

DEPARTMENT OF CHEMISTRY

Silliman University is one of few Universities in the Philippines that offer a professional B.S. Chemistry curriculum. The main objective of the department is to train students in the different techniques/aspects of chemistry that will prepare them for industry, teaching, research, and/or graduate studies.

Starting school year 1994-95, the department has been offering two parallel programs with respective emphasis on Research and Education Teaching. Graduate of either programs can take the Licensure Examination for Chemists. They could be hired by educational institutions, industrial firms, manufacturing companies, research centers, and laboratories.

The Research Emphasis program requires undergraduate student researches in preparation for graduate studies and research works. The students get the chance to have extensive hands-on experience with modern equipment. Its excellent facilities enable the department to engage in research, sometimes in tandem with the Silliman University Marine Laboratory.

Education Emphasis program has 18 units of education subjects. Graduates of the program are qualified

to teach chemistry in high school and in college. Graduates of both programs can also work in industry as chemists.

Admission

A minimum grade of 2.0 is required for all chemistry courses and in Math 11 & 12. A minimum grade of 1.8 is required for other math and science courses. A quality point average of 2.0 is required for graduation.

In addition to the University's admission policy, the chemistry department requires the prospective BS Chemistry student to meet the following basic requirements:

1. High school graduates must have a mathematics average of 80% or above in the senior year in high school.
2. Shiftees and transferees must submit a certification from the College of Arts & Sciences guidance counselor that the applicant has a high math aptitude.
3. If the applicant meets the basic requirements, he/she must submit for a brief interview with the chairman of the department.

Bachelor of Science in Chemistry Research Emphasis

First Year

First Semester	Units	Second Semester	Units
BC 11 (Preparatory English 11)	3	BC 12 (Basic Communication Skills II)	3
Speech 11 (Basic Spch Comm)	3	Soc 11 (Intro to Socio)	3
Psy 11 (Gen Psych)	3	Rel 22 (New Test Mess)	(3)
Rel 11 (Old Test Mess)	(3)	Math 25 (Mathematical Analysis I)	3
Math 11 (College Algebra)	3	Phys 45 (Gen Physics I)	3
Math 12 (Plane Trigo)	3	Chem 16 (Gen Chem II)	5
Chem 15 (Gen Chemistry 1)	5	PE 12 (Basic Phys Educ)	(2)
PE 11 (Basic Phys Educ)	(2)	NSTP 2	(1.5)
NSTP 1	(1.5)		
Total	28	Total	25

Second Year

First Semester	Units	Second Semester	Units
BC 25		Econ 21	
(Research Writing in the Discipline)	3	(Intro to Economics w/ Taxation & LandReform)	3
Math 26 (Math'cal Analysis II)	5	Math 38 (Math'cal Analysis II)	5
Phys 46 (Gen Physics II)	4	Phys 47(Gen Phys III)	4
Chem 44 (Analytical Chemistry 1)	5	Chem 44 (Analytical Chemistry II)	5
Chem 47 (Org Chem I)	5	Chem 48 (Organic Chemistry II)	5
PE 21 (Basic Phys Educ)	(2)	PE 22 (Basic Phys Ed)	(2)
Total	23	Total	24

Third Year

First Semester	Units	Second Semester	Units
CS 1 (Computer Science I)	3	Hist 31 (Phil. History w/ Phil Gov and Constitution)	3
Fil 13(Sining ng Pakikipagtalastasan)	3	Fil 24(Panitikang Filipino)	3
Math 41(Differential Equations)	3	Bio37 (Microbiology)	4
Bio 23(General Biology)	5	Math22(Analytic Geometry)	3
FA 51 (Arts & Music Appreciation)	3	Chem72(Physical Chemistry III)	4
Chem 71 (Physical Chemistry I)	3	Chem88(Biochemistry I)	4
Chem 75 (Advance Organic Chemistry)	3	Chem 58 (Chemical Literature)	1
Total	24	Total	21

*Revised On March 2010 and approved by the CurriculumCommittee and Academic Council on 03 March 2010 abd 09 March 2010, Respectively.

