

B.S. CHEMISTRY CURRICULUM

Institute of Chemistry, University of the Philippines, Diliman
(145-149 Units) Effective August 2018

- 101.1 Laboratory Techniques for Organic and Analytical Chemistry. Integrated experiments in basic organic chemistry reactions, physical methods, sampling, gravimetric analysis and titrimetric analysis; introduction to chromatography, potentiometry and spectrophotometry; safety and chemical waste management. Prereq: to be taken simultaneously with Chem 28 and Chem 33. 9 h (lab). 3 u.
- 101.2 Organic Reactions and Instrumental Methods of Analysis. Integrated experiments involving methods of synthesis, as well as instrumental techniques in analytical and organic chemistry such as spectroscopy, chromatography and electrochemistry; safety and chemical waste management. Prereq: Chem 101.1 to be taken simultaneously with Chem 34 and Chem 123. 9 h. (lab) 3 u.
- 102.1 Integrated Laboratory for Biochemistry, Inorganic Chemistry and Physical Chemistry. Integrated experiments involving laboratory techniques in biochemistry, inorganic and physical chemistry (e.g., kinetic, separation and spectroscopic methods); synthesis; safety and chemical waste management. Prereq: Chem 145, Chem 145.1 and Chem 153. Coreq: Chem 146 and Chem 154. 9 h. (lab) 3 u
- 102.2 Advanced Integrated Laboratory for Biochemistry, Inorganic Chemistry and Physical Chemistry. Integrated experiments involving advanced laboratory techniques in biochemistry, inorganic and physical chemistry (e.g., kinetic, separation and spectroscopic methods); synthesis; safety and chemical waste management. Prereq: Chem 102.1 and Chem 112. 9 h. (lab) 3 u.
- 105 Mathematical Methods for Chemistry. Applications of mathematical methods to specific chemistry problems. Prereq: Math 54. 3h. (lec). 3 u.
- 112 Principles of Inorganic Chemistry and their Applications to Representative Elements. Structure, bonding, and chemical reactivities of representative elements and their compounds. Prereq: Chem 28. 3 u.
- 113 Transition and Rare Earth Elements and their Compounds. Chemical structures, properties and reactivities of d- and f-block elements and their compounds. Prereq: Chem 112. 3h. (lec). 3 u.
- 123 Advanced Analytical Chemistry. Principles and applications of instrumental methods with emphasis on separations, spectroscopic and electrochemical methods; introduction to quality assurance in the analytical laboratory. Prereq: Chem 28, 33, 101.1; to be taken simultaneously with Chem 34 and 101.2. 3 u.

- 125 Basic Electronics for Chemical Instrumentation. Basic principles of instrumentation in spectrophotometric, electrometric and separation methods; fundamentals of electronics. Prereq: Chem 28, 34, Physics 72. 6 h. (3 lec, 3 lab) 4 u.
- 145 Principles of Biochemistry. Concepts in structure and function of the major biomolecules; bioenergetics, kinetics and mechanisms of enzyme catalysis, modulation and inhibition. Prereq: Chem 28, 34, 101.1, 101.2. 3 u.
- 145.1 Laboratory Techniques in Biochemistry. Fundamental techniques in biochemistry for extracting, handling and characterizing the major classes of biomolecules. These techniques are used for molecules of high molecular weights, which are relatively unstable and often denaturable with techniques ordinarily applied for small molecules. Coreq: Chem 145. 3 h. (lab). 3 u.
- 146 Biochemistry of Metabolism and Informational Pathways. Primary catabolic and anabolic pathways; gene replication, expression and regulation; hormones and signaling pathways. Prereq: Chem 145; to be taken simultaneously with Chem 102.1. Coreq: Chem 146.1. 3 u.
- 150 Introduction to Physical Chemistry. General principles of physical chemistry with emphasis on their application to biological systems. Prereq: Chem 26, 26.1, 31, 31.1/equiv. 3 u.
- 150.1 Introduction to Physical Chemistry Laboratory. Prereq/ Coreq: Chem 150. 3 h. (lab) 1 u.
- 153 Physical Chemistry: Foundations of Chemical Thermodynamics. Fundamental relations and equations in state. Prereq: Chem 105 or COI. 3 u.
- 154 Physical Chemistry of Real Systems. Electrochemistry, chemical kinetics and reaction mechanisms, surface phenomena, colloids, and transport properties. Prereq: Chem 153 or ChE 122, and Physics 72. 3 u.
- 156 Introduction to Quantum Chemistry. Principles of quantum mechanics applied to atomic and molecular structure; approximate methods for complex atoms and molecules. Prereq: Chem 153 and Physics 72. 3 u.
- 196 Undergraduate Seminar. Prereq: SS. 1 u., may be taken twice.
- 197 Special Topics in Applied Chemistry. Prereq: SS. 3 u.
- 200 Undergraduate Thesis. 4 u. (1 yr., 2 u./sem.).

