

CHEMISTRY DEPARTMENT
De La Salle University-Manila

MASTER OF SCIENCE IN CHEMISTRY

The Master of Science in Chemistry program aims to provide students with an extensive grounding in chemical concepts and training in chemical techniques at the graduate level, to update them on recent developments in chemistry, and to encourage independent experimental work.

Admissions

The applicant should comply with the graduate school admission requirements of DLSU. In addition, the applicant needs to take placement or aptitude examinations in four areas of Chemistry.

The applicant is expected to have either a BS Chemistry degree or other undergraduate degree provided that he has the following minimum requirements

Course	Units
General Chemistry (lecture and laboratory)	10
Organic Chemistry (lecture and laboratory)	5
Biochemistry or equivalent course	3
Physical Chemistry (lecture and laboratory)	5
Analytical Chemistry (lecture and laboratory)	5
Inorganic Chemistry	3
Differential and Integral Calculus	5
General Physics	5
Undergraduate science of engineering thesis/project	

Applicants who do not meet the minimum entry qualification may be advised to take preparatory or refresher courses prior to admission to the program.

Remedial English

An incoming graduate student who received a grade of lower than 2.0 in the Essay portion of the entrance exam is required to take two 3 unit English writing remedial courses, namely ENG501M and ENG502M. The student should successfully finish these courses (minimum grade is 2.0 for credit) within the first year of enrolment in his/her graduate program. Failure to satisfy this requirement will result in the dropping of the student from his/her program.

Program Requirements

Advance Academic Writing	(6 units)
Core courses	18 units
Cognate/Elective Courses	9 units
Graduate Seminar	3 units
Thesis	6 units
Comprehensive Examination	0 unit
Total	36 units

CORE COURSES

CHM603M	Structural Concepts in Inorganic Chemistry	3 units
CHM621M	Advanced Analytical Techniques in Chemistry Lecture	3 units
CHM622M	Advanced Analytical Techniques in Chemistry Laboratory	1 unit
CHM643M	Organic Reactions and Mechanisms	3 units
CHM644M	Organic Reactions Laboratory	2 units
CHM661M	Quantum Chemistry1	3 units
CHM791M	Advanced Biochemistry	3 units

GRADUATE SEMINAR

CHM900M	Fundamentals of Research and Seminar	3 units
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RESEARCH COURSES

CHM901M	Directed Research without laboratory	0 unit
CHM902M	Directed Research with laboratory	0 unit
CHM876M to CHM884M	Chemistry Thesis 1-9	6 units

Course Tracking for MS Chemistry

Term 1	Term 2	Term 3
(ENG 501M, 3 units) CHM900M Fundamentals of Research and Seminar (3 units) CHM621M Advanced Analytical Chemistry (3 units) CHM622M Advanced Analytical Chemistry Laboratory (1 unit)	(ENG 502M, 3 units) CHM661M Quantum Chemistry (3 units) CHM643M Organic Reactions Mechanism (3 units) Elective (3 units)	CHM603M Structural Concepts in Inorganic Chemistry CHM644M Organic Reactions Laboratory CHM791M Molecular Biochemistry (3 units)
Elective (3 units) Elective (3 units) CHM902M Directed Research without Laboratory COMPREHENSIVE EXAM	CHM876M to CHM884M Chemistry Thesis	CHM876M to CHM884M Chemistry Thesis 1 to 9

Comprehensive Examinations for M.S. Students

A graduate student is eligible to take the comprehensive examinations after he/she has enrolled and passed/completed all the core courses.

The student should apply for the comprehensive examinations at the Registrars' Office which must certify the completion of academic requirements. A permit is secured by the student from the GS Director's Office for clearance purposes, after which he/she must enlist with the department secretary.

Written comprehensive examinations are given by the Chemistry Graduate Committee in each of the following areas:

Analytical Chemistry
Biochemistry
Inorganic Chemistry
Organic Chemistry
Physical Chemistry

For MS Chemistry students, the comprehensive examinations are scheduled on five successive Saturdays. Three hours are normally allotted per subject area.

The passing mark is 50%.

A student must take all defined subject area examinations in one testing period. Only in the area(s) where a student fails will he/she be made to take a re-test. Such a re-test must be scheduled in one testing period only; i.e., if two or more examinations need to be repeated, all must be taken during one testing period. If a student fails a second time, he must audit the courses he failed whereupon he can take another re-test in the specific area. If a student fails three times in any of the five subject areas he is automatically dropped from the program regardless of the subject areas he had previously passed. A student is officially informed of the comprehensive examination results about three weeks after the end of the testing period.

