |  | | **Threads(2)** |  |  |  |  |  |  |  |  |  |  | **X** |  |  |  | | **CPU Scheduling(1)** |  |  |  |  |  |  |  |  | **x** |  |  |  |  |  | | **CPU Scheduling(2)** |  | **X** |  |  |  |  |  |  |  | **X** |  | **X** |  |  | | **Processes Synchronization(1)** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | **Processes Synchronization(2)** | **x** |  |  | **x** |  |  | **x** |  |  |  |  |  | **x** |  | | **Deadlocks(1)** | **x** |  |  |  |  |  | **x** |  |  |  |  |  |  | **x** | | **Deadlocks** | **x** |  | **x** |  |  | **x** |  |  |  |  | **X** |  | **x** |  |   **7- List of references:** | | | | |
| **7-1 Course notes**  **- Notes from the Department**  **7-2 Required books.**  **- Abraham Silberschatz, Peter B. Galvin, Greg Gagne: Operating System Concepts, Wiley 2010**  **7-3 Recommended books.**  **-** **Andrew Tanenbaum: Modern Operating Systems, third edition, Prentice Hall 2007**  **7-4 Periodicals, Web sites, etc.**  - [**http://www.webopedia.com/TERM/O/operating\_system.html**](http://www.webopedia.com/TERM/O/operating_system.html) | | | | |
| **8- Facilities required for teaching and learning:**  **Data Show Device - Whiteboard** | | | | |
| **Course coordinator:** | | **Dr. Eman Ebrahim** | | |
| **Head of the Department:** | | **Prof. Dr. Reda Gamal Abd El Rahman** | | |
| **Date: 9 / 12 /2019** | | **Updated 2020/2021** | | |

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| **Course Specification** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | | Computer Science | | |
| **Department offering the program:** | | | Mathematics | |
| **Department offering the course:** | | | Mathematics | |
| **Academic year/level:** | | | Third level / First Semester | |
| **Date of specifications approval:** | | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | |
| B - Basic information | | | | |
| **Title: Algorithms** | | | **Code:**  **353 MC** | **Year/level:**  **Third level / First Semester** |
| **Teaching Hours: 42 h** | | | **Lectures: 2h/week** | **Tutorial: 2** **h/week** |
|  |  | | **Practical: ــــ ــــ ــــ** | **Total:** **3 h/week** |
| C - Professional information **1 – Course Learning Objectives:** | | | | |
| **At the end of this course, the students must be able to:**  **Find graph and tree - complex optimization problems. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness. Apply effectively information technology relevant to the field.** | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Select essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques.**  **a2. Describe the relevant theories and their applications of Logic circuits.**  **a3. Identify the processes and mechanisms supporting the structure and function of**  **Logic circuits.**  **a4. Explain the meaning of complicated statements using**  **mathematical notation and language.** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Interpret qualitatively and quantitatively**  **science relevant data.**  **b2. Develop appropriate knowledge and awareness of the importance and**  **applications of mathematical and statistical assumptions.**  **b3. Apply the principles of effective information management, information**  **organization, and information-retrieval skills to various information systems.** | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Make a report on the investigated data, using**  **appropriate techniques and considering scientific guidance.**  **c2. Solve problems using a range of formats and approaches.**  **c3. Criticize the different methods used in addressing subject**  **related issues.**  **c4. Show essential concepts, principles, and practices of computer**  **science, mathematics and statistics, in the context of well-defined scenarios,**  **showing judgment in the selection and application of tools and techniques.** | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Communication with others.**  **d2. Community linked thinking, set tasks and solve problems on scientific basis.**  **d3. Working in groups effectively, manage time, collaborate and communicate**  **with others positively.**  **d4. Life-long learning.** | | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Introduction** | **2** | **2** | **-** |
| **Analysis and Big-O Notation** | **2** | **2** | **-** |
| **Analysis and Big-O Notation** | **2** | **2** | **-** |
| **Asymptotics, merge sort as recursive algorithm** | **2** | **2** | **-** |
| **Recurrencies** | **2** | **2** | **-** |
| **Quicksort and Order Statistics** | **2** | **2** | **-** |
| **Mid-Term Examination and Heaps** | **2** | **2** | **-** |
| **Heaps and Amortized Analysis, Counting Sort** | **2** | **2** | **-** |
| **Stacks, Queues, Hashing and Binary Search trees** | **2** | **2** | **-** |
| **Augmenting data structures** | **2** | **2** | **-** |
| **Greedy Algorithms** | **2** | **2** | **-** |
| **Huffman Encoding, Minimum Spanning Tree** | **2** | **2** | **-** |
| **Minimum Spanning Tree** | **2** | **2** | **-** |
| **Dynamic Programming, Bellman-Ford algorithm** | **2** | **2** | **-** |
| **Total hours** | **28** | **28** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brainstorming** |
| **Knowledge & Understanding** |  | **Select essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques.** | **🗸** | **🗸** | **🗸** | **🗸** |  |
|  | **Describe the relevant theories and their applications of Logic circuits.** | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **a3.** | **Identify the processes and mechanisms supporting the structure and function of Logic circuits.** | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **a4** | **Explain the meaning of complicated statements using mathematical notation and language.** | **🗸** | **🗸** | **🗸** | **🗸** |  |
| **Intellectual Skills** |  | **Interpret qualitatively and quantitatively science relevant data.** | **🗸** | **🗸** |  | **🗸** |  |
|  | **Develop appropriate knowledge and awareness of the importance and applications of mathematical and statistical assumptions.** | **🗸** |  | **🗸** | **🗸** | **🗸** |
|  | **Apply the principles of effective information management, information organization, and information-retrieval skills to various information systems.** | **🗸** | **🗸** |  | **🗸** |  |
| **Practical and professional skills** |  | **Make report on the investigated data, using appropriate techniques and considering scientific guidance.** | **🗸** |  | **🗸** | **🗸** |  |
|  | **Solve problems using a range of formats and approaches.** |  |  | **🗸** | **🗸** | **🗸** |
|  | **Criticize the different methods used in addressing subject related issues.** | **🗸** | **🗸** | **🗸** |  |  |
|  | **Show essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques.** | **🗸** | **🗸** |  | **🗸** | **🗸** |
| **General Skills** |  | **Communication with others.** | **🗸** |  |  | **🗸** |  |
|  | **Community linked thinking, set tasks and solve problems on scientific basis.** | **🗸** | **🗸** | **🗸** | **🗸** |  |
|  | **Working in groups effectively, manage time, collaborate and communicate with others positively.** | **🗸** |  | **🗸** | **🗸** |  |
|  | **Life-long learning.** | **🗸** |  | **🗸** | **🗸** | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a3, b1, b3, c1, d1,d3.** | **Week 7** | **10 %** |
| **Oral exam** | **a1, a4, b2, c2, c4, d2, d4.** | **Week 15** | **10 %** |
| **Written exam** | **a2, b3, c3.** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix** | | | | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General**  **Skills** | | | |
| **a1** | **a2** | **a3** | **a4** | **b1** | | **b2** | **b3** | **c1** | **c2** | **c3** | **c4** | **d1** | **d2** | **d3** | **d4** |
| **Introduction** | **x** |  |  |  |  | |  |  |  |  |  | **x** |  |  |  | **x** |
| **Analysis and Big-O Notation** |  | **x** |  |  |  | |  |  | **x** |  |  |  |  |  |  |  |
| **Analysis and Big-O Notation** |  |  | **x** |  |  | |  |  |  |  | **X** |  |  |  | **x** |  |
| **Asymptotics, merge sort as recursive algorithm** |  |  |  | **x** |  | |  | **x** |  |  |  | **x** |  |  |  |  |
| **Recurrencies** |  |  |  |  |  | |  |  |  |  |  |  | **x** |  |  |  |
| **Quicksort and Order Statistics** |  |  |  |  |  | | **x** |  |  |  |  |  |  |  |  |  |
| **Mid-Term Examination and Heaps** |  |  |  |  |  | |  |  | **x** |  |  |  |  |  |  |  |
| **Heaps and Amortized Analysis, Counting Sort** | **x** |  | **x** |  | **x** | |  |  | **x** | **x** |  |  |  |  | **x** |  |
| **Stacks, Queues, Hashing and Binary Search trees** |  |  |  | **x** |  | |  |  |  |  |  |  |  | **x** |  |  |
| **Augmenting data structures** |  |  |  |  |  | |  |  |  |  |  | **x** |  |  |  | **x** |
| **Greedy Algorithms** |  |  |  |  |  | |  | **x** |  |  |  |  |  |  |  | **x** |
| **Huffman Encoding, Minimum Spanning Tree** | **x** |  |  | **x** |  | |  |  |  |  |  |  |  | **x** |  |  |
| **Minimum Spanning Tree** |  |  |  | **x** |  | |  |  |  |  |  | **x** |  |  | **x** |  |
| **Dynamic Programming, Bellman-Ford algorithm** |  |  |  |  | **x** | |  |  |  |  | **x** |  |  |  |  | **x** |

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| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Sedgewick, R. and Wayne, K. (2011). *Algorithms*. 4th ed. United States of America: Addison-Wesley, p.976.**   **7-3 Recommended books.**   * **Cormen, T., Leiserson, C., Rivest, R. and Stein, C. (2009). *Introduction to Algorithms*. 3rd ed. Cambridge, Massachusetts London, England: The MIT Press, p.1313.**   **7-4 Periodicals, Web sites, etc.**   * [**http://www.ics.uci.edu/~goodrich/teach/cs161/notes**](http://www.ics.uci.edu/~goodrich/teach/cs161/notes)[Accessed 29 Oct. 2015]. [**https://www.khanacademy.org/computing/computer-science/algorithms**](https://www.khanacademy.org/computing/computer-science/algorithms) [Accessed 29 Oct. 2015]. | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | |
|  | | |
| **Course coordinator:** | **Dr. Islam Ahmed** |
| **Head of the Department:** | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | **Updated 2020/2021** |

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| **Course Specification**  **A- Affiliation** | | | |
| **Relevant program:** | **Computer Science** | | |
| **Department offering the program:** | | **Mathematics** | |
| **Department offering the course:** | | **Mathematics** | |
| **Academic year/level:** | | **Third Level /first semester** | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| ***B - Basic information*** | | | |
| **Title:**  **Databases** | | **Code:**  **357 MC** | **Year/level:**  **Third Level /first semester** |
|  | | **Lectures: 2 h/week** | **Tutorial: ــــ** |
|  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| ***C - Professional information*** | | | |
| **1 – Course Learning Objectives:** | | | |
| **: At the end of this course, the students must be able to**  **Computer science applications are used to solve mathematical and statistical problems. Apply computing knowledge and skills to the solution of real life problem. Apply effectively information technology relevant to the field. Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Know the relevant theories and their applications**.  **a2. Determine the processes and mechanisms supporting the structure.**  **a3. Select the progress of the program-related knowledge.**  **a4. Define the core ideas of mathematics and statistics.**  **a5. Describe the principles of mathematical, statistical modeling an application.** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Compare between subject-related theories and assess their concepts and**  **principles**.  **b2. Apply the knowledge and understanding of the mathematical and statistical**  **processes for modeling of real-world problems**. | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Make techniques and tools considering scientific ethics.**  **c2. Solve problems using a range of formats and approaches.**  **c3. Criticize the different methods use addressing subject related issues.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Using internet effectively.**  **d2. Community linked thinking, set tasks and solve problems scientific basis.**  **d3. Computing scientific models, systems, and tools effectively.**  **d4. Working in groups effectively, manage time, collaborate and communicate with others positively.**  **d5.Ethical behavior with property rights .** | | | |

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| 3 – Contents | | | |
| Topic | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| Overview of Database Management | **2** | **-** | **2** |
| Relational systems | **2** | **-** | **2** |
| Architectural databases | **2** | **-** | **2** |
| Database Manager | **2** | **-** | **2** |
| Database Management Systems | **2** | **-** | **2** |
| Indexing(1) | **2** | **-** | **2** |
| Midterm and Revision | **2** | **-** | **2** |
| Indexing(2) | **2** | **-** | **2** |
| Comparison methods | **2** | **-** | **2** |
| SQL language | **2** | **-** | **2** |
| Algebra relations | **2** | **-** | **2** |
| Security and solidarity (1) | **2** | **-** | **2** |
| Security and solidarity(2) | **2** | **-** | **2** |
| The family of the outputs of databases. | **2** | **-** | **2** |
| Total hours | **28** | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. Know the relevant theories and their applications.** | **🗸** |  |  | **🗸** |  |  |
| **a2. Determine the processes and mechanisms supporting the structure.** | **🗸** |  |  | **🗸** |  |  |
| **a3. Select the progress of the program-related knowledge.** | **🗸** |  |  | **🗸** |  |  |
| **a4. Define the core ideas of mathematics and statistics.** | **🗸** |  |  | **🗸** |  |  |
| **a5. Describe the principles of mathematical, statistical modeling an application.** | **🗸** |  |  | **🗸** |  |  |
| **Intellectual Skills** | **b1. Compare between subject-related theories and assess their concepts and principles**. |  | **🗸** |  | **🗸** | **🗸** | **🗸** |
| **b2. Apply the knowledge and understanding of the mathematical and statistical processes for modeling of real-world problems**. | **🗸** |  |  | **🗸** | **🗸** |  |
| **Practical and professional skills** | **c1. Make techniques and tools considering scientific ethics.** | **🗸** |  |  |  | **🗸** |  |
| **c2. Solve problems using a range of formats and approaches.** | **🗸** |  |  | **🗸** | **🗸** |  |
| **c3. Criticize the different methods use addressing subject related issues.** | **🗸** |  |  | **🗸** | **🗸** | **🗸** |
| **General Skills** | **d1. Using internet effectively.** |  | **🗸** | **🗸** |  |  |  |
| **d2. Community linked thinking, set tasks and solve problems scientific basis.** |  | **🗸** | **🗸** |  |  |  |
| **d3. Computing scientific models, systems, and tools effectively.** |  | **🗸** | **🗸** |  |  |  |
| **d4. Working in groups effectively, manage time, collaborate and communicate with others positively.** |  | **🗸** | **🗸** |  |  |  |
| **d5. Ethical behavior property rights.** | **🗸** |  |  |  | **🗸** | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **a1 , a5 ,b1** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **b2, c3, a2, a3** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **c2, d2, d4, a4,d3,d5** | | **Week 15** | | **24 %** | |
| **Written exam** | | **d1, d3,c1** | | **Start of 16th week** | | **48 %** | |
| **Total** | | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course Matrix** | | | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General**  **skills** | | | | | | **a1** | **a2** | **a3** | **a4** | **a5** | | **b1** | **b2** | **c1** | | **c2** | **c3** | **d1** | **d2** | **d3** | **d4** | **d5** | | **Overview of Database Management** | **x** |  |  |  |  | |  |  |  | |  |  | **x** |  |  |  |  | | **Relational systems** |  | **x** |  |  |  | |  |  | **x** | |  |  |  |  |  |  |  | | **Architectural databases** |  |  | **x** |  |  | |  |  |  | |  | **x** |  |  |  | **x** |  | | **Database Manager** |  |  |  | **x** |  | |  | **x** |  | |  |  | **x** |  |  |  |  | | **Database Management Systems** |  |  |  |  |  | |  | **x** |  | |  |  |  | **X** |  |  | **x** | | **Indexing(1)** |  |  |  |  |  | | **x** |  |  | |  | **x** |  |  |  |  |  | | **Midterm and Revision** |  |  |  |  |  | |  |  | **x** | |  |  |  |  |  |  |  | | **Indexing(2)** | **x** |  | **x** |  | **x** | |  |  | **x** | | **x** |  |  |  |  | **x** |  | | **Comparison methods** |  |  |  | **x** |  | |  |  |  | |  |  |  |  | **x** |  | **x** | | **SQL language** |  |  |  |  |  | | **x** |  |  | |  |  | **x** |  |  |  |  | | **Algebra** **relations** |  |  |  |  |  | |  | **x** |  | |  |  |  |  |  |  |  | | **Security and solidarity (1)** | **x** |  |  | **x** |  | |  |  |  | |  |  |  |  | **x** |  | **x** | | **Security and solidarity(2)** |  |  |  | **x** |  | |  |  |  | |  |  | **x** |  |  | **x** |  | | **The family of the outputs of databases.** |  |  |  |  | **x** | |  |  |  | |  | **x** |  |  |  |  |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**  **- Notes from the Department**   * 1. **Required books.**   **- E. Petroutsos, Mastering Database Programming with Visual Basic 6: SYBEX Inc., 1999**.  **7-3 Recommended books.**  **- W. Kim and F. H. Lochovsky, Object-oriented concepts, databases, and applications: ACM Press/Addison-Wesley Publishing Co., 1989**.  **7-4 Periodicals, Web sites, etc.**  **-** [**http://www.w3schools.com/sql/**](http://www.w3schools.com/sql/)  **-** [**http://www.sqlcourse.com/intro.html**](http://www.sqlcourse.com/intro.html) | | | | | | | |
| **8- Facilities required for teaching and learning:**  **Data Show Device - Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr.** [**Mosab abd el-hameed hassaan**](http://bu.edu.eg/staff/mosabhassaan7) | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /209** | | | | **Updated 2020/2021** | |

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| **Course Specification**  **A- Affiliation** | | | |
| **Relevant program:** | **Computer Science** | | |
| **Department offering the program:** | | **Mathematics** | |
| **Department offering the course:** | | **Mathematics** | |
| **Academic year/level:** | | **Third Level /first semester** | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| ***B - Basic information*** | | | |
| **Title:**  **Microprocessors** | | **Code:**  **325 MC** | **Year/level:**  **Third Level /first semester** |
|  | | **Lectures: 2 h/week** | **Tutorial: ــــ** |
|  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| ***C - Professional information*** | | | |
| **1 – Course Learning Objectives:** | | | |
| **: At the end of this course, the students must be able to**  **This is an introductory course in Microprocessors Based Systems. It provides a review of number systems and computer code, Microcomputer Fundamentals (architecture, CPU, Memory, I/O) and Architecture of the x86 processor family. Also it provides an introduction to assembly language to perform given tasks and run them.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Describe the Microcomputer Fundamentals (architecture, CPU, Memory, I/O)**  **a2. Identify issues about the microprocessor performance.**  **a3. Describe the architecture of the x86 processor family and its host computer system from a programmer’s point of view.**  **a4. Explain some aspects of the subject, such as hardware systems design.**  **a5. Outline the main syntax of assembly language** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Construct an innovative design to solve a problem containing a range of commercial and industrial constraints.**  **b2. Interpret a range of solutions and critically evaluate and justify proposed design solutions.**  **b3. Create designs to satisfy given requirements (synthesis, evaluation, application).** | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Prepare programs using the assembly language.**  **c2. Criticize Program a microprocessor to perform given tasks.**  **c3. Assess the assembly language to control the different computer units.**  **c4. Analyze the assembly language to write drivers for different computer accessories.**  **c5. Make computer-based systems.**  **c6. Investigate computer-based systems using appropriate tools and techniques.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Working in groups.**  **d2. Time management.**  **d3. Communication with others effectively.**  **d4. Life-long learning** | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Introduction** | **2** |  | **2** |
| **Microcomputer fundamentals** | **2** |  | **2** |
| **Architecture of microprocessor** | **4** |  | **4** |
| **Instruction set and instruction format, addressing modes** | **2** |  | **2** |
| **Data movement instruction , arithmetic and logic instructions, program control instructions, memory addressing modes** | **2** |  | **2** |
| **Midterm and Revision** | **2** |  | **2** |
| **Introduction to Assembly language** | **2** |  | **2** |
| **Basic Assembly instructions** | **6** |  | **6** |
| **Procedures** | **6** |  | **6** |
| **Total hours** | **28** |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. Describe the Microcomputer Fundamentals (architecture, CPU, Memory, I/O)** | **🗸** |  |  | | **🗸** |  |  |
| **a2. Identify issues about the microprocessor performance.** | **🗸** |  |  | | **🗸** |  |  |
| **a3. Describe the architecture of the x86 processor family and its host computer system from a programmer’s point of view.** | **🗸** |  |  | | **🗸** |  |  |
| **a4. Explain some aspects of the subject, such as hardware systems design.** | **🗸** |  |  | | **🗸** |  |  |
| **a5.Outline the main syntax of assembly language** | **🗸** |  |  | | **🗸** |  |  |
| **Intellectual Skills** | **b1. bb1. Construct an innovative design to solve a problem containing a range of commercial and industrial constraints.** |  | **🗸** |  | **🗸** | | **🗸** |  |
| **b2. Interpret a range of solutions and critically evaluate and justify proposed design solutions.** |  | **🗸** | **🗸** |  | |  |  |
| **b3. Create designs to satisfy given requirements (synthesis, evaluation, application).** |  | **🗸** | **🗸** | **🗸** | | **🗸** |  |
| **Practical and professional skills** | **c1. Prepare programs using the assembly language.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c2. Criticize Program a microprocessor to perform given tasks.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c3. Assess the assembly language to control the different computer units.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c4. Analyze the assembly language to write drivers for different computer accessories.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c5. Make computer-based systems.** |  |  |  | | **🗸** |  | **🗸** |
| **c6. Investigate computer-based systems using appropriate tools and techniques.** | **🗸** |  |  | | **🗸** | **🗸** | **🗸** |
| **General Skills** | **d1. Working in groups.** |  | **🗸** | **🗸** | |  |  |  |
| **d2. Time management.** |  | **🗸** | **🗸** | |  |  | **🗸** |
| **d3. Communication with others effectively.** |  | **🗸** | **🗸** | |  |  |  |
| **d4. Life-long learning** |  | **🗸** | **🗸** | |  |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **a1 , a2 ,a3** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **a3, b1,d2** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **c1, c2, c3, c4,d1,d3,d4** | | **Week 15** | | **24 %** | |
| **Written exam** | | **a5 , a4 , c5, c6, b2, b3** | | **Start of 16th week** | | **48 %** | |
| **Tota** | | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course Matrix** | | | | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | | **Practical and professional skills** | | | | | | **General**  **skills** | | | | | **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **b3** | **c1** | **c2** | **c3** | **c4** | **c5** | **c6** | **d1** | **d2** | **d3** | **d4** | | **Introduction** | **x** |  |  |  |  |  |  |  |  |  |  | **x** |  |  |  | **x** |  |  | | **Microcomputer fundamentals** |  |  | **X** |  |  |  |  | **x** |  |  |  |  |  |  |  |  |  |  | | **Architecture of microprocessor** |  | **X** |  | **x** |  | **x** |  |  | **x** |  |  |  | **x** |  |  |  |  | **x** | | **Instruction set and instruction format, addressing modes** |  |  |  |  | **x** |  |  |  |  |  |  |  |  | **x** | **x** |  |  |  | | **Data movement instruction , arithmetic and logic instructions, program control instructions, memory addressing modes** |  |  |  |  |  |  | **x** |  |  | **x** |  |  | **x** |  |  |  |  |  | | **Midterm and Revision** |  |  |  |  |  |  |  |  |  |  | **x** |  |  | **x** |  |  |  |  | | **Introduction to Assembly language** |  |  |  |  |  |  |  |  |  |  | **x** |  |  |  |  | **x** |  |  | | **Basic Assembly instructions** |  |  |  |  |  |  |  |  |  | **x** |  |  |  |  | **x** |  |  | **x** | | **Procedures** |  |  |  |  | **x** |  |  |  |  |  |  |  |  |  |  |  | **x** |  |   **7- List of references:**  **7-1 Course notes**  **- Notes from the Department**   * 1. **Required books.**   **-M.A. Mazidi and J.G. Mazidi, The 80x86 IBM PC and Compatible Computer Assembly Language, 4th ed., Prentice Hall, 2003.**  **7-3 Recommended books.**  **-P. Abel, IBM PC Assembly Language and Programming, Prentice Hall, 2001.**  **-Kip R. Irvine, Assembly Language for x86 Processors**  **7-4 Periodicals, Web sites, etc.**  [**http://www.intel.com**](http://www.intel.com)  [**https://onlinecourses.nptel.ac.in/noc18\_ec03/preview**](https://onlinecourses.nptel.ac.in/noc18_ec03/preview)  [**http://ocw.utm.my/course/view.php?id=79**](http://ocw.utm.my/course/view.php?id=79) | | | | | | | |
| **8- Facilities required for teaching and learning:**  **Data Show Device - Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr.** [**Fatma**](http://bu.edu.eg/staff/mosabhassaan7) **Saker** | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | | **Updated 2020/2021** | |

