

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 \(https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-non-thesis-masters-degrees/\)](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 \(https://ga.rice.edu/graduate-students/academic-policies-procedures/regulations-procedures-all-degrees/\)](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 (coursework at the 500-level or above).
- A minimum of 24 credit hours must be taken at Rice University.
- A minimum residency enrollment of one fall or spring semester of part-time graduate study at Rice University.
- A 3-6 month 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.), *or*
 - [Computational Chemistry and Data Science](#) (p.), *or*
 - [Petroleum Chemistry](#) (p.).
- A minimum overall GPA of 2.67 or higher in all Rice coursework.
- A minimum 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/degreeworks/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

Code	Title	Credit Hours
Total Credit Hours Required for the MSACS Degree		39-40.5

Degree Requirements

Code	Title	Credit Hours
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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

Cohort Courses

NSCI 501	PROFESSIONAL MASTER'S SEMINAR (2 semesters required, 1st semester)	1
NSCI 501	PROFESSIONAL MASTER'S SEMINAR (2 semesters required, 2nd semester)	1
NSCI 511	SCIENCE POLICY, AND ETHICS	3
NSCI 512	PROFESSIONAL MASTER'S PROJECT	1
NSCI 610 / ENGI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING	3

Three to Six Month Internship

A three to six month internship is required ¹

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

Total Credit Hours	39-40.5
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Footnotes and Additional Information

¹ Practical experience is offered via a three to six month 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.

Code	Title	Credit Hours
<i>Select a minimum of 4 courses (minimum of 12 credit hours) from the following:</i>		12-13.5
CHEM 501	ADVANCED ORGANIC CHEMISTRY	
CHEM 511	SPECTRAL METHODS IN ORGANIC CHEMISTRY	
CHEM 542	MEDICINAL CHEMISTRY I	
CHEM 547	SUPRAMOLECULAR CHEMISTRY	
CHEM 548	PEPTIDE CHEMISTRY DESIGN, SYNTHESIS AND STRUCTURE	
	or CHEM 554 DRUG DISCOVERY AT THE INTERFACE OF CHEMISTRY AND BIOLOGY	
CHEM 552	CHEMICAL BIOLOGY	
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.

Code	Title	Credit Hours
<i>Select a minimum of 4 courses (minimum of 12 credit hours) from the following:</i>		12-13.5
CHEM 515	CHEMICAL KINETICS AND DYNAMICS	
CHEM 523	ADVANCED ANALYSIS METHODS FOR MOLECULAR DYNAMICS FROM STATISTICAL MECHANICS TO MACHINE LEARNING	
CHEM 537	BIOPHYSICAL CHEMISTRY	
CHEM 551	BIOMOLECULAR CONCEPTS	
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	
ESCI 544	HYDROCARBON EXPLORATION	
STAT 532	FOUNDATIONS OF STATISTICAL INFERENCE I	
STAT 533	FOUNDATIONS OF STATISTICAL INFERENCE II	
STAT 535	DATA SCIENCE PROJECTS	
Total Credit Hours		12-13.5

Area of Specialization: Petroleum Chemistry

Students must complete a minimum of 4 courses (12 credit hours) to satisfy the requirements for the MSACS degree program's Petroleum Chemistry area of specialization.

Code	Title	Credit Hours
<i>Select 4 courses from the following:</i>		12
CHEM 511	SPECTRAL METHODS IN ORGANIC CHEMISTRY	
CHEM 520	CLASSICAL AND STATISTICAL THERMODYNAMICS	
CHEM 533	NANOSCIENCE AND NANOTECHNOLOGY I	
CHEM 547	SUPRAMOLECULAR CHEMISTRY	
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	
CHBE 550	PETROLEUM PHASE BEHAVIOR AND FLOW ASSURANCE	
ESCI 544	HYDROCARBON EXPLORATION	
Total Credit Hours		12

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.

Code	Title	Credit Hours
<i>Select a minimum of 3 courses (minimum of 9 credit hours) from the following:</i>		9
ENGI 515	LEADING TEAMS AND INNOVATION	
ENGI 542	PROFESSIONAL COMMUNICATION FOR ENGINEERING LEADERS	
ENGI 614	LEARNING HOW TO INNOVATE?	
ESCI 549	DATA MANAGEMENT AND DATA GOVERNANCE	
MGMT 610	FUNDAMENTALS OF THE ENERGY INDUSTRY	
MGMT 625	DESIGN THINKING	
MGMT 633 / BIOE 633	ROLES OF PHYSICIANS, SCIENTISTS, ENGINEERS AND MBA'S IN HIGH-TECH STARTUPS	
MGMT 676	SOCIAL ENTERPRISE	
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	
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/2020_21/Professional_Science_Masters_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.

Additional Information

For additional information, please see the Applied Chemical Sciences website: <https://profms.rice.edu/>

Opportunities for the MSACS Degree

Fifth-Year Master's Degree Option for Rice Undergraduate Students

Rice students have an option to pursue the Master of Science in Applied Chemical Sciences (MSACS) degree by adding an additional fifth year to their four undergraduate years of science studies.

Advanced Rice undergraduate students in good academic standing may apply to the MSACS 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 advisor, the Professional Science Master's (PSM) program director, and the MSACS 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/).

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