

UNIVERSITY OF SANTO TOMAS  
COLLEGE OF SCIENCE  
*BACHELOR OF SCIENCE IN CHEMISTRY – COURSE PROSPECTUS WITH DESCRIPTIONS*

Effective Academic Year 2015-2016

**First Year – First Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 101	General Inorganic Chemistry I	3	0	None
CHEM 101L	General Inorganic Chemistry I (Laboratory)	0	2	None
ENG 1	Introduction to College English	3	0	None
MATH 101	College Algebra	3	0	None
MATH 102	Trigonometry	3	0	None
PHIST	Philippine History	3	0	None
PSY 1	General Psychology	3	0	None
RC	Rizal Course	3	0	None
THY 1	Contextualized Salvation History	3	0	None
PE	Physical Education 1	(2)	0	None
ROTC	Military Science I (Reserve Officers' Training Corps) <i>* This is an elective. In case students do not take ROTC in the first year, they will take NSTP in the second year instead.</i>	(3)	0	None
<b>TOTAL</b>		24	2	

**CHEM 101 GENERAL INORGANIC CHEMISTRY I**

**Description** This is the first part of a two-semester course that provides the foundation on the concepts and principles of chemistry that will be encountered in the courses that the student will take in the succeeding years. It covers the structure of matter, chemical reactions: classification, stoichiometry and energetics, and the structure of atoms and molecules.



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#### **CHEM 101L GENERAL INORGANIC CHEMISTRY I (LABORATORY)**

**Description** CHEM 101L is the first part of a two-semester laboratory course in General Chemistry designed for first year B.S. Chemistry students. This course complements and consolidates the theoretical knowledge acquired in the general chemistry lecture (CHEM 101) course. This two-unit introductory laboratory course allows freshmen students to conduct observation and perform fundamental experiments on chemical reactions, stoichiometry, thermochemistry, and the periodic table. As in any laboratory course, the students are likewise expected to carry out experiments safely and carefully in the laboratory and to obtain data accurately.

#### **ENG 1 INTRODUCTION TO COLLEGE ENGLISH**

**Description** The course enhances the students' mastery of the basic communication skills in listening, speaking, reading, and writing.

Interactive activities have been designed to develop critical thinking and collaboration among students.

#### **MATH 101 COLLEGE ALGEBRA**

**Description** This is a 3-unit Mathematics course for freshmen, dealing with the fundamental principles and applications of algebra. It begins with sets, the number system and algebraic expressions. Focus is given on operations on polynomials, one-variable linear equations and inequalities, quadratic equations, two-variable linear equations, systems of linear equations, and functions and relations. At the end of the course, students should develop the values of accuracy, analytical thinking and logical reasoning.

#### **MATH 102 TRIGONOMETRY**

**Description** Topics include one-dimensional coordinate system, two dimensional coordinate system, circular functions, angles, right triangles, fundamental identities, trigonometric equation, inverse trigonometric functions, logarithmic and exponential functions.

#### **PHIST PHILIPPINE HISTORY**

**Description** This course discusses important events in the history of the Philippines from the earliest period to the contemporary.

The courses focuses on the interrelationship of important factors that were responsible for the formation of Philippine, nationhood, the state and the country's economy; how the past affected the country's present and how will it help contribute to its future.

The students are expected to develop an awareness of how events and factors affected the development of the nation and to appreciate how events in the past affected their daily lives.



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#### **PSY 1 GENERAL PSYCHOLOGY**

**Description** A three-unit course that deals with the fundamental concepts and principles in the study of human behavior and mental processes. It tackles psychological concepts, theories, and/or principles, such as the neurological basis of behavior, human development, sensation, perception, motivation, learning, and others. At the end of the course, students who major in psychology are expected to be able to have an overview of the biopsychosocial model in the scientific study of human behavior.

#### **RC RIZAL COURSE**

**Description** This course discusses the life, ideas and ideals of Jose Rizal. It aims to provide an in-depth discussion on how Rizal contributed to the development of Filipino nationhood.

The focus of this course is to depict Rizal, along with the other national heroes in the context of Philippine national history and that Rizal as the foremost Filipino hero helped inspire a national movement that reawakened Filipino nationalism

It is expected that the students develop a critical and analytical understanding of Rizal and his achievements along with other heroes.

This understanding will be in the context of Philippine national history.

#### **THY 1 CONTEXTUALIZED SALVATION HISTORY**

**Description** This Course is a critical and reflective look into the different moments of God's intervention in the history of humanity, gradually disclosing Himself and His plan of salvation through persons and events, until this revelation reached its fullness in the incarnation of His Son, our Lord Jesus Christ.

The whole history of salvation has for its central figure the person of Jesus Christ. Hence, salvation history, in its very nature, is Christocentric. It is in Jesus that the entire history of humanity finds meaning. It is also to him that history tends. Because of this, all events and persons in the history of salvation are seen in the light of the person of Jesus, apart from whom they have no value. The course shall make use of the Sacred Scriptures as its primary source since it is the Bible that contains the record of God's interventions with humanity and the testimonies of the members of early Church about their encounters with Jesus.

