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## CHEMISTRY

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### MRKT 541 (3) Consulting for Small Business

Student teams assist businesses with problems by conferring with clients, conducting analyses, and recommending solutions. Problems may encompass accounting, finance, personnel procedures, production, or marketing.

Prerequisite: consent of instructor

### MRKT 591 (1-4) In-Service

Topics will vary across various hands-on practical experience.

Prerequisite: consent of instructor

### MRKT 602 (4) Basic Business Functions

### MRKT 677 (1-4) Individual Study

S Prerequisite: consent of instructor

### MRKT 694 (1-2) Alternate Plan Paper

Independent research related to topic proposal for alternate plan paper.

F Prerequisite: consent of instructor

### MRKT 697 (3) Seminar: Marketing

Prerequisite: consent of instructor

### MRKT 698 (1-6) Internship

F Prerequisite: consent of instructor

### MRKT 699 (3-6) Thesis

Prerequisite: consent of instructor

## INTERNATIONAL BUSINESS

### IBUS 519 (3) International Business Seminar

Topics on current developments in international trade and legislation.

Prerequisite: IBUS 380

### IBUS 528 (3) International Marketing

Managerial approach to marketing decision making in multicultural market situations.

F Prerequisite: MRKT 310, IBUS 380

### IBUS 548 (3) International Business Management

Comparison of the major management systems within their differing cultural environments. Analysis of differing value systems, group behaviors, conflicts, and supervisory problems.

Prerequisite: MGMT 330 and IBUS 380

### IBUS 549 (3) International Business Policy

A capstone course for students majoring in international business designed to analyze and integrate the various international business management decisions.

Prerequisite: IBUS 380, business foundation courses

### IBUS 569 (3) International Business Finance

Financing investments and working capital management problems in multinational environments.

Prerequisite: FIRE 362, IBUS 380.

### IBUS 575 (3) International Business Law

Comparison of the two major systems of law: code and common, and their effects on commercial transaction between firms in different countries.

### IBUS 585 (3) Export Administration

Provides knowledge and documentary skills in managing and implementing the export operations of firms engaged in international trade.

Prerequisite: IBUS 380

### IBUS 586 (3) Consulting for Export Business

Student teams under faculty supervision assist area firms interested in developing or expanding international business.

Prerequisite: senior standing/consent of instructor

### IBUS 591 (1-4) In-Service

Topics will vary across various hands-on practical experiences.

Prerequisite: consent of instructor

### IBUS 677 (1-4) Individual Study

S Prerequisite: consent of instructor

### IBUS 692 (3) Multinational Business Management

Organization, finance, production, personnel, executive development, and nationalistic conflict problems of multinational business environment.

Prerequisite: consent of instructor

### IBUS 694 (1-2) Alternate Plan Paper

F Prerequisite: consent of instructor

### IBUS 696 (1-3) Seminar in International Business

Prerequisite: consent of instructor

### IBUS 698 (1-6) Internship

F Prerequisite: consent of instructor

### IBUS 699 (3-6) Thesis

Prerequisite: consent of instructor

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## CHEMISTRY MA

## CHEMISTRY MS

*College of Science, Engineering & Technology*

*Department of Chemistry and Geology*

242 Trafton Science Center N • 507-389-1963

<http://cset.mnsu.edu/chemgeol/>

Chair: Jeffrey Pribyl, Ph.D.

Graduate Coordinator: James Rife, Ph.D.

Brian Groh, Ph.D.; Bryce Hoppie, Ph.D.; S. Dean Moosavi, Ph.D.; Marie Pomije, Ph.D.; James Rife, Ph.D.; Theresa Salerno, Ph.D.; John Thoenke, Ph.D.; Trent Vorlicek, Ph.D.

The Department of Chemistry and Geology offers programs that lead to Master of Arts and Master of Science degrees in chemistry. The MS is a professional degree leading to employment in industrial research or advancement to Ph.D. programs. The MA is designed to strengthen and broaden the academic and professional preparation of those students who qualify for teacher licensure.

The Graduate Program in the Department of Chemistry and Geology offers students an opportunity to strengthen their academic education in the field of chemistry and to develop the necessary research skills for future careers.

