MASTER OF SCIENCE IN APPLIED CHEMICAL SCIENCES (MSACS) DEGREE

Program Learning Outcomes for the MSACS Degree

Upon completing the MSACS Degree, students will be able to:

1. Apply basic chemical knowledge and analytical skills to problem solving.
2. Demonstrate in-depth understanding of chemical knowledge in one of the three areas of specialization.
3. Use statistical analysis to evaluate data.
4. Demonstrate written, oral, and visual communication strategies required to communicate effectively across science, business, and government.

Requirements for the MSACS Degree

The MSACS degree is a non-thesis master's degree. For general university requirements for non-thesis masters degrees, please see Non-Thesis Master's Degrees (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/). For additional requirements, regulations, and procedures for all graduate programs, please see All Graduate Students (https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/). Students pursuing the MSACS degree must complete:

- A minimum of 14 courses (minimum of 39-40.5 credit hours, depending on course selection) to satisfy degree requirements.
- A minimum of 30 credit hours of graduate-level study (graduate semester credit hours, coursework at the 500-level or above).
- A minimum of 24 graduate semester credit hours must be taken at Rice University.
- A minimum of 24 graduate semester credit hours must be taken in standard or traditional courses (with a course type of lecture, seminar, laboratory, lecture/laboratory).
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A maximum of 2 courses (6 graduate semester credit hours) from transfer credit. For additional departmental guidelines regarding transfer credit, see the Policies (p. 3) tab.
- A 3-6 month full-time internship. Instead of a thesis, at the conclusion of their internship, students must present their internship project in both oral and written form as part of the Professional Master's Project (NSCI 512). Part-time students who already work in their area of study may request approval to fulfill the internship requirement by working on a specific, pre-approved project with their current employer.

The requirements for one area of specialization (see below for areas of specialization). The MSACS degree program offers three areas of specialization:

- Bioorganic Chemistry (p. 2), or
- Computational Chemistry and Data Science (p. 2), or
- Petroleum Chemistry (p. 2).

- A minimum overall GPA of 2.67 or higher in all Rice coursework.

- A minimum program GPA of 2.67 or higher in all Rice coursework that satisfies requirements for the non-thesis master's degree.

Note: Some of the listed courses are not offered every year, and some may also have prerequisites or require instructor permission.

The courses listed below satisfy the requirements for this degree program. In certain instances, courses not on this official list may be substituted upon approval of the program's academic advisor, or where applicable, the department or program's Director of Graduate Studies. Course substitutions must be formally applied and entered into Degree Works by the department or program's Official Certifier (https://registrar.rice.edu/facstaff/degeworks/officialcertifier/). Additionally, these must be approved by the Office of Graduate and Postdoctoral Studies. Students and their academic advisors should identify and clearly document the courses to be taken.

Summary

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<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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Degree Requirements

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Core Requirements

- Core Chemistry Courses
  - CHEM 590 PROFESSIONAL MASTERS SEMINAR IN APPLIED CHEMISTRY 3
  - CHEM 591 RESEARCH LABORATORY EXPERIENCE 3
  - CHEM 592 STATISTICAL DATA ANALYSIS 3
  - or BIOS 538 ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA

Cohort Courses

- NSCI 501 PROFESSIONAL MASTER’S SEMINAR (2 semesters required, 1st semester)
- NSCI 501 PROFESSIONAL MASTER’S SEMINAR (2 semesters required, 2nd semester)
- NSCI 511 SCIENCE POLICY, AND ETHICS 3
- NSCI 610 / ENGI 610 MANAGEMENT FOR SCIENCE AND ENGINEERING 3

Area of Specialization

Select 1 of the following Areas of Specialization (see Areas of Specialization below) 12-13.5

- Bioorganic Chemistry
- Computational Chemistry and Data Science
- Petroleum Chemistry

Elective Requirements

Select 3 courses from approved management, business, analytics, or communication coursework (see course list below) 9

Three to Six Month Full-Time Internship

A three to six month full-time internship is required 1

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Footnotes and Additional Information

Three to Six Month Full-Time Internship: Practical experience is offered via a three to six month full-time work immersion. The internship will be under the guidance of a host company, government agency, or non-profit organization. At the conclusion of the internship, students must present a summary of their internship project in both oral and written form for the cohort course Professional Master's Project (NSCI 512). Part-time students who already work in their area of study may fulfill the internship requirements by working on an approved project with their current employer.