The course, therefore, inevitably involves the actual reading of Sacred Scriptures in class in order to discover how God's Word, enveloped in human words, continues to communicate to humanity today; and at the same time to facilitate a dialogue between the text of the Bible and the day-to-day life of the Thomasian students.



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**First Year – Second Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
BIO 100	General Biology	2	0	None
BIO 100L	General Biology (Laboratory)	0	1	None
CHEM 102	General Inorganic Chemistry II	3	0	CHEM 101, CHEM 101L
CHEM 102L	General Inorganic Chemistry II (Laboratory)	0	2	CHEM 101, CHEM 101L
ENG 2	Reading and Thinking Skills for Academic Study	3	0	ENG 1
HUM 1	Art, Man, and Society	3	0	None
LIT 102A	Philippine Literatures	3	0	None
MATH 108B	Mathematical Analysis	3	0	MATH 101, MATH 102
SA	Socio-Anthropology	3	0	None
THY 2	Church and Sacraments	3	0	THY 1
PE	Physical Education 2	(2)	0	
ROTC	Military Science II (Reserve Officers' Training Corps) <i>* This is an elective. In case students do not take ROTC in the first year, they will take NSTP in the second year instead.</i>	(3)	0	
<b>TOTAL</b>		23	3	

**BIO 100 GENERAL BIOLOGY**

**Description** This course provides baseline information about the living world, with a recurrent theme of unifying biological concepts and the relationship between structure and function in living systems. Overview of the fundamental properties and chemical basis of life, cell structure and function, cellular metabolism, animal and plant tissues and organs, and basic principles in genetics will be covered.



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#### **BIO 100L GENERAL BIOLOGY (LABORATORY)**

**Description** This course provides baseline information about the living world, with a recurrent theme of unifying biological concepts and the relationship between structure and function in living systems. Overview of the fundamental properties and chemical basis of life, cell structure and function, cellular metabolism, animal and plant tissues and organs, and basic principles in genetics will be covered.

#### **CHEM 102 GENERAL INORGANIC CHEMISTRY II**

**Description** This is the second part of a two-semester course that provides the foundation on the concepts and principles of chemistry that will be encountered in the courses that the student will take in the succeeding years. It covers the concepts of intermolecular forces, the principles of phase changes, chemical kinetics, gas and ionic equilibrium, and electrochemistry.

#### **CHEM 102L GENERAL INORGANIC CHEMISTRY II (LABORATORY)**

**Description** CHEM 102L is the second part of a two-semester laboratory course in General Chemistry designed for first year B.S. Chemistry students. This course complements and consolidates the theoretical knowledge acquired in the general chemistry lecture (CHEM 102) course. This two-unit laboratory course allows freshmen students to conduct observation and perform fundamental experiments on phase change, colligative properties (freezing point depression), solubility, reaction rate, chemical equilibrium, acid-base equilibrium and titration, chemistry of halogens, electrochemistry, and qualitative chemical analysis. As in any laboratory course, the students are likewise expected to carry out experiments safely and carefully in the laboratory and to obtain data accurately.

#### **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.



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#### **HUM 1 ART, MAN, AND SOCIETY**

**Description** The course develops in the students the competence in acquiring a comprehensive knowledge of the Humanities through immersion in both classical and contemporary art forms, not only in the passive sense of mere appreciation but also in the more active sense of critical appraisal.

It is focused on a comprehensive study of the Humanities through the intensive analyses of the interrelationships and intersections between the arts, the individual man or woman, and the larger community to which he or she belongs. Although the Western canon and its aesthetics will be tackled, along with the traditional art forms, its main concern is on Filipino artistic expressions, both traditional and contemporary, and Philippine cultural practices.

Students are expected to write a critique of any Filipino art form/cultural practice using the concepts discussed in any of the theoretical and critical essays taken up during the course of the term. They are also expected to demonstrate their knowledge of the art forms in producing class projects that are multimedia and performative in orientation.

#### **LIT 102A PHILIPPINE LITERATURES**

**Description** The course is designed to develop among students an awareness, appreciation, and critical view of the depth and breadth of our country's literature 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.

The course is focused on representative literatures from the regions, tackling the wide array of Filipino encounters and experiences that are expressed through themes such as gender, racial identity, class and history.

The students are expected to write a critique on a Filipino novel, epic, drama or any other genre. They are also expected to transform or adapt Philippine literary texts into other art forms or media.

#### **MATH 108 MATHEMATICAL ANALYSIS I**

**Description** This is the first in the three-series of mathematical analysis courses for the Chemistry Program. This course is designed to deepen concepts, develop and strengthen creative skills in preparation for Calculus. Topics include the coordinate systems: polar, rectangular, and space coordinate systems, points, distance, equations of lines, second degree equations, parametric equations, equations of the plane.



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#### **SA SOCIOLOGY AND ANTHROPOLOGY**

**Description** The course introduces the discipline of Sociology and Anthropology as social sciences, as professions and as ways of life.

