UNIVERSITY OF SANTO TOMAS
FACULTY OF PHARMACY

BACHELOR OF SCIENCE IN BIOCHEMISTRY
COURSE PROSPECTUS WITH DESCRIPTIONS

Curriculum IV Effective Academic Year 2012-2013

First Year – First Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 111	General Chemistry I	3	2	None
ENG 1	Introduction to College English	3	0	None
FIL 1	Komunikasyon sa Akademikong Filipino	3	0	None
MATH 101	College Algebra	3	0	None
PSY 1	General Psychology	3	0	None
THY 1	Contextualized Salvation History	3	0	None
RC	Rizal Course	3	0	None
ZOO 101	General Zoology	2	1	None
PE 1	Physical Education I	(2)		
NSTP	National Service Training Program I	(3)		
TOTAL		**23**	**3**	

CHEM 111 General Chemistry I

Description

The lecture deals with the fundamental concepts of matter, its properties and chemical behavior in relation to their atomic and molecular structure. It provides an in-depth discussion about the properties and structure of matter, chemical reactions and the energy associated with it. The laboratory provides opportunities to gather experimental data and explore various aspects of descriptive and theoretical chemistry. The experiments are designed to apply fundamental laboratory operations and techniques that illustrate the various chemical principles and concepts. At the end of the semester, the students are expected to utilize the fundamental principles of Chemistry in everyday life and in higher chemistry courses.

ENG 1 Introduction to College English

Description

The course aims to develop the students' mastery of the basic communication skills in listening, speaking, reading and writing. Functional grammar is given emphasis to make learning meaningful for the students by engaging them in actual/real situations to help them succeed in the university and in the workplace. Interactive activities have also been designed to develop critical thinking among students.

FIL 1 Komunikasyon sa Akademikong Filipino

Deskripsyon

Gamit ang kurso sa higit na mataas na makrong kasanayan sa pagtalakay ng Araling Filipino (Philippine Studies), sa pag-unawa at pagkilala sa sarili at pambansang identidad, kultura at lipunan. Pangkalahatang saklaw ng kurso and pagtatamo ng bawat Tomasinong estudyante ng kasanayan sa komunikasyon sa apat na diskors at sa kritikal, kultural, at retorikal na nilalaman ng Araling Filipino/Filipinohiya sa larangang pang-akademiko.

MATH 101 College Algebra

Description

This is Mathematics for freshmen, which deals with the fundamental principles and applications of College Algebra. Topics include number systems, sets, algebraic expressions, polynomials, functions and relations, linear equations, quadratic equations, systems of linear equations and polynomial equations of the nth degree.

PSY 1 General Psychology

Description

This course develops students to properly understand the self through understanding the fundamental concepts and principles of psychology in the study of the physiological foundation of behavior and human development. It further strengthens and transcends understanding of the self to understanding others through the analyses of theories and principles of related concepts of sensation, perception, emotion, motivation and personality.

THY 1 Contextualized Salvation History

Description

The course brings into focus God's active involvement in the history of humanity as He gradually discloses Himself through persons and events, and ultimately through His Son, Jesus, giving humanity a glimpse of eternity through definite historical events. It highlights the centrality of the role of Jesus Christ in accomplishing the salvation of the world. This course utilizes a concentric approach to Salvation History. The concentric approach puts the Old Testament, the New Testament, and contemporary human experiences in a cycle revolving around the person of Jesus. Thus, the life and teachings of Jesus provide the main storyline, with the rest of the Sacred Scriptures as well as human experiences providing tools and details for greater knowledge and understanding of the person and mission of Jesus Christ.

RC Rizal Course

Description

This course focuses on the life, works, and writings of the Philippine national hero, Dr. Jose P. Rizal, as well as the other Filipino heroes who gave the significant contributions to the attainment of Philippine independence. The course aims to inspire young people to imbibe the patriotic and nationalistic ideals of our national hero.

ZOO 101 General Zoology

Description

This course deals with the study on how animals function, ranging from the most basic unit, the cell, to the more complex organs and organ systems. Overview of the fundamental physiological properties and biochemical basis of life, cell structure and function, cellular metabolism, animal tissues, organs, and basic principles in genetics will be covered. The laboratory will focus on observation of structural-functional relationships of living and preserved representative vertebrate animal.

