Course ID	Course Title	Credits
BIO103	Biology I	3
BIO210	Advanced Biology	3
CHE101	General Chemistry	3

Master of Science in Biotechnology

Biotechnology is a rapidly expanding cutting-edge scientific discipline with new discoveries and often life-saving products at a breathtaking pace. This industry, a merger of science and business, demands a multi-disciplinary workforce skilled in basic-research, product development, regulatory affairs and commercialization.

The Biotechnology industry harnesses advances in molecular biology, genomics, and proteomics to move discoveries and ideas out of the laboratory and into the product development pipeline. Students in the Master of Science in Biotechnology program learn to advance their careers by broadening their skill base and understanding of this dynamic field.

The Master of Science in Biotechnology is grounded in Biochemistry and Cell Biology. With this foundation in science, students continue with studies in the areas of pure science, applied science, lab science, regulatory affairs and biotechnology business. The curriculum is designed so that graduates can participate fully in research; lead lab teams, help to make development and planning decisions, create and apply research modalities to larger schemes set in large research projects. Also, managers and marketers, lawyers and liaisons, all are able to bridge the worlds between their roles and the scientists in their organization, allowing for effective communications and decision making.

The Master of Science in Biotechnology courses and curriculum, presented here, has been developed in consultation with the present courses and curriculum of similar programs at Harvard University, Johns Hopkins University and Vanderbilt University, USA.

Course Structure:

Foundation courses	12 Credits
Core courses	12 Credits
Elective courses	12 Credits
Total	36 Credits

Thesis and Non-thesis: Students taking course BBT701 (6 credits), Research in Biotechnology will be on thesis group; others not taking BBT701 will be on non-thesis group. The Non-thesis group graduate students have to take two more theory courses (3+3=6 credits).

Requirements for Master of Science degree in Biotechnology

Foundation courses (4 Courses)

Course ID	Course Title	Credits
BBT 601	Biochemistry	3
BBT 608	Advanced Biochemistry & Molecular Biology	3
BBT 615	Advanced Cell Biology	3
BBT 622	Microbiology	3
Credits for foundation courses		12

Core courses (4 Courses)

Course ID	Course Title	Credits
BBT 630	Principles of Immunology	3

BBT 638	Virology	3
BBT 645	Plant Biotechnology	3
BBT 652	Industrial Microbiology	3
BBT 671	Bioinformatics	3
BBT 685	Biostatistics	3
BBT 695	Pharmaceutical Biotechnology	3
BBT 630	Principles of Immunology	3
Credits for core courses		36

Elective courses (3 or 4 Courses)

Course ID	Course Title	Credits
BBT 659	Genes & Disease	3
BBT 678	Practical Computer Concepts for Bioinformatics	3
BBT 701	Research in Biotechnology	6
BBT 708	Economic Aspects of Biotechnology	3
BBT 713	Managing Biotechnology Professionals	3
BBT 721	Marketing Aspects of Biotechnology	3
BBT 731	Managerial Finance for Biotechnology	3
BBT 741	Introduction to CGMP Compliance	3
BBT 751	QA/QC for the Pharmaceutical & Biotechnology Industries	3
BBT 760	Ethical, Legal, & Regulatory Aspects of the Biotechnology Enterprise	3
BBT 773	Biology of HIV & AIDS	3
BBT 781	Protein Bioinformatics	3
BBT 785	Methods in Proteomics	3
BBT 791	Genomics	3
	Credits for elective courses	12
	Total Semister credit Hours	36

Department of Public Health

Master of Public Health (MPH)

The Department of Public Health follows as American model for active, student-directed learning, problem solving, and the acquisition of skills essential to the practice of public health. Each faculty member has Ph.D or MPH/MS, MBBS from reputable university. The department of Public Health offers Master of Public Health (MPH) having concentration in the area of Epidemiology, Reproductive and Child Health, Hospital and Health Services Management, Public Health Nutrition and Environmental Health.

