

MASTER OF SCIENCE IN CHEMICAL EDUCATION PROGRAM

OBJECTIVES

The Master of Science in Chemical Education is a non-thesis masteral program that is geared for teachers of undergraduate chemistry. This program is specially designed for those wish to specialize in chemical education.

ADMISSION REQUIREMENTS

Possession of B.S. degree obtained from a recognized institution of higher learning; completion of at least thirty five(35) units of college chemistry; a high degree of intellectual capacity; and aptitude for graduate study in chemistry.

DIAGNOSTIC EXAMINATIONS

The applicant shall be required to take diagnostic examinations, covering Biochemistry, Analytical, Inorganic, Organic, and Physical Chemistry. Students with unsatisfactory performance may be required to take the necessary remedial undergraduate courses without graduate credit.

GENERAL REQUIREMENTS

1. Complete a minimum of thirty three(33) units of formal graduate courses.
2. Complete two(2) units of chemistry 290 seminar courses
3. Maintain a Cumulative Weighted Average Grade (CWAG) of 2.0 or better in graduate courses at the end of each academic year.
4. Pass the M.S. preliminary examination that has to be taken by the student within one(1) year after completing the core courses.
5. Pass the comprehensive examination. The comprehensive examination is an oral examination that must be taken by the student after he/she passed the preliminary examination and completed all the course and seminar requirements for the degree. The student is required to give a seminar on a topic covering a recent development in the discipline.

COURSE REQUIREMENTS

Core Courses(24 units)

Chem 211(Systematic Inorganic Chemistry)
Chem 223(Theoretical analytical Chemistry) or
Chem 220 (Instrumental Methods of Analysis) **3**
Chem 230 (Physical Organic Chemistry I) **3 or**
Chem 240 (Advanced Biochemistry) **3**
Chem 250 (Chemical Thermodynamics I) **3**
Chem 252 (Graduate Physical Chemistry Laboratory) **3**
Chem 288 (Chemistry Teaching Practicum) **3**
Chem 289 (Special Problems in Chemical Education) **3**
Educ 380 (Seminar in College Teaching) **2**
Educ 381 (Workshop in College Teaching) **3**

Cognates (9 units): may be chosen from any of the remaining graduate course offering or any relevant graduate course in other discipline such as Physics, Mathematics, Biology, and others. **3**

DOCTOR OF PHILOSOPHY IN CHEMISTRY PROGRAM

OBJECTIVES

The program aims to provide advanced graduate training in chemistry which would allow successful students to carry out independent research, and pursue careers in academic, government, research and industrial institutions. These highly trained chemists are needed in the solution of various national developmental problems.

ADMISSION REQUIREMENTS

Possession of a B.S. or M.S. degree obtained from a recognized institution of higher learning; completion of at least sixty(60) units of college chemistry; a high degree of intellectual capacity; and aptitude for graduate study in chemistry.

DIAGNOSTIC EXAMINATIONS—required for B.S. Chemistry applicants

GENERAL REQUIREMENTS

1. Complete a minimum of twenty four (24) units of formal graduate course for M.S. degree students and forty five(45) units for B.S. degree students.
2. Complete two(2) units of chemistry 390 seminar courses, one(1) unit of which should be in student's area of specialization.
3. Maintain a cumulative Weighted Average Grade (CWAG) of 1.75 or better in graduate courses at the end of each academic year.
4. Pass the qualifying examination based on the core courses.
5. Pass the candidacy examination after completion of course work.
6. Complete a Ph.D. dissertation(12 units of Chemistry 400) based on an independent and original research.
7. Participate in a college graduate colloquia
8. Successfully defend the Ph.D. dissertation in a public doctoral examination.
9. Submit at least six(6) bound and certified copies of the approved Ph.D. dissertation and a dissertation pre-print

COURSE REQUIREMENTS

Core Course for B.S. Graduate(32 units) (* for M.S. Graduates)