Housed in Trafton Science Center, the Department of Chemistry and Geology offers an experienced faculty with diverse research interests and exceptional teaching skills. The instruments which are available to graduate students in the Department of Chemistry include a 200 MHz Fourier Transform nuclear magnetic resonance spectrometer, gas chromatographs, high pressure liquid chromatograph, Fourier Transform infrared spectrometer, atomic absorption and ultraviolet-visible spectrophotometers, centrifuges, and a scintillation counter.

**Admission.** In addition to meeting the general requirements for admission to the College of Graduate Studies and Research, students must meet the following admission requirements for the department. Information should be sent to the Graduate Coordinator.

1. Three letters of recommendation from individuals familiar with the applicant's academic background, training, and abilities.
2. A minimum GPA of 2.75/4.0 for the last two years of the baccalaureate degree.
3. A minimum GPA of 2.50/4.0 in undergraduate math and science courses or a minimum score of 600 on the Chemistry Graduate Record Exam.
4. A core of undergraduate chemistry courses must have been completed, including one year of general chemistry, one year of organic chemistry, one course in analytical chemistry, one course in inorganic chemistry (beyond the freshman year), and one semester (two quarters) of physical chemistry.
5. International students must have a minimum TOEFL score of 500 if they have not received a bachelor's degree from an educational institution whose language of instruction is English. A score of 550 or more is recommended.

Provisional admission of students with lesser qualifications will be at the discretion of the Chemistry Graduate Committee.

## CHEMISTRY MS

(Thesis Plan - 30 credits)

### Required Core (10-14 credits)

CHEM 692 Research (4 minimum)

CHEM 695 Graduate Seminar (2) (may be repeated)

CHEM 699 Thesis (4 maximum)

### Required Chemistry Electives (14-16 credits)

Choose a maximum of 10 credits of 500 level courses:

CHEM 513 CHEM 515 CHEM 523 CHEM 524 CHEM 534

CHEM 541 CHEM 551 CHEM 560 CHEM 561 CHEM 565

CHEM 566 CHEM 574 CHEM 577 CHEM 585

Choose at least two 600 level courses from:

CHEM 602 CHEM 616 CHEM 621 CHEM 642 CHEM 660

The following courses may not be used to fulfill the 14 credit elective requirement: CHEM 540, 550, 582, 677, 682, 685, 690, 692, 694, 695, 698, 699. Electives should be selected in consultation with an advisor

#### Required Science/Mathematics Electives Outside Major Field (6 credits)

6 credits at 500/600 level in Science/Mathematics (e.g. Biology, Physics, Mathematics, Computer Science, etc.), selected in consultation with an advisor.

#### Additional Requirements:

Fifty percent of all coursework must be taken at the 600 level.

All students must participate in two semesters of Graduate Seminar (CHEM 695). The presentation of one seminar each semester, and attendance at all other course meetings, are required. The first seminar, given early in the course of study, should be a research proposal, and the second seminar, given near the end of graduate study, will be a presentation of the student's thesis or alternate plan paper work.

All students must take proficiency exams at the beginning of the first semester of graduate study. The proficiency exams consist of undergraduate material in the following four areas: analytical, organic, inorganic, and physical chemistry. To be admitted to candidacy, a student must demonstrate proficiency in all four areas either by passing all four examinations or by passing with a grade of B or better the appropriate undergraduate courses selected by the Chemistry Graduate Committee.

All students must take written and oral comprehensive examinations. The written examination will be given by the student's examining committee and must be taken before the research proposal is submitted to the Graduate Office. Deficiencies revealed by the written examination should be rectified by enrollment in the appropriate course(s) followed by re-examination. The oral examination will be a thesis or alternate paper defense.

#### CHEMISTRY MA

(Thesis Plan - 30 credits)

(Alternate Plan Paper - 34 credits)

#### Required Core Courses (6-12 credits)

CHEM 695 Graduate Seminar (2)

CHEM 677/692 Individual Study/Graduate Research (2-4)

Choose one of the following:

CHEM 699 Thesis (3-6)

CHEM 694 Alternate Plan Paper (1-2)

#### Required Chemistry Electives (minimum of 6 credits)

6 credits at 500/600 level, selected in consultation with an advisor

#### Required Science/Mathematics Electives Outside Major Field (minimum of 6 credits)

6 credits at 500/600 level in Science/Mathematics (e.g. Biology, Physics, Mathematics, Computer Science, etc.), selected in consultation with an advisor.