It explores selected fundamental concepts in the study of Philippine society and culture and its relation to the global world using basic theories, research methodologies, and substantive issues defining the scientific practices of Sociology and Anthropology.

The course exposes students to the unique use of the sociological imagination and anthropological perspective in understanding the world they live in so that they may find it useful, relevant, practical, and meaningful to their lives, no matter what life choices and trajectories they would take or endure in the future.

#### **THY 2 CHURCH AND SACRAMENTS**

**Description** The course deals with the Church and Sacraments. The first part is about the nature, origin, characteristics, and mission of the Church, as having originated from the Trinitarian Community of God Whose love was revealed in the incarnate Son, Jesus Christ Who accomplished God's plan of salvation. The second part of the course deals with the liturgical life of the Church celebrated specifically through the Sacraments as visible signs of God's grace in the believing, worshipping and serving community.



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Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 201	Organic Chemistry I	3	0	CHEM 101, CHEM 101L, CHEM 102, CHEM 102L
CHEM 201L	Organic Chemistry I (Laboratory)	0	2	CHEM 101, CHEM 101L, CHEM 102, CHEM 102L
ENG 3	Academic Writing Skills	3	0	ENG 1, ENG 2
FIL 1	<i>Komunikasyon sa Akademikong Filipino</i>	3	0	None
MATH 109B	Mathematical Analysis II	4	0	MATH 101, MATH 102, MATH 108B
MICR 201	General Microbiology with Industrial Applications	2	0	BIO 101, BIO 101L, CHEM 101, CHEM 101L, CHEM 102, CHEM 102L
MICR 201L	General Microbiology with Industrial Applications (Laboratory)	0	2	BIO 101, BIO 101L, CHEM 101, CHEM 101L, CHEM 102, CHEM 102L
PHL 2	Logic	3	0	None
PHYS 103	Mechanics and Molecular Forces	3	0	MATH 101, MATH 102
PHYS 103L	Mechanics and Molecular Forces (Laboratory)	0	1	MATH 101, MATH 102
PE	Physical Education 3	(2)	0	
NSTP	Literacy Training Service (LTS) I <i>or</i> Civic Welfare Training Service (CWTS) I <i>* This is an elective. Either LTS or CWTS is chosen by the student who has not elected to take ROTC in the first year.</i>	(3)	0	
<b>TOTAL</b>		21	2	



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#### **CHEM 201 ORGANIC CHEMISTRY I**

**Description** This is a comprehensive course on the fundamentals of organic chemistry: properties and structure reactivity of organic compounds; reactions of organic compounds as acids and bases; reaction pathways' the role of carbon intermediates and stereochemistry in organic reactions; nucleophilic substitution and elimination (organic halides); structure, properties and reactions of hydrocarbons like alkanes, cycloalkanes, alkenes and alkynes. Structure determination of organic compounds by spectroscopic methods. Industrial and biological applications of organic reactions and their products are included.

#### **CHEM 201L ORGANIC CHEMISTRY I (LABORATORY)**

**Description** CHEM 201L is a one semester course in organic chemistry designed to develop in students the skills in using laboratory techniques basic in organic chemistry, concerned with the formation of proper practices and habits, including laboratory and chemical safety, waste minimization and proper disposal, and the preparation of proper laboratory reports. Furthermore, students are able to independently perform analysis, isolation, purification and synthesis of selected organic compounds. The experiments chosen for the laboratory component of this course hope to keep students motivated as they try to discover connection between organic chemistry with everyday living.

#### **ENG 3 ACADEMIC WRITING SKILLS**

**Description** This course centers on honing college students' writing and research skills for academic study.

It equips students with effective techniques in writing expository, persuasive, and argumentative compositions and any other academic texts, e.g., library, term, and research papers.

This course engages also students to craft academic papers with strong, effective, and clear theses, body paragraphs, and conclusions. It likewise helps them edit their writing to be more formal and appropriate. It also provides the students with various strategies for generating ideas about a topic and teaches them organizational patterns, topic development, and methods for making their writing more coherent. Additionally, this course helps the students develop revision strategies that can be used in other courses and trains them to use and cite references properly in their writing to avoid plagiarism.



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## **FIL 1 KOMUNIKASYON SA AKADEMIKONG FILIPINO**

**Description** *Ang Filipino I ay isang metalinggwistik na pag-aaral ng wikang Filipino. Nakatuon ito sa estruktura, gamit, katangian at kahalagahan ng wikang Filipino sa akademikong larangan.*

*Sa lapit multidisiplinaryo at paraang interaktibo, inaasahang matutukoy at matatalakay ang mga pangunahing kaalaman sa wikang ito.*

*Malilinigang dito ang mga kasanayan sa paggamit ng wikang Filipino tungo sa lalong mataas na komunikasyon sa kritikal na pagdidiskurso.*

Filipino 1 is a metalinguistic study of Filipino language which focuses on the structure, usage, nature and its value in the academic field.