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COURSE PROSPECTUS WITH DESCRIPTIONS

First Year – Second Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 112	General Chemistry II	3	2	CHEM 111
ENG 2	Reading and Thinking Skills for Academic Study	3	0	ENG 1
FIL 2	Pagbasa at Pagsulat Tungo sa Pananaliksik	3	0	FIL 1
MATH 102	Trigonometry	3	0	MATH 101
PHL 2/102	Logic	3	0	None
THY 2	Church and Sacraments	3	0	THY 1
BOT 102	General Botany with Taxonomy	3	2	None
PE 2	Physical Education II	(2)		
NSTP 2	National Service Training Program II	(3)		
TOTAL		**21**	**4**	

CHEM 112 General Chemistry II

Description

The course is a continuation of CHEM 111, and deals with: colligative properties, chemical kinetics; chemical equilibrium, acid-base equilibrium; and solubility equilibrium with its application to qualitative analysis; and introduction to thermodynamics and nuclear chemistry. At the end of the semester, the students are expected to apply the principles of chemical kinetics, chemical equilibrium, acid-base equilibrium and solubility equilibrium with qualitative analysis; understand the fundamental principles of thermodynamics in relation to the atmosphere and environment.

ENG 2 Reading and Thinking Skills for Academic Study

Description

The course aims primarily to develop students' reading and thinking skills for academic study. It equips students with an understanding of the reading skills and thinking processes; and effective higher order reading strategies for understanding academic texts. It also aims to prepare them for academic writing.

FIL 2 Pagbasa at Pagsulat Tungo sa Pananaliksik

Deskripsyon

Ito ang kursong nakatuon sa pagtuturo ng kasanayan sa kritikal na pagbasa at lohikal na pagsulat sa akademikong Filipino na sa huli'y magbibigay-kakayahan sa mga mag-aaral na gumawa ng sariling pananaliksik ukol sa disiplinang kinabibilangan ng kursong kinukuha: agham, medisina, farmasya, teknolohiya, at iba pa.

MATH 102 Trigonometry

Description

This course aims to familiarize the students with the essential concepts in Trigonometry. It deals with the study of triangles, , functions, and further, its real-life applications. The course covers exponential and logarithmic functions, trigonometric ratios, angle measures, trigonometric functions and its inverse, solution to oblique triangles, and an introduction to complex numbers.

PHL 2/102 Logic

Description

This course investigates human reason through the academic discipline of logic. It deals with the fundamental logical concepts and principles in simple apprehension, judgment and reasoning; and examines truth-validity and logical fallacies using traditional (Aristotelian) and modern (Symbolic) logic. This course aims to give students a fundamental training in analytical reasoning using the rules of correct inferential thinking.

THY 2 Church and Sacraments

Description

This course presents the continuing saga of a people in living the mission of Jesus. It introduces the students to a better understanding and deeper appreciation of their mission as members of the Church; and, to an active participation in celebrating the Presence of Jesus in the sacraments.

The first part of the course deals with the nature, origin, characteristics, goals, and mission of the Church today. This is followed by a presentation of the Seven (7) Sacraments of the Church giving emphasis to their rootedness in the Word of God, their faithfulness to the Teachings of the Church and their relevance to the contemporary concerns of the world. This facilitates the students' integration of their experiences as Church; reflection of these experiences in the Light of God's Word and Church Magisterium; and formation of a vision that leads them to a commitment to be part of the Church's mission in the world.

BOT 102 General Botany with Taxonomy

Description

The course introduces the students to an extensive presentation of plants and their value as an integral part of the ecosystem and the field of biochemistry. It focuses on the understanding of the plant morphology, physiology as basis for the understanding the synthesis of phytochemicals in relation to the main species of pharmaceutical interest, their recognitive features and taxonomic classification. The students are expected to recognize the importance of plants as an integral part of the pharmaceutical industry as source of active and inert raw materials.

Second Year – First Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 200	Organic Chemistry	3	2	CHEM 111, CHEM 112
CHEM 301	Analytical Chemistry I	3	2	CHEM 111, CHEM 112
ENG 4	Oral Communication in Context	3	0	None
MATH 108	Differential Calculus	3	0	MATH 101, MATH 102
PHL 5	Christian Ethics	3	0	THY 1, THY 2
BIOSCI 2	Human Anatomy with Physiology	3	2	ZOO 101
PE 3	Physical Education III	(2)		
TOTAL		**18**	**6**	

CHEM 200 Organic Chemistry

Description

The course deals with the different classes of organic compounds, their structures, properties, reactivities and reaction mechanisms. It includes training in both classical and modern semi- micro laboratory techniques in handling, preparing, separating, purifying, identifying and characterizing organic compounds. At the end of this course, the students are expected to use and apply knowledge gained and skills acquired in problem-solving and research in organic chemistry to biochemical and health-related fields of study.

CHEM 301 Analytical Chemistry I

Description

The course is designed for one semester introducing the methods and techniques of analytical chemistry, specifically quantitative chemical analysis, that are applied to biochemistry and related disciplines. The laboratory counterpart allows for the application of the discussed theories taught in lecture and critical assessment of experimental data. Statistical evaluation and treatment of data and more detailed approach to solution stoichiometry; equilibria of acid-base, precipitation, and oxidation-reduction titrations are the core of this course. At the end of this course, the students are expected to be able to apply the fundamental aspects and concepts of analytical chemistry to employ critical thinking skills to problem solving, to analyze the precision and accuracy of analytical data, both on an advanced level in preparation for professional practice.