**Third Level**

**Second Semester**

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | Mathematics | | | | |
| **Department offering the course:** | | Mathematics | | | | |
| **Academic year/level:** | | **Third Level / Second Semester** | | | | |
| **Date of specifications approval:** | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Operation Research (1)** | | **Code:**  **326M** | | **Year/level:**  **Third Level / Second** **Semester** | | |
| **Teaching Hours: 42 h** | | **Lectures: 3** **h/week** | | **Tutorial: --** | | |
|  | | **Practical: ــــ** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Provide grounding in the major traditional areas of Operational Research/Management, Science through a study of techniques and their application in a variety of business settings.** **Familiarize the student with the OR methodology of problem solving and appraise its application in a range of problem situations.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Determine the Formulation of linear programming problems in management** 2. **Know the ideal of modeling LP problems.** 3. **Explain how to use game theory concepts in our life.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Solve linear programming problems graphically.** 2. **Apply linear programming techniques to various types of decision Problems.** 3. **Confirm the changing nature and role of OR in business.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Investigate the Matlab software package in solving linear programming problems.** 2. **Prepare model building and problem solving skills.** 3. **Solve linear programming problems by Using the operational procedures.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups.** 2. **Life-long learning.** 3. **Using internet to obtain subject specific information.** 4. **Time management.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction** | | | **3** | | **-** | **-** |
| **Standard form of the Linear Programming Problems (LPPs) (1)** | | | **3** | | **-** | **-** |
| **Standard form of the Linear Programming Problems (LPPs) (2)** | | | **3** | | **-** | **-** |
| **Methods for solving LPPs (1)** | | | **3** | | **-** | **-** |
| **Methods for solving LPPs (2)** | | | **3** | | **-** | **-** |
| **Sensitivity analysis** | | | **3** | | **-** | **-** |
| **Revision, Mid-Term Exam** | | | **3** | | **-** | **-** |
| **Network flow problems (1)** | | | **3** | | **-** | **-** |
| **Network flow problems (2)** | | | **3** | | **-** | **-** |
| **Integer programming (1)** | | | **3** | | **-** | **-** |
| **Integer programming (2)** | | | **3** | | **-** | **-** |
| **Shortest path problems (1)** | | | **3** | | **-** | **-** |
| **Shortest path problems (2)** | | | **3** | | **-** | **-** |
| **Revision** | | | **3** | | **-** | **-** |
| **Total hours** | | | **42** | | **-** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Determine the Formulation of linear programming problems in management** | **🗸** |  |  | **🗸** |  |
| **a2-** | **Know the ideal of modeling LP problems.** | **🗸** | **🗸** |  | **🗸** |  |
| **a3-** | **Explain how to use game theory concepts in our life.** | **🗸** |  | **🗸** | **🗸** | **🗸** |
| **Intellectual Skills** | **b1** | **Solve linear programming problems graphically** | **🗸** |  |  | **🗸** |  |
| **b2** | **Apply linear programming techniques to various types of decision Problems.** | **🗸** |  |  | **🗸** |  |
| **b3** | **Confirm the changing nature and role of OR in business.** | **🗸** |  | **🗸** | **🗸** |  |
| **Practical and professional skills** | **c1** | **Investigate the Matlab software package in solving linear programming problems.** | **🗸** |  |  | **🗸** |  |
| **c2** | **Prepare model building and problem solving skills.** | **🗸** |  |  | **🗸** |  |
| **c3** | **Solve linear programming problems by Using the operational procedures.** | **🗸** | **🗸** |  | **🗸** | **🗸** |
| **General Skills** | **d1** | **Working in groups** | **🗸** |  | **🗸** | **🗸** |  |
| **d2** | **Life-long learning.** | **🗸** |  |  | **🗸** |  |
| **d3** | **Using internet to obtain subject specific information** | **🗸** |  | **🗸** | **🗸** | **🗸** |
| **d4** | **Time management** | **🗸** |  |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2, b1, b2, c1, c2,d2** | **Week 7** | **10 %** |
| **Oral exam** | **a1, a3, b1, b3, d1, d2,d3** | **Week 15** | **10 %** |
| **Written exam** | **a1, a2, c1, c3, d4** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

**6 – Course Matrix**

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| **Topic** | **Knowledge & Understanding** | | | | **Intellectual Skills** | | | **Practical and professional skills** | | | **General Skills** | | | |
| **a1** | **a2** | **a3** |  | **b1** | **b2** | **b3** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | **d4** |
| **Introduction** | **x** |  |  |  | **x** |  |  | **x** |  |  |  | **X** |  |  |
| **Standard form of the Linear Programming Problems (LPPs) (1)** |  | **x** |  | |  | **x** |  |  | **x** |  |  |  |  | **X** |
| **Standard form of the Linear Programming Problems (LPPs) (2)** |  | **x** |  | | **x** |  | **x** |  |  |  | **x** |  | **x** |  |
| **Methods for solving LPPs (1)** |  |  |  |  |  | **x** |  | **x** |  |  |  |  |  |  |
| **Methods for solving LPPs (2)** |  |  |  | | **x** |  |  | **x** |  |  |  |  |  | **X** |
| **Sensitivity analysis** |  | **x** |  | |  | **x** |  | **x** |  |  |  | **X** |  |  |
| **Revision, Mid-Term Exam** |  |  |  |  |  |  |  |  | **x** |  |  |  |  | **X** |
| **Network flow problems (1)** |  |  |  |  |  | **x** |  |  | **x** |  |  | **X** |  |  |
| **Network flow problems (2)** | **x** |  |  | |  |  |  | **x** |  |  | **x** |  |  |  |
| **Integer programming (1)** |  | **x** |  | | **x** |  |  | **x** |  |  |  |  |  | **X** |
| **Integer programming (2)** |  | **x** |  |  |  | **x** |  |  |  | **x** |  | **X** |  |  |
| **Shortest path problems (1)** |  | **x** |  |  | **x** |  |  |  |  | **x** |  |  | **x** |  |
| **Shortest path problems (2)** |  |  | **x** |  |  |  | **x** |  |  |  |  |  |  | **X** |
| **Revision** | **x** |  |  |  |  | **x** |  |  | **x** |  |  |  | **x** |  |

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|  | | **7- List of references**  **7-1 Course notes**  **-Notes were approved by the Math Department.**  **7-2 Required books.**  - **Joeseph McKean and Allen T Craig , Introduce to the probability theory, (2001)**  **7-3 Recommended books.**  **- W.D.McGlinn, "Introduction to probability theory ", John. Hopkins Univ. Press, (2003).**   * 1. **Periodicals, Web sites, etc.**   **1-**[**https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf**](https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf)  **2-http://www4.ncsu.edu/~rsmith/MA797V\_S10/Statistics.pdf** | | | | | |  |
|  | | **8- Facilities required for teaching and learning:**  **1-Data show**  **2-white board** | | | | |  |
|  | |  | | | | |  |
| **Course coordinator:** | | | | |  | **Dr. Mohamed Rabee** |  |
| **Head of the Department:** | | | | |  | **Prof. Dr** **Reda Gamal Abd El Rahman** |  |
| **Date: 9 / 12 /2019** | | | | |  | **Updated 2020/2021** |  |

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| **Course Specification**  **A- Affiliation** | | | | |
| **Relevant program:** | | **Computer Science** | | |
| **Department offering the program:** | | | **Mathematics** | |
| **Department offering the course:** | | | **Mathematics** | |
| **Academic year/level:** | | | **third level / Second Semester** | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| ***B - Basic information*** | | | | |
| **Title: Artificial Intelligence** | | | **Code:**  **352MC** | **Year/level:**  **third level / Second Semester** |
| **Teaching Hours: 42 h** | | | **Lectures:**  **2h/week** | **Tutorial: ــــ** |
|  |  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| ***C - Professional information***  **1 – Course Learning Objectives:** | | | | |
| **At the end of this course, the students must be able to:**   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | Study programming techniques that are used for making a robot and make programs which are used in games. In finally, the student must be able to develop the program in a computer, watch and all machines. | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | a1- State the machine that depend on a programming  a2- Write programs in an AI-based language, specially PROLOG | | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | |  | | b1- Solve the problems  b2-Apply AI methods to real-world applications | | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | | c1 - Analyze already exist Software. | | c2 – Make algorithms for solving some real problems. | | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to**   |  |  | | --- | --- | | |  | | --- | | d1-life-long learning  d2-working in groups | | | | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| Introduction | **2** | - | **2** |
| Blind Search Strategies | **2** | - | **2** |
| Search Problems | **2** | - | **2** |
| Heuristic Search Strategies (1) | **2** | - | **2** |
| Heuristic Search Strategies (2) | **2** | - | **2** |
| Constraint Satisfaction | **2** | - | **2** |
| Knowledge Representation | **2** | - | **2** |
| Revision and midterm exam | **2** | - | **2** |
| Reasoning | **2** | - | **2** |
| Planning (1) | **2** | - | **2** |
| Planning (2) | **2** | - | **2** |
| Uncertainly | **2** | - | **2** |
| Machine learning | **2** | - | **2** |
| Oral exam | **2** | - | **2** |
| **Total hours** | **28** | - | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** |
| **knowledge & Understanding** | **a1** | State the machine that depend on a programming | **🗸** |  | **🗸** | **🗸** |  | **🗸** |
| **a2** | |  | | --- | |  | |  | |  |   Write programs in an AI-based language, specially PROLOG | **🗸** |  |  |  |  |  |
| **Intellectual Skills** | **b1** | Solve the problems | **🗸** |  | **🗸** |  | **🗸** | **🗸** |
| **b2** | |  | | --- | |  | |  | |  |   Apply All methods to real-world applications |  | **🗸** |  | **🗸** |  |  |
| **Practical and professional skills** |  | analyze already exist Software | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |  |
|  | Make algorithms for solving some real problems. | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | life-long learning |  | **🗸** |  | **🗸** | **🗸** |  |
| **d2** | working in groups | **🗸** |  |  | **🗸** |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | **Grading** | | |
| **Mid-Term Exam** | | **b1 ,b2** | | **Week 7** | **14 %** | | |
| **Oral exam** | | **a2,d1 ,d2** | | **Week 15** | **14 %** | | |
| **Practical exams** | | **c2,a1,d2** | | **Week 15** | **24 %** | | |
| **Written exam** | | **b1,c1** | | **Start of 16th week** | **48 %** | | |
| **Total** | | | | | **100 %** | | |
| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course matrix** | | | | | | | | | | **Topic** | **Knowledge and understanding** | | **Intellectual skills** | | **Practical and professional skills** | | **General skills** | | | **a1** | **a2** | **b1** | **b2** | **c1** | **c2** | **d1** | **d2** | | Introduction |  | **x** |  |  | **x** |  |  |  | | Blind Search Strategies |  |  |  |  |  |  |  | **X** | | Search Problems |  |  |  | **x** | **x** |  |  |  | | Heuristic Search Strategies (1) | **X** |  |  |  |  |  |  |  | | Heuristic Search Strategies (2) |  |  | **x** |  |  |  |  |  | | Constraint Satisfaction |  |  |  |  |  |  | **x** |  | | Knowledge Representation | **X** | **x** |  |  | **x** |  |  |  | | Revision and midterm exam |  |  | **x** |  |  | **X** |  |  | | Reasoning |  |  |  |  |  |  |  | **X** | | Planning (1) |  |  |  | **x** |  |  | **x** |  | | Planning (2) |  | **x** |  |  |  |  |  |  | | Uncertainly |  |  |  |  |  | **x** |  |  | | Machine learning | **X** |  |  | **x** |  |  |  | **X** | | Oral exam |  | **x** |  | **x** |  |  |  |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes were approved by Math. Department.**   **7-2 Required books.**  **Singh, V. (2009). System modeling and simulation. New Delhi: New Age International (P) Ltd., Publishers, p.260. Introduction to Artificial Intelligence By: Philip C. Jackson**  **7-3 Recommended books.**   * **Kheir, N. (1988). *Systems modeling and computer simulation*. New York: M. Dekker, p.721.**   **7-4 Periodicals, Web sites, etc.**   * [**http://publish.uwo.ca/~jmalczew/gida\_5/Pursula/Pursula.html**[Accessed](http://publish.uwo.ca/~jmalczew/gida_5/Pursula/Pursula.html%5bAccessed) **292Oct2015].** * [**http://www.marinecontrol.org/Tutorial.html**](http://www.marinecontrol.org/Tutorial.html) **[Accessed 29 Oct. 2015].** * [**http://www.capterra.com/simulation-software/**](http://www.capterra.com/simulation-software/) [**Accessed 29 Oct. 2015].** | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | |
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| **Course coordinator:** | | | | **Dr. Ahmed Hassan** | | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | | |  |
| **Date: 9 / 12 /2019** | | | | **Updated 2020/2021** | | |

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| **Course Specification** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | | **Computer Science** | | |
| **Department offering the program:** | | | **Mathematics** | |
| **Department offering the course:** | | | **Mathematics** | |
| **Academic year/level:** | | | **Third level / Second Semester** | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| ***B - Basic information*** | | | | |
| **Title: Computer Networks** | | | **Code:**  **354MC** | **Year/level:**  **Third level / Second Semester** |
| **Teaching Hours: 42 h** | | | **Lectures:**  **2h/week** | **Tutorial: ــــ** |
|  |  | | **Practical: 2** **h/week** | **Total:** **3 h/week** |
| ***C - Professional information***  **1 – Course Learning Objectives:** | | | | |
| **At the end of this course, the students must be able to:**  **This course is designed to encourage in students a sense of interest for Computer Networks concept and its application in different contexts. Provide a solid foundation in the major areas of Computer Networks. Provide education and training of high quality in Computer Networks.**   |  | | --- | |  | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Explain the main concepts, definitions of Network systems**  **a2. Describe theories and concepts used in Computer Networks**  **a3. Identify Network systems and Internet protocols** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Apply appropriate theories, principles and concepts relevant to Computer Networks**  **b2. Modify the literature within the field of Computer Networks**  **b3 Interpret information from a variety of sources relevant Computer Networks**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Investigate practical activities using techniques and procedures appropriate to Computer Networks.**  **c2. Make a piece of independent research using Computer Networks, computer media and techniques.**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to**  **d1. Using internet effectively**  **d2. Working in groups.**  **d3. Computing problems relevant to Computer Networks using ideas and techniques some of which are at the forefront of the discipline.** | | | | |

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| 3 – Contents | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| OSI and TCP/IP layers | **2** | - | **2** |
| Internet protocol suite | **2** | - | **2** |
| Transmission control protocol | **2** | - | **2** |
| User datagram protocol | **2** | - | **2** |
| Sockets programming, Elementary TCP sockets | **2** | - | **2** |
| Elementary, TCP client/server | **2** | - | **2** |
| Elementary UDP sockets | **2** | - | **2** |
| Revision and midterm exam | **2** | - | **2** |
| Name and address conversions | **2** | - | **2** |
| Multicasting I/O multiplexing | **2** | - | **2** |
| Threads, Client/server design alternatives | **2** | - | **2** |
| Out-of-band data, Socket options | **2** | - | **2** |
| Advanced UDP sockets | **2** | - | **2** |
| Oral exam | **2** | - | **2** |
| **Total hours** | **28** | - | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** |
| **knowledge &Understanding** | **a1** | **a1. Explain the main concepts, definitions of Network systems** | **🗸** |  | **🗸** | **🗸** |  | **🗸** |
| **a2** | **Describe theories and concepts used in Computer Networks** | **🗸** |  |  |  |  |  |
| **a3** | **Identify Network systems and Internet protocols** |  |  |  |  |  |  |
| **Intellectual Skills** | **b1** | **Apply appropriate theories, principles and concepts relevant to Computer Networks** | **🗸** |  |  |  | **🗸** | **🗸** |
| **b2** | **Modify the literature within the field of Computer Networks** | **🗸** |  | **🗸** |  |  |  |
| **b3** | **Interpret information from a variety of sources relevant Computer Networks** | **🗸** |  |  | **🗸** |  | **🗸** |
| **Practical and professional skills** | **c1.** | **Investigate practical activities using techniques and procedures appropriate to Computer Networks.** | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |  |
| **c2.** | **Make a piece of independent research using Computer Networks, computer media and techniques.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | **Using internet effectively** |  | **🗸** |  | **🗸** | **🗸** |  |
| **d2** | **Working in groups** | **🗸** |  |  | **🗸** |  | **🗸** |
| **d3** | **Computing problems relevant to Computer Networks using ideas and techniques some of which are at the forefront of the discipline.** | **🗸** |  |  | **🗸** | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **b1 ,b2,d3,a3** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **a2,d1 ,d2** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **c2,a1,d2** | | **Week 15** | | **24 %** | |
| **Written exam** | | **b1, b3,c1** | | **Start of 16th week** | | **48 %** | |
| **Total** | | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course matrix** | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | **General skills** | | | | **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | **d1** | **d2** | **d3** | | **OSI and TCP/IP layers** | **x** |  |  |  | **x** |  |  |  |  |  |  | | **Internet protocol suite** |  |  | **x** | **x** |  |  |  |  | **x** |  |  | | **Transmission control protocol** |  |  |  |  |  |  |  | **x** |  |  |  | | **User datagram protocol** |  | **x** |  |  |  | **x** |  |  |  |  | **x** | | **Sockets programming, Elementary TCP sockets** |  |  |  |  |  |  | **x** |  |  | **x** |  | | **Elementary, TCP client/server** | **x** |  |  |  | **x** |  |  |  |  |  |  | | **Elementary UDP sockets** |  |  | **x** |  |  |  |  | **x** | **x** |  |  | | **Revision and midterm exam** | **x** |  |  |  |  | **x** |  |  |  |  | **x** | | **Name and address conversions** | **x** |  |  | **x** |  |  | **x** |  |  |  |  | | **Multicasting I/O multiplexing** |  |  |  |  |  |  |  |  | **x** |  |  | | **Threads, Client/server design alternatives** |  | **x** | **x** |  |  |  | **x** |  |  |  |  | | **Out-of-band data, Socket options** |  |  |  |  |  | **x** |  |  |  |  | **x** | | **Advanced UDP sockets** |  |  |  | **x** |  |  |  |  | **x** | **x** |  | | **Oral exam** | **x** | **x** |  |  |  |  |  | **x** |  |  |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes were approved by Math. Department.**   1. **Required books.**   **Computer Networks 5th By Andrew S. Tanenbaum (International Economy Edition) Computer Networking: A Top-Down Approach 6th by Kurose and Ross**   * 1. **Recommended books.**   **Best Nonfiction Computer Science Books on Good reads**  **7-4 Periodicals, Web sites, etc.**  **https://en.wikipedia.org/wiki/Computer\_network**  **https://www.lifewire.com/what-is-computer-networking-816249** | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr. Shadia Salah** | |
| **Head of the Department:** | | | | **Prof. Dr** **Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | | **Updated 2020/2021** | |