#### Required Professional Education Electives (minimum of 6 credits)

2-3 credits need to be taken from 600 level Educational Foundations courses. Electives should be selected in consultation with an advisor.

#### Additional Requirements:

See additional requirements described under the MS degree above.

### COURSE DESCRIPTIONS

#### CHEM 507 (3) Water Chemistry

A broad introduction to the chemistry of natural waters and chemical analysis of such systems. Topics covered may include: macromolecular analytes, organic analytes, inorganic analytes, major component/minor component/trace component determinations, matrix effects, equilibrium processes, modeling of chemical/physical transport, regulatory monitoring, and compliance issues. Laboratory exercises will provide students with goal-orientated, cooperative experiences in sampling and measurement of complex samples.

Prerequisite: CHEM 305 (or equivalent) V

#### CHEM 513 (3) Advanced Inorganic Chemistry

A survey of topics in inorganic chemistry including quantum mechanics, symmetry and group theory, solid state chemistry, molecular structure and geometry, bonding theories, and coordination chemistry emphasizing the theoretical foundation.

Prerequisite: CHEM 440/540 (or equivalent) F

#### CHEM 515 (2) Inorganic Preparations

The preparation and study of inorganic/organometallic compounds utilizing a variety

of synthetic techniques including common Schlenk technique. The studies will include characterization by common instrumental methods such as IR, NMR, and UV-vis spectroscopy. Additional studies using instrumental techniques such as IR, NMR, UV-vis, electrochemistry, and magnetic susceptibility will also be conducted.

Prerequisite: CHEM 413/513 previously or concurrently S

#### CHEM 523 (4) Chemical & Spectroscopic Determination of Structure

Spectroscopic techniques including nuclear magnetic resonance, infrared, and mass spectrometry for determining structural features of molecules will be covered. Spectroscopic methods emphasize interpretation of spectra and also provide hands-on operation of the corresponding electronic instruments. The laboratory uses these techniques for the determination of the structures of a series of unknown compounds.

Prerequisite: CHEM 321 and 331 (or equivalent) F

#### CHEM 524 (3) Advanced Organic Chemistry

Advanced synthetic organic reactions and their mechanisms. Laboratory will include examples of some of this chemistry and techniques for reaction monitoring and product purification.

Prerequisite: CHEM 423523 (or equivalent) S-E

#### CHEM 534 (2) Industrial Chemistry

The synthesis and properties of organic macromolecules, especially industrially important polymers, and the chemistry of other industrially important chemical reactions and processes.

Prerequisite: CHEM 321 (or equivalent) S-O

#### CHEM 540 (3) Physical Chemistry I

Detailed treatment of thermodynamics and chemical kinetics. Topics include equations of state, laws of thermodynamics, statistical thermodynamics, phase and reaction equilibrium, thermodynamics of solutions and electrochemistry, transport properties, and reaction kinetics.

Prerequisite: CHEM 305, 321, one year of physics, MATH 121 (or equivalent) F

#### CHEM 541 (3) Physical Chemistry II

Detailed treatment of quantum mechanics, spectroscopy, and statistical mechanics. Topics include the foundations of quantum mechanics, application of quantum mechanics to atomic and molecular structure, foundations of spectroscopic techniques, and statistical mechanics. The course concludes with a treatment of molecular reaction dynamics based on primary literature.

Prerequisite: CHEM 440/540, MATH 122 (or equivalent) S

#### CHEM 545 (2) Advanced Physical Chemistry

Integrated application of the content from 440 and 441 to an applied topic of interest to the instructor. The course will depend heavily on reading and discussion of the current primary literature of physical chemistry. Possible topics include: atmospheric chemistry, thermodynamics of protein folding, catalytic processes, or molecular processes at interfaces.

Prerequisite: CHEM 441/541 V

#### CHEM 550 (1) Physical Chemistry Laboratory I

Laboratory to accompany 540. An advanced treatment of measurement theory and data analysis precedes a series of thermodynamic and kinetic experiments designed to complement topics treated in lecture to help students develop more independence and sophistication in planning, performing, and reporting experimental work.