Chem 211(Systematic Inorganic Chemistry) **3**
*Chem 212 (Reaction Mechanism of Transition Metal Complexes) OR **3**
Chem 213 (Physical Methods of Inorganic Chemistry) **3**
Chem 223 (Theoretical Analytical Chemistry) **3 or**
*Chem 220 (Instrumental Methods of Analysis) **3**
*Chem 220.1 (Laboratory in Instrumental Methods of Analysis) **3**
Chem 230 (Physical Organic Chemistry I) **3**
*Chem 235 (Theoretical Organic Chemistry) **2**
Chem 240 (Advanced Biochemistry) **3**
*3 unit course in the Chem 240 series **3**
Chem 250 (Chemical Thermodynamics I) **3**
*Chem 255 (Quantum Chemistry) OR **3**
*Chem 257 (Chemical Kinetics) **3 or**
3



INSTITUTE OF CHEMISTRY
University of the Philippines Diliman

GRADUATE PROGRAM

Diploma in Chemistry

M.S. in Chemistry
(Thesis Option)

M.S. in Chemistry
(Non-Thesis Option)

M.S. in Chemical Education

Ph.D. in Chemistry

TELEFAX (63-2) 920-5427

DIPLOMA IN CHEMISTRY PROGRAM

OBJECTIVES

The Diploma in Chemistry program aims to provide the student with the minimum background in chemistry to enable them to upgrade their competence in teaching college chemistry or to pursue masteral studies in chemistry

ADMISSION REQUIREMENTS

Possession of a Bachelor's degree from any recognized institution of learning; completion of at least 20 units of college Chemistry including quantitative analysis and elementary organic chemistry, 10 units of college Physics and 15 units of college Mathematics, including differential and integral calculus; satisfactory performance in an entrance examination to be administered by the Institute of Chemistry and in consultation with the National Institute of Physics and the Department of Mathematics.

All applications for admission to the program shall be screened and approved by the Institute of Chemistry.

ADVANCED PLACEMENT EXAMINATIONS

Students may take advanced placement examination to be administered by the Institute of Chemistry, on any of the courses prescribed in the program. Satisfactory performance will waive enrollment in the pertinent courses.

COURSES REQUIREMENTS

The course work covers one academic year, for a total of thirty to thirty two(30-32) chemistry units.

CURRENTLY UNDERGOING REVISION

MASTER OF SCIENCE IN CHEMISTRY PROGRAM (Thesis Option)

OBJECTIVES

The Master of Science in Chemistry (Thesis Option) degree is designed to provide a comprehensive view of some of the major fields of interest in Chemistry and to develop the student's ability in conducting independent research in his chosen area of specialization. Graduates are prepared for scientific careers in academics or research institutions, and in industry, particularly in research and development.

ADMISSION REQUIREMENTS

Possession of a B.S. degree obtained from a recognized institution of higher learning; completion of at least thirty five (35) units of college Chemistry; a high degree of intellectual capacity; and aptitude for graduate study in Chemistry.

DIAGNOSTIC EXAMINATIONS

The applicant shall be required to take diagnostic examination, covering Biochemistry, Analytical, Inorganic, Organic, and Physical Chemistry. Students with unsatisfactory performance may be required to take the necessary remedial undergraduate courses without graduate credit.

GENERAL REQUIREMENTS

1. Complete a minimum of twenty four (24) units of formal graduate courses.
2. Complete two (2) units of Chemistry 290 seminar courses
3. Maintain a Cumulative Weighted Average Grade (CWAG) of 2.0 or better in graduate courses at the end of each academic year.
4. Complete an M.S. thesis (6 units of Chemistry 300) based on an independent and original research
5. Successfully defend an M.S. thesis in a public thesis examination and the M.S. examination panel should unanimously approve the thesis
6. Submit at least six (6) bound and certified copies of the approved M.S. thesis.

COURSES REQUIREMENTS

Core Courses (15 units)
Chem 211 (Systematic Inorganic Chemistry)
Chem 223 (Theoretical Analytical Chemistry) or
Chem 220 (Instrumental Methods of Analysis)
Chem 230 (Physical Organic Chemistry I)
Chem 240 (Advanced Biochemistry)
Chem 250 (Chemistry Thermodynamics I)

Cognate Subjects (9 units) : A cognate subject may be allowed only if it is highly relevant to the student's program of study which will be determined by the program adviser.