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| **Course Specification** | | | | | |
| **A- Affiliation** | | | | | |
| **Relevant program:** | Computer Science | | | | |
| **Department offering the program:** | Mathematics | | | | |
| **Department offering the course:** | Mathematics | | | | |
| **Academic year/level:** | Third level / Second Semester | | | | |
| **Date of specifications approval:** | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | | | |
| ***B - Basic information*** | | | | | |
| **Title:**  **Introduction to Scientific**  **Computations** | **Code:**  **356 MC** | | **Year/level:**  **Third level / Second Semester** | | |
| **Teaching Hours:** | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  | **Practical: 2h/week** | | **Total:** **3 h/week** | | |
| ***C - Professional information*** | | | | | |
| **1 – Course Learning Objectives:** | | | | | |
| **This course provides an introduction to basic computer programming concepts and techniques useful for Scientists, Mathematicians and Engineers. The course exposes students to practical applications of computing and commonly used tools within these domains. It introduces techniques for problem solving, program design and algorithm development. Moreover, this course focuses on developing algorithms for the numerical solution of mathematical problems and the study of the conditioning and numerical stability of these algorithms. The efficiency of these algorithms with respect to speed and storage requirements is considered as well. Emphasis is also placed on the study of the sensitivity of selected problems to perturbations in the data.** | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1- Explain basic computer programming concepts and techniques in system modeling.**  **a2- Identify different techniques for problem solving real life problems.**  **a3- Write an efficient algorithm for solving problems in system modeling.** | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1- Define traditional and nontraditional problems, set goals towards solving them, and. observe results.**  **b2- Apply appropriate research algorithms.**  **b3- Create comparisons between (algorithms, methods, techniques...etc).**  **b4- Design new algorithms to practical applications of computing and commonly used tools within these domains.** | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1- Solve problems using different algorithms.**  **c2- Criticize the different methods used in addressing subject related issues.**  **c3- Show essential concepts, principles, and practices of computer science, mathematics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques.** | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Using internet effectively.**  **d2- Computing scientific models, systems, and tools effectively.**  **d3- Ethical behavior with property right.** | | | | | |
| **3 – Contents** | | | | | |
| **Topic** | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **introduction to computational problem solving (1).** | | **2** | |  | **2** |
| **Introduction to computational problem solving (2).** | | **2** | |  | **2** |
| **Floating point arithmetic (1).** | | **2** | |  | **2** |
| **Floating point arithmetic (2).** | | **2** | |  | **2** |
| **Floating point arithmetic (3).** | | **2** | |  | **2** |
| **Basic simulation modeling. Nature of simulation** | | **2** | |  | **2** |
| **Introduction to Matlab/Simulink for modeling and simulation (2).** | | **2** | |  | **2** |
| **Mathematical modeling of differential equations using Matlab/Simulink (1).** | | **2** | |  | **2** |
| **Mathematical modeling of differential equations using Matlab/Simulink (2).** | | **2** | |  | **2** |
| **Mathematical modeling of differential equations using Matlab/Simulink (3).** | | **2** | |  | **2** |
| **Introduction to linear programming problems and the simplex method (1)** | | **2** | |  | **2** |
| **Introduction to linear programming problems and the simplex method (2)** | | **2** | |  | **2** |
| **Solving ordinary differential equations (1)** | | **2** | |  | **2** |
| **Solving ordinary differential equations (2)** | | **2** | |  | **2** |
| **Total hours** | | **28** | |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1** | **Explain basic computer programming concepts and techniques in system modeling.** | **🗸** |  |  | **🗸** |  | **🗸** |
| **a2** | **Identify different techniques for problem solving real life problems.** | **🗸** |  | **🗸** | **🗸** |  |  |
| **a3** | **Write an efficient algorithm for solving problems in system modeling.** | **🗸** |  |  | **🗸** |  | **🗸** |
| **Intellectual Skills** | **b1** | **Define traditional and nontraditional problems, set goals towards solving them, and. observe results.** |  | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |
| **b2** | **Apply appropriate research algorithms.** | **🗸** |  |  | **🗸** | **🗸** |  |
| **b3** | **Create comparisons between (algorithms, methods, techniques).** | **🗸** |  |  | **🗸** | **🗸** |  |
| **b4** | **design new algorithms to practical applications of computing and commonly used tools within these domains.** | **🗸** |  |  | **🗸** | **🗸** |  |
| **Practical and professional skills** | **c1** | **c1- Solve problems using a range of formats and approaches.** | **🗸** |  |  |  | **🗸** |  |
| **c2** | **c2- Criticize the different methods used in addressing subject related issues.** | **🗸** | **🗸** |  | **🗸** | **🗸** |  |
| **c3** | **Show essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques** | **🗸** |  |  | **🗸** | **🗸** | **🗸** |
| **General Skills** | **d1** | **Using internet effectively.** |  | **🗸** | **🗸** |  | **🗸** |  |
| **d2** | **Computing scientific models, systems, and tools effectively.** |  | **🗸** | **🗸** |  |  | **🗸** |
| **d3** | **Ethical behavior property right.** |  | **🗸** | **🗸** |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2, b1, b2, c1, c2.** | **Week 7** | **14 %** |
| **Oral exam** | **a1, a2, b1, b4, c1, c2.** | **Week 15** | **14 %** |
| **Practical exams** | **a1, a2, b1, b3, c1, c2, c3 , d1, d2, d3, d4.** | **Week 15** | **24 %** |
| **Written exam** | **a1, a2, a3, b1, b2, b2, c1, c2, c3** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6- Course matrix** | | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General Skills** | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** |
| **introduction to computational problem solving (1).** | **X** |  |  | **x** |  |  | **x** |  | **x** |  | **x** |  | **x** |
| **Introduction to computational problem solving (2).** |  | **x** | **x** | **x** |  | **x** |  |  | **x** |  | **x** |  | **x** |
| **Floating point arithmetic(1).** | **X** |  |  |  |  | **x** |  |  |  |  |  |  |  |
| **Floating point arithmetic, (2).** |  |  | **x** |  |  |  |  |  |  |  | **x** |  |  |
| **Floating point arithmetic, (3).** |  | **x** |  |  | **x** |  |  |  | **x** |  |  |  |  |
| **Basic simulation modeling. Nature of simulation** | **X** |  |  |  |  |  |  | **x** |  |  |  |  |  |
| **Introduction to Matlab/Simulink for modeling and simulation (2).** |  | **x** |  |  |  |  | **x** |  |  |  | **x** |  |  |
| **Mathematical modeling of differential equations using Matlab/Simulink (1).** |  |  | **x** |  |  |  |  |  |  |  |  |  | **x** |
| **Mathematical modeling of differential equations using Matlab/Simulink (2).** |  | **x** |  | **x** |  | **x** |  |  |  | **x** |  | **x** |  |
| **Mathematical modeling of differential equations using Matlab/Simulink (3).** | **X** |  | **x** | **x** |  |  | **x** |  |  |  |  | **x** |  |
| **Introduction to linear programming problems and the simplex method (1)** |  | **x** |  |  | **x** |  | **x** |  | **x** |  | **x** |  |  |
| **Introduction to linear programming problems and the simplex method (2)** | **X** |  | **x** |  |  | **x** |  |  |  | **x** |  |  |  |
| **Solving ordinary differential equations (1)** | **X** |  |  |  |  |  |  |  | **x** |  | **x** |  |  |
| **Solving ordinary differential equations (2)** | **X** |  |  |  | **x** |  | **x** |  |  | **x** |  | **x** |  |

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| **7- List of references**  **7-1 Course notes**  **- Notes approved by Math. Department.**   1. **Required books.**   [**Michael T. Heath**](http://www.amazon.com/Michael-T.-Heath/e/B001IODQ6W/ref=dp_byline_cont_book_1)**, Scientific Computing: an introductory survey, , The McGraw-Hill Companies, Inc.; 2nd edition.**  **7-2 Recommended books.**  **Quarteroni, Alfio, Saleri, Fausto, Gervasio, Paola, Scientific Computing with MATLAB and Octave, 2014.**  **Victor Eijkhout, Introduction to High-Performance Scientific Computing, Pearson-Prentice-Hall, 2012.**  **7-3Periodicals, Web sites, etc.**  [**http://www.cs.cmu.edu/~ph/859B/www/misc.html**](http://www.cs.cmu.edu/~ph/859B/www/misc.html)  [**https://www.adelaide.edu.au/course-outlines/105439/1/sem-1/**](https://www.adelaide.edu.au/course-outlines/105439/1/sem-1/)  [**http://www.Sciencedirect.com**](http://www.Sciencedirect.com) | | | |
| **8- Facilities required for teaching and learning:** | | |
| **a) Vital Facilities:**  **- Computer lab supported by MATLAB software.**  **- Data show device.**  **b) Lecturing Facilities:**  **- Overhead Projector, Data show device.** | | |
| **Course coordinator:** | **Dr. Reda Gamal** |
| **Head of the Department:** | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | **Updated 2020/2021** |

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| ***Course Specification***  **A- Affiliation** | | | | | | | | |
| **Relevant program:** | | Computer Science | | | | | | |
| **Department offering the program:** | | | Mathematics | | | | | |
| **Department offering the course:** | | | Mathematics | | | | | |
| **Academic year/level:** | | | Third level / Second Semester | | | | | |
| **Date of specifications approval:** | | | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | | | |
| ***B - Basic information*** | | | | | | | | |
| **Title:** Computer Applications in  Statistics | **Code:**  **368MC** | | | | **Year/level:**  **Third level / Second Semester** | | | |
| **Teaching Hours: 42 h** | | | | | | | **Lectures:**  **2h/week** | **Tutorial: ــــ** |
|  | | | | | |  | **Practical: 2h/week** | **Total:** **3 h/week** |
| ***C - Professional information***  **1 – Course LearningObjectives:** | | | | | | | | |
| **At the end of this course, the students must be able to:**  **Understand the principles and probability theories and basic of statistics. Understand methods of processing statistical data. Understand and application of statistical data.** | | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. To know the fundamental probability and statistics concepts.**  **a2. Explain principles and theories necessary for computer science such as artificial intelligence, expert systems, vision, neural networks, and computations.** | | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Solve a wide range of problems related to different courses.**  **b2.** **Hypothesize computer applications to solve some problems.**  **b3. Apply appropriate processes in applied mathematics, statistics and computer sciences.** | | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Solve big problems dedicated for computer science by using statistical techniques.**  **c2. Prepare computer-based systems.**  **c3. Assess the principles of human-computer interaction to the evaluation and construction of a wide range of materials.**   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to**  **d1. Computing effectively by oral, written and visual means.**  **d2. Working in groups effectively.**  **d3. Community linked thinking.** | | | | | | | | |

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| 3 – Contents | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **An introduction to Descriptive Statistics** | **2** | - | **2** |
| **Mean, Median, and Variance in row data and grouped data.** | **2** | - | **2** |
| **Probability, Sampling, Sample space, Permutation and combinations.** | **2** | - | **2** |
| **Discrete probability functions.** | **2** | - | **2** |
| **Conditional Probabilities, Bayes theorem, Expectations.** | **2** | - | **2** |
| **Random variables, the probability density functions.** | **2** | - | **2** |
| **Special distributions such as Normal, uniform, Binomial.** | **2** | - | **2** |
| **Revision and midterm exam** | **2** | - | **2** |
| **Correlation** | **2** | - | **2** |
| **Regression** | **2** | - | **2** |
| **Hypothesis Testing** | **2** | - | **2** |
| **Analysis of Variance** | **2** | - | **2** |
| **continuous probability functions** | **2** | - | **2** |
| **Oral exam** | **2** | - | **2** |
| **Total hours** | **28** | - | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | | **Problem solving** | **Brainstorming** |
| **knowledge &Understanding** | **a1** | | **To know the fundamental probability and statistics concepts.** | | **🗸** |  | **🗸** | **🗸** | |  | **🗸** |
| **a2** | | **Explain principles and theories necessary for computer science such as artificial intelligence, expert systems, vision, neural networks, and computations** | | **🗸** |  |  |  | |  |  |
| **Intellectual Skills** | **b1** | | **Solve a wide range of problems related to different courses.** | | **🗸** |  |  |  | | **🗸** | **🗸** |
| **b2** | | **Hypothesize computer applications to solve some problems.** | |  | **🗸** |  |  | | **🗸** | **🗸** |
| **b3** | | **Apply appropriate processes in applied mathematics, statistics and computer sciences.** | | **🗸** | **🗸** |  | **🗸** | |  |  |
| **Practical and professional skills** |  | | **Solve big problems dedicated for computer science by using statistical techniques** | | **🗸** | **🗸** | **🗸** | **🗸** | | **🗸** |  |
|  | | **Prepare computer-based systems.** | | **🗸** |  | **🗸** | **🗸** | |  | **🗸** |
|  | | **Assess the principles of human-computer interaction to the evaluation and construction of a wide range of materials.** | |  | **🗸** | **🗸** |  | | **🗸** |  |
| **General Skills** | **d1** | | **Computing effectively by oral, written and visual means.** | |  | **🗸** |  | **🗸** | | **🗸** |  |
| **d2** | | **Working in groups effectively.** | | **🗸** |  |  | **🗸** | |  | **🗸** |
| **d3** | | **Community linked thinking** | |  | **🗸** |  |  | | **🗸** |  |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | | | | **Grading** | | |
| **Mid-Term Exam** | | **b1 ,c2,d3** | | **Week 7** | | | | | **14 %** | | |
| **Oral exam** | | **a2,d1 ,d2,b3** | | **Week 15** | | | | | **14 %** | | |
| **Practical exams** | | **c1,a1,d2,b2** | | **Week 15** | | | | | **24 %** | | |
| **Written exam** | | **b1,c3** | | **Start of 16th week** | | | | | **48 %** | | |
| **Total** | | | | | | | | | **100 %** | | |
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| **6- Course Matrix** | | | | | | | | | | | | |
| **Topic** | **Knowledge and understanding** | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General Skills** | | |
| **a1** | **a2** | **b1** | **b2** | **b3** | **c1** | | **c2** | **c3** | **d1** | **d2** | **d3** |
| An introduction to Descriptive Statistics | **x** |  | **x** |  |  |  | | **x** |  |  |  | **x** |
| Mean, Median, and Variance in row data and grouped data. |  | **x** | **x** |  | **x** |  | | **x** |  | **x** |  |  |
| Probability, Sampling, Sample space, Permutation and combinations. | **x** |  |  |  | **x** |  | |  |  |  |  |  |
| Discrete probability functions. |  | **x** |  |  |  |  | |  |  | **x** |  |  |
| Conditional Probabilities, Bayes theorem, Expectations. |  | **x** |  | **x** |  |  | | **x** |  |  | **x** |  |
| Random variables, the probability density functions. | **x** |  |  |  |  |  | |  |  |  |  | **x** |
| Special distributions such as Normal, uniform, Binomial. |  | **x** |  | **x** |  |  | |  |  | **x** |  |  |
| Revision and midterm exam | **x** |  |  |  |  |  | |  | **x** |  |  | **x** |
| Correlation |  |  | **x** |  | **x** |  | |  | **x** |  | **x** |  |
| Regression | **x** |  |  |  |  |  | |  |  |  |  |  |
| Hypothesis Testing |  | **x** |  |  |  |  | | **x** |  | **x** |  |  |
| Analysis of Variance | **x** |  |  | **x** |  |  | |  | **x** |  |  | **x** |
| continuous probability functions |  | **x** |  |  | **x** |  | | **x** |  |  |  |  |
| Oral exam | **x** |  | **x** | **x** |  |  | |  | **x** |  | **x** |  |

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| **7- List of references:**  **7-1 Course notes**   * **Notes were approved by Math. Department.**   **7-2 Required books.**   * **Probability and statistics for engineers & scientists, Walpole & Myers, 2001.**   1. **Recommended books.**   **-Probability & Statistics for Engineers & Scientists, 8/E , Ronald E. Walpole Raymond H. Myers, Sharon L. Myers Keying Ye. ISBN-10: 0131877119**  **7-4 Periodicals, Web sites, etc.**  **http://www5.in.tum.de/lehre/vorlesungen/sci\_comp/ws04/TUTORIAL/** | | | | |
| **8- Facilities required for teaching and learning:**  **Data Show Device**  **Whiteboard** | | |
|  | | |
| **Course coordinator:** | | | **Dr. Gamal Ahmed** |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | | | **Updated 2020/2021** |

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| **Course Specification** | | | |
| **A- Affiliation** | | | |
| **Relevant program:** | **Computer Science** | | |
| **Department offering the program:** | | **Mathematics** | |
| **Department offering the course:** | | **Mathematics** | |
| **Academic year/level:** | | **Third level / Second Semester** | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| B - Basic information | | | |
| **Title:**  **Image processing** | | **Code:**  **366 MC** | **Year/level:**  **Third level / Second Semester** |
| **Teaching Hours:** | | **Lectures: 2h/week** | **Tutorial: ــــ** |
|  | | **Practical: 2** **h/week** | **Total:** **3 h/week** |
| C - Professional information | | | |
| **1 – Course Learning Objectives:** | | | |
| **This course focuses on the properties of digital images, design of display systems and algorithms, time and frequency representations, filters, image formation and enhancement, Image sampling and quantization, color, point operations, segmentation, linear image filtering and correlation, image transforms, Eigen images, multidimensional signals and systems, multi-resolution image processing, wavelets, morphological image processing, noise reduction and restoration, simple feature extraction and recognition tasks. Students learn to apply material by implementing and investigating image processing algorithms in Matlab.** | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1- Determine basic scientific facts, concepts, principles and techniques.**  **a2- Define relevant theories and their applications.**  **a3- To know theories and methods applied for interpreting and analyzing data related to discipline.** | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1- Organize subject-related theories and their concepts and principles.**  **b2- Interpret qualitatively and quantitatively science relevant data.**  **b3- Apply the principles of effective information management, information organization, and information-retrieval skills to various information systems.** | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1- Solve problems using a range of formats and approaches.**  **c2- Criticize the different methods used in addressing subject related issues.**  **c3- Analyze essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques.** | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Using internet effectively.**  **d2- Community linked thinking effectively.**  **d3- Ethical behavior property right.** | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Introduction to Image Processing and its applications (1).** | **2** |  | **2** |
| **Introduction to Image Processing and its applications (2).** | **2** |  | **2** |
| **Digital image Representation**   * **Image Reading, Image Displaying** * **Writing Images using MATLAB , Data Classes, and** * **Image Types using MATLAB** | **2** |  | **2** |
| **Image Pre-processing: Grey level transformation**   * **Windows and level, Histogram stretching** * **Histogram equalization** | **2** |  | **2** |
| **Image Pre-processing: local Pre-processing**   * **Image smoothing: Averaging, Median filtering** * **Edge detectors: Roberts operator, Sobel operator** | **2** |  | **2** |
| **Image segmentation (1) :**   * **Thresholding: Threshold detection methods** | **2** |  | **2** |
| **Image segmentation (2) :**   * **Edge-based segmentation: Edge image thresholding** * **Mid-Term Exam** | **2** |  | **2** |
| **Image segmentation (3) :**   * **Region-based segmentation** | **2** |  | **2** |
| **Image segmentation (4) :**   * **Clustering segmentation methods** | **2** |  | **2** |
| **Image Transforms (1): Fourier Transforms** | **2** |  | **2** |
| **Image Transforms (2): DCT Transforms** | **2** |  | **2** |
| **Image Transforms (3):**   * **Hadamard and Haar Transforms** | **2** |  | **2** |
| **Image Transforms (4): KL Transforms** | **2** |  | **2** |
| **Project In Digital Image Processing** | **2** |  | **2** |
| **Total hours** | **28** |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1- Determine basic scientific facts, concepts, principles and techniques.** | **🗸** |  |  | | **🗸** |  |  |
| **a2-Definerelevant theories and their applications.** | **🗸** |  |  | | **🗸** |  |  |
| **a3- To know theories and methods applied for interpreting and analyzing data related to discipline.** | **🗸** |  |  | | **🗸** |  |  |
| **Intellectual Skills** | **b1- Organize subject-related theories and their concepts and principles.** |  | **🗸** |  | **🗸** | | **🗸** |  |
| **Interpret qualitatively and quantitatively science relevant data.** | **🗸** |  |  | **🗸** | | **🗸** |  |
| **b3- Apply the principles of effective information management, information organization, and information-retrieval skills to various information systems.** | **🗸** |  |  | **🗸** | | **🗸** |  |
| **Practical and professional skills** | **c1- Solve problems using a range of formats and approaches.** | **🗸** |  |  | |  | **🗸** |  |
| **c2- Criticize the different methods used in addressing subject related issues.** | **🗸** |  |  | | **🗸** | **🗸** |  |
| **c3- Analyze essential concepts, principles, and practices of computer science, mathematics and statistics, in the context of well-defined scenarios, showing judgment in the selection and application of tools and techniques** | **🗸** |  |  | | **🗸** | **🗸** | **🗸** |
| **General Skills** | **d1- Using internet effectively.** |  | **🗸** | **🗸** | |  |  |  |
| **d2- Community linked thinking effectively.** |  | **🗸** | **🗸** | |  |  |  |
| **d3- Ethical behavior with property right.** |  | **🗸** | **🗸** | |  |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | | |
| **Tools:** | | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | | **a1, a2, b1, b2, c1, c2.** | | **Week 7** | | **14 %** | |
| **Oral exam** | | | **a1, a2, b1, b2, c1, c2.** | | **Week 15** | | **14 %** | |
| **Practical exams** | | | **a1, a2, b1, b2, c1, c2, c3 , d1, d2, d3.** | | **Week 15** | | **24 %** | |
| **Written exam** | | | **a1, a2, a3, b1, b2, b3, c1, c2, c3** | | **Start of 16th week** | | **48 %** | |
| **Total** | | | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course Matrix** | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General Skills** | | | | **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | | **c3** | **d1** | **d2** | **d3** | | **– Matrices.** | **x** |  |  | **x** |  |  |  | **x** |  | | **x** |  | **x** | | **– Systems of linear equations (1),** |  | **x** | **x** |  |  | **x** |  |  |  | |  |  | **x** | | **– Systems of linear equations (2).** | **x** |  |  |  |  | **x** |  |  |  | |  |  | **x** | | **– Linear transformations.** |  |  | **x** |  |  |  |  |  |  | | **x** |  |  | | **– Linear spaces (vectors) (1),** |  | **x** |  |  | **x** |  |  | **x** |  | |  |  |  | | **– Linear spaces (vectors) (2).** | **x** |  |  |  |  |  | **x** |  |  | |  |  | **x** | | **– Linear operators (1) + Mid-Term Exam.** |  | **x** |  |  | **x** |  |  |  |  | | **x** |  |  | | **– Linear operators (2).** | **x** |  |  |  |  |  |  |  | **x** | |  |  | **x** | | **– Eigenvalues and eigenvectors of linear operators (1),** |  | **x** |  |  |  | **x** |  |  | **x** | |  | **x** |  | | **– Eigenvalues and eigenvectors of linear operators (2).** |  |  | **x** | **x** |  |  |  |  |  | |  | **x** |  | | **– Inner product spaces (1),** |  | **x** |  |  | **x** |  |  | **x** |  | | **x** |  |  | | **– Inner product spaces (2).** |  |  | **x** |  | **x** |  | **x** |  | **x** | |  |  | **x** | | **– Quadratic forms and their applications (1),** |  | **x** |  |  |  | **x** |  | **x** |  | | **x** |  |  | | **– Quadratic forms and their applications (2).** | **x** |  |  | **x** | **x** |  |  |  | **x** | |  | **x** |  | | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**  **- Notes approved by Math. Department.**  **7-2Required books.**  [**Tinku Acharya**](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Tinku+Acharya)**,**[**Ajoy K. Ray**](http://eu.wiley.com/WileyCDA/Section/id-302479.html?query=Ajoy+K.+Ray)**, Image Processing: Principles and Applications, 2005.**  **7-3 Recommended books.**  **R. C. Gonzalez, R. E. Woods, „Digital Image Processing,“ 3rd edition, Prentice-Hall, 2008.**  [**Rafael C. Gonzalez**](http://www.amazon.com/Rafael-C.-Gonzalez/e/B001ITWUOG/ref=dp_byline_cont_book_1)**,**[**Richard E. Woods**](http://www.amazon.com/Richard-E.-Woods/e/B001ITVIBM/ref=dp_byline_cont_book_2)**, Digital Image Processing using Matlab,“ 2nd edition, Pearson-Prentice-Hall, 2009.**  **7-4 Periodicals, Web sites, etc.**  <https://en.wikipedia.org/wiki/Image_processing>  <http://www.efg2.com/Lab/Library/ImageProcessing/Algorithms.htm>  <http://www.Sciencedirect.com> | | | | | | | |
| **8- Facilities required for teaching and learning:** | | | | | |
| **a) Vital Facilities:**  **- Computer lab supported by MATLAB software.**  **- Data show device.**  **b) Lecturing Facilities:**  **- Overhead Projector, Data show device.** | | | | | |
| **Course coordinator:** | | | | **Dr. Metwally Rashad** | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | | **updated 2020/2021** | |