ENG 4 Oral Communication in Context

Description

The course aims to develop students' speaking skills for effective communication in diverse contexts. It likewise endeavors to enhance their listening skills in carrying out meaningful transactions needed in real-life communication situations making them communicatively competent.

MATH 108 Differential Calculus

Description

The Calculus course aims to develop an appreciation of its concept, principles and theories as well as the use of its methods as a powerful tool in the basic and applied sciences. Moreover, the course seeks to create a learning environment with the aid of computer technology for the application of mathematical skills necessary to facilitate the understanding of Physical Chemistry and for the development of values necessary to attain quality life. This is a comprehensive course on Differential Calculus. Topics include functions and relations, limits and continuity, derivatives of algebraic and transcendental functions, and extensive discussion of the wide-range applications of derivatives in the physical and life science.

PHL 5 Christian Ethics

Description

The course deals with the study of man as a moral being called by God to respond in freedom and responsibility to attain the fullness of life in Christ. It seeks to familiarize the students with the foundations of morality that would equip them with principles and guidelines to confront contemporary moral situations. This also deals with the challenges of Christian discipleship and the Christian invitation to moral growth through the study of grace, sin, conversion and virtues.

BIOSCI 2 Human Anatomy with Physiology

Description

The course deals with the study of the parts and functions of the major organs and organ systems of the human body. It introduces students to the language of anatomy, as well as, the fundamental concepts of cellular structures and functions, integration, organization, and control of all body systems. The students will engage in the analysis and application of these concepts in various real-life settings, as they acquire a basic understanding of physiological adaptations to special conditions.

BACHELOR OF SCIENCE IN BIOCHEMISTRY
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Second Year – Second Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 203	Organic Analysis	3	2	CHEM 111, CHEM 112, CHEM 200
CHEM 302	Analytical Chemistry II	3	2	CHEM 111, CHEM 112, CHEM 301
BIOCHEM 1	Chemistry of Biomolecules	3	2	CHEM 111, CHEM 112, CHEM 200
MATH 109	Integral Calculus	3	0	MATH 101, MATH 102, MATH 108
PHYSICS 201	General Physics	4	1	MATH 101, MATH 102
SCL 3	The Social Teachings of the Church	3	0	THY 1, THY 2, PHL 5
PE 4	Physical Education IV	(2)		
TOTAL		**19**	**7**	

CHEM 203 Organic Analysis

Description

The course deals with theories and techniques for identifying organic compounds. It includes systematic study of the physical properties, structures, and reactions of organic compounds. Emphasis is given on the preliminary examination of samples, qualitative instrumental analysis of the elements and functional group determination of organic molecules. Investigative and preparative techniques and underlying concepts and principles in the isolation, synthesis, purification and characterization of organic compounds are taken up. At the end of this course, the students are expected to use and apply knowledge gained and skills acquired in problem-solving and research about the course in biochemical and health-related fields of study.

CHEM 302 Analytical Chemistry II

Description

The course is a continuation of Analytical Chemistry I. It deals with the basic theories, principles, operations, and applications of modern instrumental analyses including potentiometric, spectroscopic, and chromatographic methods. At the end of this course, the students are expected to have a working knowledge of the common analytical instruments and apply the operational principles to the fields of chemistry and biochemistry.

BIOCHEM 1 Chemistry of Biomolecules

Description

The course deals with the structure and function, isolation, purification, and characterization of biomolecules: carbohydrates, proteins, lipids and nucleic acids, transmission and expression of genetic information, generation and storage of metabolic energy. At the end of the course, students are expected to explain at the molecular level structure and function of biomolecules, describe molecular processes in heredity and expression of genetic information and illustrate metabolic pathways and their control. Students are also expected to demonstrate various research techniques and skills in the qualitative and quantitative analyses of biomolecules.

MATH 109 Integral Calculus

Description

This course deals with a review of differentiation, integration and selected topics in differential equation. Topics included are differentiation and integration of trigonometric, inverse trigonometric, logarithmic and exponential functions; techniques of integration by integration by parts, algebraic substitution, trigonometric substitution and partial fraction; topics included in differential equation are partial differentiation, exact differential equation, linear equations of the first order and equations reducible to linear equations.

PHYSICS 201 General Physics

Description

It is a study of forces, motion, friction, work, power, energy, heat, light, electricity and magnetism.

SCL 3 The Social Teachings of the Church

Description

The course deals with an in-depth study of the response of the Catholic Church to the socio-political, ecological, cultural, and spiritual concerns of the times. Among the issues it tackles are human promotion and human rights, justice and peace, labor, ideologies, Church and State Relations, media education and ecology, and the Church's Preferential Option for the Poor.