Using the interactive and multidisciplinary approach, it is expected to identify and discuss the fundamental concepts of Filipino and to develop the higher language / communication skills in a critical discourse.

## **MATH 109B MATHEMATICAL ANALYSIS II**

**Description** The entire branch of differential calculus focuses on the determination, evaluation and applications of derivatives of functions. Formulas or theorems have been derived or developed to facilitate finding and evaluating derivatives of functions. Applications of derivatives of functions to rate-related problems are found in natural sciences, social sciences, business, and physical sciences. A large class of problems falling under the category of optimization also finds applications that pervade almost every aspect of our daily lives and has been the topic of discussion in many specialized fields such as labor management, product design, packaging and many more.



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#### **MICR 201 GENERAL MICROBIOLOGY WITH INDUSTRIAL APPLICATIONS**

**Description** This course is designed to introduce students to areas and concepts involved in Microbiology and the application of Microbial Biotechnology. This course will strengthen the students' knowledge of microbiology and give them a better understanding of the role of microbes in man and the environment.

The lecture course will focus on a vast array of applications in microbiology. It will discuss different groups of microbial life, their physiological growth and biotechnological by-products as well as various factors affecting their growth and production. Discussions will also cover the fundamentals of microbial genetics and genetic engineering.

This course will be conducted as a 2-hour lecture class with a separate 3-hour laboratory activities as an adjunct to the lecture discussion. The hands-on experiments will focus on basic microbiology, food and industrial microbiology.

#### **MICR 201L GENERAL MICROBIOLOGY WITH INDUSTRIAL APPLICATIONS (LABORATORY)**

**Description** This course is a hands-on learning course on the core concepts and techniques in microbiology and the application of Microbial Technology. Experiments that will be conducted will commence with the study of micro-organisms, particularly bacteria, with emphasis on the techniques for their isolation, cultivation, preservation, characterization, and identification. Techniques in quantifying these organisms as well as their control will also be conducted. Practical experiments on the applications of selected micro-organisms will be undertaken at the latter part of the course.

#### **PHL 2 LOGIC**

**Description** This course exposes the students with the fundamental concepts and principles in the study of human behaviour, sensory modalities, perception, consciousness, and motivation, emotion, stress and health and personality theories

This course provides the students with a broad, eclectic understanding on the importance of understanding human behaviour by addressing the wide range of issues and problems encountered in everyday life.

Each student is expected to apply basic psychological concepts and principles in understanding and enhancing human behaviour.

#### **PHYS 103 MECHANICS AND MOLECULAR FORCES**

**Description** Physics 103 covers fundamental concepts in mechanics and mechanical properties of matter.



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## **PHYS 103L MECHANICS AND MOLECULAR FORCES (LABORATORY)**

**Description** Physics 103L covers experiments in mechanics.



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**Second Year – Second Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 202	Organic Chemistry II	3	0	CHEM 201, CHEM 201L
CHEM 202L	Organic Chemistry II (Laboratory)	0	2	CHEM 201, CHEM 201L
CHEM 301	Analytical Chemistry I	3	0	CHEM 102, CHEM 102L
CHEM 301L	Analytical Chemistry I (Laboratory)	0	2	CHEM 102, CHEM 102L
ENG 4	Oral Communication in Context	3	0	ENG 1, ENG 2, ENG 3
FIL 2	<i>Pagbasa at Pagsulat tungo sa Pananaliksik</i>	3	0	FIL 1
MATH 110B	Mathematical Analysis III	4	0	MATH 101, MATH 102, MATH 108B, MATH 109B
PHYS 203	Heat, Electricity, and Magnetism	3	0	PHYS 103, PHYS 103L
PHYS 203L	Heat, Electricity, and Magnetism (Laboratory)	0	1	PHYS 103, PHYS 103L
PHL 5	Christian Ethics	3	0	THY 1, THY 2
PE	Physical Education 4	(2)	0	
NSTP	Literacy Training Service (LTS) I <i>or</i> Civic Welfare Training Service (CWTS) I <i>* This is an elective. Either LTS or CWTS is chosen by the student who has not elected to take ROTC in the first year.</i>	(3)	0	
<b>TOTAL</b>		22	5	

**CHEM 202 ORGANIC CHEMISTRY II**

**Description** This is a comprehensive course on the structure, properties and reactions of benzene and aromatic compounds, alcohols and phenols, ethers and epoxides, thiols and sulfides, aldehydes and ketones, carboxylic acids and its derivatives, carbanions (condensations reactions), and amines industrial and biological applications of organic reactions and their products are included.



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#### **CHEM 202L ORGANIC CHEMISTRY II (LABORATORY)**

**Description** This is a comprehensive course on preparative organic chemistry; the structure and reactivity of organic compounds; a mechanistic orientation is given in preparation to understanding biochemical purposes, industrial and biological applications of organic reactions and their products are included.