Prerequisite: CHEM 440/540 previously or concurrently F

#### CHEM 551 (1) Physical Chemistry Laboratory II

Laboratory to accompany 541. Experiments and computational projects in quantum mechanics, spectroscopy, and statistical mechanics. The experiments and projects will continue to work toward the goal of increasing the students independence and sophistication.

Prerequisite: CHEM 441/541 previously or concurrently S

#### CHEM 560 (3) Biochemistry I

Detailed analysis of the structures, properties, and functions of proteins, carbohydrates, lipids, and nucleic acids; theory for the purification and analysis of proteins and nucleic acids. Concurrent enrollment in CHEM 565 is recommended.

Prerequisite: CHEM 321 and 331, and BIOL 105 and 106 (or equivalent) F

#### CHEM 561 (3) Biochemistry II

Detailed analysis of the reactions involved in intermediary metabolism, translation, and replication.

Prerequisite: CHEM 460/560 (or equivalent) S

#### CHEM 565 (1) Biochemical Techniques I

A lecture/laboratory course which presents methodology and instrumentation used to purify and analyze biomolecules. Techniques include chromatography, autoradiography and radioisotope techniques, agarose and polyacrylamide gel electrophore-

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## CLINICAL PSYCHOLOGY

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sis, and spectrophotometry.

Prerequisite: CHEM 460/560 previously or concurrently. CHEM 305 is recommended. F

### **CHEM 566 (2) Biochemical Techniques II**

Students work in teams to solve biochemical research problems by conducting and analyzing experiments which they design.

Prerequisite: CHEM 460/560 and 465/565 S

### **CHEM 574 (2) Chromatography**

Theory and applications of thin layer, paper, liquid, and gas chromatography.

Prerequisite: CHEM 320 previously or concurrently is recommended F-E

### **CHEM 575 (4) Instrumental Analysis**

Theory and practice of modern instrumental methods including basic electronics. Special emphasis placed on sampling methods, analog and digital electronics, electrochemistry, spectrophotometric and chromatographic methods, surface and thin-film analysis, and computer acquisition and data processing techniques.

Prerequisite: CHEM 305; PHYS 212 or 222 previously or concurrently S

### **CHEM 577 (1-3) Special Topics in Instrumental Analytical Chemistry**

Detailed study and focused discussion of a specific analytical technique such as electrochemistry, X-ray analysis, etc., or an area of analysis such as metals, bioanalytical, etc. May be taken more than once for credit, if the topic is different.

Prerequisite: CHEM 305 (or equivalent) V

### **CHEM 579 (4) Teaching Physical Science**

Methods and materials for teaching physical sciences in middle school through high school. Clinical experiences required for the course.

Prerequisite: consent S

### **CHEM 582 (1-3) Problems in Teaching Science**

Investigation of current issues and topics related to the teaching of science in K-12 grades. V

### **CHEM 585 (1-2) Seminar in Environmental Chemistry**

Study of current environmental problems or issues with emphasis on the relevant chemical principles and understanding necessary to monitor or alleviate the problems.

Prerequisite: CHEM 305 (or equivalent) V

### **CHEM 590 (1-6) Workshop**

### **CHEM 591 (1-6) In-Service**

### **CHEM 597 (1-16) Internship**

### **CHEM 602 (1-6) Topics: Analytical Chemistry**

Recent advances in analytical chemistry or detailed study of advanced techniques or areas of analytical chemistry. This course may be taken more than once for credit if the topic is different.

Prerequisite: CHEM 305 (or equivalent) V

### **CHEM 616 (1-6) Topics: Inorganic Chemistry**

Topics from inorganic chemistry which may include such fields as bioinorganic chemistry, organometallic chemistry, solid state chemistry, and other topics of current interest. This course may be taken more than once for credit if the topic is different.

Prerequisite: CHEM 413/513 (or equivalent) V

### **CHEM 621 (2-6) Topics: Organic Chemistry**

Topics may include the chemistry of heterocyclic compounds or natural products, control of stereochemistry, photochemistry, advanced NMR techniques, or other areas of current interest not covered in other courses. This course may be taken more than once for credit if the topic is different.