Seminars: At least (2) units of the Chemistry 290 series, one (1) unit of which should be in the student's area of specialization.

MASTER OF SCIENCE IN CHEMISTRY PROGRAM (Non-Thesis Option)

OBJECTIVES

The Master of Science in Chemistry (Non-Thesis Option) degree is designed to focus on the needs of industry for technically competent chemists with advanced background in Chemistry; address the need to upgrade chemical and science education through faculty development; and equip students from industry or science education with advanced chemistry concepts and skill through the additional courses which include hands-on laboratory components in lieu of a thesis.

ADMISSION REQUIREMENTS - same as M.S. Chemistry (Thesis Option)

DIAGNOSTIC EXAMINATIONS - same as M.S. Chemistry (Thesis Option)

GENERAL REQUIREMENTS

1. Complete a minimum of thirty three (33) units of formal graduate courses.
2. Complete two (2) units of Chemistry 290 seminar courses
3. Maintain a Cumulative Weighted Average (CWAG) of 2.0 or better in graduate courses at the end of each academic year
4. Pass the M.S. preliminary examination. The preliminary examination is a written examination that has to be taken by the student within one(1) year after completing the core courses.
5. Pass the comprehensive examination on a research proposal covering a recent development in Chemistry. The comprehensive examination is an oral examination that must be taken by the student after he/she passed the preliminary examination and completed all the courses and seminar requirements for the degree.

COURSE REQUIREMENTS

Core Courses (26 units)
Chem 211 (Systematic Inorganic Chemistry)
Chem 213 (Physical Methods of Inorganic Chemistry)
Chem 220 (Instrumental Methods of Analysis)
Chem 220.1 (Laboratory in Instrumental Methods of Analysis)
Chem 230 (Physical Organic Chemistry I)
Chem 237 (Spectroscopic Methods in Organic Chem)
Chem 240 (Advanced Biochemistry)
Chem 250 (Chemical Thermodynamics I)
Chem 255 (Quantum Chemistry) or
Chem 257 (Chemical kinetics)

Cognate Subjects (7 units): A cognate subject may be allowed only if it is highly relevant to the students program of study, which will be determined by the program adviser.

Seminars: At least (2) units of the Chemistry 290 series, one (1) unit of which should be in the student's area of specialization.

- 257 CHEMICAL KINETICS.** Reaction rates and mechanisms. Credit: 3 units (3 hrs lec) Prereq: Chem 154/COI
- 288 CHEMISTRY TEACHING PRACTICUM.** Credit: 2 units (2 hr lec); Prereq: consent of the institute and passing of the comprehensive examination
- 289 SPECIAL PROBLEM IN CHEMICAL EDUCATION.** Credit: 2 units (2 hrs lec); Prereq: consent of the graduate committee and passing of the comprehensive examination.
- 291 SEMINAR IN INORGANIC CHEMISTRY.** Credit 1 unit. Prereq: completion of 9 units in the M.S. program
- 292 SEMINAR IN ANALYTICAL CHEMISTRY.** Credit: 1 unit. Prereq: completion of 9 units in the M.S. program
- 293 SEMINAR IN ORGANIC CHEMISTRY.** Credit: 1 unit. Prereq: completion of 9 units in the M.S. program
- 294 SEMINAR IN BIOCHEMISTRY.** Credit: 1 unit. Prereq: completion of 9 units in the M.S. program
- 295 SEMINAR IN PHYSICAL CHEMISTRY.** Credit 1 unit. Prereq: completion of 9 units in the M.S. program.
- 300 M.S. THESIS.** Credit: 6 units (one year; 3 units per semester)
- 319 SPECIAL TOPICS IN INORGANIC CHEMISTRY.** Trends and developments in inorganic chemistry. Credit: 3 units (3 hrs lec; may be taken more than once if topical coverage is different); Prereq: COI
- 319.1 SPECIAL TOPICS IN EXPERIMENTAL INORGANIC CHEMISTRY.** Credit: 1 unit (may be taken more than once if topical coverage is different); Prereq COI
- 329 SPECIAL TOPICS IN ANALYTICAL CHEMISTRY.** Trends and developments in analytical chemistry. Credit: 3 units (3hrs lec; may be taken more than once if topical coverage is different); Prereq: COI
- 329.1 SPECIAL TOPICS IN EXPERIMENTAL ANALYTICAL CHEMISTRY.** Credit: 1 unit (may be taken more than once if topical coverage is different); prereq: COL