#### **CHEM 301 ANALYTICAL CHEMISTRY I**

**Description** This is a three-unit course that covers the principles of chemical equilibrium and its applications to various equilibrium systems, namely, slightly soluble solids, acid-base, redox, distribution and complex equilibria. The use of these principles to qualitative analysis supported with mathematical calculations and analyses are discussed.

#### **CHEM 301L ANALYTICAL CHEMISTRY I (LABORATORY)**

**Description** This is a two-unit laboratory course which covers the principles of chemical equilibrium and its applications to various equilibrium systems involving inorganic cations and anions. The use of these principles to qualitative analysis is discussed. Separation and identification of ions in aqueous solutions are the major activities in the laboratory – these are individual hands-on experiments.

#### **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 communication situations making them communicatively competent.

#### **FIL 2 PAGBASA AT PAGSULAT TUNGO SA PANANALIKSIK**

**Description** *Ang Filipino 2 ay 3-yunit na kurso at ikalawa sa serye ng mga kurso sa ilalim ng kurikulum sa Filipino sa antas kolehiyo.*

*Nakasentro ang kursong ito sa paglilinang sa kasanayan at kahusayan ng mga mag-aaral sa matalino at makatuwirang pagbabasa at pagsusulat ng mga akademikong babasahin/sulatin upang makabuo ng mga makabuluhang pananaliksik sa kanilang larangang kinabibilangan gamit ang wikang Filipino.*

Filipino 2 aims to develop the proficiency of students in critical reading and academic writing that will guide them to do meaningful researches related to their discipline using the Filipino language.



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#### **MATH 110B MATHEMATICAL ANALYSIS III**

**Description** This is the third in the series of three mathematical analysis courses for the Chemistry program. This course focuses on concepts and methods of Integral Calculus built on skills developed in the first and second courses of Mathematical Analysis. Antidifferentiation and formal techniques of integration are discussed together with some physical applications which include computation of areas, volumes and laws of growth and decomposition. Students are also introduced to solutions of ordinary differential equations.

#### **PHYS 203 HEAT, ELECTRICITY, AND MAGNETISM**

**Description** Physics 203 covers the areas of heat, thermodynamics, electricity, magnetism, direct and alternating current circuits.

#### **PHYS 203L HEAT, ELECTRICITY, AND MAGNETISM**

**Description** Physics 203L covers selected experiments in heat, electricity and magnetism.

#### **PHL 5 CHRISTIAN ETHICS**

**Description** The course provides an overview of Christian Ethics which is designed to help students begin answering some fundamental questions about Christ-centered life and what makes it worth living.

It is divided into three parts: Human Person's Ethics of Being and Doing, introduces one to the realities of moral life, to an analysis of the moral process (constituents, sources and modifiers of human acts), to the relationship of ethics and morality to religious faith, and to the specific nature of Christian morality; Unit 2, Realizing Human Dignity and Genuine Freedom, deals with the human person as a moral agent, human freedom, conscience, sin and moral obligation in the light of the Word of God in the Sacred Scriptures and in the teachings of the Church enshrined in Her Traditions, Pronouncements and Documents; and, Unit 3, the Christian Response to some Special Contemporary Moral Issues, gives special attention to the Ten Commandments in highlighting the moral principles and virtues vis-à-vis some contemporary moral issues.

The course seeks the formation of a Christian conscience of the students to enable them to make correct judgments in their everyday moral decisions and choices especially about specific moral issues they are encountering and thus lead them towards committed moral living.



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**Third Year – First Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 206	Advanced Organic Chemistry	3	0	CHEM 202, CHEM 202L
CHEM 302	Analytical Chemistry II	3	0	CHEM 301, CHEM 301L
CHEM 302L	Analytical Chemistry II (Laboratory)	0	2	CHEM 301, CHEM 301L
CHEM 402	Physical Chemistry I	3	0	CHEM 202, CHEM 202L, CHEM 301, CHEM 301L, MATH 110B, PHYS 203, PHYS 203L
CHEM 601	General Biochemistry	3	0	CHEM 202, CHEM 202L
CHEM 601L	General Biochemistry (Laboratory)	0	2	CHEM 202, CHEM 202L
ETAR	Economics with Taxation and Agrarian Reform	3	0	None
FL 1	Foreign Language 1	3	0	None
PHYS 208	Wave, Optics, and Modern Physics	3	0	PHYS 203, PHYS 203L
PHYS 208L	Wave, Optics, and Modern Physics (Laboratory)	0	1	PHYS 203, PHYS 203L
<b>TOTAL</b>		21	5	

**CHEM 206 ADVANCED ORGANIC CHEMISTRY**

**Description** Advanced treatment of the principles and concepts of organic chemistry with emphasis on synthesis and mechanism; relations between structure and reactivity; stereochemistry; structure determination by the application of spectroscopic methods; carbanion chemistry; orbital symmetry; polymer chemistry; heterocyclic chemistry.

**CHEM 302 ANALYTICAL CHEMISTRY II**

**Description** This course is designed to introduce the student to modern methods of instrumental analysis in analytical chemistry. The course also aims to gain some familiarity with the fundamental principles and applications of spectrochemical, separation and electrochemical methods. The focus of the course is in trace analysis, and therefore methods for the identification, separation and quantitation of trace substances will be described.