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| **Course Specification**  **A- Affiliation** | | | | | | |
| **Relevant program:** | Computer Science | | | | | |
| **Department offering the program:** | | Mathematics | | | | |
| **Department offering the course:** | | Mathematics | | | | |
| **Academic year/level:** | | Third Level /second semester | | | | |
| **Date of specifications approval:** | | 9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419). | | | | |
| ***B - Basic information*** | | | | | | |
| **Title:**  **Programming Languages**  **Theory** | | **Code:**  364 MC | | **Year/level:**  Third Level /second semester | | |
|  | | **Lectures: 2 h/week** | | **Tutorial: ــــ** | | |
|  | | **Practical: 2h/week** | | **Total:** **3 h/week** | | |
| ***C - Professional information*** | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **This course addresses the basic principles of programming languages. It emphasizes the structure and the semantics of programming languages. It covers the major elements of languages such as types, objects, names, scopes, expressions, functions, procedures, parameters, control structures and run-time storage management. This course introduces aspects of programming language translation such as lexical analysis, parsing, interpretation, and compilation. Students will gain a deep understanding of semantics of programming languages as well as their implementation and apply this knowledge to analyses and evaluate existing programming languages** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. State the formal description of programming language syntax.**  **a2. Identify major features of programming languages, with a particular focus on**  **imperative language features.**  **a3. To know the advantages of different language paradigms, with a particular emphasis on functional and logic programming language.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Construct the design features of common programming languages** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Relate the semantics of programming languages with their implementation to analyze and appraise existing programming languages.**  **c2.Make simple programming language translators.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Computing a variety of design concepts and features of programming languages.**  **d2. Life-long learning and ability to contrast and choose programming languages appropriate to project.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Language evolution and evaluation** | | | **2** | |  | **2** |
| **Formal description of languages** | | | **2** | |  | **2** |
| **Programming language translation** | | | **4** | |  | **4** |
| **Variables and data types** | | | **2** | |  | **2** |
| **Expression and statements** | | | **2** | |  | **2** |
| **Midterm and Revision** | | | **2** | |  | **2** |
| **Subprogram design and implementation** | | | **4** | |  | **4** |
| **Functional languages** | | | **4** | |  | **4** |
| **Abstract data types** | | | **2** | |  | **2** |
| **Exceptions** | | | **2** | |  | **2** |
| **programming environments and tools** | | | **2** | |  | **2** |
| **Total hours** | | | **28** | |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. State the formal description of programming language syntax.** | **🗸** |  |  | |  | **🗸** |  |
| **a2. Identify major features of programming languages, with a particular focus on imperative language features;** | **🗸** |  |  | |  | **🗸** |  |
| **a3. To know the advantages of different language paradigms, with a particular emphasis on functional and logic programming language** | **🗸** |  |  | |  | **🗸** |  |
| **Intellectual Skills** | **b1. Construct the design features of common programming languages.** |  | **🗸** | **🗸** |  | | **🗸** |  |
| **Practical and professional skills** | **c1. Relate the semantics of programming languages with their implementation to analyze and appraise existing programming languages.** |  |  | **🗸** | | **🗸** |  |  |
| **c2. Make simple programming language translators.** |  |  | **🗸** | | **🗸** |  |  |
| **General Skills** | **d1. Computing a variety of design concepts and features of programming languages.** |  | **🗸** | **🗸** | |  |  |  |
| **d2. Life-long learning and ability to contrast and choose programming languages appropriate to project.** |  | **🗸** | **🗸** | |  |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1 , a2 ,a3** | **Week 7** | **14 %** |
| **Oral exam** | **a1,a3, d1** | **Week 15** | **14 %** |
| **Practical exams** | **c1, c2,d2** | **Week 15** | **24 %** |
| **Written exam** | **a1 , a2 ,a3**, **b1, c1, c2** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6 – Course Matrix** | | | | | | | | |
| **Topic** | **Knowledge & Understanding** | | | **Intellectual Skills** | **Practical and professional skills** | | **General Skills** | |
| **a1** | **a2** | **a3** | **b1** | **c1** | **c2** | **d1** | **d2** |
| **Language evolution and evaluation** | **x** |  |  |  | **x** |  | **x** |  |
| **Formal description of languages** |  | **x** |  |  | **x** |  |  |  |
| **Programming language translation** |  |  | **x** | **x** |  |  |  | **x** |
| **Variables and data types** | **x** |  |  |  |  | **x** |  |  |
| **Expression and statements** |  | **x** |  | **x** | **x** |  | **x** |  |
| **Midterm and Revision** | **x** |  |  |  | **x** |  | **x** |  |
| **Subprogram design and implementation** |  |  | **x** | **x** |  | **x** |  | **x** |
| **Functional languages** | **x** |  |  | **x** |  | **x** |  | **x** |
| **Abstract data types** |  | **x** |  | **x** | **x** |  | **x** |  |
| **Exceptions** |  | **x** |  |  | **x** |  | **x** |  |
| **programming environments and tools** | **x** |  | **x** | **x** |  | **x** |  | **x** |
| **Language evolution and evaluation** | **x** |  |  |  | **x** |  | **x** |  |
| **Formal description of languages** |  | **x** |  | **x** |  | **x** |  | **x** |
| **Programming language translation** |  | **x** |  | **x** |  | **x** | **x** |  |

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| **7- List of reference**  **7-1 Course notes**  **- Notes from the Department**  **7-2 Required books.**  **-Sebesta, R.W 2013, Concepts of programming languages, 10th edn, Addison-Wesley, Boston.**  **7-3 Recommended books.**  **-Robert Harper.****[Practical Foundations for Programming Languages.](http://www.cs.cmu.edu/~rwh/plbook/1sted-revised.pdf" \t "_blank)**  **7-4 Periodicals, Web sites, etc.**  [**https://en.wikipedia.org/wiki/Programming\_language\_theory**](https://en.wikipedia.org/wiki/Programming_language_theory) | | | | |
| **8- Facilities required for teaching and learning:** | | |
|  | | |
| **Course coordinator:** | | | **Dr. Gamal Ahmed** |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | | | **Updated 2020/2021** |

**Fourth Level**

**First Semester**

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| **Course Specification** | | | | | | | |
| **A- Affiliation** | | | | | | | |
| **Relevant program:** | | **Computer Science** | | | | | |
| **Department offering the program:** | | | **Mathematics** | | | | |
| **Department offering the course:** | | | **Mathematics** | | | | |
| **Academic year/level:** | | | **Fourth level / First Semester** | | | | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| ***B - Basic information*** | | | | | | | |
| **Title:**  **Scientific Computations (1)** | | | **Code:**  **451 MC** | | **Year/level:**  **Fourth level / First Semester** | | |
| **Teaching Hours: 42 h** | | | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  |  | | **Practical: 2h/week** | | **Total:** **3 h/week** | | |
| ***C - Professional information***  **1 – Course Learning Objectives:** | | | | | | | |
| **At the end of this course, the students must be able to:**  **Apply computing knowledge and skills to the solution of real life problem. Provide a ground for applying knowledge acquired in previous. Further develop and apply problem solving skills through the introduction of numerical methods. Aside from developing competency in numerical analysis topics.** | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Determine the advantages and disadvantages of alternative standard numerical algorithms.**  **a2. Know the importance of error estimates and be able to make simple estimates of truncation errors.**  **a3. Explain basic matrix and vector operations, numerical differentiation.**  **a4. Define which method is applicable to solve systems of linear equations and the nature of the information provided by each.** | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Discover a practical problem; to know the mathematical basis of the problem.**  **b2. Develop and implement an algorithm to find a numerical solution of the problem.**  **b3. To know the solution and develop a practical interpretation of the numerical results.**  **b4. Solve ordinary and partial differential equations using numerical techniques.**  **b5. Organize the definition of the order of convergence of an iterative method, and describe how the order of a method relates to both the convergence and error behavior for that method.**  **b6. Formulate the order of convergence of standard iterative methods.** | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Show standard numerical techniques in solving practical scientific problems.**  **c2.Analyze basic numerical techniques to the solution of mathematical problems.** | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Time management effectively.** 2. **Computing numerical analysis for practical problems in different settings.** 3. **Working in groups Present knowledge of various numerical methods in different applications.** | | | | | | | |
| **3 – Contents** | | | | | | | |
| **Topic** | | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction.** | | | | **2** | |  | **2** |
| **Starting with MATLAB. Script Files and Creating Arrays. Mathematical Operations with Arrays.** | | | | **2** | |  | **2** |
| **Symbolic vs. Numeric World and 2d Plots.** | | | | **2** | |  | **2** |
| **Programming in MATLAB and User-Defined Functions and Function Files. Data Management.** | | | | **2** | |  | **2** |
| **Polynomials. Interpolation and Curve Fitting. | 3D Plotting.** | | | | **2** | |  | **2** |
| **Applications to Numerical Analysis | Numerical Integration and Solving ODEs.** | | | | **2** | |  | **2** |
| **Mid-Term Examination and Introduction to Numerical Linear Algebra** | | | | **2** | |  | **2** |
| **Numerical Linear Algebra. Eigenvalues and Eigenvectors.** | | | | **2** | |  | **2** |
| **LU, QR, SVD decompositions.** | | | | **2** | |  | **2** |
| **Dynamical Systems and Stability.** | | | | **2** | |  | **2** |
| **Boundary Value Problems. Finite Elements.** | | | | **2** | |  | **2** |
| **Finite differences and fast iterative methods.** | | | | **2** | |  | **2** |
| **Fourier Series and Integrals.** | | | | **2** | |  | **2** |
| **Discrete Fourier Transform and Fast Fourier Transform** | | | | **2** | |  | **2** |
| **Total hours** | | | | **28** | |  | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** |
| **Knowledge & Understanding** | **a1** | **Determine the advantages and disadvantages of alternative standard numerical algorithms.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |
| **a2** | **Know the importance of error estimates and be able to make simple estimates of truncation errors.** | **🗸** | **🗸** |  | **🗸** |  |  |
| **a3** | **Explain basic matrix and vector operations, numerical differentiation and integration.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **a4** | **Define which method is applicable to solve systems of linear equations and the nature of the information provided by each.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Discover a practical problem; to know the mathematical basis of the problem.** | **🗸** | **🗸** | **🗸** | **🗸** |  | **🗸** |
| **b2** | **Develop and implement an algorithm to find a numerical solution of the problem.** |  |  | **🗸** | **🗸** |  | **🗸** |
| **b3** | **To know the solution and develop a practical interpretation of the numerical results.** |  | **🗸** | **🗸** | **🗸** |  | **🗸** |
|  | **Solve ordinary and partial differential equations using numerical techniques.** | **🗸** |  | **🗸** |  | **🗸** |  |
|  | **Organize the definition of the order of convergence of an iterative method, and describe how the order of a method relates to both the convergence and error behavior for that method.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
|  | **Formulate the order of convergence of standard iterative methods** | **🗸** | **🗸** | **🗸** |  |  |  |
| **Practical and professional skills** | **c1** | **Show of standard numerical techniques in solving practical scientific problems.** | **🗸** | **🗸** |  |  | **🗸** |  |
| **c2** | **Analyze basic numerical techniques to the solution of mathematical problems.** | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | **Time management effectively.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |
| **d2** | **Computing numerical analysis for practical problems in different settings.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |
| **d3** | **Working in groups Present knowledge of various numerical methods in different applications.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a3, b3, b4, c2, d1, d2.** | **Week 7** | **14 %** |
| **Oral exam** | **a3, a4, b1, b5, c1, d1, d2.** | **Week 15** | **14 %** |
| **Practical exams** | **b6, b1, b2, b3, d3.** | **Week 15** | **24 %** |
| **Written exam** | **a1, b5, b3, b4, c2, d1, d2.** | **Start of the week 16** | **48 %** |
| **Total** | | | **100 %** |

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| **6- Course Matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | | | **Practical and professional skills** | | **General Skills** | | | | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **b4** | **b5** | **b6** | **c1** | **c2** | **d1** | **d2** | **d3** | | Introduction. |  | **X** |  | **x** | **x** |  |  |  |  |  |  | **x** |  |  | **X** | | Starting with MATLAB. Script Files and | **x** |  |  |  |  |  | **X** |  |  |  |  |  |  |  |  | | Symbolic vs. Numeric World |  | **X** |  |  |  |  |  | **x** |  | **X** |  |  | **x** |  | **X** | | User-Defined Functions and Function Files. |  |  |  |  |  | **x** |  |  | **X** |  |  | **x** |  | **X** |  | | Interpolation and Curve Fitting. | 3D Plotting. | **x** |  | **X** |  | **x** |  | **x** |  |  |  | **X** |  |  |  | **X** | | Applications to Numerical Analysis |. |  | **X** |  |  |  | **x** |  |  | **X** |  |  |  | **x** | **X** |  | | Mid-Term Examination | **x** |  |  |  | **X** |  |  |  | **X** |  |  |  |  |  | **X** | | Eigenvalues and Eigenvectors. |  | **X** |  |  |  |  | **x** |  |  |  | **x** |  |  | **X** |  | | LU, QR, SVD decompositions. | **x** |  |  |  | **X** |  |  |  |  |  |  |  |  | **X** |  | | Dynamical Systems and Stability. |  | **X** |  |  |  | **X** |  | **x** |  |  |  | **x** |  |  |  | | Boundary Value Problems. | **x** |  |  |  |  |  | **x** |  |  |  | **x** |  | **X** |  | **x** | | Finite differences and fast iterative methods. | **x** | **X** |  |  |  |  | **x** |  | **X** |  |  | **x** |  | **X** |  | | Fourier Series and Integrals. | **x** |  |  |  | **x** |  |  |  |  | **X** |  |  | **x** |  | **X** | | Discrete Fourier Transform and Fast Fourier Transform |  |  | **x** |  |  | **X** |  |  |  |  | **x** |  |  |  | **X** | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Burden, R. L., and Faires, J. D., Numerical Analysis, Sixth Edition, Brooks/Cole Publishing Company, 1997, p. 1005.**   **7-3 Recommended books.**   * **Gerald, C. F., and Wheatley, P. O., Applied Numerical Analysis, Fourth Edition, Addison-Wesley Publishing Company.**   **7-4 Periodicals, Web sites, etc.**   * **http://www5.in.tum.de/lehre/vorlesungen/sci\_comp/ws04/TUTORIAL/** * **http://www.mathworks.com/discovery/scientific-computing.html** | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | |
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| **Course coordinator:** | **Dr. Mosab Hassan** |
| **Head of the Department:** | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | Updated 2020/2021 |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Fourth level / First Semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Computer security techniques** | | **Code:**  **453MC** | | **Year/level:**  **Fourth level / First Semester** | | |
|  | | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  | | **Practical: ــــ** | | **Total:** **2 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **The “Computer Security Techniques” course is a fourth year undergraduate course that introduces students to the subject of Information Security from the technical point of view. The purpose of this course is to help students in learning the principles of computer information security in general and of constructing secure systems in particular. It familiarizes students with the aspects of information security: security attacks, security mechanisms, and security services. Since cryptographic techniques underlie many of the security mechanisms in use, this course covers the development, use and management of such techniques. It also introduces authentication techniques, access control mechanisms, and how security assurance is achieved on computer networks.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1- Know the principles of computer and information security and describe the types of attacks and malicious code that may be used against a computer system; threats and countermeasures**  **a2- Describe similarities and differences among various symmetric and public key cryptographic techniques.**  **a3- Explain discretionary , mandatory, and role-based access control models.**  **a4-Determine Technologies and concepts used for providing secure communications channels, secure internetworking devices, and network medium and describe the risk assessment techniques and the types of security policies.**  **a5- Describe the role and types of intrusion detection systems, firewalls, and physical security** concepts. | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1- Hypothesize the information security needs of an organization**  **b2- Organize security threats to networked systems and make decisions regarding network security practice.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1-Examine Implement cryptography algorithms and technique.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Communication with others to Discuss high awareness of how to protect data and resources from disclosure, to guarantee the authenticity of data and messages and to protect computer systems from network-based attacks.**  **d2- Using internet to Develop research skills and extend professional knowledge to clarify problems and take responsibility for furthering own learning**. | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Overview of Information Security-** | | | **2** | | **-** | **-** |
| **Attackers and their attacks** | | | **2** | |  |  |
| **Security Basics** | | | **2** | | - | - |
| **Traditional Symmetric-Key Ciphers** | | | **2** | |  |  |
| **Modern Symmetric-Key Ciphers** | | | **2** | | **-** | **-** |
| **Asymmetric Key Cryptography.** | | | **2** | |  |  |
| **Revision and Mid term** | | | **2** | |  |  |
| **Message Integrity and Authentication** | | | **2** | | **-** | **-** |
| **Hash Functions and Digital Signature.** | | | **2** | |  |  |
| **Entity Authentication** | | | **2** | | **-** | **-** |
| **Key Management** | | | **2** | |  |  |
| **Securing the Network Infrastructure.** | | | **2** | |  |  |
| **Operational Security** | | | **2** | | **-** | **-** |
| **Security Policies and Procedures** | | | **2** | |  |  |
| **Total hours** | | | **28** | | **-** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. Know the principles of computer and information security and describe the types of attacks and malicious code that may be used against a computer system; threats and counter measures.** | **🗸** |  | **🗸** |  |  |
| **a2. Describe similarities and differences among various symmetric and public key cryptographic techniques.** | **🗸** |  | **🗸** |  | **🗸** |
| **a3. Explain discretionary, mandatory and role-based access control models.** | **🗸** |  | **🗸** |  |  |
| **a4. Determined Technologies and concepts used for providing secure communications channels secure internetworking devices, and network medium and describe the risk assessment techniques and the types of security policies.** | **🗸** |  | **🗸** |  |  |
| **a5. Describe the role and types of intrusion detection systems, firewalls, and physical security concepts.** | **🗸** |  | **🗸** |  | **🗸** |
| **Intellectual Skills** | **b1. Hypothesize the information security needs of an organization.** | **🗸** | **🗸** |  | **🗸** |  |
| **b2. Organize security threats to networked systems and make decisions regarding network security practice.** | **🗸** |  |  | **🗸** |  |
| **Practical and professional skills** | **c1. Examine Implement cryptography algorithms and techniques.** | **🗸** |  |  | **🗸** |  |
| **General Skills** | **d1. Communication with others to Discuss high awareness of how to protect data and resources from disclosure, to guarantee the authenticity of data and messages and to protect computer systems from network-based attacks.** | **🗸** | **🗸** | **🗸** |  | **🗸** |
| **d2. Using internet to Develop research skills and extend professional knowledge to clarify problems and take responsibility for furthering own learning.** |  | **🗸** | **🗸** |  |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | |
| **Tools:** | | | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | | | **a1- a2- a3- a4- a5- b1- b2- b3- c1- c2** | | **Week 7** | | **14 %** | |
| **Oral exam** | | | | **a1- a2- a3- a4- a5- b1- b2- b3- d1- d2** | | **Week 15** | | **14 %** | |
| **Practical exams** | | | | **a3, c1, d2** | | **Week 15** | | **24%** | |
| **Written exam** | | | | **a1- a2- a3- a4- a5- b1- b2- b3- c1- c2** | | **Start of 16th week** | | **48 %** | |
| **Total** | | | | | | | | **100 %** | |
| **6-Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **General skill** | | **Practical and professional skills** | **Intellectual skills** | | **Knowledge and understanding** | | | | | | **Topic** | | d2 | d1 | c1 | b2 | b1 | a5 | a4 | a3 | a3 | a2 | a1 | |  |  |  |  |  |  | **x** | **x** |  |  |  | **Overview of Information Security-** | |  |  |  | **X** | **x** |  |  | **x** |  |  |  | **Attackers and their attacks** | |  |  |  |  |  |  |  |  |  | **x** |  | **Security Basics** | | **X** |  |  | **X** |  |  |  | **x** | **X** |  |  | **Traditional Symmetric-Key Ciphers** | |  | **x** | **x** |  | **x** | **x** |  |  | **X** |  | **x** | **Modern Symmetric-Key Ciphers** | |  |  |  |  |  | **x** |  |  |  |  | **x** | **Asymmetric Key Cryptography.** | | **X** |  |  | **X** |  |  |  | **x** |  |  |  | **Revision and Mid term** | |  | **x** |  |  | **x** |  | **x** |  |  | **x** |  | **Message Integrity and Authentication** | |  |  | **X** |  |  |  |  |  |  |  |  | **Hash Functions and Digital Signature.** | |  |  |  | **x** |  |  |  |  |  |  |  | **Overview of Information Security-** | |  |  |  | **x** |  | **x** |  | **x** |  |  |  | **Attackers and their attacks** | | **X** |  |  |  |  |  |  | **x** |  | **x** | **x** | **Entity Authentication** | | **X** | **x** | **x** |  |  |  |  |  |  | **x** |  | **Key Management** | |  |  | **x** |  |  |  |  | **x** |  | **x** |  | **Securing the Network Infrastructure.** | |  |  | **x** |  |  |  |  |  | **X** |  |  | **Operational Security** | |  | **x** |  | **x** |  |  |  |  |  |  |  | **Security Policies and Procedures** | | | | | | | | | | | |
|  | | | | | | | |
| **7- List of references:**  **7-1 Course notes**  **- Notes approved by Math. Department.**   * 1. **Required books.**   **- B. A. Forouzan, Cryptography & Network Security: McGraw-Hill, Inc., 2007.**  **- S. William and W. Stallings, Cryptography and Network Security, 4/E: Pearson Education India, 2006.**  **7-3 Recommended books.**  **- A. Conklin, G. White, C. Cothren, D. Williams, and R. L. Davis, Principles of computer security: security+ and beyond: McGraw-Hill, Inc., 2004.**  - **C. P. Pfleeger and S. L. Pfleeger, Security in computing: Prentice Hall Professional Technical Reference, 2002.**  **7-4 Periodicals, Web sites, etc.**  [**http://its.ucsc.edu/security/training/intro.html**](http://its.ucsc.edu/security/training/intro.html)  **8- Facilities required for teaching and learning:** | | | | | | |
| **Black board, white board and data show.** | | | | | | |
| **Course coordinator:** | | | **Dr. Mosab Hassan** | |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | Updated 2020/2021 | |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Fourth Level / First semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| ***B - Basic information*** | | | | | | |
| **Title:**  **Theory of Computation** | | **Code:**  **457 MC** | | **Year/level:**  **Fourth Level / First semester** | | |
|  | | **Lectures: 2 h/week** | | **Tutorial:** | | |
|  | | **Practical-** | | **Total:** **2 h/week** | | |
| ***C - Professional information*** | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Introduce Fundamental ideas in the theory of computation including, computability, complexity, and reducibility among computational problems. Teaches core ideas in computer science theory. Define and investigate a formalized model of computation, and what it means to reduce one problem to another. A student's ability to think clearly, originally, and devise correct proofs.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Identify of the fundamental nature of computation including the understanding of specific models of computation.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Confirm integrate knowledge and understanding of appropriate principles to develop skills in engineering and scientific problem solving.**  **b2. Construct rigorous proofs.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Make design and inject solutions to scientific and engineering problems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Communication with others effectively, developed through extensive written home works and working coherently.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Church’s thesis: models of computation** | | | **2** | | **-** | **-** |
| **Grammars** | | | **2** | |  |  |
| **the μ-recursive functions** | | | **2** | |  |  |
| **Turing computability** | | | **2** | |  |  |
| **Simple programming languages** | | | **2** | | **-** | **-** |
| **Coding programs by numbers** | | | **2** | |  |  |
| **Complexity Theory** | | | **2** | | **-** | **-** |
| **Midterm and Revision** | | | **2** | |  |  |
| **Time complexity** | | | **2** | |  |  |
| **P and NP** | | | **2** | | **-** | **-** |
| **Polynomial-time reducibility** | | | **2** | |  |  |
| **NP-Completeness** | | | **2** | | **-** | **-** |
| **The Cook-Levin Theorem** | | | **2** | |  |  |
| **Example reductions among NP-hard** | | | **2** | |  |  |
| **Total hours** | | | **28** | | **-** | **-** |