Third Year – First Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 401	Physical Chemistry I	3	2	MATH 101, MATH 102, MATH 108, MATH 109, CHEM 111, PHYS 201
BIOCHEM 2	Proteins, Carbohydrates and Lipids	3	2	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1
BIOCHEM 3	Nucleic Acids and Molecular Biology	3	0	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1
GIM	General and Industrial Microbiology	3	2	BOT 102, CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1
MATH 600	Biostatistics	2	1	MATH 101, MATH 102
HETAR	Health Economics with Taxation and Land Reform	3	0	None
TOTAL		**17**	**7**	

CHEM 401 Physical Chemistry 1

Description

This is the first of a two-part series of Physical Chemistry courses designed to enable students to explain macroscopic, molecular and atomic and sub-atomic phenomena using theories and laws of physics. It applies both the classical and modern principles of physics such as classical mechanics, energy dynamics and quantum physics to explain physical properties and transformation of chemical systems. In this course, the first of the Physical Chemistry series, gas laws and the laws of thermodynamics will be discussed. Common instrumental techniques of analysis of physical properties of matter and calorimetry will composed the experiments in the laboratory. It focuses on the Kinetic Molecular Theory; behavior of ideal and real gas systems and the Laws of Thermodynamics. At the end of this course, the students are expected to be able to understand both on the macroscopic and molecular level certain physico-chemical properties of matter and its transformations,. The student is also expected to relate energies involved in physical transformations and chemical reactions. The student should be equipped with the fundamentals of physical chemistry, particularly thermodynamic laws and principles, and should be ready to apply these in biochemical systems.

BIOCHEM 2 Proteins, Carbohydrates, and Lipids (PCL)

Description

The course deals with the investigation of the structure and function of biological molecules specifically proteins, carbohydrates, and lipids. It is important in the study of the reactions and interactions of biological macromolecules and cellular processes. Understanding of these is applied primarily in medicine, nutrition, agriculture and other specialized fields of Science. The course focuses on the structure-function relationship of proteins, carbohydrates and lipids as well as their clinical correlations. It details fundamental analytical techniques, conformations, and dynamics essential for discussion on the varied functions of macromolecules in biological systems. It also covers hormones, biological membranes and transport, introductory bioinformatics, biophysics, signal transduction and discussion of some current researches in the study of proteins, carbohydrates, and lipids. At the end of this course, the students are expected to deepen theoretical knowledge about the structure and function of proteins, carbohydrates, and lipids; combine knowledge from other Biochemistry courses to improve acquired competencies in the analysis and understanding of these important biomolecules in the context of implementing research projects, including the ability to communicate and present results; and to make use of scholarly information available in literature and databases.

BIOCHEM 3 Nucleic Acids and Molecular Biology

Description

This course aims to equip the students with conceptual underpinnings in nucleic acid chemistry and molecular biology to fully comprehend how nucleic acids interact with other biomolecules that help promote cellular growth, division and development. The course is a detailed analysis of gene structure and function including: the structure and physico-chemical properties of DNA and RNA; genome organization and chromatin structure; molecular mechanisms of replication, repair, transcription and translation; regulation of gene expression; recombinant DNA technology and; nucleic acid sequencing as important tools of modern molecular biology. It also covers discussions on systems biology and functional genomics. At the end of this course, the students are expected to understand the concepts governing biochemical mechanisms that control the maintenance, expression, and evolution of prokaryotic and eukaryotic genomes and apply what they have learned in molecular biology research and biotechnology.

GIM General and Industrial Microbiology

Description

The course deals with the fundamentals of microbiology. Lectures are focused on the structure of prokaryotic and eukaryotic microorganisms, microbial diversity and ecology, industrial microbiology, host-microbe interactions, immunity and human infectious diseases, microbial (soil, water, food) diseases, and metagenomics. Laboratory sessions are focused on pure culture techniques, methods of staining and the microscopic, colonial and biochemical identification of microorganisms. At the end of this course, the students are expected to acquire, articulate, retain and apply the core concepts learned in basic microbiology. They should master a set of fundamental skills, which would be useful to function effectively as professionals and to their continued development and learning in the field of microbiology. They must demonstrate competency in routine and specialized microbiological research laboratory or industry.

MATH 600 Biostatistics

Description

The course deals with the collection, organization, presentation, analyses, evaluation, interpretation, formulation and testing of hypotheses and formulation of generalization and inferences involving biological data, especially those concerning health care, preventive medicine, clinical and laboratory tests.

HETAR Health Economics with Taxation and Land Reform

Description

The course deals with the application of concepts and principles of economics in health and medical care, supply and demand, evaluation of health programs and interventions, the health finance and the health sector. Students are expected to engage in economic research related to pharmaceutical health care.