The primary educational objective of the department is to develop managers and leaders in the public health sectors of the 21st century. It is a flexible and career oriented program designed to meet the needs of the professional in the health sector. The program is suitable for MBBS or BDS graduates, registered nurses, and graduates in social sciences, anthropology and psychology with working experience in health sectors. Classes are held mainly on Friday (8.00 am- 9.00 pm) along with five days a week (Sun-Thurs) in the evening (6.00pm- 9.00 pm) allowing even full time professionals to attend.

diseases in a global context. 3 Credits

BBT408 Oncology and Virology : This course is divided into two sections. The oncology section gives the epidemiology, molecular biology, Metastasis: Pathways and mechanism; and Carcinogenic agents and their cellular interactions and immunology of cancer. Types of cancers, their advanced diagnosis and treatments are covered. The virology section introduces an overview of virology that includes the nomenclature and taxonomy, structure and propagation, effect of animal viruses on host cell, pathogenesis, prevention and control of viral infection. 3 Credits

BBT410 Neurochemistry: This Neurochemistry course provides a broad introduction to the mammalian nervous system with a particular focus on the structure and function of the human brain. Neurons have a special cellular chemistry related to their ability to send and receive chemical signals. The course comprises the biochemistry of the nervous system; neurotransmitter synthesis and metabolic mechanisms at the synapse, release and re-uptake/degradation of classical neurotransmitters and peptide transmitters. Receptors for neurotransmitters and their ligands will be described from a chemical-pharmacological point of view and the relevance of these molecules and their interactions for development of tolerance, super-sensitivity and long-term potentiation will be discussed. Different chemical signalling pathways and their connections to developmental malfunctions will also be included in this course. This advanced-level undergraduate course put emphasis on human neurological diseases that includes the basic knowledge of neurobiology, molecular biology, biochemistry, and cell biology. After completion of this course, the students will have sufficient knowledge about cellular and molecular neuroscience. 3 Credits

BBT412 Biochemistry of Drugs: This course is designed to give a detailed knowledge on prescription and non-prescription drugs which include broad classification and features of drugs with specific examples. Pharmacokinetics, molecular mechanism of drug action, drug design, drug targeting and pharmacogenomics are included. 3 Credits

BBT450 Laboratory IV: Molecular Diagnostics: The principal aim of this course is to introduce the students modern techniques of molecular biology used in clinical diagnosis. The course will emphasise the importance on molecular diagnostic and clinical applications in light of the process of diagnosis and the diagnostic importance of pathology and genetics. 4 Credits

BBT490 Viva-Voce: Students will face viva before the viva board and answer comprehensive questions on the entire 4 year syllabus of studies. They will also be tested on their ability to answer analytical case study questions. Additionally they are tested on their ability to relate information from various aspects of Biochemistry. 2 Credits

BBT499 Project : Every student will be required to participate in a project related to biochemistry and biotechnology under the supervision of an advisor, approved by the chairman. They will write a thesis paper on their work, present it before a large audience and answer questions regarding their work. 3 Credits.

BBT601 Biochemistry:This course explores the roles of essential biological molecules including proteins, lipids, and carbohydrates, with an introduction to nucleic acids. Students examine the structure of proteins, their function, the methodologies for the purification and characterization of proteins, and the alteration of protein function through protein engineering. Enzymes and their kinetics and mechanisms are covered in detail. This course provides the linkage between the inanimate world of chemistry and the living world of biology. 3 Credits

BBT608 Advanced Biochemistry and Molecular Biology : This course focuses on intermediary metabolism and the role carbohydrates and lipids play in cell function. In addition, students examine nucleic acid structure and function and investigate the tools used in recombinant DNA technology. Specific topics include glycolysis, Kreb's cycle, oxidative phosphorylation; and DNA replication, transcription, translation, gene regulation, targeted expression of desired genes in plants and animals and post-transcriptional gene silencing like RNA interference RNAi). Prerequisite: BBT 601 Biochemistry. 3 Credits

BBT615 Advanced Cell Biology : This course covers cell organization and subcellular structure. Students examine the evolution of the cell, chromosome and plasma membrane structures and behaviours, mechanics of cell division, sites of macromolecular synthesis and processing, transport across cell membranes, cell dynamics, organelle biogenesis, and cell specialization. Students also are introduced to the experimental techniques used in cell biology to study cell growth, manipulation, and evaluation. Prerequisite: BBT 601 Biochemistry. 3 Credits

BBT622 Microbiology: This course is an overview of microorganisms important in clinical diseases and biotechnology. Students are introduced to the general concepts concerning the morphology, genetics, and reproduction of these microbial agents. Lectures focus on individual organisms with emphasis on infectious diseases, biotechnology applications, molecular and biochemical characteristics, and molecular and serological identification methods. Students will also discuss the impact biotechnology, and particularly genomics, will have on the development of antibiotics and vaccines as treatment and preventative measures. 3 Credits