**Undergraduate Thesis may commence (preliminatries only) on summer before the 4th year offering of the course upon the departmetns approval

Fourth Year

First Semester	Units	Second Semester	Units
Foreign Language	3	Philo 31 (Introduction to Logic)	3
Hist 41 (Rizal Life & Works)	3	SOAN 65 (Culture and Society)	3
Litt 21 (Literature of the Philippines)	3	Rel 61 (Christian Ethics)	4
Chem 73 (Physical Chemistry III)	3	Chem 64 (Seminar)	1
Chem 89 (Biotechnology & Bioinformatics)	4	Chem 82 (Inorganic Chemistry)	4
Chem 61 (Environmental Chemistry)	3	Chem 92 (Industrial Chemistry)	4
Chem 97 (Undergraduate Thesis I)**	3	Chem 98 (Undergraduate Thesis II)	1
Total	22	Total	19

Course Description

11 GENERAL CHEMISTRY I

4 units

The fundamental laws and theories of chemistry. Structure of the atom and chemical bonding. The three states of matter. Elements and compounds. The periodic table. Chemical reactions. Lec 3, Lab 3.

12 GENERAL CHEMISTRY II

4 units

Reaction rates, reversible reactions, Le Chatelier's principle, and chemical equilibrium. Solutions and solubility. Concepts of acid-base and redox system. Lec 3, Lab 3. Prerequisite: Chem 11 or equivalent.

15 GENERAL CHEMISTRY I

5 units

The fundamental laws and theories of chemistry. Structure of the atom and chemical bonding. The three states of matter. Elements and compounds. The periodic table. Chemical reactions. Lec 3, Lab 6.

15 AHSE

5 units

A new course for B.S. Medical Technology students which covers General Chemistry I and General Chemistry II with Qualitative Analysis. Lec 4, Lab 3.

15 HS

5 units

A new course for B.S. Nursing students which covers General Chemistry, Basic Organic Chemistry and Introductory Biochemistry. Lec 4, Lab 3.

16 GENERAL CHEMISTRY II WITH QUALITATIVE ANALYSIS

5 units

Electronic structure and chemical bonding; solutions and solubility; concept of acid-base redox systems, correlation of fundamental properties of atoms and periodic table; main group elements, their reactivities, separation and identification of ions. Prerequisite: Chem 15 or equivalent. Lec 4 or 3, Lec 3 or 6

18 INTRODUCTION TO ORGANIC CHEMISTRY WITH BIOCHEMISTRY **5 units**

A survey of functional groups of organic compounds and their reactivities with emphasis towards biological systems. Chemical processes in the body such as acid-base balance, enzyme systems, proteins, carbohydrates, lipids, mineral and vitamins, and effects of drugs and poisons. Prerequisite: Chem 15 or equivalent. Lec 4, Lab 3.

21 CHEMISTRY AND ITS APPLICATIONS **3 units**

For BBA students. The fundamental laws of Chemistry. Atomic structure and bonding. Chemical reactions. Role of Chemistry in industry and technology, consumer products and environment. Economic factors related to Chemistry. Lec 3.

25 GENERAL CHEMISTRY I **5 units**

For BS Chemistry students. The fundamental laws and theories of chemistry, structure of the atom and chemical bonding; the three states of matter; elements and compounds; the periodic table; chemical reaction, reaction rates and chemical equilibrium. Lec 3, Lab 6.

26 GENERAL CHEMISTRY II WITH QUALITATIVE ANALYSIS **5 units**

For BS Chemistry students. Electronic structure and chemical bonding solution and solubility; concept of acid-base redox systems, correlation of fundamental properties of atoms and periodic table; main group elements, their reactivities, separation and identification of ions. Prerequisite: Chem 25 or equivalent. Lec 3, Lab 6.