Third Year – Second Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 402	Physical Chemistry 2	3	1	MATH 101, MATH 102, MATH 108, MATH 109, CHEM 111, CHEM 112, CHEM 203, CHEM 401, PHYS 201
BIOCHEM 4	Biochemical Catalysis	2	2	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3
BIOCHEM 5	Biochemical Techniques	2	2	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3
BIOCHEM 12	Cell Physiology and Genetics	3	0	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3
BIOINFO	Bioinformatics	2	1	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3
ENG 3	Academic Writing Skills	3	0	ENG 1, ENG 2, CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3
SCL 9	Marriage and Family	3	0	THY 1, THY 2, PHL 5
TOTAL		**18**	**6**	

CHEM 402 Physical Chemistry 2

Description

This is the second of the Physical Chemistry series. This course is designed to enable students to understand systems in equilibrium – a condition which is common in biochemical systems. It also intends to help students understand the role of the state variables in the physical state and composition of a system. It also relates thermodynamic variables in electrochemical systems. Deriving kinetic equations of simple chemical systems is also taught in this subject in preparation for understanding biochemical kinetics. It focuses on Chemical Equilibrium; Phase Diagrams; Thermodynamics of Electrochemical Systems; and Chemical Kinetics. At the end of this course, the students are expected to understand and explain chemical equilibrium. He/She should be able to explain physico-chemical transformations due to variations in the state variables. He/She should be able to understand and explain the relationship between thermodynamic variables and electrochemical systems. He/She should be able to derive kinetic equations for simple chemical systems.

BIOCHEM 4 Biochemical Catalysis

Description

The course aims to demonstrate creative application of concepts and methods in analyzing biological processes and functions based on knowledge of enzyme structure, properties, kinetics and mechanisms involved in regulation and inhibition geared towards proficiency in the practice of biochemistry in the allied health, biological and environmental sciences. It deals with the study of enzyme properties, kinetics, catalytic mechanisms, inhibition and regulation. It elucidates the structure-function relation in enzyme catalysis; roles of coenzymes and cofactors in biocatalysis including the experimental methods involved in isolation, purification and effects of parameters involved in enzyme kinetics in relation to its applications in health research. It also includes discussion on catalytic activities of new and modified enzymes (abyzymes) and non-protein catalysts (ribozymes). Upon completion of the course, students should be able to discuss the importance of biochemical catalysts in biological systems; understand the general properties of enzymes and relate the factors affecting enzyme activity; differentiate the six(6) classes of enzymes according to type of chemical reactions catalyzed; apply the principles of enzyme kinetics through graphical relationship between substrate concentration and velocity of enzyme using Michaelis-Menten, Lineweaver-Burke and Eadie-Hofstee plots; explain the different mechanisms that

regulate and inhibit enzyme activity; evaluate enzymes according to type of inhibition and regulation; elucidate the different mechanisms by which the cofactors contribute to enzyme catalysis; distinguish common methods used in enzyme isolation, characterization and purification and associate the application of enzymes in medicine, industry and research; and describe non-protein catalysts, ribozymes and abyzymes based on catalytic mechanisms and their applications

BIOCHEM 5 Biochemical Techniques

Description

The course gives a thorough understanding of fundamental to advanced concepts and principles of various Biochemical techniques and the development of competencies and skills in experimental Biochemistry essential in the practice of one's profession. The course describes the theoretical and practical aspects of biochemical techniques such as electrophoresis and chromatography. It also covers molecular methods for protein and nucleic acid isolation and characterization, immunobiology and recombinant DNA technology. The students must be able to perform electrophoresis and chromatography, and interpret the results. They must be able to isolate and characterize proteins and nucleic acids using molecular methods.

BIOCHEM 12 Cell Physiology and Genetics

Description

This course aims to introduce the students to the dynamic relationships between cellular structure and the biochemical processes that are necessary for cell growth, differentiation, survival and death; providing them fundamental insights that will encourage the students to initiate and to develop the process of inquiry-based learning in biochemistry and molecular biology. The course deals with the molecular structure, function and organization of the cellular organelles and components with emphasis on eukaryotic cell mechanisms for cellular transport of molecules, signaling, trafficking, interactions with extracellular materials and energy transduction. It also covers the cell cycle and its regulation, cytogenetics and Mendelian concepts of heredity. At the end of this course, the students are expected to understand the basic concepts governing molecular biology of the cell and genetics that will allow them to explore and assess their interest for continued or advanced studies in the fields of biochemistry, molecular biology and biotechnology.

BIOINFO Bioinformatics

Description

This course covers computational techniques for mining the large amount of information produced by recent advances in biology, biochemistry and molecular biology, such as genome sequencing and microarray technologies. Main topics of the course include: DNA/RNA and protein sequence alignment, phylogenetic trees, protein structure prediction, microarray data analysis and gene protein networks. At the end of this course, the students are expected to have knowledge on use of bioinformatics tools in exploring and understanding biological data (proteins and nucleotides); perform basic sequence analyses and convert protein sequence to nucleotide sequence and vice versa using existing tools; generate phylogenetic tree based on sequence alignments and describe which tools will be appropriate given a research problem.

