



## MASTER OF SCIENCE IN CHEMISTRY

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### Master of Science in Chemistry

The Master of Science in Chemistry program at the University of Detroit Mercy (UDM) is designed to prepare students for success in the professional scientific workplace or graduate school. In addition, it is also designed for the professional working in a chemically-related field who wants to broaden or deepen his/her knowledge in the field of chemistry. Chemists need to be well versed in several branches of chemistry in order to solve chemical research problems. The program is designed to prepare graduates with the skills to critically assess and solve problems requiring the application of chemical principles. UDM pledges to produce graduates who are familiar with research design methodology and are able to use problem-solving techniques associated with research. The Master of Science in Chemistry degree allows the student to acquire a well-rounded, advanced education in chemistry as well as specialization and research in polymers, biochemistry, computational chemistry, and inorganic/organic synthesis.

Students can pursue this degree on a full-time or part-time basis. There are two tracks to the MS degree. In both tracks, the students complete courses in several subdisciplines, write a report describing current developments in a specific field, and give an oral seminar to the Department on a current topic. In the non-thesis track, the student has the option of participating in a research project with one of the full-time faculty members in the Department. In the thesis-option track, the student must complete a thesis based on research completed with one of the full-time faculty members. Close faculty-student contact is maintained to assist each student in tailoring a curriculum to fit his or her interests and goals.

### Admission Requirements

Applicants for admission to graduate studies leading to the Master of Science in Chemistry degree must present evidence of all undergraduate work with an undergraduate major in chemistry or its equivalent with a minimum GPA of 3.0 in the major field and an overall GPA of 2.75 (or at least in the last 60 hours). Such prior work must be essentially equivalent to

that required by the Chemistry and Biochemistry Department for a Bachelor of Science degree as set forth in the current University of Detroit Mercy Undergraduate Catalog. Students will also be required to submit one letter of recommendation, an essay, and all necessary transcripts. Applicants whose undergraduate preparation does not satisfy these admission requirements may be admitted on probationary status to the University with the approvals of the dean of the College of Engineering and Science and the chairperson of the Department of Chemistry and Biochemistry. Courses taken to satisfy admission requirements may not be taken for graduate credit.

### Degree Requirements

Of the 30 credit hours required for the degree, the following requirements must be met:

- A minimum of four courses from different branches of chemistry at the 5000-level or above
- A one-credit course in chemical information and safety (CHM 5020).
- Two semesters of Seminar (CHM 5000, 1 credit hour each). During the first semester the student will attend and critique all seminars and will write a literature review paper on a topic of current interest. During the second semester, the student will present a 45-minute seminar on this topic.
- Full-time students who receive a teaching or research assistantship must perform thesis research and write and defend the thesis. The student will earn six hours of thesis credit (CHM 6990). The student must select a research advisor by the end of two terms of study.

A maximum of nine credit hours may be undergraduate/graduate cross-listed courses. A maximum of six credit hours of graduate-level courses from other departments may be applied to the degree. With the chairperson's approval, entering transfer students may transfer a maximum of 6 credit hours (with a grade of 3.0 or better) from another accredited university. If they have a previous master's degree, up to 9 credits may be transferred.

**For further information, please write, call or e-mail:**

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**Courses Descriptions**

- CHM 5000 Seminar** 1 cr.  
 Critical discussion of topics of general interest. Required of all full-time students during each term of graduate study. Part-time students are encouraged to attend. All students are required to take two semesters of seminar for one credit each during which time they write a review paper and present a seminar.
- CHM 5010 Inorganic Chemistry** 3 cr.  
 (Prerequisite: Two terms of undergraduate physical chemistry or their equivalents). General survey of modern inorganic chemistry.
- CHM 5020 Chemical Information & Safety** 1 cr.  
 An introduction to current methods of chemical information retrieval. Also, an introduction to safety procedures and OSHA requirements for the handling, storage, and disposal of chemicals.
- CHM 5210 Mechanistic Organic Chemistry** 3 cr.  
 (Prerequisite: One year undergraduate courses in both organic and physical chemistry). A survey of reaction mechanisms in organic chemistry including methods of mechanism determination, and applications of mechanistic understanding.
- CHM 5220 Synthetic Organic Chemistry** 3 cr.  
 (Prerequisite: CHM 5210). Systematic review of the major synthetic methods of organic chemistry including strategies

for multi-step syntheses and targeting both natural products and novel molecules.

**CHM 5250 Polymer Surface Coatings** 3 cr.  
 (Prerequisite: CHM 4200). Chemical, physical and mechanical properties of polymers related to their functions as protective coatings. Comparisons between coatings made with various alkyds and varnishes. The effects of solvents (and mixtures of solvents), fillers, wetting and flattening agents related to the special requirements of coatings. Equipment required for the preparation and applications of coatings. Necessary evaluation tests and significance of these tests.