- 339 SPECIAL TOPICS IN ORGANIC CHEMISTRY.** Trends and developments in organic chemistry. Credits: 3 units (3 hrs lec; may be taken more than once if topical coverage is different); Prereq COI.
- 339.1 SPECIAL TOPICS IN EXPERIMENTAL ORGANIC CHEMISTRY.** Credit: 1 unit (may be taken more than once if topical coverage is different) Prereq: COI.
- 349 SPECIAL TOPICS IN BIOCHEMISTRY.** Trends and developments in biochemistry. Credit: 3 units (3 hrs lec; may be taken more than once if topical coverage is different); Prereq: COI.
- 349.1 SPECIAL TOPICS IN EXPERIMENTAL BIOCHEMISTRY.** Credit: 1 unit (may be taken more than once if topical coverage is different); Prereq: COI.
- 359 SPECIAL TOPICS IN PHYSICAL CHEMISTRY.** Trends and developments in physical chemistry. Credit: 3 units (3 hrs lec; may be taken more than once if topical coverage is different); Prereq: COI.
- 359.1 SPECIAL TOPICS IN EXPERIMENTAL PHYSICAL CHEMISTRY.** Credit: 1 unit (may be taken more than once if topical coverage is different); Prereq: COI.
- 391 RESEARCH SEMINAR IN INORGANIC CHEMISTRY.** Credit: 1 unit; Prereq: completion of 12 units in the PhD program.
- 392 RESEARCH SEMINAR IN ANALYTICAL CHEMISTRY.** Credit: 1 unit; Prereq: completion of 12 units in the PhD program.
- 393 RESEARCH SEMINAR IN ORGANIC CHEMISTRY.** Credit: 1 unit; Prereq: Completion of 12 units in the PhD program.
- 394 RESEARCH SEMINAR IN BIOCHEMISTRY.** Credit: 1 unit; Prereq: completion of 12 units in the PhD program.
- 395 RESEARCH SEMINAR IN PHYSICAL CHEMISTRY.** Credit: 1 unit; Prereq: completion of 12 units in the program.
- 400 PH.D. DISSERTATION.** Credit: 12 units; Prereq: completion of all course requirements and passing of candidacy examination.

GRADUATE COURSES

CHEMISTRY

- 201 CHEMISTRY FOR TEACHERS OF COLLEGE CHEMISTRY.** Credit: 4 units (3 hrs lec, 3 hrs lab).
- 203 ENVIRONMENTAL CHEMISTRY.** Chemistry applied to the study of the environment, its pollution and control. Credit: 3 units (3 hrs lec).
- 203.1 ENVIRONMENTAL CHEMISTRY LABORATORY.** The chemical analysis of soil, water, and air samples. Credit: 2 units (6 hrs lab); Coreq: Chem 203.
- 211 SYSTEMATIC INORGANIC CHEMISTRY.** Study of the chemistry of the metallic and non-metallic elements. Credit: 3 units(3 hrs lec); Prereq: Chem 112, 156 / COI.
- 212 REACTION MECHANISM OF TRANSITION METAL COMPLEXES.** Mechanisms of reactions of first-and second-series transition metal ions in relation to their structures. Credit: 3 units (3 hrs lec; Prereq: Chem 211 / COI.
- 213 PHYSICAL METHODS OF INORGANIC CHEMISTRY.** Applications of spectroscopy and other modern physical techniques to the study of inorganic compounds. Credit: 3 units (3 hrs lec); Prereq: Chem 211/ COI.
- 214 INORGANIC SYNTHESIS.** Methods of synthesis of inorganic and organometallic compounds. Credit: 4 units (2 hrs lecture, 6 hrs lab); Prereq: Chem 211/ COI.
- 215 COORDINATION CHEMISTRY.** Bonding and structure of coordination compounds; quantitative interpretation of spectral, magnetic and crystallographic data. Credit: 5 units (3 hrs lecture, hrs lab); Prereq: Chem 211/ COI.
- 216 BIOINORGANIC CHEMISTRY.** Structure, bonding, and mechanistic aspect of metal ion involvement in biological processes. Credit: 3 units hrs lec); prereq Chem 211 / COI.
- 217 NUCLEAR CHEMISTRY.** Theories of radioactive decay. The study of nuclear reactions. Methods of chemical separation of radioactive substances, their detection, and measurement. Credit: 3 units (3 hrs lec); Prereq: Chem 154 / COI.