ENG 3 Academic Writing Skills

Description

The course aims to develop the students' proficiency in writing and research skills in academic discourse. The focus is on descriptive, expository, and argumentative texts, library research paper and critiques. Collaborative and workshop activities between teacher and students have been designed to foster expressive, creative and critical academic writing skills among students.

SCL 9 Marriage and Family

Description

This course is a multidisciplinary approach to marriage but emphasis is given to the theological and psycho-sociological aspects. It is divided into three parts. Part 1 deals with marriage as a natural and social institution and as a vocation revealed in God's plan. Part II deals with the family and community relations and the true meaning of family spirituality. Part III deals with man's response to the vocation of marriage and family. As such, the vital need of preparation towards the growth in responsible marital family relationship is shown.

Third Year – Third Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
APEPRACT	Advanced Practice Experience/ Practicum	0	2	BOT 102, CHEM 111, CHEM 112, CHEM 200, CHEM 203, CHEM 301, CHEM 302, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5, BIOINFO, GIM

APEPRACT Advanced Practice Experience/Practicum

Description

The course provides the students with exposure and opportunities to work in an actual environment, such as industrial, medical or research laboratories. The students must be able to render 240 hours of training in either local or international Host Training Establishments (HTEs) such as research facilities, higher educational institutions (HEIs), industries and training laboratories. The students must gain practical experience after working in their respective HTEs. They must be able to summarize and report the skills that they learned from the experience. They should receive satisfactory or better evaluation from their immediate supervisor in the HTE.

Fourth Year – First Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
BIOCHEM 6	Intermediary Metabolism	3	2	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 12
BIOCHEM 7	Physical Biochemistry	2	2	MATH 101, MATH 102, MATH 108, MATH 109, CHEM 111, CHEM 112, CHEM 200, CHEM 203, CHEM 401, CHEM 402, PHYS 201, BIOCHEM 1
BIOCHEM 8	Nutritional Biochemistry	3	0	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5
BIOCHEM 9	Phytochemistry	3	0	BOT 102, CHEM 111, CHEM 112, CHEM 203, BIOCHEM 1, BIOCHEM 2
BIOENTREP	Bioentrepreneurship	3	0	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5
PHAR	Pharmacology	3	1	MATH 600, BIOSCI 2, ZOO 101
THS 1	Thesis I	1	1	ENG 1, ENG 2, ENG 3, BOT 102, CHEM 111. CHEM 112, CHEM 200, CHEM 203, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5, BIOINFO, GIM
TOTAL		**18**	**6**	

BIOCHEM 6 Intermediary Metabolism

Description

The detailed knowledge on the chemical reactions and energy involved in metabolic pathways used by living organisms as well as the regulation of the pathways will provide the students to have a deeper understanding on the mechanism of metabolic disorders and contribute to the growing health and nutrition concerns of the society. The course deals with the chemical transformation that carbohydrates, lipids and proteins undergo in the cell to release utilizable energy and waste products and to provide building blocks for cellular components and other important metabolites. It also describes the regulatory mechanisms that control chemical pathways and the role of vitamins and minerals in the various chemical transformations. It elucidates the basis of metabolic disorders and derangement at the molecular level. At the end of this course, the students are expected to describe the metabolism of carbohydrates, lipids and nitrogenous compounds (proteins and nucleic acids) as well as the energy involved in metabolic pathways; explain the intracellular and extracellular regulators of metabolic pathways; and analyze and interpret biochemical data in common lifestyle and metabolic diseases.

BIOCHEM 7 Physical Biochemistry

Description

Physical Biochemistry is a course designed to enable student to explain biological phenomena using theories and laws of physics and physical chemistry. It applies atomic theories, thermodynamic principles, laws of thermodynamics and quantum and nuclear chemistry to explain and understand the behavior and principles of separation and analysis of supramolecular systems particularly the biomolecules. It focuses on Energetics; Quantum Chemistry; Isolation and Purification of Macromolecules; and Spectrophotometric Analysis. At the end of this course, the students are expected to understand and explain the role of the laws of thermodynamics in biochemical energetics. He/She

should be able to explain the biophysical principles of separation and analysis of biomolecules such as chromatographic and spectrophotometric techniques. He/She should be able to perform separation and analysis techniques and troubleshoot problems that may be encountered during experimentation.

BIOCHEM 8 Nutritional Biochemistry

Description

The subject discusses the relationship of food and nutrients to health and emphasizes the overlap between problems of nutrition and the techniques of biochemistry. Thus, nutritional knowledge can lead to improvement of human health and application in diets in everyday living. The course deals with the biochemistry, function and nutritional value of dietary carbohydrates, lipids, proteins, vitamins and minerals. It details nutrient types, sources, consumption, requirements, recommendations, digestion and absorption, distribution, storage and excretion, toxicity and deficiency. It also examines the role of nutrition in health and disease states. At the end of this course, the students are expected to explain the biochemical importance and metabolic mechanisms of macronutrients as well as the roles of vitamins and minerals in nutrition.