Grades

1. The minimum grade with credit is 2.0.
2. The College Graduate Council has agreed to implement the following grading schemes for non-regular subjects:

Subject	Purpose	Minimum Grade with Credit
Audit	Personal enrichment	AUDIT
	Requirement for retaking comprehensive exams	AUDIT
Enrichment/ Refresher	New admission	1.0 (M.S./Ph.D.)
	Re-admission	{ 2.0 (M.S.) 2.5 (Ph.D.)

3. Students taking Directed Research are given a grade of AUDIT. Those taking Thesis/Dissertation are given a grade of 9.9 until the students complete all requirements.
4. As per department policy, no incomplete grade is given for graduate courses.
5. The deadline for submission of GS grading sheets and course card distribution follows that of the undergraduates. Course cards may be distributed earlier but not later than the scheduled date. The COS-GSO will notify concerned faculty of his/her course card schedule.

Directed Research

1. A graduate student who has enrolled and passed/completed all academic requirements may start work on his thesis provided he is enrolled in Directed Research. He may or may not have taken or passed the comprehensive examinations.
2. Students should enroll in Directed Research as an AUDIT class.
3. Directed Research will be offered every term and during summer. The course carries zero (0) units; however, the student will be asked to pay for three laboratory units. The student may enroll in this course for an unlimited number of times until he becomes eligible to enroll in thesis. The course will be on a tutorial basis with the research advisers as instructor.
4. A student enrolled in Directed Research/Thesis/Dissertation is required to obtain a Certificate of Research Enrolment from the Graduate School Office to be presented to the adviser to confirm his/her enrolment.

Research and Mentoring

1. Only those students with Certificate of Research Enrolment (Directed Research, Thesis, Dissertation) should be allowed to work in the laboratory or accommodated for research consultation. Mentors are requested to refer those without clearance to the COS-GSO.
2. Students are required to write a research proposal for their thesis topic and have this approved by the thesis panel approved by the Graduate School Committee. The panel shall consist of 3 members and must include an external examiner to be chosen by the adviser upon consultation with the concerned advisee. All members of the committee should have at least an MS Chemistry degree or in a field related to the thesis and the chair should have a PhD degree. Research advisers are reminded that application for proposal/final defense must be filed and completed two weeks before the scheduled date of defense.
3. Please note that students who are expected to defend their thesis/dissertation during the Summer Term but not before the 3rd Term deadline set by the Registrar's Office do not need to enroll in Thesis/Dissertation. However, they must enroll in Residency in order to gain campus access. If the defense is set after the 3rd Term deadline but before the Term 1 of the next SY, student must enroll in Thesis/Dissertation for the Summer Term.
4. As part of the degree requirements, students must submit a hard copy of the thesis or dissertation, an electronic copy (CD or floppy), a poster, and a manuscript in the style of Journal of Research in Science and Engineering before the final grade is given.

Course Description

Advance Academic Writing Courses:

Advanced Technical Reading and Writing 1 (ENG501M)

3 units

The first part of an intensive English academic reading and writing course, focuses on the review of basic reading and writing skills and their application in the preparation of short academic papers such as definitions and descriptions, and non-prose forms. It emphasizes the mastery of active reading strategies, the effective use of rhetorical and organizational features of academic writing, and proper documentation.

Advanced Technical Reading and Writing 2 (ENG502M)

3 units

The second part of the intensive English academic reading and writing course, focuses on the writing of data commentary and the various parts of a research report, with emphasis on the different rhetorical moves and the linguistic features that realize these moves. The course continues to emphasize the observance of integrity in writing and research.

Fundamentals of Research and Seminar (CHM900M)

3 units

A course aimed at guiding the student in choosing a research problem for a master's thesis. Surveys of the use of chemical literature, including databases and computer-aided searching, is presented. The student is required to submit a proposal of his or her thesis research at the end of the course, as well as to present a seminar on a current topic of chemical interest.

Core Courses:

Advanced Analytical Techniques in Chemistry Lecture (CHM621M)

3 units

A course dealing with the principles and instrumentation in spectroscopy, chromatography, mass spectrometry, hyphenated techniques, thermal analytical methods, and voltametry.

Advanced Analytical Techniques in Chemistry Laboratory (CHM622M)

1 unit

A laboratory course covering instrumental analytical applications of absorption and emission spectroscopy, chromatography, and voltametric methods in determining important physicochemical data. Co-requisite : CHM621M

Advanced Biochemistry (CHM791M)

3 units

A study of the structure and function of biomolecules, biochemical pathways, and signal transduction.

Organic Reactions and Mechanisms (CHM643M)

3 units

An intensive review of selected organic chemical reactions and mechanisms emphasizing the experimental approach.