44 ANALYTICAL CHEMISTRY **5 units**

The techniques of quantitative separation and determination of inorganic substances, volumetric, gravimetric, spectrophotometric and electroanalytic procedures. Prerequisite: Chem 16 or 41. Lec 3, Lab 6

45 ORGANIC CHEMISTRY WITH DRUG EDUCATION **5 units**

For BSND and BSMT students. Properties, structure, reactivity and stereochemistry of organic compounds including reaction mechanisms, physical and chemical methods, techniques of separation and purification. Physical and functional group tests of organic species. Prerequisite: Chem 12 or 15. Lec 4, Lab 3.

47 ORGANIC CHEMISTRY I **5 units**

For BS Chemistry students. Properties, structure, reactivity and stereochemistry of organic compounds including reaction mechanisms; physical and chemical methods, techniques of separation and purification. Physical and functional group test of organic species and dangerous drug chemicals. For Chemistry and Biology students. Prerequisite: Chem 12 or 15. Lec 3, Lab 6

48 ORGANIC CHEMISTRY II

5 units

Properties, structure, reactivity and stereochemistry of organic compounds including reaction mechanisms and an introduction to spectroscopy as a tool in structure determination; functional group tests, systematic qualitative analysis of organic species. Reactivity and properties of dangerous drugs. Prerequisite: Chem 47. Lec 3, Lab 6

53 ANALYTICAL CHEMISTRY

5 units

Similar to Chem 44. Designed for Medical Technology students. Prerequisite: Chem 15 AHSE. Lec 3, Lab 6

58 CHEMICAL LITERATURE AND RESEARCH METHODOLOGY

1 unit

The nature, deposition and retrieval of chemical information. Experimental Design. Writing of thesis outline in preparation for Chem 97 and 98. Prerequisite: Chem 44 and 48. Lec 1

62 ENVIRONMENTAL CHEMISTRY, TOXICOLOGY AND DANGEROUS DRUGS

3 units

Action of toxicants, dangerous drugs and their effects on body metabolism and other processes; evaluation of chemicals (e.e. trace elements and carcinogens), body tolerance and resistance to toxicants; natural toxins; mutagenicity. Prerequisite: Chem 48 and 75. Lec 2, 3. Lab 3

65 SEMINAR

1 unit

Student presentation and discussion of special topics in chemistry. Requirement: Junior or Senior standing. Lec 1

69 STOICHIOMETRY

3 units

Consolidation of the various mass-mole-volume-concentration ratios of the reactants and products taken up in the different chemistry subjects. Serves as a review program on stoichiometric problems in analytical, organic and industrial chemistry. Prerequisite: Chem 44 and 48. Lec 3

71 PHYSICAL CHEMISTRY I

4 units

The nature and laws of states of matter, and the thermodynamic and kinetic exploration of chemical processes. Prerequisite: Phys 46 and Math 26 (concurrent) Chem 44 and 48. Lec 3, Lab 3

72 PHYSICAL CHEMISTRY II

4 units

The physical methods of investigation of chemical bonding, and structure; spectroscopy, X-ray diffraction, and others; study of systems and processes with the application of thermodynamic kinetic laws and concepts. Prerequisite: Chem 71. Lec 3, Lab 3

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5 units

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75 TECHNICAL AND INSTRUMENTAL ANALYSIS **5 units**

Methods and techniques of quantitative analysis of substances with economic importance: water, soil, ore, food, commercial products, and industrial wastes. Theory and application of various laboratory instruments such as AAS, UV-Vis, IR, NMR, ESR, Mass Spectroscopy, HPLC and GC. Prerequisite: Chem 44 and 47. Lec 3, Lab 6.