- 218 ORGANOMETALLIC CHEMISTRY OF THE TRANSITION METAL.** A study of metal complexes using carbon as the ligating atom. Credit: 3 units(3 hrs lec); Prereq: Chem 211/ COI.
- 219 SOLID STATE CHEMISTRY.** Structure and bonding in solid state materials. Credit: 3 units(3 hrs lec); Prereq: Chem 211 /COI.
- 220 INSTRUMENTAL METHODS OF ANALYSIS..** Fundamentals of chemical instrumentation; theory and application of some common instrumental methods. Credit: 3 units(3 hrs lec); Prereq: Chem 123/ COI.
- 220.1 LABORATORY IN INSTRUMENTAL METHODS OF ANALYSIS.** Credit: 2 units (6 hrs lab); Prereq: Chem 123.1/COI. Coreq: Chem 220.
- 221 ELECTROANALYTICAL CHEMISTRY.** Theory of modern electrochemical methods, such as cyclic voltammetry, Stripping analysis, AC and differential pulse polarography, and ring-disk electrodes. Credit: 3 units (3 hrs lec) ; Prereq: Chem 220/ COI.
- 222 OPTICAL METHODS OF ANALYSIS.** Fundamentals of optical instrumentation; Principles and applications of spectroscopy and spectrophotometry. Credit: 3 units(3 hrs lec); Prereq: Chem 220 / COI.
- 223 THEORETICAL ANALYTICAL CHEMISTRY.** Theory of analytical separations based on chemical and phase equilibria. Credit: 3 units (3 hrs lec) Prereq: Chem 123/COI.
- 224 AQUATIC CHEMISTRY.** The composition properties, and processes in natural aquatic systems. Credit: 3 units(3 hrs lec); Prereq: Chem 220,223/ COI.
- 225 MODULAR CHEMICAL INSTRUMENTATION.** Fundamentals of analog and digital electronics; modular approach to chemical instrumentation. Credit 3 units (2 hrs lec); Prereq Chem 220/COI.
- 226 ANALYTICAL SEPARATION METHODS.** Advanced treatment of separation theory and its application to some common analytical separation methods. Credit 3 units(3 hrs lec); Prereq: Chem 223/ COI.
- 227 RADIOISOTOPE TECHNIQUES.** Methods of chemical separation, detection, and measurement of radioactive substances; application to chemical problems. Credit: 4 units(2 hrs lec, 6 hrs lab); Prereq: Chem 217 / COI.
- 230 PHYSICAL ORGANIC CHEMISTRY I.** Applications of physical chemistry in the study of structure, reactivity, and reaction mechanism of organic compounds. Credit 3 units (3 hrs lec); Prereq: Chem 154, 34/COI.
- 231 POLYMER CHEMISTRY.** Synthesis, physical and chemical properties, structure and functions of synthetic and natural polymers. Credit: 3 units (3 hrs lec); Prereq: Chem 230/ COI.
- 231.1 POLYMER CHEMISTRY LABORATORY.** Methods and techniques in polymer synthesis; testing and characterization of polymers. Credit: 2 units (6 hrs lab), Coreq: Chem 231/ COI.
- 234 PHYSICAL ORGANIC CHEMISTRY II.** Principles of stereochemistry and their applications to the study of configuration, conformation, and reaction mechanism of organic compounds. Credit: 3 units (3 hrs lec; Prereq: Chem 230/COI.
- 235 THEORETICAL ORGANIC CHEMISTRY.** Application of quantum chemistry in the study of structure, reactivity, and reaction mechanisms of organic compounds. Credit: 3 units (3 hrs lec); Prereq: Chem 156, 230/ COI.
- 236 ORGANIC SYNTHESIS.** Techniques of organic synthesis. Credit: 3 units (3 hrs lec); Prereq: Chem 230/COI.