Areas of Specialization

Students must complete a minimum of 4 courses (minimum of 12-13.5 credit hours, depending on area of specialization) to satisfy the requirements for one area of specialization.

Area of Specialization: Bioorganic Chemistry

Students must complete a minimum of 4 courses (minimum of 12-13.5 credit hours, depending on course selection) to satisfy the requirements for the MSACS degree program's Bioorganic Chemistry area of specialization.

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<tr>
<th>Code</th>
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<tbody>
<tr>
<td>CHEM 501</td>
<td>ADVANCED ORGANIC CHEMISTRY</td>
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<td>CHEM 511</td>
<td>SPECTRAL METHODS IN ORGANIC CHEMISTRY</td>
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<tr>
<td>CHEM 542</td>
<td>MEDICINAL CHEMISTRY I</td>
<td></td>
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<td>CHEM 547</td>
<td>SUPRAMOLECULAR CHEMISTRY</td>
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<tr>
<td>CHEM 548</td>
<td>PEPTIDE CHEMISTRY DESIGN, SYNTHESIS AND STRUCTURE</td>
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<tr>
<td>CHEM 552</td>
<td>CHEMICAL BIOLOGY</td>
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<tr>
<td>or CHEM 562</td>
<td>ORGANIC CHEMISTRY OF ENZYME-CATALYZED REACTIONS</td>
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<tr>
<td>or BIOS 558</td>
<td>FUNDAMENTALS OF QUANTITATIVE ENVIRONMENTAL HEALTH RISK ASSESSMENT</td>
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Total Credit Hours 12-13.5

Area of Specialization: Computational Chemistry and Data Science

Students must complete a minimum of 4 courses (minimum of 12-13.5 credit hours, depending on course selection) to satisfy the requirements for the MSACS degree program's Computational Chemistry and Data Science area of specialization.

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<tr>
<th>Code</th>
<th>Title</th>
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<tr>
<td>CHBE 505</td>
<td>ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS</td>
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<tr>
<td>CHEM 515</td>
<td>CHEMICAL KINETICS AND DYNAMICS</td>
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<tr>
<td>CHEM 523</td>
<td>ADVANCED ANALYSIS METHODS FOR MOLECULAR DYNAMICS FROM STATISTICAL MECHANICS TO MACHINE LEARNING</td>
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<td>CHEM 537</td>
<td>BIOPHYSICAL CHEMISTRY</td>
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<td>CHEM 551</td>
<td>BIOMOLECULAR CONCEPTS</td>
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Total Credit Hours 12-13.5

Course List to Satisfy Requirements

Elective Requirements

Select a minimum of 3 courses (minimum of 9 credit hours) from the following approved coursework in management, business, analytics or communication.

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<tr>
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<tr>
<td>EEPS 585</td>
<td>COMPUTATIONAL AND DATA SCIENCE IN THE ENERGY INDUSTRY</td>
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<tr>
<td>EEPS 587</td>
<td>SEM: PETROLEUM GEOCHEMISTRY - PRINCIPALS AND PRACTICE</td>
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<tr>
<td>ENG 515</td>
<td>LEADING TEAMS AND INNOVATION</td>
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<tr>
<td>ENG 614</td>
<td>LEARNING HOW TO INNOVATE?</td>
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<tr>
<td>MGMT 610</td>
<td>FUNDAMENTALS OF THE ENERGY INDUSTRY</td>
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<td>MGMT 625</td>
<td>DESIGN THINKING</td>
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<td>MGMT 633</td>
<td>ROLES OF PHYSICIANS, SCIENTISTS, ENGINEERS AND MBA'S IN HIGH-TECH STARTUPS</td>
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<td>MGMT 676</td>
<td>MISSION AND VALUES AS A LEADER IN ECONOMIC ACTIVITIES</td>
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Total Credit Hours 12-13.5
MGMT 686  INTRODUCTION TO MARKETING RESEARCH
MGMT 689  DECISION MODELS
MGMT 717  PROJECT MANAGEMENT
MGMT 721  BUSINESS LAW
MGMT 747  REGULATORY ENVIRONMENT OF BUSINESS
MGMT 771  DIGITAL MARKETING
NSCI 515  FOUNDATIONS OF PROJECT AND PROGRAM MANAGEMENT