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| **4 - Teaching and Learning methods:** | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. Identify of the fundamental nature of computation including the understanding of specific models of cmputation.** | **🗸** |  | **🗸** |  | **🗸** |
| **Intellectual Skills** | **b1. Confirm integrate knowledge and understanding of appropriate principles to develop skills in engineering and scientific problem solving.** | **🗸** | **🗸** | **🗸** | **🗸** |  |
| **b2. Construct rigorous proofs.** | **🗸** |  | **🗸** | **🗸** |  |
| **Practical and professional skills** | **c1. Make design and inject solutions to scientific and engineering problems.** | **🗸** |  |  | **🗸** | **🗸** |
| **General Skills** | **d1. Communication with others effectively, developed through extensive written home works and working coherently.** | **🗸** |  | **🗸** | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b2** | **Week 7** | **14 %** |
| **Oral exam** | **b1, c1** | **Week 15** | **14 %** |
| **Practical exams** | **c1, d1** | **Week 15** | **24 %** |
| **Written exam** | **d1** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

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| **6-Course matrix**   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **General skills** | **Practical and professional skills** | **Intellectual skills** | | **Knowledge and understanding** | **Topic** | | d1 | c1 | b2 | b1 | a1 | |  |  | **X** |  |  | **Church’s thesis: models of computation** | |  |  |  |  |  | **Grammars** | | **x** |  |  |  | **X** | **the μ-recursive functions** | |  |  |  | **x** |  | **Turing computability** | |  |  |  |  |  | **Simple programming languages** | |  |  | **X** |  | **X** | **Coding programs by numbers** | | **x** |  |  |  |  | **Complexity Theory** | |  |  |  |  | **X** | **Midterm and Revision** | | **x** |  |  |  |  | **Time complexity** | |  | **X** |  |  |  | **P and NP** | |  |  |  |  | **x** | **Polynomial-time reducibility** | |  | **X** |  | **x** |  | **NP-Completeness** | | **x** |  |  |  | **x** | **The Cook-Levin Theorem** | |  |  | **X** |  |  | **Example reductions among NP-hard** | | | |
| **7- List of references:** | | | |
| * 1. **Course notes**   **-Notes approved by Math. Department.**   * 1. **Required books.**   **- D. Kozen, Theory of computation: Springer Science & Business Media, 2006.**  **-** **M. Sipser, Introduction to the Theory of Computation: Cengage Learning, 2012.**  **7-3 Recommended books.**  **- C. H. Papadimitriou, Computational complexity: John Wiley and Sons Ltd., 2003.**  **7-4 Periodicals, Web sites, etc.**  [**https://en.wikipedia.org/wiki/Theory\_of\_computation**](https://en.wikipedia.org/wiki/Theory_of_computation)  **https://www.cs.cornell.edu/research/theory** | | | |
|  | | | |
| **8- Facilities required for teaching and learning:** | | | |
| **Black board, white board and data show.** | | | |
| **Course coordinator:** | | **Prof Dr. Maher Shedid** | |
| **Head of the Department:** | **Prof. Dr. Reda Gamal Abd El Rahman** | | |
| **Date: 9 /12 /2019** | Updated 2020/2021 | | |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Fourth Level /First semester** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Computer Graphics** | | **Code:**  **461 MC** | | **Year/level:**  **Fourth Level /First semester** | | |
|  | | **Lectures: 2** **h/week** | | **Tutorial: ----** | | |
|  | | **Practical: 2** **h/week** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Students should have an understanding of the principles and practice of two-dimensional and three-dimensional computer graphics.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1- Explain two-dimensional and three-dimensional computer graphics techniques; coordinate transformations; drawing curves and surfaces; shading & lighting models; graphics devices; animation techniques; ray tracing; virtual reality; object-oriented approaches to computer graphics.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Organize Integrate spatial reasoning and problem-solving.**   **b2- Construct objects in 2D and 3D space using coordinate transformations.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1- Draw two-dimensional graphics objects in OpenGL in C++.**  **c2- Draw basic three-dimensional scenes in OpenGL in C++.**  **c3- Make solutions to problems and evaluate alternatives.**  **c4- Prepare symbolic techniques to spatial problems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1- Using internet to Solve problems.**  **d2- Working in groups.**  **d3- Computation results** | | | | | | |
|  | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Quick Review: Two-dimensional graphics** | | | **2** | | **-** | **2** |
| **Mathematics for 3D Graphics** | | | **2** | |  | **2** |
| **3D-Affine transformations (rotating, translating, scaling)** | | | **2** | | **-** | **2** |
| **3D Clipping** | | | **2** | |  | **2** |
| **Parallel Projection (Introduction to Camera Model)** | | | **2** | | **-** | **2** |
| **Perspective Projection (3D)** | | | **2** | |  | **2** |
| **Midterm and Revision** | | | **2** | |  | **2** |
| **Curves and surfaces, Bezier, Splines(1)** | | | **2** | |  | **2** |
| **Curves and surfaces, Bezier, Splines(2)** | | | **2** | |  | **2** |
| **Hidden line and surface removal** | | | **2** | |  | **2** |
| **Illumination models (ambient, diffuse, specular)** | | | **2** | |  | **2** |
| **Shading models (flat, Phong, Gouraud)** | | | **2** | |  | **2** |
| **Texture Mapping** | | | **2** | |  | **2** |
| **Loading 3D Models** | | | **2** | |  | **2** |
| **Total hours** | | | **28** | | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Discussions & Seminars** | **Exercises** | **Class activities** |
| **Knowledge & Understanding** | **a1** | **Explain two-dimensional and three-dimensional computer graphics techniques; coordinate transformations; drawing curves and surfaces; shading & lighting models; graphics devices; animation techniques; ray tracing; virtual reality; object-oriented approaches to computer graphics.** | **🗸** |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Organize spatial reasoning and problem-solving.** | **🗸** |  |  |  |
| **b2** | **Construct objects in 2D and 3D space using coordinate transformations.** | **🗸** |  |  | **🗸** |
| **Practical and professional skills** | **c1** | **Draw two-dimensional graphics objects in OpenGL in C++.** | **🗸** |  | **🗸** |  |
| **c2** | **Draw basic three-dimensional scenes in OpenGL in C++.** | **🗸** |  |  |  |
| **c3** | **Make solutions to problems and evaluate alternatives.** | **🗸** |  |  |  |
| **c4** | **Prepare symbolic techniques to spatial problems.** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | **Using internet to Solve problems** | **🗸** | **🗸** |  |  |
| **d2** | **Working in groups** | **🗸** | **🗸** |  |  |
| **d3** | **Computation results** | **🗸** |  |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b2** | **Week 7** | **14 %** |
| **Oral exam** | **b1, c3** | **Week 15** | **14 %** |
| **Practical exams** | **c1, c4,c2, d2** | **Week 15** | **24 %** |
| **Written exam** | **d1, d3** | **Start of the week 16** | **48 %** |
| **Total** | | | **100 %** |
|  | | | |
| **6-Course matrix**   |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **General skills** | | | **Practical and professional skills** | | | | **Intellectual skills** | | **Knowledge and understanding** | **Topic** | | **d3** | **d2** | **d1** | **c4** | **c3** | **c2** | **c1** | **b2** | **b1** | **a1** | |  |  |  |  |  |  |  | **x** |  |  | **Quick Review: Two-dimensional graphics** | |  |  | **x** |  |  | **x** |  |  | **x** | **X** | **Mathematics for 3D Graphics** | | **X** |  |  |  | **x** |  | **x** |  |  |  | **3D-Affine transformations (rotating, translating, scaling)** | | **X** |  |  | **x** |  |  |  |  |  |  | **3D Clipping** | |  |  |  |  |  |  | **x** |  |  |  | **Parallel Projection (Introduction to Camera Model)** | |  |  | **x** |  |  |  |  |  |  |  | **Perspective Projection (3D)** | |  |  |  |  | **x** | **x** |  |  |  |  | **Midterm and Revision** | | **X** |  |  |  |  |  |  | **x** |  |  | **Curves and surfaces, Bezier, Splines(1)** | |  | **x** |  |  |  | **x** |  |  | **x** |  | **Curves and surfaces, Bezier, Splines(2)** | | **X** |  |  |  | **x** |  | **x** |  |  |  | **Hidden line and surface removal** | |  |  |  |  |  |  |  |  |  | **X** | **Illumination models (ambient, diffuse, specular)** | |  |  |  |  |  |  | **x** |  |  |  | **Shading models (flat, Phong, Gouraud)** | |  |  | **x** |  |  |  |  |  |  |  | **Texture Mapping** | | | | |

**7- List of references:**

**7-1 Course notes**

**-Notes approved by Math. Department.**

**7-2Required books.**

**- By Michael J Folk, Bill Zoellick, and Greg Riccardi, File Structures: An Object-Oriented Approach with C++, 3rd edition, Addison Wesley Longman, 1997**

**7-3 Recommended books.**

**-By Michael J Folk, Bill Zoellick, and Greg Riccardi, File Structures: An Object-Oriented Approach with C++, 3rd edition, Addison Wesley Longman, 1997**

**7-4 Periodicals, Web sites, etc.**

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| **8- Facilities required for teaching and learn**   * **Data Show Device** * **Whiteboard** | |
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| **Course coordinator:** | **Dr. Eman Ebrahim** |
| **Head of the Department:** | **Prof. Dr.**  **Khaled Hashem** |
| **Date: 9 / 12 /2019** | Updated 2020/2021 |

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| **Course Specification** | | | | | | |
| **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | **Mathematics** | | | | |
| **Department offering the course:** | | **Mathematics** | | | | |
| **Academic year/level:** | | **Fourth Level /First Term** | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | |
| **Title:**  **Data Communications** | | **Code:**  **463 MC** | | **Year/level:**  **Fourth Level /First Term** | | |
|  | | **Lectures: 2** **h/week** | | **Tutorial: ----** | | |
|  | | **Practical: 2** **h/week** | | **Total:** **3 h/week** | | |
| C - Professional information | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **: At the end of this course, the students must be able to**  **Students should have an understanding of the principles and practice of two-dimensional and three-dimensional computer graphics.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1- Explain two-dimensional and three-dimensional computer graphics techniques; coordinate transformations; drawing curves and surfaces; shading & lighting models; graphics devices; animation techniques; ray tracing; virtual reality; object-oriented approaches to computer graphics.** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1-Organize spatial reasoning and problem-solving.**  **b2- Compare objects in 2D and 3D space using coordinate transformations.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1 Draw two-dimensional graphics objects in OpenGL in C++.**  **c2- Design basic three-dimensional scenes in OpenGL in C++.**  **c3- Prepare solutions to problems and evaluate alternatives.**  **c4-Show symbolic techniques to spatial problems.** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1-Using internet to Solve problems.**  **d2- Working in groups.**  **d3- Computation results** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Quick Review: Two-dimensional graphics** | | | **2** | | **-** | **2** |
| **Mathematics for 3D Graphics** | | | **2** | |  | **2** |
| **3D-Affine transformations (rotating, translating, scaling)** | | | **2** | | **-** | **2** |
| **3D Clipping** | | | **2** | |  | **2** |
| **Parallel Projection (Introduction to Camera Model)** | | | **2** | | **-** | **2** |
| **Perspective Projection (3D)** | | | **2** | |  | **2** |
| **Midterm and Revision** | | | **2** | |  | **2** |
| **Curves and surfaces, Bezier, Splines(1)** | | | **2** | |  | **2** |
| **Curves and surfaces, Bezier, Splines(2)** | | | **2** | |  | **2** |
| **Hidden line and surface removal** | | | **2** | |  | **2** |
| **Illumination models (ambient, diffuse, specular)** | | | **2** | |  | **2** |
| **Shading models (flat, Phong, Gouraud)** | | | **2** | |  | **2** |
| **Texture Mapping** | | | **2** | |  | **2** |
| **Loading 3D Models** | | | **2** | |  | **2** |
| **Total hours** | | | **28** | | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Discussions & Seminars** | **Exercises** | **Class activities** |
| **Knowledge & Understanding** | **a1** | **Explain two-dimensional and three-dimensional computer graphics techniques; coordinate transformations; drawing curves and surfaces; shading & lighting models; graphics devices; animation techniques; ray tracing; virtual reality; object-oriented approaches to computer graphics.** | **🗸** |  | **🗸** |  |
| **Intellectual Skills** | **b1** | **Organize spatial reasoning and problem-solving.** | **🗸** |  |  |  |
| **b2** | **Compare objects in 2D and 3D space using coordinate transformations.** | **🗸** |  |  | **🗸** |
| **Practical and professional skills** | **c1** | **Draw two-dimensional graphics objects in OpenGL in C++.** | **🗸** |  | **🗸** |  |
| **c2** | **Design basic three-dimensional scenes in OpenGL in C++.** | **🗸** |  |  |  |
| **c3** | **Prepare solutions to problems and evaluate alternatives.** | **🗸** |  |  |  |
| **c4** | **Show symbolic techniques to spatial problems.** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | **Using internet to Solve problems** | **🗸** | **🗸** |  |  |
| **d2** | **Working in groups** | **🗸** | **🗸** |  |  |
| **d3** | **Computation results** | **🗸** |  |  | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b2** | **Week 7** | **14 %** |
| **Oral exam** | **b1, c3** | **Week 15** | **14 %** |
| **Practical exams** | **c1, c4,c2, d2** | **Week 15** | **24 %** |
| **Written exam** | **d1, d3** | **Start of the week 16** | **48 %** |
| **Total** | | | **100 %** |

**6-Course matrix**

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| **General skills** | | | **Practical and professional skills** | | | | **Intellectual skills** | | **Knowledge and understanding** | **Topic** |
| **d3** | **d2** | **d1** | **C4** | **c3** | **c2** | **c1** | **b2** | **b1** | **a1** |
| **x** |  |  |  |  |  | **x** |  |  |  | **Quick Review: Two-dimensional graphics** |
| **x** |  |  |  |  |  |  | **x** | **x** | **x** | **Mathematics for 3D Graphics** |
|  |  |  |  | **x** |  |  |  |  |  | **3D-Affine transformations (rotating, translating, scaling)** |
| **x** | **x** |  | **x** |  |  |  |  |  |  | **3D Clipping** |
|  |  |  |  |  |  | **x** |  |  |  | **Parallel Projection (Introduction to Camera Model)** |
|  |  | **x** |  |  |  |  |  |  |  | **Perspective Projection (3D)** |
|  |  |  |  |  | **x** |  | **x** |  |  | **Midterm and Revision** |
|  |  |  |  |  |  | **x** |  |  |  | **Curves and surfaces, Bezier, Splines(1)** |
|  |  | **x** |  |  |  |  | **x** |  |  | **Curves and surfaces, Bezier, Splines(2)** |
| **x** |  |  |  | **x** |  | **x** |  |  |  | **Hidden line and surface removal** |
| **x** | **x** |  | **x** |  |  |  |  |  | **x** | **Illumination models (ambient, diffuse, specular)** |
|  |  |  |  |  |  | **x** |  |  |  | **Shading models (flat, Phong, Gouraud)** |
|  |  | **x** |  |  |  |  |  |  |  | **Texture Mapping** |

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| **7- List of references:** |
| **7-1 Course notes**  **- Notes approved by Math. Department.**  **7-2Required books.**  **- By Michael J Folk, Bill Zoellick, and Greg Riccardi, File Structures: An Object-Oriented Approach with C++, 3rd edition, Addison Wesley Longman, 1997**  **7-3 Recommended books.**  **-By Michael J Folk, Bill Zoellick, and Greg Riccardi, File Structures: An Object-Oriented Approach with C++, 3rd edition, Addison Wesley Longman, 1997**  **7-4 Periodicals, Web sites, etc.**  [**http://www.Sciencedirect.com**](http://www.Sciencedirect.com) |
| |  |  |  |  | | --- | --- | --- | --- | | **8- Facilities required for teaching and learning:**   * **Data Show Device - Whiteboard**   **­** | | | | |  | | | | | **Course coordinator:** | | **Dr. Eman Ebrahim** | | | **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** | | **Date: 9 / 12 /2019** | | **Updated 2020/2021** | | |

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| **Course Specification** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | | **Computer Science** | | |
| **Department offering the program:** | | | **Mathematics** | |
| **Department offering the course:** | | | **Mathematics** | |
| **Academic year/level:** | | | **Fourth level / First Semester** | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419)** | |
| B - Basic information | | | | |
| **Title:**  **Software Design and**  **Engineering** | | | **Code:**  **467 MC** | **Year/level:**  **Fourth level / First Semester** |
| **Teaching Hours: 42 h** | | | **Lectures: 2h/week** | **Tutorial: ــــ** |
|  |  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| C - Professional information1 – Course Learning Objectives: | | | | |
| **At the end of this course, the students must be able to:**  **Introduce students to the technologically important area of software design and engineering. Apply computing knowledge and skills to the solution of real life problem. Apply effectively information technology relevant to the field. Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices.** | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1-State the processes and mechanisms supporting the structure and function of the specific topics.**  **a2-Identify the related terminology, nomenclature and classification systems.**  **a3-Describe the progress of the program-related knowledge.**  **a4- Identify the hardware and software are integrate create computer systems and distinguish between selected forms of computer hardware architecture, and operating system technology.**  **a5-To know appropriate theories, practices, and tools for the specification, design, implementation, and evaluation of a computer-based system.** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1-Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.**  **b2-Apply the principles of effective information management, Information organization, and information-retrieval skills to various information systems.** | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1-Examine problems using a range of formats and approaches.**  **c2- Prepare computer-based systems.**  **C3- Collections of sources of numerical errors and usage of symbolic and numerical soft as apart of partial computation** | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1-CommunicationWith others to know technology and information effectively.**  **d2- Community linked thinking, set tasks and solve problems on scientific basis.**  **d3-Working in groups effectively, manage time, collaborate and communicate with others positively.**  **d4- life long learning.** | | | | |

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| **3 – Contents** | | | | | | | | | | | |
| **Topic** | | | **Lecture hours** | | | **Tutorial hours** | | | **Practical hours** | | |
| **Introduction to Software Engineering.** | | | **2** | | |  | | | **2** | | |
| **Software Processes.** | | | **2** | | |  | | | **2** | | |
| **Software Processes.** | | | **2** | | |  | | | **2** | | |
| **Software Processes.** | | | **2** | | |  | | | **2** | | |
| **Project Management.** | | | **2** | | |  | | | **2** | | |
| **Project Management.** | | | **2** | | |  | | | **2** | | |
| **Mid-Term Examination and Requirements Engineering.** | | | **2** | | |  | | | **2** | | |
| **Requirements Engineering.** | | | **2** | | |  | | | **2** | | |
| **Requirements Engineering.** | | | **2** | | |  | | | **2** | | |
| **Structured Analysis and Design.** | | | **2** | | |  | | | **2** | | |
| **Structured Analysis and Design.** | | | **2** | | |  | | | **2** | | |
| **System Modeling: Introduction to OO Analysis** | | | **2** | | |  | | | **2** | | |
| **System Modeling: Design (UML) and Use Cases** | | | **2** | | |  | | | **2** | | |
| **System Modeling: Sequence Diagrams, Conceptual Modeling and Class Diagrams** | | | **2** | | |  | | | **2** | | |
| **Total hours** | | | **28** | | |  | | | **28** | | |
| **4 - Teaching and Learning methods:** | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | **Lecture** | **Presentations & Movies** | | **Discussions & Seminars** | **Practical** | | **Problem solving** | **Brainstorming** | |
| **Knowledge & Understanding** | **a1** | **State the processes and mechanisms supporting the structure and function of the specific topics.** | | **🗸** | **🗸** | | **🗸** | **🗸** | |  |  | |
| **a2** | **Identify the related terminology, nomenclature and classification systems.** | | **🗸** | **🗸** | | **🗸** | **🗸** | |  |  | |
| **a3** | **Describe the progress of the program-related knowledge.** | | **🗸** | **🗸** | | **🗸** | **🗸** | |  |  | |
| **a4** | **Identify the hardware and software are integrate create computer systems and distinguish between selected forms of computer hardware architecture, and operating system technology.** | | **🗸** | **🗸** | | **🗸** | **🗸** | |  |  | |
| **a5** | **To know appropriate theories, practices, and tools for the specification, design, implementation, and evaluation of a computer-based system.** | | **🗸** | **🗸** | | **🗸** | **🗸** | |  |  | |
| **Intellectual Skills** | **b1** | **Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.** | |  | **🗸** | | **🗸** | **🗸** | |  |  | |
| **b2** | **Apply the principles of effective information management, Information organization, and information-retrieval skills to various information systems.** | | **🗸** |  | | **🗸** | **🗸** | | **🗸** |  | |
| **Practical and professional skills** | **c1** | **Examine problems using a range of formats and approaches.** | | **🗸** |  | |  |  | | **🗸** |  | |
| **c2** | **Prepare computer-based systems.** | | **🗸** |  | | **🗸** | **🗸** | | **🗸** |  | |
| **c3** | **Collections of sources of numerical errors and usage of symbolic and numerical software as a part of practical computation.** | | **🗸** |  | | **🗸** | **🗸** | | **🗸** | **🗸** | |
| **General Skills** | **d1** | **Communication with others to know technology and information effectively.** | |  | **🗸** | |  | **🗸** | |  |  | |
| **d2** | **Community linked thinking , set tasks and solve problems on scientific basis.** | |  |  | | **🗸** | **🗸** | | **🗸** | **🗸** | |
| **d3** | **Working in groups effectively, manage time, collaborate and communicate with others positively.** | |  |  | | **🗸** | **🗸** | | **🗸** |  | |
| **d4** | **life long learning.** | | **🗸** | **🗸** | |  | **🗸** | | **🗸** | **🗸** | |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **a1,a2,a3,b2,c1,d2,d4** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **a1,a2,a3a4,a5,b2,c1,c3,d2,d3,d4** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **a1,a2,a3,b1,c1,d2,d4** | | **Week 15** | | **24 %** | |
| **Written exam** | | **a1,a2,a3,b2,c1,d2,d4** | | **Start of the 16th week** | | **48 %** | |
| **Total** | | | | | | **100 %** | |
|  | | | | | | | |
| **6- Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | | | **Intellectual skills** | | **Practical and professional skills** | | | **General**  **Skills** | | | | | **a1** | **a2** | **a3** | **a4** | **a5** | **b1** | **b2** | **c1** | **c2** | **c3** | **d1** | **d2** | **d3** | **d4** | | **Introduction to Software Engineering.** | **X** |  | **x** |  |  | **x** |  | **x** |  | **x** |  | **x** |  | **x** | | **Software Processes.** |  |  |  |  | **x** |  |  |  |  |  |  |  |  | **x** | | **Software Processes.** |  |  |  | **X** |  |  | **x** |  | **x** |  |  |  |  |  | | **Software Processes.** | **X** |  |  |  |  |  |  |  |  |  |  |  | **x** |  | | **Project Management.** |  |  | **x** |  |  | **x** |  | **x** |  | **x** |  | **x** |  |  | | **Project Management.** | **x** |  |  |  | **x** |  |  |  | **x** |  | **x** |  |  |  | | **Mid-Term Examination and Requirements Engineering.** |  |  |  |  |  |  | **x** |  |  |  |  |  |  | **x** | | **Requirements Engineering.** | **x** |  |  | **x** |  |  |  |  |  |  | **x** |  | **x** |  | | **Requirements Engineering.** |  | **X** |  |  |  |  |  |  |  |  |  |  |  |  | | **Structured Analysis and Design.** | **x** |  |  |  | **x** |  |  | **x** |  |  |  |  | **x** |  | | **Structured Analysis and Design.** |  |  |  |  |  |  | **x** |  |  | **x** |  |  | **x** |  | | **System Modeling: Introduction to OO Analysis** | **x** |  | **x** |  | **x** |  |  | **x** |  |  |  |  |  | **x** | | **System Modeling: Design (UML) and Use Cases** |  | **x** |  |  |  | **x** | **x** |  | **x** | **x** |  | **x** |  |  | | **System Modeling: Sequence Diagrams, Conceptual Modeling and Class Diagrams** | **X** |  |  |  | **x** |  |  | **x** |  |  | **x** |  |  |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Otero, C. (2012). *Software Engineering Design*. Boca Raton: Auerbach Publishers, Incorporated.**   **7-3 Recommended books.**   * **Mitcham, C. (2005). *Encyclopedia of science, technology, and ethics*. Detroit, MI: Macmillan Reference USA.**   **7-4 Periodicals, Web sites, etc.**   * **http://www.freetutes.com/systemanalysis/** [Accessed 29 Oct. 2015]. * **http://www.tutorialspoint.com/software\_engineering/** [Accessed 29 Oct. 2015]. * [**http://www3.ul.ie/~icse2000/tutorials.html /**](http://www3.ul.ie/~icse2000/tutorials.html%20/)[Accessed 29 Oct. 2015]. | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr. Mosab abelhammed** | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | | Updated 2020/2021 | |

