Course contents

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| **Course code & name** | **Level** |
| **Com 201 Computer programming** | **2** |
| The aim of this course is to introduce students to more complex data structures and their uses, including sequential files, arrays and classes. Students will learn to create more powerful programs within specific programming language. Python or R as an examples |  |
| **Sta 203 Biostatistics** | **2** |
| The aim of this course is to study the types of statistics, population versus sample, mean, median, mode, variance, standard deviational, and coefficient of variation, and to give students basic knowledge of some standard probability distributions; random variable, frequency distribution, sampling distribution and estimation of population parameters. The course also trains students to implement statistical hypotheses and put them to the test, implement tests of significance, and perform analysis of variance as well as regression and correlation to biological studies. |  |
| **Bio 205 Cell Biology** | **2** |
| The aim of this course is to clearly identify cell organelles in terms of both their histological structure and function, provide an overview of the  specialization of cells into tissues and organs within the animal body, with special focus on nervous tissue as the illustrated example. |  |
| **Zoo 207 Genetics** | **2** |
| This course aims to provide a deep understanding about different aspects of genetics, through in-depth studies on Mendelian Genetics, mutations and. Moreover, to provide students with important and essential skills like constructing family pedigree, karyotyping and genetic counseling. |  |
| **Bio 202 Scientific editing for Biology** | **2** |
| The course provides the basic scientific writing skills to prepare other professional materials for presentation or publication and writing scientific articles and thesis. |  |
| **Mic204 Microbiology** | **2** |
| This course aims to give a sound foundation to the students by classifying the various types of microorganisms, the structure,  morphology, and components of the microbial cell. The course clarifies the different environmental and chemical factors affecting the microbial |  |

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| growth and relates how microorganism maintains itself in a balanced state in the biosphere. The course provides a strong practical element, with an emphasis on developing the skills needed in a laboratory and  gaining hands-on experience of diagnostic techniques. |  |
| **Zoo206 Cell and Tissue Culture** | **2** |
| The aim of this course is to introduce the concepts of cell and tissue culture to the students, and to teach the basic knowledge and skills essential to the successful cultivation of cells and tissues. The course also aims at exploring development phenomena in tissue culture cells. |  |
| **BCh 208 Biochemistry** | **2** |
| The course introduces students to the principles of Biochemistry and will cover subjects including solutions and blood buffers, carbohydrates, fats, proteins and enzymes. Moreover, the course will provide the students with important and essential skills like the detection of carbohydrates and proteins and understanding some of their reactions. The course also covers a detailed description of the main metabolic pathways which occur in the body and using this information to understand and explain the relationship between their deregulation and different diseases. Additionally, the course gives students a solid basis for understanding how these metabolic pathways are interconnected and how deregulation represents an important aspect for  pathological phenomena. |  |
| **Zoo 303 Genomics** | **3** |
| The aim of this course is to provide students with a good basic foundation in the molecular structure, organization, and function of the genetic material in different organisms, the ability to distinguish between different types of molecular markers, and to critically appraise  the different methods used in molecular mapping, genome sequencing. |  |
| **Zoo305 Immunology** | **3** |
| The aim of this course is to provide sufficient knowledge about the types  of Immunity and the differences between them (Innate and Acquired Immunities) and to highlight the differences between cellular and |  |

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| humoral immunity. The course also aims at explaining the immune response to different types of antigens as well as illustrating the function of different immunoglobulins. The course clearly covers knowledge regarding the complement system, hypersensitivity and autoimmunity and clarifies the different applications of Immunoinformatics |  |
| **Zoo 307 Physiology (structure and metabolism)** | **3** |
| The aim of this course is to provide the student with the knowledge about normal structure, and function of the body and each of its major systems. Explain the physiological mechanisms involved. |  |
| **Bio 309 Biotechnology management** | **3** |
| The aim of this course is to enable students to gain understanding of major decisions faced by managers to balance organization’s objectives with the needs and opportunities of global marketplace. It allows the students to relate theory to practice through the use of individual or group project throughout the course. Additionally, it helps the students to perform a market analysis of a particular biotechnological product. Also, it gives the students an understanding of critical issues in marketing and equip them with concepts and models relevant to those issues. The course allows the students to acquire an understanding of basic marketing concepts; such as product innovation, product launch,  and marketing mix. |  |
| **Zoo302 Proteomics** | **3** |
| The course covers study of proteins, particularly their function and structure, studying changes in metabolism in response to different stress conditions. Focusing on different types of techniques for the analysis of expressed proteins. The techniques include gel electrophoresis, MALDI-TOF/MS etc. The analysis of novel proteins and their role in disease maintenance and treatment and the applicative perspective of proteomics in the fields of biotechnology and biomedical. |  |
| **Zoo304 Molecular Biology** | **3** |
| This course introduces the students to the prokaryotic and eukaryotic gene structure, expression, regulation and analysis. The course provides in-depth studies covering various molecular tools and techniques such as restriction enzymes digestion, PCR methods, gene cloning, molecular markers and transcriptomics in addition to their applications. |  |