Prerequisite: CHEM 321 and 331 (or equivalent) V

### **CHEM 642 (2-6) Topics: Physical Chemistry**

Advanced consideration of some fundamental area in physical chemistry with application to a topic of current interest to the instructor and students. The course will depend on reading and discussion of current primary literature. Possibilities include: quantum mechanics and molecular structure calculations, condensed phase structure, development of novel materials, etc.

Prerequisite: CHEM 442/542 (or equivalent) V

### **CHEM 660 (2-6) Topics: Biochemistry**

Detailed study of the literature in one selected area of biochemistry. This course may be taken more than once for credit if the topic is different.

Prerequisite: CHEM 461/561 (or equivalent) V

### **CHEM 677 (1-6) Individual Study**

### **CHEM 682 (2) Chemistry for the Elementary Teacher**

### **CHEM 685 (1-3) Laboratory Supervision & Maintenance**

### **CHEM 690 (1-6) Workshop**

### **CHEM 692 (1-6) Research**

### **CHEM 694 (1-2) Alternate Plan Paper**

### **CHEM 695 (1-2) Graduate Seminar**

Students will present a seminar on either a research proposal for their graduate research or the results of their thesis research.

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### **CHEM 698 (1-8) Internship**

### **CHEM 699 (3-6) Thesis**

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## CLINICAL PSYCHOLOGY MA

*College of Social and Behavioral Sciences*

*Department of Psychology*

23 Armstrong Hall • 507-389-2724

Chair: Rosemary Krawczyk, Ph.D.

Graduate Coordinator: Barry J. Ries, Ph.D.

Paul Brandon, Ph.D.; Michael Fatis, Ph.D.; Nancy Fenrick, Ph.D.; Phillip Goernert, Ph.D.; Daniel Houlihan, Ph.D.; Kimberly O'Farrell, Ph.D.; Edison Perdomo, Ph.D.; Lisa Perez, Ph.D.; Dan Sachau, Ph.D.; Tilman Sheets, Ph.D.; Robert Widner, Ph.D.

The Department of Psychology offers programs of study leading to the MA degree in Clinical Psychology and Industrial/Organizational Psychology.

Application for graduate study in Clinical Psychology should be initiated by contacting the Department of Psychology as well as the College of Graduate Studies and Research. Two separate applications are required. The Clinical Psychology Program application is available from the department and must be submitted to the clinical program to initiate the admission review process. All applicants should arrange to take the GRE and have scores forwarded to the College of Graduate Studies and Research and to the Clinical Program Admission Committee.

**Financial Assistance.** In recent years, the Department of Psychology has been able to award graduate assistantships to some students accepted into the program. Assistantships are awarded on the basis of standardized test scores and past performance as a graduate assistant.

**Program Description.** The Clinical Psychology Program is a full time, two year research oriented course of study which provides theoretical and applied training to students who wish to pursue doctoral study. Graduates typically pursue the doctorate in professional psychology.

**Admission.** In addition to completing the general admission requirements for the College of Graduate Studies and Research, the following must be completed:

1. A bachelor's degree in psychology from an accredited institution. Coursework must include statistics and a course in conditioning, learning or behavior modification.
2. Applicants who have a bachelor's degree other than psychology, from an accredited institution and courses in statistics, experimental psychology, personality, abnormal psychology, a course in conditioning, learning or behavior modification, developmental psychology (child, adolescent, or aging) and a course in history and systems of psychology.
3. Students with undergraduate course deficiencies may be considered, however, they must complete deficiencies prior to enrolling in advanced coursework.
4. The GRE is required (see department for specific requirements).
5. Three letters of recommendation, preferably from psychology professors.
6. A personal statement including the applicant's interest in clinical psychology and long term career goals.

### **CLINICAL PSYCHOLOGY MA**

(Thesis Plan - 50 credits)

#### **Required Core Courses (50 credits)**

PSYC 610	Research Design & Statistics (4)
PSYC 613	Beh. Res. Meth (4)
PSYC 649	Behavior Theory and Philosophy (3)
PSYC 650	Schools of Psychotherapy (3)
PSYC 651	Adult Psychopathology & Therapy (4)
PSYC 654	Clinical Case Management (4)
PSYC 682	Child Psychopathology & Therapy (4)