78 ADVANCED ORGANIC CHEMISTRY **3 units**

Organic reactions discussed mainly in terms of their mechanisms. Spectroscopic methods of investigation of organic compounds. Heterocyclic compounds. Polymers. Prerequisite: Chem 48. Lec 3

81 ADVANCED INORGANIC CHEMISTRY **3 units**

Transition elements. Study of coordination complexes with regard to bonding theories and reactions. Lanthanides. Nuclear Chemistry. Prerequisite: Chem 44. Lec 3

88 BIOCHEMISTRY WITH DRUG EDUCATION

4/5 units

The macromolecular description of biological material including dangerous drugs and the chemical transformations attending life processes, with the methods employed in bio-chemical studies. Prerequisite: Chem 48 and Bio 23. Lec 3, 4. Lab 3, 6

89 CHEMICAL THEORIES **2 units**

Elementary Quantum Mechanics and its application to spectroscopy and chemical bonding. Probable selected topics (depending on available faculty member): Huckel Molecular Orbital Theory, Elementary Statistical Mechanics, Kinetic Theory, etc. Prerequisite: Chem 44 and 48. Lec 2

91 INDUSTRIAL CHEMISTRY **3 units**

The chemistry, engineering (unit process and unit operation), and economics (material balance of current industrial processing with emphasis on Philippine industries). Utilization of locally available materials. Evaluation of alternative processes on their impact to the environment. Plant visitation. Prerequisite: Chem 48 and 75. Lec 3

93 SEMINAR IN CHEMISTRY TEACHING **3 units**

Philosophy and methodology of chemistry education and teaching, curriculum development, learning resources. Includes effective methods of presentation and problem solving, preparing classroom demonstration, handling laboratory experiments, construction, care and repair of simple laboratory equipment. Prerequisite: Chem 48 and 75. Lec 2 or 3, Lab 3

94 ADVANCED BIOCHEMISTRY **3 units**

Kinetics and thermodynamic principle of metabolic reactions, biochemi-

94 ADVANCED BIOCHEMISTRY**3 units**

Kinetics and thermodynamic principle of metabolic reactions, biochemical energetics, optional topics such as recombinant DNA, molecular endocrinology, neurochemistry and immunochemistry. Prerequisite: Chem 88. Lec 2, Lab 3

97 UNDERGRADUATE THESIS/PRACTICUM I**3 units**

Research methods and an independent investigation of a previously un-researched chemical problem. Students report their research findings in the form of a thesis. Practicum: A 320-hour practical training in an industrial laboratory setting can be used as substitute for the thesis requirement. The training includes quality control, industrial operations and processes. The student is required to make a written proposal prior to the training and a final report of his experience. Prerequisite: Candidacy for graduation.

98 UNDERGRADUATE THESIS/PRACTICUM II 3 units**Continuation of Chemistry 97****99 SPECIAL TOPICS IN CHEMISTRY****3 units**

Specialized application of chemistry in industry such as nuclear technology, geothermal chemistry, colloid chemistry, solid state chemistry, food technology, textile and fiber chemistry, depending upon availability of qualified faculty. Prerequisite: Chem 48 and 75. Lec 2, Lab 3

MathChem 25 MATHEMATICAL ANALYSIS I**5 units**

Similar to Math 25 with applications to chemistry.

MathChem 26 MATHEMATICAL ANALYSIS II**5 units**

Similar to Math 26 with applications to chemistry.

MathChem 31 MATHEMATICAL ANALYSIS III**5 units**

Similar to Math 31 with applications to chemistry.

MathChem 38 DIFFERENTIAL EQUATIONS**3 units**

Similar to Math 38 with applications to chemistry. Application to wave function of quantum mechanics.

Members of the Faculty

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Instructor. BS (Chemistry), Silliman University

Paulina S. Aspilla

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Instructor. BS (Chemistry), Philippine Women's University

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Instructor. BS (Chemistry), Silliman University

Alphita J. Enojo

Instructor. BS (Chemistry), Silliman University; LLB, Silliman University

Jean Theresa O. Go

Instructor. BS(Chemistry), Silliman University

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