BBT630 Principles of Immunology : This course covers molecular and cellular immunology, including antigen and antibody structure and function, effector mechanisms, complement, major histocompatibility complexes, B- and T-cell receptors, antibody formation and immunity, cytotoxic responses, and regulation of the immune response. Students are also introduced to the applied aspects of immunology, which include immunoassay design, various formats and detection methods, and flow cytometry. Special topics include immunomodulation, immunosuppression, immunotherapy, autoimmunity, and vaccination. Prerequisites: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology; BBT 615: Cell Biology I. 3 Credits

BBT638 Virology: This series of lectures and discussions emphasizes fundamental principles related to the interaction of animal viruses with host cells. General topics include chemical and physical properties of viruses, virus classification, cultivation and assay of viruses, molecular events during viral replication and morphogenesis, persistent infections, viruses as the cause of neoplasia, and other subjects. Viruses are "entities" studied by some microbiologists. They are fascinating because although they are acellular and cannot be considered as "true living" organisms, they cannot be considered as "non living" either…or are they? Some biologist would say that viruses are simply selfish pieces of nucleic acids, which had managed to be propagated by all kinds of organisms. One thing is true, with their amazing diversity it is not surprising to find that there at least one virus for just about each living organism that inhabits this planet cockroaches appear to be the exception so far). In this course with will cover the basics of virus structure, biochemistry, replication, pathogenesis and diversity. Prerequisite: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology and BBT 615: Advanced Cell Biology I. 3 Credits

BBT645 Plant Biotechnology: In this course, students are introduced to the application of recombinant DNA technology to agriculture. Studied are methods for the introduction of foreign DNA into plant and animal cells and generation of stably transformed plants and animals. Students

consider specific examples of the use of transgenic plants and animals in biotechnology, which can provide protection against insects, diseases, and tolerance to specific herbicides. They also investigate how recombinant growth hormones can result in leaner meat, greater milk yield, better feed utilization, how transgenic plants and animals can serve as bioreactors for the production of medicinal or protein pharmaceuticals, methods of introducing foreign genes to plants, inducible control of gene expression, and use of different/suitable promoters for tissue specific expression. Because recombinant agricultural products are released into the environment or consumed as foods, students also need to become familiar with environmental safety issues. Prerequisites: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology; BBT 615: Advanced Cell Biology I 3 Credits

BBT652 Industrial Microbiology :Industrial microbiology is primarily associated with the commercial exploitation of microorganisms, and involves processes and products that are of major economic, environmental and social importance throughout the world. One of the major aspects of industrial microbiology is related to production of valuable microbial products via fermentation processes. These include traditional fermented foods and beverages, such as bread, beer, cheese and wine, which have been produced for thousands of years. In addition, over the last hundred years or so, microorganisms have been further employed in the production of numerous chemical feedstocks, energy sources, enzymes, food ingredients and pharmaceuticals. This course is intended to be an introduction to industrial microbiology to masters students on a range of applied biology, microbiology, biochemistry, biotechnology, food science and chemical engineering courses. This course will provide an overview of industrial microbiology/biotechnology as an applied biological science. At the end of this subject, students will appreciate the breadth of industrial microbiology, and be able to discuss broadly the use of microorganisms in these areas. They should be able to discuss how different types of industry may obtain, handle, and maintain microorganisms. Fermenters will be considered as a major part of this subject. Students will be able to utilise the basic principles behind the operation of batch and continuous fermenters; discuss the differences between industrial processes that are purely chemical processes and those that are microbiological, and discuss the different uses of batch and continuous fermentation for different industrial purposes. They will be aware of the different methods of genetic improvement that have been used to modify microorganisms for different fermentations. They will learn examples of the modification of chemical compounds in microbial processes. Prerequisites: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology; BBT 615: Advanced Cell Biology I. 3 Credits

BBT659 Genes and Disease: Because of recent advances, powerful diagnostic tests now detect genetic diseases, and there is promise of gene replacement therapy. In this course students cover general genetic principles, DNA tools for genetic analysis, cytogenetics, gene mapping, the molecular basis of genetic diseases, animal models, immunogenetics, genetics of development, genetics of cancer, and treatment of genetic diseases. Molecular methods of analysis are emphasized. Prerequisites: All four-core courses. 3 Credits