BIOCHEM 9 Phytochemistry

Description

The course intends to prepare the students for research work on phytochemistry and related natural products. This should equip the students with the theories and principles on the detection, extraction, isolation and identification of bioactive secondary metabolites from plant origins. Primary and secondary metabolites are differentiated from each other. The sources and applications of bioactive compounds from plant sources are presented. The importance of isolating phytochemicals is explained. How the various secondary metabolites branch out from primary production is mapped out. The structure, function and medicinal applications of the different secondary metabolites are discussed. Recent advances in phytochemistry are reported in class. At the end of this course, the students are expected to apply the concepts and principles of detection, extraction, isolation and identification of secondary metabolites from plant sources. The students will be prepared to work on natural products chemistry laboratories. They will be able to write research proposals on phytochemistry that would eventually lead to drug discovery and design.

BIOENTREP Bioentrepreneurship

Description

The course deals with the fundamental concepts and principles in the use of biological materials and products for business and enterprise. It describes innovative research and discusses marketing strategy and business operation including the policies on intellectual property rights. It also covers the development of a viable business plan and feasible innovative product/s in biotechnology. It focuses on fundamental concepts in entrepreneurship in biotechnology, development of a business plan, marketing and business strategy. At the end of this course, the students are expected to understand various methods and tools for evaluating the entrepreneurial concept; learn the key elements required to write a successful business plan; generate several ideas for potential businesses based on important trends and practices according to one's interests; and develop each entrepreneurial mindset in biotechnology.

PHAR Pharmacology

Description

The course deals with the study of basic concepts of Pharmacology and includes emphasis on certain drugs, their biochemical and physiological actions, therapeutic uses, adverse drug reactions and drug interactions.

THS 1 Thesis I

Description

The course is a guide for the preparation of a draft of the research proposal for a thesis based on Bloom's taxonomy of intellectual behavior: remembering, understanding, applying, analyzing, evaluating and creating. It also covers carrying out experimental work properly and safely including handling of reagents and chemicals as well as experimental plants and animals, and operation of equipment and apparatus. The course focuses on the preparation of a thesis proposal, consisting of 3 chapters: Introduction, Review of Related Literature and Methodology/Experimental. At the end of this course, the students are expected to submit a thesis proposal of their research including a timetable of activities (Gantt chart) and a table of budget needed (optional), and start and if able, finish the work on their research.

Fourth Year – Second Term/Semester

Abbreviation	Course Title	Lec Units	Lab Units	Pre-Requisites
CHEM 104	Advanced Inorganic Chemistry	3	0	MATH 101, MATH 102, MATH 108, MATH 109, CHEM 111, CHEM 112
BIOCHEM 10	Immunology, Virology and Cancer	3	0	CHEM 111, CHEM 112, CHEM 200, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5, BIOCHEM 6, BIOCHEM 8, BIOCHEM 12
BIOCHEM 11	Seminar in Biochemistry	3	0	MATH 101, MATH 102, MATH 108, MATH 109, BOT 102, CHEM 111, CHEM 112, CHEM 200, CHEM 203, PHYS 201, CHEM 401, CHEM 402, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5, BIOCHEM 6, BIOCHEM 7, BIOCHEM 8, BIOCHEM 9, BIOCHEM 12, BIOINFO, GIM
LIT 102 A	Philippine Literatures	3	0	None
SA	Socio-Anthropology	3	0	None
PD	Professional Deontology	3	0	THY 1, THY 2, PHL 5,SCL 3
PHISTCONS	Philippine History and Constitution	3	0	None
THS 2	Thesis II	0	2	ENG 1, ENG 2, ENG 3, MATH 101, MATH 102, MATH 108, MATH 109, BOT 102, CHEM 111, CHEM 112, CHEM 200, CHEM 203, PHYS 201, CHEM 401, CHEM 402, BIOCHEM 1, BIOCHEM 2, BIOCHEM 3, BIOCHEM 4, BIOCHEM 5, BIOCHEM 6, BIOCHEM 7, BIOCHEM 8, BIOCHEM 9, BIOCHEM 12, BIOINFO, GIM
TOTAL		**18**	**6**	

CHEM 104 Advanced Inorganic Chemistry

Description

The course gives the students a more profound approach to the fundamental concepts of chemistry than what had been presented in a general chemistry course. Inorganic chemistry presents the origin of the atom and the historical development of the atomic model; the different theories of chemical bonding – molecular orbital theory and valence bond theory; point group symmetry and the structures of crystalline solids; reactions of acids and bases; coordination chemistry; theories on complex ion formation; and electronic transitions of d metal complexes. At the end of the course, the students must be able to paraphrase the origin of the atom; explain the quantum mechanical model of the atom; explain the different bond theories; analyze the point group symmetry of various compounds; relate the theories and principles of inorganic chemistry to biochemical concepts; and apply the theories of transition metal complexes into researches in the field of inorganic chemistry and biochemistry.