**Fourth Level**

**Second Semester**

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| **Course Specification**  **A- Affiliation** | | | | | | | | | | | | | | |
| **Relevant program:** | | | **Computer Science** | | | | | | | | | | | |
| **Department offering the program:** | | | | **Mathematics** | | | | | | | | | | |
| **Department offering the course:** | | | | **Mathematics** | | | | | | | | | | |
| **Academic year/level:** | | | | **Fourth level / second Semester** | | | | | | | | | | |
| **Date of specifications approval:** | | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | | | | | | | |
| B - Basic information | | | | | | | | | | | | | | |
| **Title:**  Essay of Research | | | | **Code:**  **400 MC** | | **Year/level:**  **Fourth level / Second Semester** | | | | | | | | |
| **Teaching Hours:** | | | | **Lectures: 2** **h/week** | | **Tutorial: - ــــ** | | | | | | | | |
|  | | | | **Practical: ــــ** | | **Total:** **2**  **h/week** | | | | | | | | |
| C - Professional information | | | | | | | | | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | | | | | | | | | |
| **At the end of this course, the students must be able to:**  **-Develop the student's independent study skills, presentation skills, research skills, and develop research in mathematics topics and writing small Thesis as well as developing the student's ability to get to grips with a substantial piece of advanced mathematics through self-study.** | | | | | | | | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | | | | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1-Know knowledge of different area of mathematics topics.**  **a2- Select advanced mathematical topics.**  **a3- Memorize skills on making a formal presentation.**  **a4-Know how to advance search in mathematics.** | | | | | | | | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1- develop skills on problem-solving**  **b2- Apply and improve numerical methods to get more accurate solutions.**  **b3-Discover and study the accuracy of the obtained results.** | | | | | | | | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **Show some problems using numerical methods .-c1-**  **c2- Summarize confidence in their abilities to use mathematics.**  **c3- Investigate and criticize the different methods used in solving problems.** | | | | | | | | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1-Using internet to collect data to get information effectively.**  **d2- Time management to solve problems.**  **d3- communication With others to presentation skills.** | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | |
| **3 – Contents** | | | | | | | | | | | | | | |
| **Topic** | | | | | **Lecture hours** | | | **Tutorial hours** | | | **Practical hours** | | | |
| **Every student perform a project under supervisor of one the staff and at the end of first or second term write an essay about his work and student assessment will be taken by the staff.** | | | | | **2/ weekly** | | | **-** | | | **-** | | | |
| **Write an essay about his work and student assessment will be taken by the staff.** | | | | | **2/ weekly** | | |  | | |  | | | |
| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | **Lecture** | | **Presentations & Movies** | | **Discussions & Seminars** | **Practical** | | **Problem solving** | | **Brain storming** |
| **Knowledge & Understanding** | **a1-** | **Know knowledge of different area of mathematics topics.** | | | **🗸** | |  | |  |  | |  | |  |
| **a2-** | **Select advanced mathematical topics.** | | | **🗸** | |  | |  |  | | **🗸** | |  |
| **a3-** | **Memorize skills on making a formal presentation.** | | | **🗸** | |  | |  |  | | **🗸** | |  |
| **a4-** | **Know how to advance search in mathematics** | | | **🗸** | |  | | **🗸** |  | | **🗸** | |  |
| **Intellectual Skills** | **b1-** | **Develop skills on problem-solving** | | |  | | **🗸** | |  |  | |  | **🗸** | |
| **b2-** | **Apply and improve numerical methods to get more accurate solutions.** | | | **🗸** | |  | |  | **🗸** | |  |  | |
| **b3-** | **Discover and study the accuracy of the obtained results** | | |  | | **🗸** | |  |  | | **🗸** |  | |
| **Practical and professional skills** | **c1-** | **Solving some problems using Show numerical methods** | | | **🗸** | |  | |  |  | | **🗸** | |  |
| **c2-** | **Summarize confidence in their abilities to use mathematics.** | | | **🗸** | |  | |  |  | | **🗸** | |  |
| **c3-** | **Investigate and criticize the different methods used in solving problems.** | | | **🗸** | |  | | **🗸** |  | | **🗸** | |  |
| **General Skills** | **d1-** | **-Using internet to Collect data to get information effectively.** | | |  | | **🗸** | |  |  | |  | **🗸** | |
|  | | |  | |  | |  |  | |  |  | |
| **d2-** | **Time management to solve problems.** | | |  | | **🗸** | |  |  | | **🗸** |  | |
| **d3-** | **communication With others to presentation skills.** | | | **🗸** | |  | | **🗸** |  | | **🗸** |  | |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| Oral exam | **a1, a2 , b1, b2,c1, c3, d1,d2** | **Weekly** | **0 %** |
| Activation | **a3, b2, b3, c2, d1, d2.** | **Weekly** | **20 %** |
| Discussions | **a4,b3,c3,d3** | **End of semester** | **80 %** |
| **Total** | | | **100 %** |

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| **6- Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | **Practical and professional skills** | | | **General skills** | | | | **a1** | **a2** | **a3** | **a4** | **b1** | **b2** | **b3** | **c1** | **c2** | **c3** | **b1** | **b2** | **b3** | | **Every student perform a project under supervisor of one the staff and at the end of first or second term** |  | X |  | x |  | x |  |  | x | x |  | x |  | | **Write an essay about his work and student assessment will be taken by the staff.** | X |  | x |  | X |  | x | x |  |  | x |  | X |   **7- List of references:** | | | | | | | |
| **7-1 Course notes**  **Notes approved by Math. Department**  **7-2 books.**  **-“According to** Essay of Research**"**  **7-3 Recommended books.**  **- -“According to** Essay of Research**"**  **7-4Periodicals, Web sites, etc.**  **-“According to** Essay of Research**"** | | | | | | | |
| **8- Facilities required for teaching and learning:** | | | | | | |
| **Personal computer, Data show, Power point application, White board, Whiteboard marker and internet.** | | | | | | |
| **Course coordinator:** | **Staff of Department** | | | | |
| **Head of the Department:**  **Date: 9 / 12 /2019** | **Prof. Dr. Reda Gamal Abd El Rahman**  Updated 2020/2021 | | | | |
|  | **Course Specification** | | | | |
| **A- Affiliation** | | | | | | | |
| **Relevant program:** | | | **Computer Science** | | | | |
| **Department offering the program:** | | | | **Mathematics** | | | |
| **Department offering the course:** | | | | **Mathematics** | | | |
| **Academic year/level:** | | | | **Fourth level / Second Semester** | | | |
| **Date of specifications approval:** | | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | |
| B - Basic information | | | | | | | |
| **Title:**  **Distributed Computing** | | | | **Code:**  **452 MC** | **Year/level:**  **Fourth level / Second Semester** | | |
| **Teaching Hours: 28 h** | | | | **Lectures: 2h/week** | **Tutorial: ــــ** | | |
|  | |  | | **Practical: ــــ ــــ ــــ** | **Total:** **2 h/week** | | |
| C - Professional information **1 – Course Learning Objectives:** | | | | | | | |
| **At the end of this course, the students must be able to:**  **Introduce students to the technologically important area of distributed and parallel computing. Understand a number of different models of parallel and distributed computing and how there are different problems associated with the realization of these models, particularly with respect to communication and algorithm design. Build efficient suitable parallel and distributed machines.** | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Determine basics of parallel computational models.**  **a2. Explain the importance of the parallel computers.**  **a3. Explain line segment intersection.**  **a4. Explain and illustrate segment-segment-segment intersection.**  **a5. Explain and illustrate visibility graph.**  **a6. Explain and illustrate voronoi-Diagrams.**  **a7. Explain and illustrate Delaunay triangulations.**  **a8. Explain motion planning.** | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Formulate Geometrical problems.** 2. **Organize how to propose a parallel efficient algorithm for the given problem.** 3. **Construct the parallel algorithm.** 4. **Interpret how to describe the systematic steps in the proof of the theories.** | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Make an effective algorithm for given problems.** 2. **Collect effective computer programs for the parallel algorithm indicators.** | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Computing the geometrical problem and how to deal with it as a data to be processed** 2. **Communication with others to present effective computer programs that employ efficient algorithms.** 3. **Using internet to present algorithms for solving scientific problems related to other disciplines.** | | | | | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Introduction to Parallel** | **2** | - | - |
| **Introduction to Distributed Computing** | **2** | - | - |
| **Parallel and Distrubuted Architectures, Socket programming** | **2** | - | - |
| **Parallel Performance, Shared Memory and Threads** | **2** | - | - |
| **Parallel Algorithms** | **2** | - | - |
| **Parallel Algorithms, OpenMP** | **2** | - | - |
| **Mid-Term Examination and Scalable Algorithms** | **2** | - | - |
| **Message Passing** | **2** | - | - |
| **Distributed Systems, MapReduce, Clusters** | **2** | - | - |
| **Distributed Coordination, Security** | **2** | - | - |
| **Distributed File Systems, Security** | **2** | - | - |
| **Distributed Shared Memory, Peer-to-Peer** | **2** | - | - |
| **Distributed Shared Memory, Peer-to-Peer** | **2** | - | - |
| **Cloud Computing and Final Project Presentations** | **2** | - | - |
| **Total hours** | **28** | - | - |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | | **Lecture** | **Presentations & Movies** | | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** | |
| **Knowledge & Understanding** | | | **a1** | **Determine basics of parallel computational models.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a2** | **Explain the importance of the parallel computers.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a3** | **Explain line segment intersection.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a4** | **Explain and illustrate segment-segment-segment intersection.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a5** | **Explain and illustrate visibility graph.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a6** | **Explain and illustrate voronoi-Diagrams.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a7** | **Explain and illustrate Delaunay triangulations.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **a8** | **Explain motion planning.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **Intellectual Skills** | | | **b1** | **Formulate Geometrical problems.** | | | **🗸** | **🗸** | |  |  | **🗸** |  | |
| **b2** | **Organize how to propose a parallel efficient algorithm for the given problem.** | | | **🗸** | **🗸** | | **🗸** | **🗸** |  | **🗸** | |
| **b3** | **Construct the parallel algorithm.** | | |  | **🗸** | | **🗸** | **🗸** |  | **🗸** | |
| **b4** | **Interpret how to describe the systematic steps in the proof of the theories.** | | | **🗸** |  | | **🗸** |  | **🗸** |  | |
| **Practical and professional skills** | | | **c1** | **Make an effective algorithm for given problems.** | | | **🗸** | **🗸** | |  | **🗸** |  |  | |
| **c2** | **Collect effective computer programs for the parallel algorithm indicators.** | | | **🗸** | **🗸** | |  | **🗸** |  |  | |
| **General Skills** | | | **d1** | **Computing the geometrical problem and how to deal with it as a data to be processed.** | | | **🗸** | **🗸** | | **🗸** |  |  |  | |
| **d2** | **Communication with others to present effective computer programs that employ efficient algorithms.** | | | **🗸** | **🗸** | |  | **🗸** |  |  | |
| **d3** | **Using internet to Present algorithms for solving scientific problems related to other disciplines.** | | |  | **🗸** | | **🗸** | **🗸** |  |  | |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | | | | | |
| **Tools:** | | **To Measure** | | | | **Time schedule** | | | **Grading** | | | | | | |
| **Mid-Term Exam** | | **a1,a2,a3,a4,a5,a6,a7,a8, b1, b2, d2** | | | | **Week 7** | | | **10 %** | | | | | | |
| **Oral exam** | | **a1,a2,a3,a4,a5,a6,a7,a8,c1,c2,d1, d2** | | | | **Week 15** | | | **10 %** | | | | | | |
| **Written exam** | | **a1,a2,a3,a4,a5,a6,a7,a8,b4,d3,b1,b2** | | | | **Start of the week 16** | | | **80 %** | | | | | | |
| **Total** | | | | | | | | | **100 %** | | | | | | |
| **6- Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | | | | | | **Intellectual skills** | | | | **Practical and professional skills** | | **General skills** | | | | **a1** | **a2** | **a3** | **a4** | **a5** | **a6** | **a7** | **a8** | **b1** | **b2** | **b3** | **b4** | **c1** | **c2** | **d1** | **d2** | **d3** | | **Introduction to Distributed Computing** |  | **x** |  | **x** |  |  |  | **x** |  |  | **x** |  | **x** |  | **x** |  | **X** | | **Parallel and Distributed Architectures, Socket programming** |  |  | **x** |  |  |  | **x** |  |  | **x** |  |  |  |  |  | **x** |  | | **Parallel Performance, Shared Memory and Threads** | **x** |  |  |  |  |  | **x** |  | **x** |  |  | **x** |  | **x** |  |  | **X** | | **Parallel Algorithms** |  | **x** |  |  | **x** |  | **x** |  |  |  |  | **x** | **x** | **x** |  | **x** |  | | **Parallel Algorithms, OpenMP** |  |  | **x** |  |  |  |  | **x** |  |  | **x** |  |  |  | **x** |  | **X** | | **Mid-Term Examination and Scalable Algorithms** | **x** |  |  |  |  | **X** |  |  |  | **x** |  |  |  |  |  |  |  | | **Message Passing** |  |  |  | **x** |  |  |  | **x** |  |  | **x** |  |  | **x** |  |  |  | | **Distributed Shared Memory, Peer-to-Peer** |  |  | **x** |  |  | **x** |  |  |  | **x** |  | **x** |  | **x** |  |  | **X** | | **Cloud Computing and Final Project Presentations** | **x** |  |  |  |  |  |  |  |  |  |  |  |  |  |  | **x** |  | | | | | | | | | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Crichlow, J. (1988). *An introduction to distributed and parallel computing*. New York: Prentice-Hall, p.238.**   **7-3 Recommended books.**   * **Attiya, H. and Welch, J. (1998). *Distributed Computing: Fundamentals, Simulations, and Advanced Topics*. 2nd ed. London: McGraw-Hill, p.419.**   **7-4 Periodicals, Web sites, etc.**   * **https://www.wiziq.com/tutorials/distributed-computing** [Accessed 29 Oct. 2015]. * **https://www.cl.cam.ac.uk/projects/raspberrypi/tutorials/distributed-computing/** [Accessed 29 Oct. 2015]. * [**http://www.fieldtriptoolbox.org/tutorial/distributedcomputing**](http://www.fieldtriptoolbox.org/tutorial/distributedcomputing)[Accessed 29 Oct. 2015]. | | | | | | | | | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| **Course coordinator:** | | | | | **Dr. Shadia Salah** | |
| **Head of the Department:**  **Date: 9 / 12 /2019** | | | | | **Prof. Dr. Reda Gamal Abd El Rahman**  Updated 2020/2021 | |

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| ***Course Specification***  **A- Affiliation** | | | | | | | |
| **Relevant program:** | | **Computer Science** | | | | | |
| **Department offering the program:** | | | **Mathematics** | | | | |
| **Department offering the course:** | | | **Mathematics** | | | | |
| **Academic year/level:** | | | **Fourth level / Second Semester** | | | | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| B - Basic information | | | | | | | |
| **Title:**  **Compiler theory** | | | **Code:**  **458 MC** | | **Year/level:**  **Fourth level / Second Semester** | | |
| **Teaching Hours: 28 h** | | | **Lectures: 2h/week** | | **Tutorial: ــــ** | | |
|  |  | | **Practical: ــــ ــــ ــــ** | | **Total:** **2 h/week** | | |
| C - Professional information **1 – Course Learning Objectives:** | | | | | | | |
| **At the end of this course, the students must be able to:**  **The course comes as follows up on an operating system course and assumes knowledge of assembler design (prerequisite) to concentrate on specific issues of compiler construction. This course introduces student to the compiler design, as it is one of most important system programs. The main motive to make students understand what happens behind the scene when they write application programs till it runs.** | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Define the main phases of compiler construction and how to select the appropriate approach for designing each phase.** 2. **State regular expressions and draw their state diagrams NFA and DFA.** 3. **Determine language syntax into context free grammar productions, and write attribute grammar to perform semantic actions on a CFG.** 4. **Describe the overall structure of a compiler and know about the grammar rules and syntax of languages.** | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Formulate the whole process of compiler design with all its phases.** 2. **Organize languages according to their compilers and select the suitable language for each application.** 3. **Develop attributes, components, relationships, patterns, main ideas, and errors for a program.** 4. **Report ambiguities in language syntax and how to resolve them.** | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1-Show the best environment (compiling and linking options) for their programs to run most efficiently.**  **c2. Investigate effectively as an individual and as a member of a team.**  **c3. Collect independent information acquisition and management, using the scientific literature.** | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Using internet to Present the whole process of designing and implementing a language; an experience that may help in applications.**  **d2. Working in groups and manage a project.**  **d3. Communication with others to Manage tasks and resources.**  **d4. life-long learning to Search for information.** | | | | | | | |
| **3 – Contents** | | | | | | | |
| **Topic** | | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction to Compilers** | | | | **2** | |  |  |
| **Automata** | | | | **2** | |  |  |
| **Lexical Analysis** | | | | **2** | |  |  |
| **Grammars and Syntax Analysis** | | | | **2** | |  |  |
| **Syntax directed translation** | | | | **2** | |  |  |
| **Type checking** | | | | **2** | |  |  |
| **Mid-Term Examination and Parsers** | | | | **2** | |  |  |
| **Parsers Implementation and Semantic Analysis** | | | | **2** | |  |  |
| **Run-time organization** | | | | **2** | |  |  |
| **Intermediate Representation, code generation** | | | | **2** | |  |  |
| **Code generation and Code optimization** | | | | **2** | |  |  |
| **Error Detection and Recovery** | | | | **2** | |  |  |
| **Error Repair, Compiler Implementation** | | | | **2** | |  |  |
| **C++, Java, and YACC Compilers** | | | | **2** | |  |  |
| **Total hours** | | | | **28** | |  |  |

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| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | | **Practical** | **Problem solving** | **Brainstorming** | |
| **Knowledge & Understanding** | | **a1** | | **Define the main phases of compiler construction and how to select the appropriate approach for designing each phase.** | | | **🗸** | **🗸** | **🗸** | |  |  |  | |
| **a2** | | **State regular expressions and draw their state diagrams NFA and DFA.** | | | **🗸** | **🗸** | **🗸** | |  |  |  | |
| **a3** | | **Determine language syntax into context free grammar productions, and write attribute grammar to perform semantic actions on a CFG.** | | | **🗸** | **🗸** | **🗸** | |  |  |  | |
| **a4** | | **Describe the overall structure of a compiler and know about the grammar rules and syntax of languages.** | | | **🗸** | **🗸** | **🗸** | |  |  |  | |
| **Intellectual Skills** | | **b1** | | **Formulate the whole process of compiler design with all its phases.** | | |  | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **b2** | | **Organize languages according to their compilers and select the suitable language for each application.** | | | **🗸** | **🗸** | **🗸** | | **🗸** |  |  | |
| **b3** | | **Develop attributes, components, relationships, patterns, main ideas, and errors for a program.** | | | **🗸** | **🗸** | **🗸** | | **🗸** |  |  | |
| **b4** | | **Report ambiguities in language syntax and how to resolve them.** | | | **🗸** | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **Practical and professional skills** | | **C1** | | **Show the best environment (compiling and linking options) for their programs to run most efficiently.** | | | **🗸** | **🗸** |  | | **🗸** | **🗸** |  | |
| **C2** | | **Investigate effectively as an individual and as a member of a team.** | | | **🗸** | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **C3** | | **Collect independent information acquisition and management, using the scientific literature.** | | | **🗸** |  | **🗸** | | **🗸** | **🗸** | **🗸** | |
| **General Skills** | | **d1** | | **Using internet to Present the whole process of designing and implementing a language; an experience that may help in applications.** | | |  | **🗸** | **🗸** | |  |  |  | |
| **d2** | | **Working in groups and manage a project.** | | |  | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **d3** | | **Communication with others to Manage tasks and resources.** | | |  | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **d4** | | **life-long learning to Search for information.** | | |  | **🗸** | **🗸** | | **🗸** | **🗸** |  | |
| **5- Students’ Assessment Methods and Grading:** | | | | | | | | | | | | | | | |
| **Tools:** | | | **To Measure** | | | **Time schedule** | | | | **Grading** | | | | | |
| **Mid-Term Exam** | | | **a1,a2,a3,a4,b3,b4,d3,d1** | | | **Week 7** | | | | **10 %** | | | | | |
| **Oral exam** | | | **a1,a2,a3,a4,d3,d2,b2** | | | **Week 15** | | | | **10 %** | | | | | |
| **Written exam** | | | **a1,a2,a3,a4,b1,d3,d4** | | | **Start of the week 16** | | | | **80 %** | | | | | |
| **Total** | | | | | | | | | | **100 %** | | | | | |
| **6- Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | | **Practical and professional skills** | | | **General**  **skills** | | | | | a1 | a2 | a3 | a4 | b1 | b2 | b3 | b4 | c1 | c2 | c3 | d1 | d2 | d3 | d4 | | Introduction to Compilers | x |  |  |  |  |  |  |  | x |  | x |  | x |  |  | | Automata |  | x |  | x |  |  |  | x |  |  |  |  |  |  |  | | Lexical Analysis |  |  |  |  |  |  |  |  |  |  | x |  | x |  |  | | Grammars and Syntax Analysis |  | x |  |  |  | X |  |  | x |  |  |  |  | x | X | | Syntax directed translation |  |  |  |  |  |  |  |  |  | x |  |  |  |  |  | | Type checking | x |  |  |  |  | X |  |  |  |  | x |  |  |  |  | | Mid-Term Examination and Parsers |  |  | x |  | x |  |  |  | x |  |  |  |  |  |  | | Parsers Implementation and Semantic Analysis |  | x |  |  |  |  |  |  |  |  | x |  |  |  | x | | Run-time organization | x |  |  | x |  |  |  |  | x |  |  |  | x |  |  | | Intermediate Representation, code generation |  |  | x |  |  |  | x |  |  |  |  |  | x |  | x | | Code generation and Code optimization |  | x |  |  |  |  |  | x |  |  |  | x |  | x |  | | Error Detection and Recovery | x |  |  |  |  |  | x |  |  |  | x |  |  |  |  | | Error Repair, Compiler Implementation | x |  |  |  |  |  |  |  |  | x |  | x |  |  | X | | C++, Java, and YACC Compilers |  | x |  | x |  |  |  | x |  |  |  |  |  |  | X | | | | | | | | | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Aho, A. and Aho, A. (2006). *Compilers*. Boston, Second Edition, Mass.: Pearson Addison-Wesley, p.1038.**   **7-3 Recommended books.**   * **LEWIS, P., ROSENKRANTZ, D. and Stearns, R. (1976). *Compiler Design Theory*. United States of America: Addison-Wesley, p.647.**   **7-4 Periodicals, Web sites, etc.**   * **http://www.cs.man.ac.uk/~pjj/farrell/compmain.html** [Accessed 29 Oct. 2015]. * **http://www.tutorialspoint.com/compiler\_design/** [Accessed 29 Oct. 2015]. * [**http://www.dreamincode.net/forums/topic/260592-an-introduction-to-compiler-design-part-i-lexical-analysis/**](http://www.dreamincode.net/forums/topic/260592-an-introduction-to-compiler-design-part-i-lexical-analysis/)[Accessed 29 Oct. 2015]. | | | | | | | | | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | | | | | | | | |
|  | | | | | | | | | | | | |
| **Course coordinator:** | | | | | **Dr. Ahmed Hassan** | | | | | | | | |
| **Head of the Department:** | | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | | | | | | | | |
| **Date: 9 / 12 /2019** | | | | | Updated 2020/2021 | | | | | | | | |