BBT671 Bioinformatics: Retrieval and analysis of electronic information are essential in today's research environment. This course explores the theory and practice of biological database searching and analysis. In particular, students are introduced to integrated systems where a variety of data sources are connected through worldwide web access. Information retrieval as well as interpretation is discussed and many practical examples in a computer laboratory setting enable students to improve their data mining skills. Methods included in the course are searching the biomedical literature, sequence homology searching and multiple alignments, protein sequence motif analysis, and several genome analytical methods. Classes are held in a computer laboratory. Acquaintance with computers is required. Prerequisites: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology. 3 Credits

BBT678 Practical Computer Concepts for Bioinformatics : This course introduces students with a background in the life sciences to the basic computing concepts of the UNIX operating system, relational databases, structured programming, object-oriented programming, and the Internet. Included is an introduction to SQL and the Perl scripting language. The course emphasizes relevance to molecular biology and bio-informatics. It is intended for students with no computer programming background, but with a solid knowledge of molecular biology. Prerequisites: BBT 601: Biochemistry. BBT 608: Advanced Biochemistry and Molecular Biology. 3 Credits

BBT685 Biostatistics: This course introduces statistical concepts and analytical methods as applied to data encountered in biotechnology and biomedical sciences. It emphasizes the basic concepts of experimental design, quantitative analysis of data, and statistical inferences. Topics include probability theory and distributions; population parameters and their sample estimates; descriptive statistics for central tendency and dispersion; hypothesis testing and confidence intervals for means, variances, and proportions; the chi-square statistic; categorical data analysis; linear correlation and regression model; analysis of variance; and nonparametric methods. The course provides students a foundation to evaluate information critically to support research objectives and product claims and a better understanding of statistical design of experimental trials for biological products/devices. Prerequisites: Basic mathematics algebra); scientific calculator. 3 Credits

BBT695 Pharmaceutical Biotechnology: Pharmaceutical Biotechnology has a long tradition and is rooted in the last century, first exemplified by penicillin and streptomycin as low molecular weight biosynthetic compounds. Today, Pharmaceutical Biotechnology still has its fundamentals in fermentation and bioprocessing, but the paradigmatic change affected by biotechnology and pharmaceutical sciences has led to an updated definition. The biopharmaceutical industry has changed dramatically since the first recombinant protein Humulin) was approved for marketing in 1982. The range of resources required for the pharmaceutical industry has expanded from its traditional fields. Advances in the field of recombinant genetics allows scientists to routinely clone genes and create genetically modified organisms that can be used in industrial production processes. Also, specific therapeutic proteins can be synthesized in nonbiological ways, and recombinant proteins can be isolated from complex mixtures in commercially viable processes. Therapeutic proteins and the recently approved antisense oligonucleotides and recombinants antibodies represent new and innovative biotech drugs that are different from classical drugs in the development and production process. In this area, pharmaceutical companies are confronted with new challenges to develop new products and to apply new technologies. In this course, you will find updated facts and figures about the Biopharmaceuticals, and discussions of how biotechnology is applied in human and animal health care, and in industrial and environmental processes. Pharmaceutical Microbiology course consists of Ten Chapters: 1) Pharmaceuticals, Biologics and Biopharmaceuticals; 2) Antimicrobial Compounds; 3) Recombinant and Synthetic Vaccines; 4) Enzyme Therapeutics; 5) Recombinant Pharmaceuticals; 6) Monoclonal Antibodies and Recombinant Antibodies; and 7) Nucleic Acids as Therapeutic Agents. The text material essentially embodies not only an ample emphasis on the vivid coverage of fundamental principles of microbiology as a scientific discipline but also maintains a manageable length for the apprehension of brilliant students. 3 Credits

BBT701 Research in Biotechnology For thesis student: Students in the biotechnology program have the opportunity to enrol in an independent research course. This elective course is an option after a student has completed at least eight graduate-level courses and has compiled a strong academic record. Prior to proposing a project, interested students must have identified a

research topic and a mentor who is familiar with their prospective inquiry and who is willing to provide guidance and oversee the project. The research project must be independent of current work related responsibilities as determined by the project mentor. The mentor may be a faculty member teaching in the biotechnology program, a supervisor from the student's place of work, or any expert with appropriate credentials. Prerequisites: All foundation courses and two core courses. 6 Credits