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#### **CHEM 302 ANALYTICAL CHEMISTRY II (LABORATORY)**

**Description** This course is the laboratory component of Instrumental analysis lecture course (Chem 302 lec) and presupposes a certain level of understanding in the theory of instrumental analytical chemistry. This laboratory course would include experiments on electroanalytical, chromatographic, and optical methods. The emphasis of this course is to apply much of the theory students were exposed to in Chem 302 lec to assessing relevant and timely chemical issues that rely on the effective use of modern analytical instrumentation.

#### **CHEM 402 PHYSICAL CHEMISTRY I**

**Description** This the first course in a two-semester physical chemistry sequence. This course provides a background in fundamental chemical thermodynamics and its application to physical and chemical equilibrium systems. It includes the following topics: gas laws, laws of thermodynamics; thermochemistry; chemical equilibrium and phase equilibrium.

#### **CHEM 601 GENERAL BIOCHEMISTRY**

**Description** A 3-unit one-semester course on the biochemistry of the biomolecules designed for BS Chemistry majors. The course deals with the different types of cells, the organelles and their fractionation; the structures and interactions of biomolecules that give rise to supramolecular structures and their corresponding functions; enzyme chemistry, kinetics and regulation; structure and dynamics of cell membranes; and an introduction to some aspects of molecular biology, recombinant DNA technology, and the methods that biotechnology uses to manipulate DNA.

#### **CHEM 601L GENERAL BIOCHEMISTRY (LABORATORY)**

**Description** A 2-unit one-semester laboratory course on the isolation and characterization of the biomolecules designed for BS Chemistry majors. The course consists of experiments that teach students the techniques and methods used in the extraction, isolation, purification, characterization and quantitative determination of the primary metabolites found in biological samples namely proteins (including enzymes), nucleic acids, lipids and carbohydrates. Moreover, chemical analysis of metabolic products in urine samples is also included.

#### **ETAR ECONOMICS WITH TAXATION AND AGRARIAN REFORM**

**Description** This course deals with the introduction to Economics, Taxation and Agrarian Reform. It derives on the principles of macroeconomics, leading to better understanding of the economic situation of the country and the international economy. The latter part of the course involves the study of the principles and kinds of taxation, principles and implementation of cooperative program, and the background, objectives and implementation of the agrarian reform program of the Philippines.



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**FL 1 FOREIGN LANGUAGE 1**

**Description** This course aims to develop the listening and speaking skills of the learners focusing on correct pronunciation and vocabulary enrichment.

Basic strong verbs like sein (to be) and haben (to have) will be introduced including their usages and idioms. Along with these two basic but important verbs will be the introduction to the conjugation of weak verbs.

The declensions of nouns and adjectives in the four cases (nominative, genitive, dative and accusative) will be emphasized.

**PHYS 208 WAVE, OPTICS, AND MODERN PHYSICS**

**Description** Physics 208 covers fundamental physics concepts and applications of mechanical and electromagnetic waves, sound, nature and propagation of light, geometric and physical optics and LASER and selected topics in modern physics.

**PHYS 208L WAVE, OPTICS, AND MODERN PHYSICS (LABORATORY)**

**Description** Physics 208L covers selected experiments in wave motion, sound, light and modern physics.



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**Third Year – Second Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 103	Inorganic Chemistry	3	0	CHEM 102, CHEM 102L
CHEM 303	Advanced Analytical Chemistry	2	0	CHEM 302, CHEM 302L
CHEM 303L	Advanced Analytical Chemistry (Laboratory)	0	2	CHEM 302, CHEM 302L
CHEM 307L	Chemometrics (Laboratory)	0	1	CHEM 302, CHEM 302L
CHEM 403	Physical Chemistry II	3	0	CHEM 402
CHEM 403L	Physical Chemistry II (Laboratory)	0	2	CHEM 402
CHEM 503	Professional Exposure, Jurisprudence, and Practicum	3	0	CHEM 202, CHEM 202L, CHEM 302, CHEM 302L
CHEM 602	Advanced Biochemistry	3	0	CHEM 601, CHEM 601L
CHEM 602L	Advanced Biochemistry (Laboratory)	0	1	CHEM 601, CHEM 601L
THS I	Thesis I	2	0	CHEM 302, CHEM 402, CHEM 402L, CHEM 601, ENG 3
<b>TOTAL</b>		16	6	

**CHEM 103 INORGANIC CHEMISTRY**

**Description** This course is designed for chemistry majors that deal with important concepts of inorganic chemistry. It involves a comprehensive review of the atomic structure, the relation of atomic and molecular structure to chemical and physical properties and the study of the periodicity of the elements. The course is intended to expand the student's knowledge base in inorganic chemistry by providing new ways of understanding bonding, and reactivity. It will likewise introduce the crystalline solid state and the magnetic and spectral properties of coordination compounds.