First Year

First Semester		Second Semester	
GE1 (AH1) Eng 13	3	GE4 (AH3) Speech 30	3
GE2 (SSP1) Kas 1*	3	Chem 17	3
GE3 (AH2) Arts 1	3	Chem 17.1	2
Chem 16	3	Math 21	4
Chem 16.1	2	Biology 11	3
Geol 11	3	Biology 11.1	2
PE	(2)	PE	(2)
NSTP ¹	(3)	NSTP ¹	(3)
	<u>17</u>		<u>17</u>

Second Year

First Semester		Second Semester	
Chem 28	3	GE5 (SSP2) Philo 1	3
Chem 33	3	Chem 34	3
Chem 101.1	3	Chem 123	3
Math 22	4	Chem 101.2	3
Physics 71	4	Chem 105	3
PE	(2)	Physics 71.1	3
NSTP ¹	(3)	PE	(2)
	<u>18</u>	NSTP ¹	(3)
			<u>17</u>

Third Year

First Semester		Second Semester	
GE6 (AH4) Fil 40*	3	GE7 (SSP3) Socsci 1	3
Chem 145	3	Chem. 146	3
Chem 145.1	1	Chem. 112	3
Chem 153	3	Chem. 102.1	3
Physics 72	4	Chem. 154	3
Physics 72.1	1		15
	<u>15</u>		

Midyear: Chem. 197- 3 units

Fourth Year

First Semester		Second Semester	
Chem 113	3	GE8 (MST1) STS 1	3
Chem. 102.2	3	GE9 free choice	3
Chem. 156	3	GE10 free choice	3
Chem. 196	1	Chem. 200	2
Chem. 200	2	PI 100	3
Elective ²	3-5	Elective ²	3-5
	<u>15-17</u>		<u>17-19</u>

¹Choice of CMT (may be taken Starting first year) or CWTS (may be taken starting second year) Note: As a requirement for graduation, all student are required to take six (6) units in one of the National Service Training Program (NSTP) components. ROTC & Civic Welfare Training Service are offered by UPD.

²Two (2) course electives equivalent to a minimum of 6 units, at least 3 units of which are science electives.

*Kas 1 and Fil 40 satisfy the 6 - unit Philippine Studies requirement

The list of science electives includes courses where students satisfy the prerequisites.

COLLEGE OF SCIENCE

Chemistry graduate courses

Biology courses

BIO 12 Fundamentals of Biology II; BIO 101 Plant Morphoanatomy; BIO 102 Comparative Vertebrate Anatomy; BIO 111 *Psychology*, Taxonomy, morphology and phylogeny of algae; BIO 112 Mycology; BIO 114 Mosses, Hepatics & Ferns; BIO 115 Taxonomy of Angiosperms; BIO 116 Invertebrate Biology; BIO 116.1 Invertebrate Biology Laboratory; BIO 118 Insect Biology; BIO 120 General Microbiology; BIO 150 Fundamental of Cell and Molecular Biology; BIO 180 Statistical Methods in Biology

Geology courses

Geol 11.1 Laboratory in Principles of Geology; Geol 40 Elementary Mineralogy

Marine Science courses

MS 101 Oceans; MS 102 The Marine Sciences; MS 220 Chemical Oceanography; MS 221 Marine Geochemistry; MS 222 Chemistry of Marine Coastal Environment; MS 226 Marine Pollution Chemistry; MS 226.1 Marine Pollution Chemistry Laboratory

Mathematics courses

Math 114 linear Algebra; Math 121.1 Elementary Differential Equations; Math 162 Theory of Interest; *Math* 203 Matrices and Applications; Math 258 Combinatorial Mathematics

Meteorology courses

Meteo 101 General Meteorology; Meteo 224 Air Pollution Meteorology

Materials Science and Engineering courses

MSE 201 Fundamentals of Materials Science and Engineering; MSE 211 Laboratory Module in Transmitted Light Microscopy; MSE 212 Laboratory Module in Mineralogy; MSE 214 Laboratory Module in Vacuum Technologies and Thin Film Deposition; MSE 215 Laboratory Module in Electronic and Magnetic Measurements; MSE 216 Laboratory Module in Ceramics Processing and Characterization; MSE 231 Thermodynamics of Materials; MSE 233 Kinetics of Materials; MSE 241 Physics of Solids; MSE 266 Polymer Materials; MSE 271 Physics of Liquid Crystals

Molecular Biology and Biotechnnology courses

MBB 10 Introduction to Molecular Biology; MBB 110 Fundamentals of Molecular Microbiology; MBB 121 Fundamentals of Cell and Tissue Culture; MBB 125 Molecular Physiology of Eukaryotic Systems; MBB 140 Molecular Genetics

Environmental Science courses

Env Sci 201 Fundamentals of Environmental Science I; Env Sci 202 Fundamentals of Environmental Science II; Env Sci 211 Computational Methods in Environmental Science; Env Sci 212 Environmental Problems and Issues

Physics courses

Physics 73 Elementary Physics III
Physics 73.1 Elementary Physics III Laboratory

COLLEGE OF ENGINEERING

Chemical Engineering courses

ChE 2 Elementary Chemical Engineering; ChE 100 Introduction to Chemical Engineering Profession.