Organic Reactions Laboratory (CHM644M)

2 units

A laboratory course covering the application of concepts and theories discussed in organic synthesis lecture. Techniques such as monitoring of reactions, proper handling of toxic and air sensitive compounds, and determining correct reaction set-up are also included.

Structural Concepts in Inorganic Chemistry (CHM603M)**3 units**

This course introduces the quantitative basis of group theory and the use of symmetry in chemistry. It includes the chemical applications of group theory in areas such as spectroscopy and bonding. It also deals with atomic theory, structure and symmetry, bonding theories, acid-base chemistries and chemical forces in inorganic compounds. Coordination compounds, organometallics, cage/cluster compounds, and bio-organic systems are likewise presented from the viewpoint of their structure and bonding.

Quantum Chemistry 1 (CHM661M)**3 units**

A study of the postulates of quantum mechanics as applied to simple systems and hydrogen-like systems. The course includes group theory and discussions of selected approximation methods for many electron systems.

Research Courses:**Directed Research without Laboratory (CHM901M)****0 unit**

The development of an original problem under the supervision of an adviser. The course is designed for students who are not yet eligible to enroll in the thesis course but who wish to start working in their research problem which does not entail laboratory work.

Directed Research with Laboratory (CHM902M)**0 unit**

Development of an original research problem through laboratory experimentation under the supervision of an adviser. The course is designed for student who wish to start laboratory research work but are not yet eligible to enroll in the thesis course.

Chemistry Thesis 1 to 9 (CHM876M – CHM884M)**6 units**

Conduct of an original research under the supervision of a thesis mentor.

Cognate/Elective Courses:**Advanced Physical Organic Chemistry (CHM767M)****3 units**

A course emphasizing the application of physical chemistry in the study of structure and reactivity compounds as well as organic reactions mechanisms.

Advanced Techniques in Biochemistry Laboratory (CHM782M)**3 units**

This course deals with the theory and application of modern biochemical techniques and instrumentation. Topics covered include the use chromatographic and electrophoretic techniques, and spectroscopy in the separation, characterization, analysis, and structural elucidation of biomolecules.

Biological Membranes/Molecular Basis of Selected Diseases (CHM785M)

Part I focuses on the molecular principles to explain the structure, function, dynamics and bioenergetics of biological membranes. Part II deals with the molecular basis of selected diseases and drug therapy.

Chemical Kinetics (CHM763M)**3 units**

A course dealing with the study of rates of chemical reactions, their description, interpretations, and mechanisms. The course includes the principal theories if unimolecular and bimolecular processes, chain reactions, absolute reaction rate theory and its applications to chemical systems. Selected topics, such as heterogeneous kinetics, isotopic effects, flow systems, fast reaction techniques, may be covered.

Chemical Thermodynamics (CHM761M)**3 units**

An extended study of principles of the thermodynamics laws and their application to chemical and related systems, real and ideal. The principles and applications of statistical thermodynamics are introduced.

Chemistry of Natural Products (CHM747M)**3 units**

The study of structures and biogenesis of the different groups of secondary metabolites. It also includes spectroscopic methods applied to structure elucidation of secondary metabolites, the experimental techniques in detection, extraction and isolation of secondary metabolites, a discussion of the research directions in the chemistry of natural products research, and inorganic aspects of natural products.

Chemistry of Nucleic Acids and Proteins (CHM783M)**3 units**

A study of the structures, functions and biosynthesis and metabolism of nucleic acids and proteins.

Chemistry of Lipids (CHM891M)**3 units**

A study of the chemistry of lipids, the relationships between structures and functions. Lipid metabolism will also be discussed.

Chemistry of Carbohydrates (CHM809M)**3 units**

A study of the chemistry of carbohydrates from a predominantly structural and mechanistic approach. Carbohydrate metabolism is also discussed.

Chemistry of Enzymes (CHM891M)**3 units**

A course in biochemistry which discusses enzyme classification and nomenclature, 3-dimensional structure of enzymes, mechanics of catalysis and enzyme-substrates interaction.

Chemical Crystallography 1 (CHM777M)**3 units**

An introduction to x-ray diffraction processes of single crystals. The course includes crystallographic symmetry, x-ray principles, diffraction processes, collection and interpretation of x-ray data.

Chemical Crystallography 2 (CHM779M)**3 units**

A course dealing with crystallographic computational techniques and devices and their application towards the solution of three-dimensional molecular structures.

Chemistry of Heterocycles (CHM893M)**3 units**

A study of systematic heterocyclic chemistry with emphasis on 5- and 6- membered systems. Comparison with carbocyclic systems will be included.

Chromatographic Methods Lecture (CHM723M)**1 unit**

A study of the fundamental principles, instrumentation, application, and qualitative as well as quantitative interpretation of the physico-chemical data of liquid chromatographic methods (SLC, HPLC, IEC, GPC) and gas chromatographic methods (GSC, GLC). New methods such as supercritical fluid chromatography may also be included.