Total Credit Hours 9

Policies for the MSACS Degree
Professional Science Master’s Graduate Program Handbook
The General Announcements (GA) is the official Rice curriculum. As an additional resource for students, the Professional Science Master’s Program publishes a graduate program handbook, which can be found here: [https://gradhandbooks.rice.edu/2023-24/Natural_Sciences_Professional_Masters_Graduate_Handbook.pdf](https://gradhandbooks.rice.edu/2023-24/Natural_Sciences_Professional_Masters_Graduate_Handbook.pdf)

Admission
Admission to graduate study in Applied Chemical Sciences is open to qualified students holding a bachelor’s degree in a related science or engineering program that included course work in general chemistry, physics, and advanced math. Scores from the general Graduate Record Examination (GRE), good critical thinking and communication skills and strong quantitative abilities. Some lab experience, intro statistics, introductory economics and computer skills preferred. Department faculty evaluate the previous academic record and credentials of each applicant individually and make admission decisions.

Transfer Credit
For Rice University's policy regarding transfer credit, see Transfer Credit ([https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer](https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/#transfer)). Some departments and programs have additional restrictions on transfer credit. Students are encouraged to meet with their academic program's advisor when considering transfer credit possibilities.

Program Transfer Credit Guidelines
Students pursuing the MSACS degree should be aware of the following program-specific transfer credit guidelines:

- No more than 2 courses (6 credit hours) of transfer credit from U.S. or international universities of similar standing as Rice may apply towards the degree.
- Requests for transfer credit will be considered by the program director on an individual case-by-case basis.

Additional Information
For additional information, please see the Applied Chemical Sciences website: [https://profms.rice.edu/](https://profms.rice.edu/)

Opportunities for the MSACS Degree
Fifth-Year Master’s Degree Option for Rice Undergraduate Students
In certain situations and with some terminal master's degree programs, Rice students have an option to pursue a master's degree by adding an additional fifth year to their four years of undergraduate studies.

Advanced Rice undergraduate students in good academic standing typically apply to the master's degree program during their junior or senior year. Upon acceptance, depending on course load, financial aid status, and other variables, they may then start taking some required courses of the master’s degree program. A plan of study will need to be approved by the student’s undergraduate major advisor and the master's degree program director.

As part of this option and opportunity, Rice undergraduate students:

- must complete the requirements for a bachelor’s degree and the master's degree independently of each other (i.e. no course may be counted toward the fulfillment of both degrees).
- should be aware there could be financial aid implications if the conversion of undergraduate coursework to that of graduate level reduces their earned undergraduate credit for any semester below that of full-time status (12 credit hours).
- more information on this Undergraduate - Graduate Concurrent Enrollment opportunity, including specific information on the registration process can be found here ([https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/](https://ga.rice.edu/undergraduate-students/academic-opportunities/undergraduate-graduate-concurrent-enrollment/)).

Rice undergraduate students completing studies in science may have the option to pursue the Master of Science in Applied Chemical Sciences (MSACS) degree. For additional information, students should contact their undergraduate major advisor, the faculty MSACS program director, and the Professional Science Master’s (PSM) program director.

Additional Information
For additional information, please see the Applied Chemical Sciences website: [https://profms.rice.edu/](https://profms.rice.edu/)

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