**CHEM 303 ADVANCED ANALYTICAL CHEMISTRY**

**Description** This course presents analytical chemistry as an information science: introductory chemometrics. It furthers the students' background in analytical chemistry, particularly in the statistical evaluation of data, sampling, method development and method validation.



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#### **CHEM303L ADVANCED ANALYTICAL CHEMISTRY (LABORATORY)**

**Description** Advanced Analytical Chemistry Laboratory is a two unit laboratory course that is an integration of all the analytical chemistry skills and knowledge that the students have learned. Through this integration process, the course offers the students good preparation for actual employment as analytical chemists when they graduate. Introductory topics include a comprehensive review of classical and instrumental analysis, sources of information, principles of quality assurance in the analytical chemistry laboratory, chemistry law, sampling and sample preparation. The range of experiments to be performed include: environmental analysis; biochemical and chemical analysis; and industrial analysis.

#### **CHEM 307L CHEMOMETRICS (LABORATORY)**

**Description** This course presents an introduction to statistics for the analytical laboratory, to experimental design for analytical method development and chemical process improvement, and to applications of pattern recognition and multivariate calibration in chemistry. To facilitate this goal, the course uses softwares such as Scilab and R to illustrate statistical principles without lengthy derivations. Numerous statistical applications in chemistry are shown.

#### **CHEM 403 PHYSICAL CHEMISTRY II**

**Description** This is the second course in a two-semester physical chemistry sequence. This course provides a background in fundamental chemical thermodynamics and its application to physical and chemical equilibrium systems. It includes the following topics: solutions; phase diagrams; electrochemistry and chemical kinetics.

#### **CHEM 403L PHYSICAL CHEMISTRY II (LABORATORY)**

**Description** CH 402 Lab is a comprehensive one-semester course on physical chemistry for the Chemistry Major Program, with a 1-unit credit. The course emphasizes on physical equilibria, chemical equilibria, electrochemical equilibria, chemical kinetics and adsorption on various surfaces. A working knowledge of these is essential for an understanding of the conditions and techniques used to bring about chemical changes in industry and in the laboratory.

#### **CHEM 503 PROFESSIONAL EXPOSURE, JURISPRUDENCE, AND PRACTICUM**

**Description** The purpose of the On-the-Job Training class is to develop, promote, and coordinate a collaborative effort between the business-community. The business partners will provide tutoring, internships, mentoring, professional expertise, career awareness, and other services. The experience of the student in the OJT is shared and processed in the course. Furthermore, the students are exposed to skills essential for career success, such as resume writing, job interview preparation, and introduction to entrepreneurship.



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#### **CHEM 602 ADVANCED BIOCHEMISTRY**

**Description** A 3-unit one-semester course on Advanced Biochemistry designed for BS Chemistry majors. The course deals with the thermodynamic concepts applied to specific biochemical topics; bioenergetics and metabolism of carbohydrates, lipids, and compounds of nitrogen; other aspects of carbohydrate metabolism, such as glycogen metabolism, gluconeogenesis, pentose phosphate pathway, glyoxylate cycle; integrated metabolic pathways. The flow of biological information (including regulation, mutagenesis, and repair) and photosynthesis will also be discussed.

#### **CHEM 602L ADVANCED BIOCHEMISTRY (LABORATORY)**

**Description** A 1-unit one-semester laboratory course on Advanced Biochemistry designed for BS Chemistry majors. The course deals with the analysis of proteins and nucleic acids. Students are required to undertake a mini-research project of their own choosing, from the preparation of a research proposal to experimentation to presentation of results in a colloquium.

#### **THS 1 THESIS I**

**Description** The course is the first of a three-semester course on Thesis. Thesis 1 is a two-unit lecture course that prepares the student in his task of conducting research individually. It guides him on good research practices, including ethical practices, methods of research, writing of the research proposal and the final thesis, dissemination of research through oral presentations, poster presentations and publications. The output is the thesis proposal. The second and third courses are laboratory courses in consultation with the student's research adviser.



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**Fourth Year – First Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM 104	Inorganic Chemistry II	3	0	CHEM 103, CHEM 403, CHEM 403L
CHEM 104L	Inorganic Chemistry II (Laboratory)	0	1	CHEM 103, CHEM 403, CHEM 403L
CHEM 404	Physical Chemistry III	3	0	CHEM 403, CHEM 403L
CHEM 405L	Computational Chemistry (Laboratory)	0	1	CHEM 403, CHEM 403L
PGC	Philippine Government and Constitution	3	0	None
PHLSCI	Philosophy of Science	3	0	PHL 2
SCL 3	The Social Teachings of the Church	3	0	PHL 5, THY 1, THY 2
THS 2	Thesis II	0	2	THS 1
<b>TOTAL</b>		15	4	

**CHEM 104 INORGANIC CHEMISTRY II**

**Description** This course is designed for chemistry majors that deal with important concepts of inorganic chemistry. It is centered on acquiring a conceptual understanding of the structure, bonding and chemistry of inorganic molecules. It will be assumed that students recall principles of general chemistry. It focuses on the relation of atomic and molecular structure to chemical and physical properties. It includes the study of the periodicity and descriptive chemistry of inorganic classes and groups. Topics covered include group theory, molecular orbital theory, structure and bonding concepts in the solid state, redox reactions, acid/base theories, and coordination compounds.