Chromatographic Methods Laboratory (CHM724M)**2 units**

A laboratory course on separation of mixtures by liquid and gas chromatographic methods.

Coordination Chemistry (CHM703M)**3 units**

A course covering the structure and bonding of coordination compounds, their reactivities and mechanisms. Spectral, magnetic, and crystallographic data are used in the characterization of these compounds.

Electroanalytical Chemistry (CHM721M)**3 units**

A course covering fundamental concepts of analytical electrochemistry, methodology, and practical applications of electrochemical techniques, such as controlled-potential and controlled current methods, and spectroelectrochemistry, and introductory electronics.

Environmental Chemistry (CHM751M)**3 units**

A course dealing with the fundamentals of dynamic equilibria processes in the environment sources as well as the study on the nature and chemistry of pollutants, monitoring, and control of environmental pollution in air, land and water.

Enzymology (CHM783M)**3 units**

This course deals with enzyme structure and function, kinetics, mechanism, and regulation.

Food and Plant Biochemistry (CHM787M)**3 units**

Part I focuses on the molecular principles to explain the structure, function, dynamics and bioenergetics of biological membranes. Part II deals with the molecular basis of selected diseases and drug therapy.

Inorganic Synthesis Lecture (CHM701M)**2 units**

A course dealing with the analysis, strategy, and planning involved in the synthesis of inorganic compounds, particularly coordination compounds.

Inorganic Synthesis Laboratory (CHM702M)**2 units**

A laboratory course accompanying the inorganic synthesis lecture. Laboratory experiments on the synthesis of inorganic compounds such as metal carbonyls, transition metal complexes, metallocenes are included. Techniques of monitoring of reaction, proper handling of sensitive materials, determining correct reaction set-ups, as well as characterization of inorganic products are emphasized.

Co-requisite : CHM701M

Marine Natural Products (CHM893M)**3 units**

A phyletic survey of the natural products isolated from the marine environment, with chemical ecology and chemotaxonomy implications and biosynthetic considerations.

Medicinal Chemistry (CHM805M)**3 units**

The study of structure, synthesis, mechanism of action and biosynthesis of medicinal agents such as cardiovascular agents, central nervous system stimulants and depressants, anesthetics, anti-allergens, analgesics, and hormones.

Nanoscience (CHM755M)**3 units**

Deals with chemistry of nanoparticles and its applications.

Optical Methods of Analysis (CHM727M)**3 units**

A study on optical instrumentation and the principles and applications of spectrography and spectrophotometry.

Organic Synthesis Lecture (CHM741M)**2 units**

A course dealing with the analysis, strategy, and planning of multi-step organic synthesis, including the application of protecting groups and metal catalysts, the choice of proper reagents, and reaction conditions.

Physical Biochemistry (CHM789M)

This 3-unit course focuses on the basic principles of quantitative and physical biochemistry. Topics include acid-base balance, bioenergetics, enzyme catalysis, and techniques used to determine the structure of biomolecules

Polymer Chemistry (CHM807M)**3 units**

This course tackles topics on the physicochemical properties of polymers which include the molecular weight, morphology, bulk, solubility, elasticity and thermal transitions. It looks into the mechanisms and kinetics of polymerization process as well as copolymerization.

Physical Inorganic Chemistry (CHM705M)**3 units****Quantum Chemistry 2 (CHM765M)****3 units**

A course dealing with approximation methods for chemical systems and a study of time dependent processes.

Special Topics in Analytical Chemistry (CHM721M)**3 units**

Study of the recent trends in analytical chemistry

Special Topics in Inorganic Chemistry (CHM811M)**3 units**

Study of the recent trends in inorganic chemistry

Special Topics in Analytical Chemistry (CHM813M)**3 units**

Study of the recent trends in analytical chemistry

Special Topics in Inorganic Chemistry (CHM815M)**3 units**

Study of the recent trends in inorganic chemistry

Special Topics in Physical Chemistry (CHM817M)**3 units**

Study of the recent trends in physical chemistry

Special Topics in Biochemistry (CHM819M)**3 units**

Study of the recent trends in biochemistry

Spectroscopic Methods in Organic Chemistry (CHM743M)

3 units

A course dealing with the application of spectroscopic techniques (UV-Vis, IR, MS, NMR) in the structure of elucidation of organic compounds. Two dimensional NMR techniques are emphasized.

Stereochemistry (CHM745M)

3 units

A course on control elements in organic synthesis. Topics include regiospecificity, stereospecificity, asymmetric induction/catalysis, and Woodward-Hoffman rules.