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| **Course Specification**  **A- Affiliation** | | | | | | |
| **Relevant program:** | **Computer Science** | | | | | |
| **Department offering the program:** | | Mathematics | | | | |
| **Department offering the course:** | | Mathematics | | | | |
| **Academic year/level:** | | Fourth level / Second Semester | | | | |
| **Date of specifications approval:** | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | |
| ***B - Basic information*** | | | | | | |
| **Title:**  **Data Mining** | | **Code:**  **464 MC** | | **Year/level:**  **Fourth level / Second Semester** | | |
| **Teaching Hours:** | | **Lectures: 2** **h/week** | | **Tutorial: ـــ** | | |
|  | | **Practical: 2** **h/week** | | **Total:** **3 h/week** | | |
| ***C - Professional information*** | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | |
| **At the end of this course, the students must be able to:-**  **The overall aim of this course is to introduce students to modern data mining techniques and their use in business and other areas of applications. In particular, the course explores basic concepts, principles and techniques of data mining, online analytic processing and data warehousing with emphasis on both the technical and the practical issues. The course provides students with an understanding in evaluating and comparing data mining solutions for effective use of the solutions in practice. The course also equips students with some hands-on experience and skills in conducting a data mining project using a data mining software tool, and/or constructing a data warehouse.** | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1.To know the concepts, techniques and algorithms of the data-mining.**  **a2. To Know and understand the principles and techniques of a number of application areas informed by the research directions of data mining.**  **a3. Identify of some aspects of the OLAP and Decision support systems** | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Develop raw input data to provide suitable input for a range of data mining algorithms.**  **b2. Organize evaluate and select appropriate data-mining algorithms.**  **b3. compare the different method between (methods, techniques ... etc).**  **b4. Discover attributes, components, relationships, patterns, main ideas, and errors.** | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Prepare of a data mining application.**  **c2. Solve data mining problems with pressing commercial or industrial constraints.**  **c3. Investigate problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis). \**  **c4. Analyze the principles of effective data management, information organization, and information-retrieval skills to data mining** | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Working in groups effectively**  **d2. Community linked thinking , set tasks and solve**  **problems on scientific bases.**  **d3. Using internet and communication technology effectively.** | | | | | | |
| **3 – Contents** | | | | | | |
| **Topic** | | | **Lecture hours** | | **Tutorial hours** | **Practical hours** |
| **Introduction** | | | **2** | | **-** | **2** |
| **The main concepts and algorithms to data mining.** | | | **2** | | **-** | **2** |
| **Classification (1)** | | | **2** | | **-** | **2** |
| **Classification (2)** | | | **2** | | **-** | **2** |
| **Classification (3)** | | | **2** | | **-** | **2** |
| **Clustering (1)** | | | **2** | | **-** | **2** |
| **Clustering (2)** | | | **2** | | **-** | **2** |
| **Clustering (3)** | | | **2** | | **-** | **2** |
| **Association Rules (1)** | | | **2** | | **-** | **2** |
| **Association Rules (2)** | | | **2** | | **-** | **2** |
| **Association Rules (3)** | | | **2** | | **-** | **2** |
| **Mining Frequent graphs (1)** | | | **2** | | **-** | **2** |
| **Mining Frequent graphs (2)** | | | **2** | | **-** | **2** |
| **Mining Frequent graphs (3)** | | | **2** | | **-** | **2** |
| **Total hours** | | | **28** | | **-** | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | |
| **Intended Learning Outcomes** | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brain storming** |
| **Knowledge & Understanding** | **a1. . To Know the concepts, techniques and algorithms of the data-mining.** | **🗸** |  | **🗸** | **🗸** |  |  |
| **a2. To Know and understand the principles and techniques of a number of application areas informed by the research directions of data mining.** | **🗸** |  | **🗸** |  |  |  |
| **a3. Identify of some aspects of the OLAP and Decision support systems complicated statements using mathematical notations and language.** | **🗸** | **🗸** |  |  |  |  |
| **Intellectual Skills** | **b1. Develop raw input data to provide suitable input for a range of data mining algorithms.** | **🗸** |  |  |  |  |  |
| **b2. Organize Critically evaluate and select appropriate data-mining algorithms.** | **🗸** |  | **🗸** | **🗸** |  |  |
| **b3. compare the different method between (methods, techniques...etc).** | **🗸** |  |  | **🗸** |  |  |
|  | **b4. Discover attributes, components, relationships, patterns, main ideas, and errors.** |  |  |  | **🗸** |  | **🗸** |
| **Practical and professional skills** | **c1. Prepare data mining application.** | **🗸** |  |  | **🗸** |  |  |
| **c2. Solve data mining problems with pressing commercial or industrial constraints.** | **🗸** |  |  | **🗸** |  |  |
| **c3. Investigate problem analysis from written descriptions; derive requirements specifications from an understanding of problems (analysis, synthesis).** | **🗸** |  | **🗸** |  |  |  |
| **c4. Analyze the principles of effective data management, information organization, and information-retrieval skills to data mining** | **🗸** |  |  |  |  |  |
| **General Skills** | **d1. Working in groups effectively.** |  | **🗸** |  |  |  |  |
| **d2. Community linked thinking , set tasks and solve**  **problems on scientific bases.** |  |  |  |  |  | **🗸** |
| **d3. Using internet and communication technology effectively.** |  |  | **🗸** |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | |
| **Tools:** | **To Measure** | | **Time schedule** | | **Grading** |
| **Mid-Term Exam** | **a1 , a2 ,b1, b2** | | **Week 7** | | **14 %** |
| **Oral exam** | **b2, b4, d1** | | **Week 15** | | **14 %** |
| **Practical exams** | **c1, c2, c3, d2, d3** | | **Week 15** | | **24 %** |
| **Written exam** | **a1,a2,a3, b1,b2,b3,c1,c4** | | **Week 16** | | **48 %** |
| **Total** | | | | | **100 %** |
| **6- Course matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | | **Practical and professional skills** | | | | **General**  **skills** | | | | a1 | a2 | a3 | b1 | b2 | b3 | b4 | c1 | c2 | c3 | C4 | d1 | d2 | d3 | | **Introduction** | x | x |  |  | x | x |  | x | x | x |  |  | X |  | | **The main concepts and algorithms to data mining.** |  | x |  |  | x |  | x |  | x |  | x |  |  |  | | **Classification (1)** |  |  |  | x |  |  |  |  |  |  |  |  |  | x | | **Classification (2)** |  | x |  |  |  | x |  | x |  | x |  |  |  |  | | **Classification (3)** |  |  | x |  |  |  |  |  |  |  |  |  |  | X | | **Clustering (1)** |  |  |  | x |  |  |  |  |  |  |  |  |  |  | | **Clustering (2)** |  | x |  |  |  |  | x |  |  |  |  |  |  | X | | **Clustering (3)** | x |  |  |  |  |  |  |  | x |  |  |  | X |  | | **Association Rules (1)** |  | X |  |  |  |  | x |  |  |  | x |  |  | X | | **Association Rules (2)** |  |  |  |  | x |  |  |  |  | x |  | x |  |  | | **Association Rules (3)** | x |  |  |  |  | x |  |  | x |  |  |  | X |  | | **Mining Frequent graphs (1)** |  | x |  | x |  |  |  | x |  | x |  |  |  | X | | **Mining Frequent graphs (2)** | x |  |  | x |  | x |  |  |  |  |  |  | X |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**  **-Notes from the Department of Maths .**   * 1. **Required books.**   [**Mohammed J. Zaki**](http://www.cs.rpi.edu/~zaki) **and** [**Wagner Meira, Jr.**](http://homepages.dcc.ufmg.br/~meira) **;**[**Data Mining and Analysis**](http://www.cs.rpi.edu/~zaki/dataminingbook)**, Cambridge University Press, May 2014**  **7-3 Recommended books.**  **Data Mining: Concepts and Techniques, Second Edition (The Morgan Kaufmann Series in Data Management Systems) by Jiawei Han, 2005**  **7-4Periodicals, Web sites, etc.**  **http://www.web-datamining.net**  **8- Facilities required for teaching and learning:**  **- Data Show Device**  **- Whiteboard** | | | | | | |
|  | | | | | | |
| **Course coordinator:** | | **Dr. Mosab Abd elhamed** | |
| **Head of the Department:** | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2020** | | Updated 2020/2021 | |

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| **Course Specification**  **A- Affiliation** | | | | |
| **Relevant program:** | | **Computer Science** | | |
| **Department offering the program:** | | | **Mathematics** | |
| **Department offering the course:** | | | **Mathematics** | |
| **Academic year/level:** | | | **Fourth level / Second Semester** | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| B - Basic information | | | | |
| **Title:**  **Cryptography** | | | **Code:**  **466 MC** | **Year/level:**  **Fourth level / Second Semester** |
| **Teaching Hours: 42 h** | | | **Lectures: 2h/week** | **Tutorial: ــــ** |
|  |  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| C - Professional information **1 – Course Learning Objectives:** | | | | |
| **At the end of this course, the students must be able to:**  **Studying how to design coding system. Know how coding system work. Studying some important codes. Apply effectively information technology relevant to the field.** | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Identify the ability of the student to design coding system.**  **a2. To know how coding system works.**  **a3. Define number systems and how to create new codes.** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Confirm students in some related courses.**  **b2. Design discussion concerning assigned problems**  **b3.Construct mental ability for the student** | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Show techniques and tools considering scientific ethics.**  **c2Analyze problems using a range of formats and approaches.**  **c3-show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice.** | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Communication with others, set tasks and solve problems on scientific basis.**  **d2.Working in groups effectively, manage time, collaborate and communicate with others positively.**  **d3. Time management to Analysis of results**  **d4. lifelong learning.** | | | | |

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| **3 – Contents** | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Overview and Introduction to Cryptography** | **2** | - | **2** |
| **Mathematical Background** | **2** | - | **2** |
| **Mathematical Background** | **2** | - | **2** |
| **Symmetric Cryptosystems** | **2** | - | **2** |
| **Stream Ciphers** | **2** | - | **2** |
| **Block Ciphers** | **2** | - | **2** |
| **Mid-Term Examination and Feistel Ciphers** | **2** | - | **2** |
| **Multiple Encryption** | **2** | - | **2** |
| **DES/AES** | **2** | - | **2** |
| **Hash Functions** | **2** | - | **2** |
| **More on Hash Functions** | **2** | - | **2** |
| **Data Integrity, Authentication, MAC** | **2** | - | **2** |
| **Asymmetric Cryptosystems** | **2** | - | **2** |
| **Algorithmic Number Theory** | **2** | - | **2** |
| **Total hours** | **28** | - | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** |
| **Knowledge & Understanding** | **a1** | **Identify the ability of the student to design coding system.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |
| **a2** | **To know how coding system works.** | **🗸** | **🗸** |  | **🗸** |  |  |
| **a3** | **Define number systems and how to create new codes.** | **🗸** | **🗸** | **🗸** | **🗸** |  |  |
| **Intellectual Skills** | **b1** | **Confirm students in some related courses.** | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |  |
| **b2** | **Design discussion concerning assigned problems.** | **🗸** | **🗸** | **🗸** |  |  |  |
| **b3** | **Construct of mental ability for the student** |  |  |  |  |  | **🗸** |
| **Practical and professional skills** | **c1** | **Show techniques and tools considering scientific ethics.** |  |  | **🗸** | **🗸** |  |  |
| **c2** | **Analyze problems using a range of formats and approaches.** |  |  | **🗸** | **🗸** | **🗸** |  |
| **c3** | **Show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice.** | **🗸** |  | **🗸** | **🗸** | **🗸** |  |
| **General Skills** | **d1** | **Communication with others, set tasks and solve problems on scientific basis.** | **🗸** |  | **🗸** | **🗸** | **🗸** | **🗸** |
| **d2** | **Working in groups effectively, manage time, collaborate and communicate with others positively.** | **🗸** |  | **🗸** | **🗸** | **🗸** |  |
| **d3** | **Time management to Analysis of results.** |  | **🗸** | **🗸** | **🗸** |  |  |
| **d4** | **life long learning.** | **🗸** |  |  | **🗸** | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **a1,a2,a3,c2,c3,d1,d4** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **a1,a2,a3,b2,d3,d4** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **a1,a2,a3,b2,c1,c2,c3,d3,d2** | | **Week 15** | | **24 %** | |
| **Written exam** | | **a1,a2,a3,c2,c3,d1,d4** | | **Week 16** | | **48 %** | |
| **Total** | | | | | | **100 %** | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **6- Course Matrix** | | | | | | | | | | | | | | | | | **Topic** | **Knowledge and understanding** | | | | **Intellectual skills** | | | **Practical and professional skills** | | | | **General**  **skills** | | | | | **a1** | **a2** | **a3** | **b1** | | **b2** | **b3** | **c1** | **c2** | **C3** | **d1** | | **d2** | **d3** | **d4** | | **Overview and Introduction to Cryptography** | **x** |  |  |  | |  |  |  |  |  |  | |  |  | **x** | | **Mathematical Background** |  | **x** |  |  | |  |  | **x** |  |  |  | |  |  |  | | **Mathematical Background** |  |  | **x** |  | |  |  |  |  | **x** |  | |  | **x** |  | | **Symmetric Cryptosystems** |  |  |  |  | |  | **x** |  |  |  |  | |  |  |  | | **Stream Ciphers** |  |  |  |  | |  |  |  |  |  | **X** | |  |  |  | | **Block Ciphers** |  |  |  |  | | **X** |  |  |  |  |  | |  |  |  | | **Mid-Term Examination and Feistel Ciphers** |  |  |  |  | |  |  | **x** |  |  |  | |  |  |  | | **Multiple Encryption** | **x** |  | **x** | **x** | |  |  | **x** | **x** |  |  | |  | **X** |  | | **DES/AES** |  |  |  |  | |  |  |  |  |  |  | | **x** |  |  | | **Hash Functions** |  |  |  |  | |  |  |  |  |  |  | |  |  | **x** | | **More on Hash Functions** |  |  |  |  | |  | **x** |  |  |  |  | |  |  | **x** | | **Data Integrity, Authentication, MAC** | **x** |  |  |  | |  |  |  | **x** |  |  | | **x** |  |  | | **Asymmetric Cryptosystems** |  |  |  |  | |  |  |  |  |  |  | |  | **X** |  | | **Algorithmic Number Theory** |  |  |  | **x** | |  |  |  |  | **x** |  | |  |  | **x** | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Paar, C. and Pelzl, J. (2010). *Understanding cryptography*. Berlin: Springer.**   **7-3 Recommended books.**   * **Ferguson, N., Schneier, B. and Kohno, T. (2012). *Cryptography Engineering*. Chichester: John Wiley & Sons, Inc.**   **7-4 Periodicals, Web sites, etc.**   * **http://www.brighthub.com/computing/smb-security/articles/80137.aspx**   [Accessed 29 Oct. 2015].   * [**http://www.tutorialspoint.com/cryptography**](http://www.tutorialspoint.com/cryptography)[Accessed 29 Oct. 2015]. * [**https://www.cs.auckland.ac.nz/~pgut001/tutorial**](https://www.cs.auckland.ac.nz/~pgut001/tutorial)[Accessed 29 Oct. 2015]. | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr. Fathy EL Aziz** | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2020** | | | | Updated 2021/2022 | |

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| **Course Specification**  **A- Affiliation** | | | | | | | | | | | | | | |
| **Relevant program:** | | | | **Computer Science** | | | | | | | | | | |
| **Department offering the program:** | | | | | **Mathematics** | | | | | | | | | |
| **Department offering the course:** | | | | | **Mathematics** | | | | | | | | | |
| **Academic year/level:** | | | | | **Fourth level / Second Semester** | | | | | | | | | |
| **Date of specifications approval:** | | | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | | | | | | |
| B - Basic information | | | | | | | | | | | | | | |
| **Title: Systems Simulation** | | | | | **Code:**  **362 MC** | | | **Year/level:**  **Fourth level / Second Semester** | | | | | | |
| **Tea-ching Hours: 42 h** | | | | | **Lectures: 2h/week** | | | **Tutorial: ــــ** | | | | | | |
|  | | |  | | **Practical: 2h/week** | | | **Total:** **3 h/week** | | | | | | |
| C - Professional information **1 – Course Learning Objectives:** | | | | | | | | | | | | | | |
| **At the end of this course, the students must be able to:**  **Use such knowledge and understanding in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoff involved in design choices. Collect, analyze, and present data using appropriate formats and techniques. Postulate concepts and choose appropriate solutions to solve problems on scientific basis. Apply effectively information technology relevant to the field.** | | | | | | | | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1. Select mathematical, statistical, and computing knowledge in solving different problems.**  **a2. State knowledge and to know of the principles of mathematical modeling, statistical modeling and application.**  **a3. Write the meaning of complicated statements using mathematical notation and language.** | | | | | | | | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1. Construct and solve abstract and mathematical models of computer and communication systems.**  **b2. Apply the knowledge and construction of the mathematical and statistical processes for modeling of real-world problems.**  **b3. Develop appropriate knowledge and awareness of the importance and applications of mathematical and statistical assumptions..** | | | | | | | | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. Make the investigated data, using appropriate techniques and considering scientific guidance.**  **c2. Show problems using a range of formats and approaches.**  **c3. Prepare competence in the use of statistical and mathematical methods in problem solving and modeling.**  **c4. Show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice.** | | | | | | | | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**  **d1. Communication with others to get information effectively.**  **d2. Community linked thinking , set tasks and solve problems on scientific basis.**  **d3. Working in groups effectively, manage time, collaborate and communicate with others positively.**  **d4. Lifelong learning.** | | | | | | | | | | | | | | |
| **3 – Contents** | | | | | | | | | | | | | | |
| **Topic** | | | | | | **Lecture hours** | | | | **Tutorial hours** | | **Practical hours** | | |
| **Introduction** | | | | | | **2** | | | |  | | **2** | | |
| **Modeling & simulation development process** | | | | | | **2** | | | |  | | **2** | | |
| **Fidelity, accuracy and resolution of models** | | | | | | **2** | | | |  | | **2** | | |
| **Verification and validation in systems engineering** | | | | | | **2** | | | |  | | **2** | | |
| **Reference architectures** | | | | | | **2** | | | |  | | **2** | | |
| **Systems modeling language (SysML)** | | | | | | **2** | | | |  | | **2** | | |
| **Mid-Term Examination and Systems modeling language (SysML)** | | | | | | **2** | | | |  | | **2** | | |
| **Simulation methodologies: Continuous, discrete** | | | | | | **2** | | | |  | | **2** | | |
| **Simulation methodologies: Monte Carlo, agent-based, system dynamics, games and virtual worlds** | | | | | | **2** | | | |  | | **2** | | |
| **System engineering life cycle** | | | | | | **2** | | | |  | | **2** | | |
| **Design of Experiments, surrogate modeling and optimization** | | | | | | **2** | | | |  | | **2** | | |
| **Simulation ROI** | | | | | | **2** | | | |  | | **2** | | |
| **Distributed simulation standards** | | | | | | **2** | | | |  | | **2** | | |
| **Case studies of M&S in acquisition process** | | | | | | **2** | | | |  | | **2** | | |
| **Total hours** | | | | | | **28** | | | |  | | **28** | | |
| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | | **Lecture** | | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | | **Problem solving** | **Brainstorming** |
| **Knowledge & Understanding** | **a1** | **Select mathematical, statistical, and computing knowledge in solving different problems.** | | | | | **🗸** | | **🗸** | **🗸** | **🗸** | | **🗸** | **🗸** |
| **a2** | **State knowledge and to know of the principles of mathematical modeling, statistical modeling and application.** | | | | | **🗸** | | **🗸** |  |  | | **🗸** |  |
| **a3** | **Write the meaning of complicated statements using mathematical notation and language.** | | | | | **🗸** | | **🗸** | **🗸** |  | |  |  |
| **Intellectual Skills** | **b1** | **Construct and solve abstract and mathematical models of computer and communication systems.** | | | | |  | |  | **🗸** | **🗸** | | **🗸** | **🗸** |
| **b2** | **Apply the knowledge and construction of the mathematical and statistical processes for modeling of real-world problems.** | | | | | **🗸** | |  |  | **🗸** | | **🗸** | **🗸** |
| **b3** | **Develop appropriate knowledge and awareness of the importance and applications of mathematical and statistical assumptions.** | | | | |  | |  | **🗸** | **🗸** | |  | **🗸** |
| **Practical and professional skills** | **C1** | **Make problems using a range of formats and approaches.** | | | | | **🗸** | | **🗸** | **🗸** |  | | **🗸** |  |
| **C2** | **Show competence in the use of statistical and mathematical methods in problem solving and modeling.** | | | | | **🗸** | | **🗸** |  |  | | **🗸** |  |
| **c3.** | **Prepare competence in the use of statistical and mathematical methods in problem solving and modeling.** | | | | | **🗸** | | **🗸** |  | **🗸** | | **🗸** | **🗸** |
| **c4.** | **Show the concepts and methods of computer science, mathematics, and statistics to the solution of the real problems in professional practice.** | | | | | **🗸** | | **🗸** |  | **🗸** | |  | **🗸** |
| **General Skills** | **d1** | **Communication with others to get information effectively.** | | | | |  | | **🗸** |  | **🗸** | | **🗸** |  |
| **d2** | **Community linked thinking , set tasks and solve problems on scientific basis.** | | | | |  | |  | **🗸** | **🗸** | | **🗸** | **🗸** |
| **d3** | **Working in groups effectively, manage time, collaborate and communicate with others positively.** | | | | | **🗸** | |  |  | **🗸** | | **🗸** | **🗸** |
| **d4** | **Lifelong learning** | | | | | **🗸** | |  |  | **🗸** | | **🗸** | **🗸** |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, b2, c1, d2, d3.** | **Week 7** | **14 %** |
| **Oral exam** | **a3, b2, d2, d3.,c4** | **Week 15** | **14 %** |
| **Practical exams** | **a1, a2, b1, b3, c3, d1,d3** | **Week 15** | **24 %** |
| **Written exam** | **a1, b2, c1, d2, d4.** | **Start of 16th week** | **48 %** |
| **Total** | | | **100 %** |