Civil Engineering courses

CE 21 *Engineering Statistics*

Engineering Sciences courses

ES 1 *Engineering Drawing*

Materials Engineering courses

MatE 10 Engineering Materials; MatE 11 Fundamentals of Materials Engineering I; MatE 101 Thermodynamics of Materials; MatE 105 Analytical Techniques in Materials Engineering; MatE 105.1 Analytical Techniques in Materials Engineering Lab; MatE 131 Polymer Materials

Metallurgical Engineering courses

MetE 11 Principles of Metallurgy; MetE 12 Metallurgical Measurement; MetE 13 Methods of Metallurgical Analysis; MetE 14 Metallurgical Experimental Design; MetE 17 Metallurgical Thermodynamics; MetE 18 Metallurgical Thermodynamics Laboratory; MetE 120 Ore Dressing; MetE 121 Mineral Processing I

Industrial Engineering courses

IE 3 Engineering to Industrial Engineering; IE 21 Industrial Materials and Processes

Information Technology

IT 100 Introduction to Information Technology; IT 110 Information System in Enterprises

COLLEGE OF HOME ECONOMICS

Foods and Nutrition courses

FN 102 Principles of Food Preparation; FN 121 Physiological Aspect of Nutrition; FN 122 Principles of Nutrition; FN 124 Nutrition for at-Risk Groups; FN 131 Dietary Patterns.

Food Science courses

FS 106 General Microbiology; FS 116 Food Microbiology; FS 125 Food Chemistry; FS 126 Food Biotechnology; FS 127 Food Processing I; FS 135 Physico-Chemical Analysis of Foods; FS 140 Waste Management in food Processing

SCHOOL OF STATISTICS

Stat 101 Elementary Statistics



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UNDERGRADUATE COURSES CHEMISTRY

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| 16 | General Chemistry I. Fundamentals of chemistry. Prereq/ Coreq: Math 11/equiv. 9 h. (3 class, 6 lab) 5 u. |
| 17 | General Chemistry II. Continuation of Chemistry 16. Prereq: Chem 16, Math 14/equiv. 9 h. (3 class, 6 lab) 5 u. |
| 26 | Introduction to Quantitative Chemical Analysis. Basic principles of analytical chemistry with emphasis on stoichiometry and equilibrium concepts and calculations. Prereq: Chem 16, Math 17/ equiv.; to be taken simultaneously with Chem 26.1. 3 u. |
| 26.1 | Introduction to Quantitative Chemical Analysis Laboratory. Prereq: To be taken simultaneously with Chem 26. 6 h. (lab) 2 u. |
| 28 | Fundamentals of Analytical Chemistry. Principles and techniques of absolute methods of analysis and selected comparative methods. Prereq: Chem 17. Coreq: Chem 28.1 (for non-BS Chem majors) or Chem 101.1 (for BS Chem majors). 3 u. |
| 28.1 | Fundamentals of Analytical Chemistry Laboratory. Prereq: To be taken simultaneously with Chem 28. 6 h. (lab) 2 u. |
| 31 | Elementary Organic Chemistry. Introduction to modern theories in organic chemistry. Correlation of structure with properties of organic compounds. Prereq: Chem 16/equiv; to be taken simultaneously with Chem 31.1. 3 u. |
| 31.1 | Elementary Organic Chemistry Laboratory. Prereq: To be taken simultaneously with Chem 31. 6 h. (lab) 2 u. |
| 33 | Fundamentals of Organic Chemistry . Introduction to modern concepts in organic chemistry. Discussion of electronic and structural effects on reaction mechanisms. Chem 17. 3 u. |
| 34 | Organic Reactions and Spectroscopy. An integrated application of modern concepts in organic chemistry to physical properties and chemical reactivities of organic compounds. Prereq: Chem 33. 3 u. |
| 40 | Elementary Biochemistry. An elementary treatment of structure-function relationship of biomolecules and biochemical mechanisms. Prereq: Chem 26, 26.1, 31, 31.1/Chem 17, Chem 31, 31.1/equvs.; to be taken simultaneously with Chem 40.1. 3 u. |
| 40.1 | Elementary Biochemistry Laboratory. Prereq: To be taken simultaneously with Chem 40. 6 h. (lab) 2 u. |