**CHEM 104L INORGANIC CHEMISTRY II (LABORATORY)**

**Description** This course will introduce experimental methods used by inorganic chemists to synthesize and analyse important classes of inorganic compounds. Synthetic methods for the most part will mirror those used in organic chemistry, with some variations. Instrumental methods of analysis involve measurement of electronic (UV-VIS) and vibrational (IR) spectra.



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#### **CHEM 404 PHYSICAL CHEMISTRY III**

**Description** This is an advanced course in physical chemistry which presents a rigorous introduction to the basic principles of quantum mechanics and its applications. It focuses on a conceptual understanding of quantum theory and the application of these and related concepts to solve chemical problems.

#### **CHEM 405L COMPUTATIONAL CHEMISTRY (Laboratory)**

**Description** This course provides the essential theoretical background of computational chemistry and the practical skills to perform computations to solve chemical problems. The content includes discussions of molecular mechanics, Hartree-Fock theory, semi-empirical methods, density functional theory (DFT), basis sets, geometry optimization and transition state searches, and molecular property calculations. In addition, students will learn how to read the professional literature in computational chemistry. Softwares include GAMESS (General Atomic and Molecular Electronic Structure System), Gabedit, and Avogadro.

#### **PGC PHILIPPINE GOVERNMENT AND CONSTITUTION**

**Description** This course is designed to introduce to the students the importance of a national charter in the development of a nation and its government. The subject is designed to provide fundamental information on how the present Philippine constitution reflects the historical and systemic forces that interplay in Philippine politics.

This course will tackle the evolutionary trail of the Philippine charter starting from the Biak na Bato constitution up to the 1987 Charter in order to provide a more detailed understanding of the evolutionary and revolutionary character of all the Philippine Republics.

The course hopes to widen the knowledge and appreciation of political science students in the constitutional history of the country and how it shaped the current systemic character of the Philippine government.

#### **PHLSCI PHILOSOPHY OF SCIENCE**

**Description** This course deals with the logical and historical analysis of the methodology, theories, aim of science, as well as its function in the society. It surveys the history of science and looks at it from the different philosophical views as a kind of knowledge and a way of explaining the world. It also deals with the ethical value of scientific exploits in general and medical practice in particular. Thus, it emphasizes the interrelationships of NATURE, SCIENCE, and VALUES.



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## **SCL 3 THE SOCIAL TEACHINGS OF THE CHURCH**

**Description** The course is an in-depth thematic study of Catholic social thought as found in the Gospel, in the tradition of primitive Christianity, the Fathers of the Church, the official documents of the social teachings of the Church and the lived experience of peoples.

As Mother and Teacher, the Church keeps alive in the personal and collective memory of the people the saving mission of Christ, who became all things to all human beings except sin, and its implication to the final destiny of the human person. She proposes individual and societal life witnessing in the very real experiences of the human person and the communities of peoples in the socio-cultural, economic, political, technological and ecological environments.

As a true disciple of the Risen Christ and moved by the Spirit, the human person is empowered and challenged to bring about social transformation and development by practical competent acts of compassion and commitment to truth in love.

## **THS 2 THESIS II**

**Description** This is independent research work of each student under the supervision of a faculty adviser.



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**Fourth Year – Second Term / Semester**

Abbreviation	Title	Lec. Units	Lab. Units	Pre-Requisites
CHEM CORR	Correlation Course	6	0	CHEM 104, CHEM 104L, CHEM 206, CHEM 303, CHEM 303L, CHEM 404, CHEM 405L, CHEM 602, CHEM 602L
SCL 9	Marriage and Family	3	0	PHL 5, SCL 3, THY 1, THY 2
THS 3	Thesis III	0	2	THS 1, THS 2
<b>TOTAL</b>		<b>9</b>	<b>2</b>	

**CHEM CORR CORRELATION COURSE**

**Description** This six-unit terminal course serves as an intensive review of all previously taken chemistry courses to prepare students for the Chemist Licensure Exam. It covers all the major areas, namely Inorganic Chemistry, Organic Chemistry, Analytical Chemistry, Physical Chemistry and Biochemistry. Students are required to take a simulated licensure exam before the end of the course.

**SCL 9 MARRIAGE AND FAMILY**

**Description** The course Marriage and Family is an inter-disciplinary approach to preparation for and understanding of love, marriage and family life includes the Biblical, theological, sacramental, canonical, legal, psychological and sociological dimensions.

It is rooted in the Catholic spirituality that promotes the culture and transmission of life, faithful to the teachings of the Church, it includes education in human sexuality and responsible parenthood based on the magisterial documents.

**THS 3 THESIS III**

**Description** This is the completion of the independent research work; writing of the thesis; and thesis defense.

