

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 (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/degreeworks/officialcertifier/) (<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
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)	1
NSCI 501	PROFESSIONAL MASTER'S SEMINAR (2 semesters required, 2nd semester)	1
NSCI 511	SCIENCE POLICY, AND ETHICS	3
NSCI 610 / ENGI 610	MANAGEMENT FOR SCIENCE AND ENGINEERING	3
Area of Specialization		
<i>Select 1 of the following Areas of Specialization (see Areas of Specialization below)</i>		12-13.5
Bioorganic Chemistry		
Computational Chemistry and Data Science		
Petroleum Chemistry		
Elective Requirements		
<i>Select 3 courses from approved management, business, analytics, or communication coursework (see course list below)</i>		9
Three to Six Month Full-Time Internship		
A three to six month full-time internship is required ¹		
NSCI 512	PROFESSIONAL MASTER'S PROJECT	1
Total Credit Hours		39-40.5

Footnotes and Additional Information

¹ **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.

Code	Title	Credit Hours	
<i>Select a minimum of 4 courses (minimum of 12 credit hours) from the following:</i>			
CHEM 501	ADVANCED ORGANIC CHEMISTRY	12-13.5	
CHEM 511	SPECTRAL METHODS IN ORGANIC CHEMISTRY		
CHEM 542	MEDICINAL CHEMISTRY I		
CHEM 547	SUPRAMOLECULAR CHEMISTRY		
CHEM 548	PEPTIDE CHEMISTRY DESIGN, SYNTHESIS AND STRUCTURE		
CHEM 552	CHEMICAL BIOLOGY		
	or CHEM 562 ORGANIC CHEMISTRY OF ENZYME-CATALYZED REACTIONS		
	or BIOS 558 FUNDAMENTALS OF QUANTITATIVE ENVIRONMENTAL HEALTH RISK ASSESSMENT		
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>			
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	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		
Total Credit Hours			12-13.5

EEPS 585	COMPUTATIONAL AND DATA SCIENCE IN THE ENERGY INDUSTRY
EEPS 587	SEM: PETROLEUM GEOCHEMISTRY - PRINCIPALS AND PRACTICE
STAT 532	FOUNDATIONS OF STATISTICAL INFERENCE I
STAT 533	FOUNDATIONS OF STATISTICAL INFERENCE II
STAT 535	DATA SCIENCE PROJECTS
STAT 630	TOPICS IN CLINICAL TRIALS

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>			
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	12	
CHBE 550	PETROLEUM PHASE BEHAVIOR AND FLOW ASSURANCE		
CHEM 511	SPECTRAL METHODS IN ORGANIC CHEMISTRY		
CHEM 520	CLASSICAL AND STATISTICAL THERMODYNAMICS		
CHEM 533 / CEVE 533 / MSNE 534	NANOSCIENCE AND NANOTECHNOLOGY I		
CHEM 547	SUPRAMOLECULAR CHEMISTRY		
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>		
EEPS 585	COMPUTATIONAL AND DATA SCIENCE IN THE ENERGY INDUSTRY	9
EEPS 587	SEM: PETROLEUM GEOCHEMISTRY - PRINCIPALS AND PRACTICE	
ENGI 515	LEADING TEAMS AND INNOVATION	
ENGI 614	LEARNING HOW TO INNOVATE?	
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	MISSION AND VALUES AS A LEADER IN ECONOMIC ACTIVITIES	

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

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/>

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/>