**6 – Course Matrix**

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| **Topic** | **Knowledge & Understanding** | | | **Intellectual Skills** | | | **Practical and professional skills** | | | | **General Skills** | | | |
| **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | **c3** | **c4** | **d1** | **d2** | **d3** | **d4** |
| **Introduction** | **x** |  |  |  | **x** |  |  | **x** |  |  | **x** | **x** |  | **X** |
| **Modeling & simulation development process** |  |  | **x** | **x** |  |  | **x** |  |  | **x** |  |  | **x** |  |
| **Fidelity, accuracy and resolution of models** | **x** | **X** |  |  |  |  |  |  | **X** |  |  | **x** |  |  |
| **Verification and validation in systems engineering** |  |  | **x** |  |  |  | **x** |  |  |  |  |  |  | **X** |
| **Reference architectures** | **x** |  |  |  | **x** |  |  | **x** |  |  |  | **x** |  | **X** |
| **Systems modeling language (SysML)** |  | **X** |  | **x** |  | **x** | **x** | **x** |  | **x** | **x** |  | **x** |  |
| **Mid-Term Examination and Systems modeling language (SysML)** | **x** |  |  |  |  |  |  | **x** | **X** | **x** |  | **x** |  | **X** |
| **Simulation methodologies: Continuous, discrete** | **x** |  | **x** |  | **x** |  | **x** | **x** |  |  |  | **x** |  |  |
| **Simulation methodologies: Monte Carlo, agent-based, system dynamics, games and virtual worlds** | **x** |  |  |  |  | **x** |  |  |  |  |  | **x** |  |  |
| **System engineering life cycle** |  | **X** |  | **x** |  |  |  | **x** | **X** |  |  | **x** | **x** | **X** |
| **Design of Experiments, surrogate modeling and optimization** | **x** |  | **x** |  | **x** |  | **x** |  |  | **x** |  |  |  |  |
| **Simulation ROI** |  | **x** |  |  |  | **x** |  |  |  |  | **x** | **x** |  |  |
| **Distributed simulation standards** | **x** | **x** |  |  | **x** |  | **x** |  |  | **x** |  |  | **x** |  |
| **Case studies of M&S in acquisition process** |  | **x** | **x** |  |  | **x** |  |  |  |  | **x** |  |  |  |

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| **7- List of references:** | | | | |
| **7-1 Course notes**   * **Notes approved by Math. Department.**   1. **Required books.** * **Singh, V. (2009). *System modeling and simulation*. New Delhi: New Age International (P) Ltd., Publishers, p.260.**   **7-3 Recommended books.**   * **Kheir, N. (1988). *Systems modeling and computer simulation*. New York: M. Dekker, p.721.**   **7-3 Periodicals, Web sites, etc.**   * **http://publish.uwo.ca/~jmalczew/gida\_5/Pursula/Pursula.html** [Accessed 29 Oct. 2015]. * **http://www.marinecontrol.org/Tutorial.html [**Accessed 29 Oct. 2015]. * [**http://www.capterra.com/simulation-software/**](http://www.capterra.com/simulation-software/) **[**Accessed 29 Oct. 2015]. | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | |
|  | | |
| **Course coordinator:** | | | **Dr. Shadia Salah** |
| **Head of the Department:** | | | **Prof. Dr. Reda Gamal Abd El Rahman** |
| **Date: 9 / 12 /2019** | | | **Updated 2020/2021** |

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| **Course Specification** | | | | | | | | | | | | | |
| **A- Affiliation** | | | | | | | | | | | | | |
| **Relevant program:** | | | **Computer Science** | | | | | | | | | | |
| **Department offering the program:** | | | | **Mathematics** | | | | | | | | | |
| **Department offering the course:** | | | | **Mathematics** | | | | | | | | | |
| **Academic year/level:** | | | | **Fourth Level / Second Semester** | | | | | | | | | |
| **Date of specifications approval:** | | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | | | | | | | | | |
| B - Basic information | | | | | | | | | | | | | |
| **Title:**  **Operation Research (2)** | | | | **Code:**  **426M** | | **Year/level:**  **Fourth** **Level / Second** **Semester** | | | | | | | |
| **Teaching Hours: 42 h** | | | | **Lectures: 3** **h/week** | | **Tutorial: --** | | | | | | | |
|  | | | | **Practical: ــــ** | | **Total:** **3 h/week** | | | | | | | |
| C - Professional information | | | | | | | | | | | | | |
| **1 – Course Learning Objectives:** | | | | | | | | | | | | | |
| **: At the end of this course, the students must be able to**  **Provide grounding in Classical optimization techniques, Numerical methods for unconstrained optimization problems, Pontriagen's maximums principals.** | | | | | | | | | | | | | |
| **2 - Intended Learning Outcomes (ILOS)** | | | | | | | | | | | | | |
| **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**   1. **Identify the Formulation of classical optimization techniques** 2. **Know the numerical methods for unconstrained optimization problems.** 3. **Explain how to use control problems.** | | | | | | | | | | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**   1. **Solve unconstrained optimization problems.** 2. **Apply numerical methods to unconstrained optimization problems.** 3. **Confirm how to use control problems.** | | | | | | | | | | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**   1. **Investigate the Matlab software package in solving some problems.** 2. **Show model building and problem solving skills.** 3. **Examine the operational procedures to solve Optimal control problems.** | | | | | | | | | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to:**   1. **Working in groups.** 2. **Community linked thinking (Self-learning).** 3. **Using the internet to obtain subject specific information.** 4. **Time Mangement.** | | | | | | | | | | | | | |
| **3 – Contents** | | | | | | | | | | | | | |
| **Topic** | | | | | **Lecture hours** | | | | **Tutorial hours** | | **Practical hours** | | |
| **Introduction** | | | | | **3** | | | | **-** | | **-** | | |
| **Classical optimization techniques (1)** | | | | | **3** | | | | **-** | | **-** | | |
| **Classical optimization techniques (2)** | | | | | **3** | | | | **-** | | **-** | | |
| **Numerical methods for unconstrained optimization problems (1)** | | | | | **3** | | | | **-** | | **-** | | |
| **Numerical methods for unconstrained optimization problems (2)** | | | | | **3** | | | | **-** | | **-** | | |
| **Numerical methods for constrained optimization problems (1)** | | | | | **3** | | | | **-** | | **-** | | |
| **Revision, Mid-Term Exam** | | | | | **3** | | | | **-** | | **-** | | |
| **Numerical methods for constrained optimization problems (2)** | | | | | **3** | | | | **-** | | **-** | | |
| **Calculus of variation (1)** | | | | | **3** | | | | **-** | | **-** | | |
| **Calculus of variation (2)** | | | | | **3** | | | | **-** | | **-** | | |
| **Optimal control problems** | | | | | **3** | | | | **-** | | **-** | | |
| **Pontriagen's maximums principals** | | | | | **3** | | | | **-** | | **-** | | |
| **Bellman's dynamic programming.** | | | | | **3** | | | | **-** | | **-** | | |
| **Revision** | | | | | **3** | | | | **-** | | **-** | | |
| **Total hours** | | | | | **42** | | | | **-** | | **-** | | |
| **4 - Teaching and Learning methods:** | | | | | | | | | | | | | |
| **Intended Learning Outcomes** | | | | | | | **Lecture** | **Presentations & Movies** | | **Discussions & Seminars** | | **Problem solving** | **Brain storming** | |
| **Knowledge & Understanding** | **a1-** | **Identify of the Formulation of classical optimization techniques** | | | | | **🗸** |  | |  | | **🗸** |  | |
| **a2-** | **Know the numerical methods for unconstrained optimization problems.** | | | | | **🗸** | **🗸** | |  | | **🗸** |  | |
| **a3-** | **Explain how to use control problems.** | | | | | **🗸** |  | | **🗸** | | **🗸** | **🗸** | |
| **Intellectual Skills** | **b1** | **Solve unconstrained optimization problems.** | | | | | **🗸** | **🗸** | |  | | **🗸** |  | |
| **b2** | **Apply numerical methods to unconstrained optimization problems.** | | | | | **🗸** |  | |  | | **🗸** | **🗸** | |
| **b3** | **Conform how to use control problems.**  **.** | | | | | **🗸** |  | |  | | **🗸** |  | |
| **Practical and professional skills** | **c1** | **Investigate the Matlab software package in solving some problems.** | | | | | **🗸** |  | | **🗸** | | **🗸** |  | |
| **c2** | **Show model building and problem solving skills.** | | | | | **🗸** |  | |  | | **🗸** | **🗸** | |
| **c3** | **Examine the operational procedures to solve Optimal control problems** | | | | | **🗸** | **🗸** | |  | | **🗸** |  | |
| **General Skills** | **d1** | **Working in groups** | | | | | **🗸** |  | |  | | **🗸** | **🗸** | |
| **d2** | **Community linked thinking (Self-learning).** | | | | | **🗸** |  | |  | | **🗸** |  | |
| **d3** | **using the internet to obtain subject specific information** | | | | | **🗸** |  | | **🗸** | | **🗸** |  | |
| **d4** | **time Management.** | | | | | **🗸** | **🗸** | |  | | **🗸** | **🗸** | |

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| **5- Students’ Assessment Methods and Grading:** | | | |
| **Tools:** | **To Measure** | **Time schedule** | **Grading** |
| **Mid-Term Exam** | **a1, a2, b1, b2, c1, c3** | **Week 7** | **10 %** |
| **Oral exam** | **a1, a2, b1, b2, d1, d2,d3** | **Week 15** | **10 %** |
| **Practical exams** | - | - | - |
| **Written exam** | **a1, a3, c1, c2, d1,b3,d4** | **Start of 16th week** | **80 %** |
| **Total** | | | **100 %** |

**6- Course Matrix**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Topic** | | | | **Knowledge & Understanding** | | | | | **Intellectual Skills** | | | **Practical and professional skills** | | | **General Skills** | | | | | |
| **a1** | | **a2** | **a3** |  | **b1** | **b2** | **b3** | **c1** | **c2** | **c3** | **d1** | **d2** | | **d3** | | **d4** |
| **Introduction** | | | | **X** | |  |  |  | **x** |  |  | **x** |  |  |  | **x** | |  | |  |
| **Classical optimization techniques (1)** | | | |  | | **x** |  | |  | **x** |  |  | **x** |  |  |  | |  | | **X** |
| **Classical optimization techniques (2)** | | | |  | | **x** |  | | **x** |  | **x** |  |  |  | **x** |  | | **x** | |  |
| **Numerical methods for unconstrained optimization problems (1)** | | | |  | |  |  |  |  | **x** |  | **x** |  |  |  |  | |  | |  |
| **Numerical methods for unconstrained optimization problems (2)** | | | |  | |  |  | | **x** |  |  | **x** |  |  |  |  | |  | | **X** |
| **Numerical methods for constrained optimization problems (1)** | | | |  | | **x** |  | |  | **x** |  | **x** |  |  |  | **x** | |  | |  |
| **Revision, Mid-Term Exam** | | | |  | |  |  |  |  |  |  |  | **x** |  |  |  | |  | | **X** |
| **Numerical methods for constrained optimization problems (2)** | | | |  | |  |  |  |  | **x** |  |  | **x** |  |  | **x** | |  | |  |
| **Calculus of variation (1)** | | | | **X** | |  |  | |  |  |  | **x** |  |  | **x** |  | |  | |  |
| **Calculus of variation (2)** | | | |  | | **x** |  | |  |  |  | **x** |  |  |  |  | |  | | **X** |
| **Optimal control problems** | | | |  | |  |  |  |  | **x** |  |  |  |  |  | **x** | |  | |  |
| **Pontriagen's maximums principals** | | | |  | | **x** |  |  | **x** |  |  |  |  | **x** |  |  | | **x** | |  |
| **Bellman's dynamic programming.** | | | |  | |  | **x** |  |  |  | **x** |  |  |  |  |  | |  | | **X** |
| **Revision** | | | | **X** | |  |  |  |  | **x** |  |  | **x** |  |  |  | | **x** | |  |
| **7- List of references**  **7-1 Course notes**  **-Notes were approved by the Math Department.**   * 1. **Required books.**   - **Joeseph McKean and Allen T Craig , Introduce to the probability theory, (2001)**  **7-3 Recommended books.**  **- W.D.McGlinn, "Introduction to probability theory ", John. Hopkins Univ. Press, (2003).**  **7-4 Periodicals, Web sites, etc.**  **1-**[**https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf**](https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf)  **2-http://www4.ncsu.edu/~rsmith/MA797V\_S10/Statistics.pdf** | | | | | | | | | | | | | | | | | |
| **8- Facilities required for teaching and learning:**  **1-Data show**  **2-white board** | | | | | | | | | | | | | | | | |
|  |  | | | | | | | | | | | | | | | |
| **Course coordinator:** | | | | | **Dr. Mohamed Rabee** | | | | | | | | | | | |
| **Head of the Department:** | | | | | **Prof. Dr.**   **Reda Gamal Abd El Rahman** | | | | | | | | | | | |
| **Date: 9 / 12 /2019** | | | | | **updated 2020/2021** | | | | | | | | | | | |

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| **Course Specification** | | | | |
| **A- Affiliation** | | | | |
| **Relevant program:** | | **Computer Science** | | |
| **Department offering the program:** | | | **Mathematics** | |
| **Department offering the course:** | | | **Mathematics** | |
| **Academic year/level:** | | | **Fourth level / Second Semester** | |
| **Date of specifications approval:** | | | **9 /12 / 2019, No. (390) and updated 2020/2021 meeting no.( 419).** | |
| ***B - Basic information*** | | | | |
| **Title: Scientific Computation (2)** | | | **Code:**  **462MC** | **Year/level:**  **Fourth level / Second Semester** |
| **Teaching Hours: 42 h** | | | **Lectures:**  **2h/week** | **Tutorial: ــــ** |
|  |  | | **Practical: 2h/week** | **Total:** **3 h/week** |
| ***C - Professional information***  **1 – Course Learning Objectives:** | | | | |
| **At the end of this course, the students must be able to:**  **Give students a detailed description of the concepts of symbolic algorithms. Provide students with up-to-date knowledge on some methods and techniques. Make students familiar with some software packages and toolkits used to implement the methods mentioned above into practiced in scientific computing.**   |  | | --- | |  | | | | | |
| **2 - Intended Learning Outcomes (ILOS)**  **a - Knowledge and understanding:**  **At the end of this course, the students must be able to:**  **a1.Identify the main methods of non-numerical analysis of functions and processes.**  **a2. Know using the modern algorithms for searching information in targeted areas**  **a3. Use symbolic software packages to perform engineering and science computations.** | | | | |
| **b - Intellectual skills:**  **At the end of this course, the students must be able to:**  **b1 solve programming and computing system.**  **b2. Formulate about program correctness and algorithm complexity.**  **b3. Solve mathematics to describe and model applications, to identify appropriate solution methods, and to interpret and analyze results.** | | | | |
| **c - Practical and professional skills:**  **At the end of this course, the students must be able to:**  **c1. collect varying levels of complexity using a number of different programming languages.**  **c2. Examine computing and mathematical problems and devise solutions to them**.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  | | | | | | | | | |  |  |  |  |  |  |  |  |  | | | | | |
| **d - General skills:**  **At the end of this course, the students must be able to**  **d1. Communication with others effectively by presenting complex information by computer presentations and in written reports.**  **d2. Computing Program in the major computer programming paradigms.**  **d3. Using the internet effectively, respecting professional conduct and professional ethics.** | | | | |

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| --- | --- | --- | --- |
| 3 – Contents | | | |
| **Topic** | **Lecture hours** | **Tutorial hours** | **Practical hours** |
| **Introduction** | **2** | - | **2** |
| **Number theoretic algorithms** | **2** | - | **2** |
| **Fast algorithms for multiplication of numbers and polynomials** | **2** | - | **2** |
| **Modern algorithms for sorting, searching and retrieving information** | **2** | - | **2** |
| **Symbolic integration** | **2** | - | **2** |
| **Fast factorization of polynomials** | **2** | - | **2** |
| **Algorithmically solvable and unsolvable problems.** | **2** | - | **2** |
| **Revision and midterm exam** | **2** | - | **2** |
| **Quantifier elimination and applications to stability analysis** | **2** | - | **2** |
| **Quantifier elimination and applications control theory** | **2** | - | **2** |
| **Symbolic solution of differential equations** | **2** | - | **2** |
| **Discrete Cosine Transform** | **2** | - | **2** |
| **Discrete Wavelets Transform** | **2** | - | **2** |
| **Oral exam** | **2** | - | **2** |
| **Total hours** | **28** | - | **28** |

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| **4 - Teaching and Learning methods:** | | | | | | | | |
| **Intended Learning Outcomes** | | | **Lecture** | **Presentations & Movies** | **Discussions & Seminars** | **Practical** | **Problem solving** | **Brainstorming** |
| **knowledge &Understanding** | **a1** | **Identify the main methods of non-numerical analysis of functions and processes.** | **🗸** |  | **🗸** | **🗸** |  | **🗸** |
| **a2** | **Know using the modern algorithms for searching information in targeted areas** | **🗸** |  |  |  |  |  |
| **a3** | **Use symbolic software packages to perform engineering and science computations.** | **🗸** |  |  | **🗸** |  |  |
| **Intellectual Skills** | **b1** | **Solve and formally specify and solve programming and computing system.** | **🗸** |  |  |  | **🗸** | **🗸** |
| **b2** | **Formulate about program correctness and algorithm complexity.** |  | **🗸** |  | **🗸** |  |  |
| **b3** | **Solve mathematics to describe and model applications, to identify appropriate solution methods, and to interpret and analyze results.** |  | **🗸** |  |  | **🗸** |  |
| **Practical and professional skills** |  | **Collect programs of varying levels of complexity using a number of different programming languages.** | **🗸** | **🗸** | **🗸** | **🗸** | **🗸** |  |
|  | **Examine computing and mathematical problems and devise solutions to them**. | **🗸** | **🗸** | **🗸** |  | **🗸** |  |
| **General Skills** | **d1** | **Communication with others effectively by presenting complex information by computer presentations and in written reports.** |  | **🗸** |  | **🗸** | **🗸** |  |
| **d2** | **Computing Program in the major computer programming paradigms.** | **🗸** |  |  | **🗸** |  | **🗸** |
| **d3** | **Using the internet effectively, respecting professional conduct and professional ethics.** |  | **🗸** |  |  | **🗸** |  |

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| **5- Students’ Assessment Methods and Grading:** | | | | | | | |
| **Tools:** | | **To Measure** | | **Time schedule** | | **Grading** | |
| **Mid-Term Exam** | | **b1 ,b3** | | **Week 7** | | **14 %** | |
| **Oral exam** | | **a2,d1 ,d2,b2,d3** | | **Week 15** | | **14 %** | |
| **Practical exams** | | **c2,a1,d2,d3** | | **Week 15** | | **24 %** | |
| **Written exam** | | **b1,a3,c1** | | **Start of 16th week** | | **48 %** | |
| **Total** | | | | | | **100 %** | |
| **6-Course Matrix**   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Topic** | **Knowledge and understanding** | | | **Intellectual skills** | | | **Practical and professional skills** | | **General Skills** | | | | | **a1** | **a2** | **a3** | **b1** | **b2** | **b3** | **c1** | **c2** | **d1** | **d2** | **d3** | | | **Introduction** |  |  |  |  |  | **x** |  |  |  |  | | **x** | | **Number theoretic algorithms** | **x** |  |  |  |  |  |  |  |  |  | |  | | **Fast algorithms for multiplication of numbers and polynomials** |  |  | **x** |  |  |  |  |  | **X** |  | |  | | **Modern algorithms for sorting, searching and retrieving information** |  | **X** |  |  | **x** |  |  | **x** |  | **X** | |  | | **Symbolic integration** | **x** |  |  |  |  |  | **x** |  |  |  | |  | | **Fast factorization of polynomials** |  |  |  | **x** |  |  |  |  |  |  | |  | | **Algorithmically solvable and unsolvable problems.** | **x** |  | **x** |  |  |  |  |  |  |  | | **x** | | **Revision and midterm exam** |  | **X** |  |  |  | **x** | **x** |  |  | **X** | |  | | **Quantifier elimination and applications to stability analysis** | **x** |  | **x** |  |  |  |  |  |  | **X** | |  | | **Quantifier elimination and applications control theory** |  |  |  |  | **x** |  |  | **x** | **x** |  | |  | | **Symbolic solution of differential equations** | **x** |  | **x** |  | **x** |  | **x** |  |  |  | | **x** | | **Discrete Cosine Transform** |  | **X** |  |  |  |  |  |  | **x** |  | |  | | **Discrete Wavelets Transform** | **X** |  |  | **x** |  |  |  |  |  |  | |  | | **Oral exam** | **X** |  |  |  |  |  |  | **x** |  | **X** | |  | | | | | | | | |
| **7- List of references:**  **7-1 Course notes**   * **Notes were approved by Math. Department.**   1. **Required books.** * **Burden, R. L., and Faires, J. D., Numerical Analysis, Sixth Edition, Brooks/Cole Publishing Company, 1997, p. 1005.**   **7-3 Recommended books.**   * **Gerald, C. F., and Wheatley, P. O., Applied Numerical Analysis, Fourth Edition, Addison-Wesley Publishing Company, 1989.**   **7-4 Periodicals, Web sites, etc.**   * **http://www5.in.tum.de/lehre/vorlesungen/sci\_comp/ws04/TUTORIAL/** * **http://www.mathworks.com/discovery/scientific-computing.html** | | | | | | | |
| **8- Facilities required for teaching and learning:**   * **Data Show Device** * **Whiteboard** | | | | | |
|  | | | | | |
| **Course coordinator:** | | | | **Dr. Gamal Ahmed** | |
| **Head of the Department:** | | | | **Prof. Dr. Reda Gamal Abd El Rahman** | |
| **Date: 9 / 12 /2019** | | | | **Updated 2020/2021** | |



Appendix 7

Computer Science Program Course ILOs’ Matrix



Appendix 8

Examination Systems

**Examination Systems**

The exam is evaluated each courses at 100 degrees and distributed degrees and it can be organized as follows:

1. Courses which did not include the part "practical"
   1. Midterm Exam (10%)  
      (MCQ – Supplying-True or False – Solving Problems-Stating and Proofs)
   2. Final Oral Exam (10%)  
      (Discussing some topics)
   3. Final Term Examination (80%)  
      (MCQ – Supplying-True or False – Solving Problems-Stating and Proofs)
2. Courses which include part "practical"
   1. Midterm Exam (14%)  
      (MCQ – Supplying-True or False – Solving Problems-Stating and Proofs)
   2. Final Oral Exam (14%)  
      (Discussing some topic)
   3. Final Practical Examination (24%)  
      (Solving problems by using Implementation-Doing some tasks)
   4. Final Term Examination (48%)  
      (MCQ – Supplying-True or False – Solving Problems-Stating and Proofs)