- 236.1 ORGANIC SYNTHESIS LABORATORY.** Experimental techniques in organic synthesis. Credit: 2 units (6 hrs lab); Coreq: Chem 236/COI.
- 237 SPECTROSCOPIC METHODS IN ORGANIC CHEMISTRY.** Application of nmr, esr, ir, uv-vis, and mass spectrometry in organic chemistry. Credit: 3 units (3 hrs lec); Prereq: Chem 230/COI.
- 238 HETEROCYCLIC CHEMISTRY.** Synthesis properties, and chemical reactivity of N-, O-, S- containing heterocyclic compound . Credit: 3 units (3 hrs lec); Prereq: Chem 230 /COI.
- 239 NATURAL PRODUCTS CHEMISTRY.** Chemistry and biogenesis of major classes of secondary metabolites. Credit: 3 units (3 hrs lec); Prereq Chem 230 /COI.
- 240 ADVANCE BIOCHEMISTRY.** Structure and conformation of biomolecules; electronic indices and reactivity of biomolecules; fundamental techniques used in the study of biomolecules. Credit: 3 units (3 hrs lec); Prereq: Chem 146 / COI.
- 241 LIPIDS AND RELATED SYSTEMS.** Structure function correlations, cellular utilization and regulation mechanisms. Credit: 3 units (3hrs lec); Prereq: Chem 240 /COI.
- 242 CARBOHYDRATES AND RELATED SYSTEMS.** Structure-function correlations, cellular utilization and regulation mechanisms. Credit: 3 units (3 hrs lec); Prereq: Chem 240 / COI.
- 243 NUCLEIC ACIDS.** Structure-function correlations and mechanism of cellular utilization and regulation of nucleic acids. Credit: 3 units (3 hrs lec); Prereq: Chem 240 / COI.
- 244 PROTEINS.** Structure-function correlations and mechanisms of cellular utilization and regulation of proteins. Credit 3 units (3 hrs lec) ; Prereq: Chem 240 / COI.
- 245 ENZYMES.** The chemical nature of enzymes and co-enzymes, their general methods of preparation and investigation, the kinetics and mechanisms of their action. Credit 3 units (3 hrs lec); Prereq: Chem 244 / COI.
- 247 MOLECULAR BIOCHEMISTRY.** Behavior of biologically active substance and mechanisms of enzymes reactions in terms of electronic theory Credit: 3 units (3 hrs lec) Prereq: Chem 240 / COI.
- 248 METABOLIC AND INFORMATION PATHWAYS.** Integration and regulation of catabolic and biosynthetic processes; biochemistry of informal melocules. Credit: 3 units (3 hrs lec); Prereq: Chem 240/COI.
- 250 CHEMICAL THERMODYNAMICS I.** Thermodynamics theory; applications to chemical and other related systems; introduction to irreversible thermodynamics. Credit: 3 units (3 hrs lec); Prereq: Chem 153/COI. 3 u.
- 251 CHEMICAL THERMODYNAMICS II.** Ensembles and thermodynamics; non-interacting system; interacting systems; quantum statistics. Credit: 3 units (3 hrs lec) ; Prereq: Chem 156, 250/ COI.
- 252 GRADUATE PHYSICAL CHEMISTRY LABORATORY.** Credit: 2 units (6 hrs lab); Prereq: COI.
- 255 QUANTUM CHEMISTRY.** Approximation methods; non-interacting particles; the chemical applications of group theory. Credit: 3 units (3 hrs lec) ; Prereq: Chem 156/ COI.
- 256 ADVANCED QUANTUM CHEMISTRY.** Representation theory; quantum transitions under the influence of external perturbation; quantum theory of scattering; approximation methods. Credit: 3 units (3 hrs lec); Prereq: Chem 255/COI.