BBT708 Economic Aspects of Biotechnology: This course examines the economic, business, and financial forces that define and shape the biotechnology industry, with special focus on early stage and growing companies. A major focus is on decision making under uncertainty, which includes how to interpret and screen various input types in the decision process and how to balance the empirical and intuitive approaches to odelling problems arising from the nature of the biotechnology business. The course will permit the student to prepare an analytic approach to complex problems, identify and assess risks and payoffs, evaluate risks and payoffs in monetary and non-monetary terms, develop a structure for strategy and tactics, and understand how and why people make the decisions they make. Topics include defining and distinguishing the biotechnology industry, competitive forces and impact on strategy, regulation of genetic products, planning under uncertainty, system thinking and system failure, the economic environment, estimating costs and benefits, strategic components, marketing and sales, research and development, and valuing a company. 3 Credits

BBT713 Managing Biotechnology Professionals: The roles of managers and leaders within biotechnology companies undergo constant change. Biotechnology managers must engage in new and innovative problem-solving strategies; lead a diverse and global workforce; develop partnerships with other businesses, customers, and competitors; manage horizontally and across teams; and utilize technology as a competitive advantage. The student is able to address current challenges in his/her own organization and learn methods of implementing change, such as negotiation techniques and motivation. The course includes in-depth discussions of leadership skills, communication, conflict resolution, and goal integration. Students research a biotechnology organization and odelli what is working and not working within the management systems and suggest alternatives. 3 Credits

BBT721 Marketing Aspects of Biotechnology : This course introduces students to the strategic and tactical approaches used in the marketing of biotechnological products and services. Students gain a thorough understanding of the research and planning necessary to develop a marketing plan, the relationship between the marketing and sales functions, the difference between marketing a scientific product and a scientific service, pricing strategies, distribution alternatives, communications, promotion, and the importance of perception. Knowledge of marketing terminology and techniques prove helpful to anyone in the industry. 3 Credits

BBT731 Managerial Finance for Biotechnology : This course integrates the tools of financial analysis with real-world problems in the technology industries. Topics include modelling, costs and benefits, and ratio and break-even analysis. Students will read, prepare, and odelli financial statements. The difference between management financial and tax financial statements will also be covered. 3 Credits

BBT741 Introduction to cGMP Compliance: This course will introduce students to the cGMP model for quality systems. Compliance to current Good Manufacturing Practices is required in the production of biotechnology as well as drug products. After an introduction to the history of cGMP and the current regulations as they exist today, participants in this course will learn to develop quality systems that will ensure compliance Topics will include cGMP history, to the applicable regulations, comparison of other Regulatory models, Quality Assurance/Quality

Control, Document Management and Systems Implementation. 3 Credits

BBT751 QA/QC for the Pharmaceutical and Biotechnology Industries: There are many new quality initiatives for drugs, biotech products and medical devices that have been recently introduced. These include risk based, science based and systems based assessments. Students will be presented with a comprehensive overview of the current best practices in quality assurance and quality control. Students will also be exposed to the most recent theories and expectations from the Food and Drug Administration. 3 Credits

BBT760 Ethical, Legal, and Regulatory Aspects of the Biotechnology Enterprise This course provides an overview of the important ethical, legal, and regulatory issues that are critical to the biotechnology industry. The course is divided into the three sections of ethics, legal issues, and regulations, each section taught by a faculty member who specializes in the area. The three sections are organized to provide basic material in a way that allows for an appreciation of how each influences the others. The section on ethics introduces students to core ethical values that guide the practice of science in the biotechnology industry. The section on legal issues focuses on key legal concepts, such as protecting inventions and intellectual property, and licensing. The section on regulation addresses the range of regulatory oversight mechanisms with which the biotech industry must comply and strategies for doing so. 3 Credits

BBT773 Biology of HIV and AIDS : This course includes an overview of the biology and life cycle of the immunodeficiency virus, including the simian viruses SIVs). Specific areas of HIV immunolopathogenisis are emphasized, to include HIV diagnosis, HIV-induced immune dysfunction, and therapeutic breakthroughs in the treatment of HIV-1 disease. Students become familiarized with current methods in biotechnology that have advanced our understanding of the biology of retroviruses. Special topics include international genetic variation subtypes and clades). HIV vaccine development and global economic impact. Prerequisites: BBT 601: Biochemistry; .BBT 602: Advanced Biochemistry and Molecular Biology; BBT 603:Advanced Cell Biology I 3 Credits