**CHM 5290 Industrial Aspects of Chemistry** 3 cr.  
 (Prerequisite: One year undergraduate course in organic chemistry). Industrial transformations of various feedstocks of the chemical and allied industries. Commercial uses of inorganic and organic substances including macromolecular materials. Utilization of different chemicals in the economy.

**CHM 5340 Synthesis & Characterization of Macromolecules** 3 cr.  
 (Prerequisite: CHM 4200 and one year undergraduate organic chemistry). Practical discussion of the reactions and techniques involved in the preparation of polymer samples, their purification and characterization.

**CHM 5380 Recent Advances in Chemistry Related to Societal Issues** 3 cr.  
 (Prerequisite: Graduate Standing in Chemistry). A tour of the current chemical literature with in-depth student participation. An advanced treatment of current research in chemistry. Topics, such as combinatorial methods and their affect on the pharmaceutical industry, supra-molecular synthesis and inter-disciplinarity in chemistry, application of nano-technology, alternative fuel sources and hydrogen storage, abiotic biomimetic systems and total synthesis of anti-cancer/anti-HIV compounds, are selected from the current literature and will vary yearly. Particular emphasis will be placed on the ethics of technological advance and how chemistry affects the lives of all organisms on Earth.

**CHM 5410 Thermodynamics of Molecular Systems** 3 cr.  
 (Prerequisite: One year undergraduate course in physical chemistry). Thermodynamics of molecular systems with an introduction to the behavior of macromolecules.

**CHM 5420 Physical Chemistry of Macromolecules** 3 cr.  
 (Prerequisite: CHM 5410). Theoretical treatment of the behavior of macromolecules in solution and in the glassy and crystalline states as a function of their structure.

**CHM 5500 Introduction to Polymer Engineering & Science 3 cr.**

(Prerequisite: one year organic chemistry, one year physical chemistry). Introductory overview of terminology, synthesis, properties, and fabrication of polymers.

**CHM 5610 Biochemistry of Macromolecules I 3 cr.**

(Prerequisite: CHM 2290 or permission of instructor). Three hours of lecture and class discussion per week. The chemistry of carbohydrates, lipids, proteins and nucleic acids in relation to cellular structure. Applications and modifications. Special emphasis on enzymes and enzyme kinetics.

**CHM 5620 Biochemistry of Macromolecules II 3 cr.**

(Prerequisite: CHM 5610 or equivalent). Chemistry of carbohydrates, lipids, proteins and nucleic acids in relation to cellular structure. Applications and modifications. Special emphasis on enzymes and enzyme kinetics.

**CHM 5700 Basic Biochemistry 3 cr.**

(Prerequisite: CHM 2290). An introduction to structure-function relationships of biomolecules, including amino acids, proteins, carbohydrates, lipids, and nucleic acids. Also an introduction to metabolism, including glycolysis, Krebs cycle and oxidation phosphorylation. Physiological applications of biochemistry are stressed. Designed for students in special programs in the health sciences.

**CHM 5730 Biochemistry Laboratory I 2 cr.**

(Co-requisite: CHM 5620). Isolation, purification and characterization of carbohydrates, nucleic acids and proteins from natural sources. Techniques of spectroscopy, column, and thin-layer chromatography. Enzyme kinetics using isolated enzymes. Designed to supplement CHM 561 and CHM 562.

**CHM 5740 Recent Advances in Biochemistry 3 cr.**

(Prerequisite: CHM 5620). An advanced treatment of current research in biochemistry. Receptors, hormones, neurobiochemistry, recombinant DNA, biochemistry of disease. Emphasis on interpretation of the literature and the significance of recent discoveries to the improvement of life. Discussion with student participation.

**CHM 5810 Advanced Instrumental Analysis 3 cr.**

(Prerequisite: Undergraduate physical chemistry). Application of physical methods to the study of chemical systems with emphasis on spectroscopic techniques.

**CHM 5820 Advanced Instrumental Analysis Laboratory 2 cr.**

(Prerequisite: Graduate standing and permission of the instructor). Three hours of lab instruction per week/ credit. Laboratory experience in solving problems using selected instrumental methods of chemical analysis.

**CHM 5980 Non-Thesis Research 1 cr.**

A student may elect up to three credits of non-thesis research in the laboratory of a chemistry faculty member. A research report is required at the end of each semester.

**CHM 6010 Special Topics in Chemistry 3 cr.**

(Prerequisite: Individual prerequisites and course descriptions specified in appropriate course announcements). Varying topics of interest in different branches of chemistry.

**CHM 6990 Thesis Research Progressive credit 6 cr.**

Full-time students who receive a teaching or research assistantship must perform thesis research and write and defend the thesis. The student will earn six hours of thesis credit (CHM 6990). The student must select a research advisor by the end of two terms of study.