BIOCHEM 10 Immunology, Virology and Cancer

Description

The course deals with the application of essential biochemical principles in understanding the mechanisms of the immune response in health and disease states including the molecular aspects of the detection and study of viral genes and expressed proteins in HIV/AIDS as well as the genetic basis of cancer. This will provide the students with the basis for associating these mechanisms with strategies for diagnostics and therapeutics including related biotechnological advances in the treatment of diseases. Major topics include cellular and molecular immunology, mechanisms of the immune response, nature of viruses and their replication, immunological response to viral infection and the molecular genetics of cancer. At the end of this course, the students are expected to make use of the principles of biochemistry in explaining the cellular and molecular mechanisms involved in the development of the immune response in various disease states; in HIV infection and AIDS and in carcinogenesis; discuss recent advances and emerging themes in the diagnosis and treatment of these diseases.

BIOCHEM 11 Seminar in Biochemistry

Description

The course is designed to offer an opportunity for students to present current topics in biochemistry of their interest through journal critique using power point technical oral presentation while engaging oneself in critical discussion with the facilitator. It enriches and equip students with the fundamentals of biochemistry research, bioethics, intellectual property rights (IPR), manuscript writing and publishing, and sourcing research grant. It also provides a venue for mock presentation of students' thesis followed by thesis defense in front of a panel of evaluators. The course includes journal critique of two (2) recent journal publications combined into one (1) 20-min technical oral presentation, brief discussion on research ethics, IPR, mock and thesis defense. At the end of the course, the students can broaden their knowledge in various areas of current researches and applications of biochemistry research; perform journal critiquing through synthesis of concepts derived from evaluating and summarizing selected articles under review; make an effective technical oral presentation in class or defend thesis in the presence of a panel of evaluators.

LIT 102A Philippine Literatures

Description

This course introduces students to representative literatures from the regions tackling the wide array of Filipino encounters and experiences as these are expressed through themes such as gender, racial identity, class and history. This course is designed to develop among students an awareness, appreciation, and critical view of the depth and breadth of our country's literatures in order to foster among them the desire for truth, love for country and nature, and respect for peoples and cultures, which will, eventually constitute a competent, compassionate, and committed Thomasian. At the end of the course, the students are expected to read and analyze literary selections that exemplify the multivalent Filipino experiences and their multivocal articulations; understand how the Filipino is constituted in Philippine literary texts; appreciate the different types and forms of Filipino literatures; value cultural differences and similarities embodied in Philippine literary outpourings; write a critique paper on a Filipino novel, epic or drama; and transform and extend creatively Philippine literary materials to other artistic expressions.

SA Socio-Anthropology

Description

This is an introduction to the origin, development, scope, basic concepts, theories, and methods of Sociology and Anthropology, as the scientific study of human beings. Focusing on the Philippines, the course gives emphasis on culture, human evolution, human groups and socialization, social stratification, rural and urban communities, social institutions and social change. It aims to expand the students' view and understanding of both local and global realities.

PD **Professional Deontology**

Description

The course deals with a review of the basic principles of Christian Ethics. It also deals with rights and duties in the practice of Medical Technology; the Code of Ethics and the fundamentals of Bioethics. The ethical dimension of the different advancements in the fields of Biotechnology and Genetic Engineering are discussed. At the end of the course, the students are expected to have a sound knowledge of the basic principles of ethics, rules and guidelines in such a way as to make its study of direct value and lead to a richer appreciation and respect for of human life; make ethical decision with clear, personal understanding of the full significance of his actions band on Christian principles and values and to meet the various challenge that lie ahead in the practices of their profession; and discern the various challenges that lie ahead in the practice of their profession so that they make a difference as Thomasian graduates.

PHISTCONS **Philippine History and Constitution**

Description

The course deals with the study of the Philippines, its life and people, their culture and social organizations, historical milestones, its government and constitution.

THS 2 **Thesis II**

Description

The course is intended to provide the students with a venue to carry out the laboratory part of their undergraduate thesis according to their experimental plan as submitted in Thesis I. This will allow them to apply the principles and techniques learned in their major courses as needed in their study. The course focuses on carrying out the experimental part of the thesis. At the same time, the final 3 chapters of the manuscript will be prepared: Results and Discussion, Summary and Conclusion, Recommendation, Appendices and Bibliography will also be prepared. At the end of the course, the students should be finished with their experimental work. They must be able to correctly interpret the results of their experiment and defend their thesis against a panel of examiners. A manuscript of the thesis must be prepared for approval of the adviser. The students should present their research on a scientific forum/expo/conference either by poster or oral presentation. If possible, the research must be published through the efforts of the adviser.