BBT781 Protein Bioinformatics: Because the gap between the number of protein sequences and the number of protein crystal structures continues to expand, protein structural predictions are increasingly more important. This course provides a working knowledge of various computer-based tools available for predicting the structure and function of proteins. Topics include protein database searching, protein physicochemical properties, secondary structure prediction, and statistical verification. Also covered are graphic visualization of the different types of three-dimensional folds and predicting 3-D structures by homology. Computer laboratories complement material presented in lectures. Prerequisites: BBT 601: Biochemistry; BBT 602: Advanced Biochemistry and Molecular Biology; BBT 610: Bioinformatics. 3 Credits

BBT785 Methods in Proteomics : This course covers the analytical methods used to separate and characterize pharmaceutical compounds predominantly proteins) derived through biotechnology. While emphasis is placed on the general principles and applicability of the methods, current protocols are discussed, and problem sets representing realistic developmental challenges are assigned. Topics include chromatography HPLC, SEC, IEC), electrophoretic techniques 2-D gel electrophoresis), spectroscopic methods UV/Vis, fluorescence, CD), analytical ultracentrifugation, microarrays, mass spectroscopy, amino acid analysis, sequencing, and methods to measure protein-protein interactions. Prerequisites: BBT 601: Biochemistry; BBT 608: Advanced Biochemistry and Molecular Biology . 3 Credits

BBT791 Genomic Sequencing and Analysis : The completion of the human genome sequence is just the latest achievement in genome sequencing. Armed with the complete genome sequence, scientists need to identify the genes encoded within, to assign functions to the genes, and to put these into functional and metabolic pathways. This course will provide an overview of the laboratory and computational techniques beginning with genome sequencing and annotation, extending to bioinformatics analysis and comparative genomics and including functional genomics. Prerequisites: BBT 601: Biochemistry; BBT 602: Advanced Biochemistry and Molecular Biology; BBT 671: Bioinformatics. 3 Credits

BEN205 Bengali Language and Literature: Styles of prose: Standard, Colloquial and Dialect. Review and practice of basic grammar and syntax and introduction to language skills. Development of integrated language skills with special focus on the mechanics of the language. Important aspects of grammar and vocabulary will be dealt with. This course will aim to show the trend of Bengali literature in the last 100 years by exposing the students to the popular work of major Bengali poets, short story writers, novelists and essayists. 3 credits.

BIO103 Biology I: This course is an introduction to the basic principles of modern biology and their relevance to human life. Students in the BBA or other programs likely will come from widely differing backgrounds, like science, commerce, and humanities or arts. Therefore, specific emphasis will be placed upon the understanding of basic biological concepts and terminology in the field of biology. The major part of the course is intended to provide students, especially non-science students, with background knowledge in the disciplines of ecology, physiology, nutrition, human organ systems, medical microbiology, and biotechnology. This background knowledge is intended to provide non-biological science students with a basic foundation in biology that will be helpful for their professional position in diverse arena. The biology course has the following objectives: i) to introduce students to the nature, history of biological science, and scope of studying biology; ii) to introduce students to biological science, emphasizing the relationships of humans to the environment, taxonomy, diversification of life, ecology, and environmental concerns; iii) to emphasize cell chemistry, cell structure, cell physiology, cell processes to include respiration and photosynthesis, cell reproduction and genetics; iv) to provide students with a basic knowledge in nutrition; v) to provide students with a general introduction to anatomy and physiology of human digestive, respiratory, circulatory and excretory systems; vi) to emphasize blood composition, function of blood, blood grouping, and blood diseases; and vii) to provide students with a general introduction to infectious disease, microbial mechanism of pathogenicity, disease transmission, and host defence system. 3 Credits

BIO210 Introduction to Molecular Biology) Description: The course focuses on the basic concepts in the molecular biology of the gene; cell structuring; the chemistry of Nucleic Acids, DNA, RNA; basic structure and function of proteins, three dimensional structure of DNA, replication, transcription, translation of the gene, characterization of gene products, control of gene expression and gene regulation, cloning of gene, practical applications. 3 credits.

BIO210 Introduction to Molecular Biology: This course is designed to be a fundamental introduction to one of the pivotal fields in modern biology. Introduction to Molecular Biology is an attempt to explain the chemical processes that characterize "life". It introduces biological macromolecules with their structure and function. It also introduces DNA as the genetic blueprint for life and explores how it functions within the cell at a molecular level. It provides grounding in areas such as gene structure, function and biotechnology. This course also deals with gene expression and the methods in DNA cloning. The objectives of the course are to enable students to: i) understand the basic concept on the chemistry of life including the formation of biomolecules; ii) understand structure, properties and function of macromolecules like carbohydrates, lipids, proteins and nucleic acids; iii) understand