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| **Zoo306 Cancer Biology** | **3** |
| This course aims at introducing the students to detailed description of the molecular basis of cancer and the mechanisms which lead to the initiation and progression of cancer as a serious disease. To this end, hall marks of cancer and the underlying mechanisms are covered in this course. Additionally, the course aims to link this information to how specific cancer drugs are designed based on the important and key alterations studied throughout the course. |  |
| **Zoo 401 Bioinformatics** | **4** |
| The aim of the course is to increase the awareness of the students regarding the importance of Bioinformatics as a rapidly growing field of biotechnology. This course aims to provide knowledge on the different computer methods used to analyze the huge amount of information that is being gathered about human gene sequences and genetic diseases. The course also emphasizes the integration of basic and applied research in human, plant and microorganism gene mapping and molecular cloning. |  |
| **Mic403 Fermintation Technology** | **4** |
| This course aims to give the students the ability to understand the physiology, metabolism and the growth of microorganisms that are important to various industries, figure out how to control microbial growth in industrial production process and illustrate the role of microorganisms in production of primary and secondary metabolites as desired products. The course gives examples about different Industrial fermentation processes (Foods & Drugs), demonstrating the whole steps that are taken in appraising the limitations & importance of these industries. |  |
| **Zoo407 Instrumentaion Technology** | **4** |
| This course provides hands-on the basic and essential instrumentation skills required in chemistry, molecular biology and biotechnology. Students will learn the basics of laboratory safety, aseptic technique, measurements and calculations and preparation of solutions/samples. This knowledge will then be applied to advanced instrumentation utilizing spectrophotometers, centrifuges, thermal cyclers, automated DNA sequencing, western blotting, GC/MS, HPLC, and bioreactors. Students will also gain a well-rounded understanding of the maintenance of these various instruments, from ordering supplies to requesting technical support and daily/monthly maintenance. |  |

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| **Zoo402 Genomic analysis** | **4** |
| This course will assess the relationships among sequence, structure, and function in complex biological networks as well as progress in realistic modeling of quantitative, comprehensive, functional genomics analyses. Exercises will include databases, and simulation approaches and practical applications to medicine, biotechnology, drug discovery, and genetic engineering. Future opportunities and current limitations will be critically addressed. In addition to the regular lecture sessions, supplementary sections are scheduled to address issues related to Perl, Mathematica and biology. |  |
| **Zoo404\_Epignetics** | **4** |
| The aim of Epigenetics course is to understand DNA methylation, chromatin, histone code, position effect, gene regulation, epigenetic variation, epimutation, imprinting, gene silencing, RNAi, ncRNA, biomarker, therapy, high throuput Drug-RNA sequencing. |  |
| **Zoo406 Research and Seminar** | **4** |
| This course aims to give the students the ability to demonstrate in depth knowledge of a topic of interest related to education with guidance from an academic supervisor & the course develop the students understanding of the critical role of the literature review within the research process moreover the course provides the basic scientific writing skills will be gained from the course to prepare other professional materials for presentation or publication. |  |
| **Zoo405 Stem cell biology** | **4** |
| In this course, embryonic and adult stem cells in different organisms are examined in terms of their molecular, cellular, and potential therapeutic properties. Genetic reprogramming and cloning of animals are critically evaluated. Additionally, exploring the underlying biology specifically analyzing the mechanisms that enable a single genome to encode multiple cell states ranging from neurons to fibroblasts to T cells. Study new developments in the area of pluripotency, cellular reprogramming and differentiation. The course will also consider the potential consequences and limitations of stem cell therapy, particularly the connection between stem cells and cancer. |  |
| **Zoo301 DNA Forensics** | **3** |
| This course focuses on the molecular biology technique of DNA fingerprinting: what it is, how it works, and how the data from these experiments are used for paternity testing and forensics? Technique of gel electrophoresis, analyzing the lengths of their DNA is considered. |  |
| **Zoo308 Marine Biotechnology** | **3** |
| Focusing on Marine natural products, Marine organisms (an alternative source of potentiality valuable natural products), Pharmaceuticals from marine organisms (anti-cancer, diagnostic and therapeutic, bioadhesives and thermostable enzymes) and biomedical and biotechnological applications. |  |
| **Zoo409 Medical Biotechnology** | **3** |
| Studying molecular diagnostic tests for genetic disorders and wildlife forensics. It also includes ideas about drug discovery, drug repurposing, vaccine development, diagnostics, nutrition and nanomaterial development. |  |