Undergraduate Research Opportunities in Chemistry

Marquette University

Department of Chemistry

Undergraduate Research Experiences in Chemistry

The undergraduate research experience is a key ingredient in your development as a scientist, and provides invaluable experience into the methods of scientific inquiry. Such experience is strongly encouraged if you plan to pursue graduate work in the chemical sciences, but is valuable for all majors. There are many opportunities available for you to participate in research at Marquette, and some of the available projects are listed in Section B. In addition, summer research and internship opportunities at other institutions are available, and these are discussed in Section C.

A. Undergraduate Research at MU

The department has strong research programs, and many opportunities exist for undergraduates to participate. **Course credit** may be obtained via CHEM 195, Research in Chemistry, or CHEM 199, Senior Thesis, either of which counts as an elective in the major program. The total credit hours and number of laboratory hours per credit hour are arranged with the research advisor. For both courses a written document is typically required for successful completion of the course. The grade is assigned based upon that document and the overall assessment of the faculty advisor. A list of projects is provided in Section B – please contact the faculty member directly to inquire about projects that interest you.

Summer research opportunities may also be available within the department. The department has in past years funded 10 week summer undergraduate research programs which pay a stipend of typically $2500, and faculty with external research grants may offer summer support to qualified undergraduates. Summer programs are also available at other institutions (see Section C).

Research in any branch of chemistry requires a significant time investment, and you are encouraged to begin working as soon as possible, but no later than the spring semester of your junior year. Past MU undergraduates have participated in research for periods ranging from 1 semester to 4 years.

Students are encouraged to present their work at local or national meetings such as the biannual American Chemical Society meeting or the

annual Wisconsin Undergraduate Research Symposium in Chemistry. Funding is typically available to support travel to these meetings.

B. List of faculty research areas and projects designed for an undergraduate student

ORGANIC CHEMISTRY

Dr. William Donaldson *(TW 654, 288-7374, William.Donaldson@mu.edu)*
Prerequisites: Chem 023/024 or 123/124
Research Interests: Organic chemistry; Use of organo–iron complexes in the synthesis of natural products

Dr. Rajendra Rathore *(TW 638, 288-2076, Rajendra.Rathore@mu.edu)*
Research Interests: Organic supramolecular chemistry; Preparation of electroactive organic materials for molecular devices, sensors, switches, etc.
Specific projects:
1. Synthesis of molecular wires
2. Development of organic sensors for nitric oxide
3. Preparation of electroactive organic bowls and tubes
4. Synthesis of organic macromolecules containing multiple redox–active chromophores

Dr. Mark Steinmetz *(TW 633, 288-3535, Mark.Steinmetz@mu.edu)*
Prerequisites: Chem 023/024 or 123/124
Research Interests: Photocleavable protecting groups
Specific projects:
1. Synthesis and photochemistry of photocleavable amides
2. Synthesis and photochemistry of photocleavable oximates
3. Synthesis and photochemistry of photocleavable heterocycles

Dr. Daniel Sem *(*TW 652, 288–7859, *Daniel.Sem@mu.edu)*
Prerequisites: Chem 023/024 or 123/124
Research Interests: Medicinal and biochemical methods development, with applications in proteomics.
Focus areas: NMR spectroscopy, enzymology, fluorescence, cheminformatics, combinatorial and medicinal chemistry

INORGANIC CHEMISTRY

Dr. Dan Haworth *(TW 670, 288-3534, Daniel.Haworth@mu.edu)*

Prerequisites: Chem 023/024 or 123/124, Chem 115

Research Interests: Preparation of transition metal complexes

Specific projects:
1. Metal complexes of S_4N_4
2. Molecular wire compounds of S_4N_4

Dr. Chae Yi *(TW 619, 288-3536, Chae.Yi@mu.edu)*

Prerequisites: Chem 023 or 123

Research Interests: Homogeneous catalysis; Synthesis of Organometallic Compounds

Specific projects: Ruthenium catalyzed coupling reactions of alkenes and alkynes

PHYSICAL CHEMISTRY

Dr. Jeanne Hossenlopp *(TW 508, 288-3537, Jeanne.Hossenlopp@mu.edu)*

Prerequisites: Interest in chemistry

Research Interests: Development of novel mixed chemical/laser methods for thin films; chemical sensor development; laser spectroscopy and dynamics

Specific projects:
1. Synthesis and characterization of materials for gas sensors
2. Sensor screening
3. Laser processing of materials

Dr. Scott Reid *(TW 518, 288-7565, Scott.Reid@mu.edu)*

Prerequisites: Enthusiasm and interest

Research Interests: Laser spectroscopy and photochemistry of molecular free radicals; time-resolved laser spectroscopy; fluorescence and luminescence; thin film deposition via pulsed lasers; mass spectrometry

Specific projects:
1. Laser spectroscopy of carbenes
2. Alkoxy radical spectroscopy and photochemistry
3. Fluorescence resonance energy transfer of biological molecules
4. Laser deposition of thin metal oxide films

POLYMER CHEMISTRY

Dr. Charles Wilkie *(TW 601 or 101, 288-7239, Charles.Wilkie@mu.edu)*
Prerequisites: Chem 023/024 or 123/124
Research Interests: Fire retardancy, Nanocomposites, Polymer Degradation

Summer Research and Internship Opportunities

Many opportunities exist for summer research and industrial internships at other institutions. The National Science Foundation sponsors summer REU (Research Experience for Undergraduates) sites at many universities throughout the country, and MU undergraduates have been very competitive in applying for these positions. The REU program is a 10 week program with a competitive stipend – for more information contact the chair of the undergraduate committee (for 2003-04, Dr. Jeanne Hossenlopp) or visit the NSF web site at: http://www.nsf.gov/.

Additional opportunities exist for paid summer internships at local industrial firms such as Kimberly-Clark, Sigma-Aldrich, Miller Brewing Company, and many more. Such positions provide valuable experience for students interested in exploring technical positions in industry following completion of the B.S. degree.

Lists of summer research and internship opportunities are available in the chemistry office (TW 101).