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 15 courses (minimum of 42-43.5 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 (NSCI 514). 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.[1]
- 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***
  - Chemistry for the Energy Industry (p. 2), ***or***
  - Computational Chemistry and Data Science (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/). Additionally, these course substitutions 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		42-43.5

Degree Requirements

Code	Title	Credit Hours
Core Requirements		
Core Chemistry Courses		
BIOS 538	ANALYSIS AND VISUALIZATION OF BIOLOGICAL DATA	3
CHEM 590	PROFESSIONAL MASTERS SEMINAR IN APPLIED CHEMISTRY	3
CHEM 591	RESEARCH LABORATORY EXPERIENCE	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 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		
Chemistry for the Energy Industry		
Computational Chemistry and Data Science		
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]		
NSCI 512	PROFESSIONAL MASTER'S PROJECT	1
NSCI 514	PROFESSIONAL MASTERS INTERNSHIP	3
Total Credit Hours		**42-43.5**

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. With approval of the advising faculty, a capstone project, independent study, or a research project can be used to fulfill the internship requirement. At the conclusion of the internship (or the conclusion of the capstone project, independent study, or research project), students must present a summary of their 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
Select a minimum of 4 courses (minimum of 12 credit hours) from the following:		*12-13.5*
CHEM 501	ADVANCED ORGANIC CHEMISTRY	
CHEM 511	SPECTRAL METHODS IN ORGANIC CHEMISTRY	
CHEM 515	CHEMICAL KINETICS AND DYNAMICS	
CHEM 542	MEDICINAL CHEMISTRY I	
CHEM 547	SUPRAMOLECULAR CHEMISTRY	
CHEM 548	PEPTIDE CHEMISTRY DESIGN, SYNTHESIS AND STRUCTURE	
CHEM 552	CHEMICAL BIOLOGY I	
or CHEM 562	ORGANIC CHEMISTRY OF ENZYME-CATALYZED REACTIONS	
or BIOS 558	FUNDAMENTALS OF QUANTITATIVE ENVIRONMENTAL HEALTH RISK ASSESSMENT	
CHEM 553	STRATEGIC APPLICATIONS OF NAMED REACTIONS IN ORGANIC SYNTHESIS	
Total Credit Hours		**12-13.5**

Area of Specialization: Chemistry for the Energy Industry

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

Code	Title	Credit Hours
Select 4 courses from the following:		*12*
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	
CHBE 517	FUNDAMENTALS OF MATERIALS IN ENERGY AND SUSTAINABILITY	
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	
CHEM 575	PHYSICAL METHODS IN INORGANIC CHEMISTRY	
Total Credit Hours		**12**

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
Select a minimum of 4 courses (minimum of 12 credit hours) from the following:		*12-13.5*
CHBE 505	ADVANCED NUMERICAL METHODS WITH ENGINEERING APPLICATIONS	
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	
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	
or STAT 630	STATISTICAL DESIGNS FOR CLINICAL TRIALS	
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.

Code	Title	Credit Hours
Select a minimum of 3 courses (minimum of 9 credit hours) from the following:		*9*
EEPS 585	COMPUTATIONAL AND DATA SCIENCE IN THE ENERGY INDUSTRY	
EEPS 587	SEM: PETROLEUM GEOCHEMISTRY - PRINCIPALS AND PRACTICE	

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	LEADERSHIP, ETHICS, AND FREE ENTERPRISE
MGMT 686	INTRODUCTION TO MARKETING RESEARCH
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/2026_27/Natural_Sciences_Professional_Masters_Graduate_Handbook.pd (https://gradhandbooks.rice.edu/2026_27/Natural_Sciences_Professional_Masters_Graduate_Handbook.pdf)f.

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). Some departments and programs have additional restrictions on transfer credit. Requests for transfer credit must be approved for Rice equivalency by the appropriate academic department offering the Rice equivalent course (corresponding to the subject code of the course content) and by the Office of Graduate and Postdoctoral Studies (GPS). 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 guideline:

- 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.

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/).

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/.