RICE
CHEMISTRY

Academic Year 2021-2022

Undergraduate Advising Information

Last Updated: 8/18/2021

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Important Message Regarding COVID-19

While every effort will be made to have a more normal and in-person educational experience this year compared to last, the Covid pandemic continues to introduce uncertainty in the method of course delivery. Currently we anticipate that most classes will be taught in person. The department of chemistry will follow university guidelines if changes to a hybrid or online only mode become required.

Introduction to the Rice Chemistry Undergraduate Program

Undergraduate students interested in studying chemistry benefit from Rice's renowned faculty members and a strong research program. The Department of Chemistry offers undergraduate chemistry majors a Bachelor of Science (B.S.) degree or a Bachelor of Arts (B.A.) degree. The Department also offers a Bachelor of Science degree in Chemical Physics.

The B.S. in Chemistry degree rigorously prepares students for a career in chemistry or a related discipline, and the degree requirements are consistent with the guidelines for certification by the American Chemical Society. This curriculum provides a broad and comprehensive introduction to core areas of chemistry while promoting depth of understanding in one or more specific fields. B.S. students complete a series of foundation courses in general chemistry, analytical chemistry, biological chemistry, inorganic chemistry, organic chemistry, and physical chemistry. Students then complete one or more specializations, or "tracks," consisting of in-depth courses both in and out of the specialization.

The B.A. in Chemistry degree is a more flexible program that provides a comprehensive overview of all areas of chemistry, including laboratory experiences, but can be coupled more easily with other majors or professional career paths.

The B.S. in Chemical Physics degree is offered in conjunction with the Department of Physics and Astronomy. Students take upper-level courses in both chemistry and physics, focusing on the applications of physics to chemical systems. For more information on this option, contact Prof. Bruce Weisman (Chemistry) or Prof. Stan Dodds (Physics).

Follow Rice Chemistry!

Chemistry Department Website

- Our website contains all information on the Undergraduate program, as well as the Graduate program, Alumni, departmental events and awards, and specific faculty research and news articles.

Facebook

- Our Facebook page includes notifications of all seminars and Department events and news as well as all photos of Departmental events.

LinkedIn: *Search 'Groups' for 'Rice University Chemistry Department'*

- Our LinkedIn page is updated every time we receive news on job opportunities for those in the field of Chemistry.

Rice Chemistry Student Organizations

Owlchemy: The Rice Undergraduate Chemistry Society formed from the merger of two previous undergraduate chemistry organizations, Owlchemy and RUCS. In addition to continuing Owlchemy's commitment to education through local volunteering and demonstrations, the club seeks to provide academic and career resources, serve as a liaison to the chemistry faculty and graduate students, and create a social network of support for Rice chemistry undergraduates. The club's mission is to improve the overall academic and social interactions of both incoming freshmen and upperclassmen while promoting the study of chemistry campus and community-wide.

Chemistry Major Advisors

The Chemistry Department has one faculty advisor for every residential college so that each student can form a consistent bond within the Department while completing their degree. Contact your Major Advisor with any questions or concerns you may have – they're here to help!

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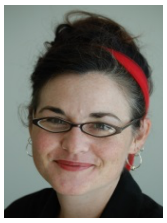
<td>  </td>
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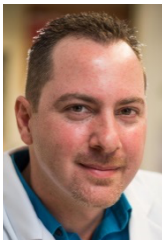
<td>  </td>
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<td>Chemical Physics (all colleges)

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Pursing a Chemistry Degree

The guide below is designed to help you explore your academic interests in chemistry and to ensure that graduates have appropriate preparation for employment or graduate school in chemistry or related fields. If you are interested in pursuing a health profession, please refer to the resources provided by The Office of Academic Advising.

First Year	Second Year
● Plan a tentative course of study with your Divisional Advisor and/or Major Advisor. ● Take at least one CHEM course, in addition to the required MATH and PHYS courses. ● Try to attend a departmental gathering, reception, or seminar to start meeting CHEM faculty and students. ● Visit the Center for Career Development to learn about the education and skills required for possible careers in Chemistry. ● Attend the Student Activities Fair and join Owlchemy. ● Identify summer programs and job opportunities through the Chemistry website and the Rice Summer Opportunities Fair. ● Strongly consider making arrangements to conduct research during the next academic year.	● Use the tips below, the General Announcements, the OAA website, and the CHEM website to determine your degree plan with your Major Advisor: - Not all courses are offered every year. Plan ahead to have flexibility in your schedule. - Complete all lower-level CHEM requirements by the end of your 2nd year. - Complete as many laboratory course requirements as possible by the end of the second year, which provides useful training for independent research in future years. - Check that you will complete at least the minimum required hours (48) at the 300 level or higher and that you will be able to complete at least 60 hours outside of your major requirements. - If you have not yet enrolled in CHEM 391, make arrangements to conduct research next year (B.S. degree candidates are expected to complete CHEM 391 before the end of their third year.) ● Apply for summer programs, research opportunities, internships, and/or study abroad programs.
Third Year	**Fourth Year**
● Apply to attend a research conference or symposium and consider presenting your research. ● Consider post-graduation plans. Begin gathering information about graduate schools or employment sectors. ● Speak with faculty members, advisors, and other mentors about post-graduation plans. ● Begin preparing CV and personal statements. ● Register and prepare for relevant standardized tests. ● Look for scholarship and fellowship opportunities. ● Request letters of recommendation from faculty.	● Complete remaining degree requirements. ● Complete and submit employment and/or graduate applications. ● Request additional letters of recommendation, if necessary. ● Consider taking time off before starting work and/or graduate school, and discuss this possibility with your advisor.

Frequently Asked Questions

What's the difference between Chemistry and Chemical Engineering? While there is much overlap between the disciplines, the major differences between chemistry and chemical engineering have to do with originality and scale. Chemists are more likely to develop fundamentally new chemicals, materials, or techniques, while chemical engineers are more likely to apply known materials or ideas to effectively solve real-world problems.

Is it better to get a B.S. rather than a B.A. in Chemistry? Neither degree is necessarily "better" — it depends on your career path. Your specific experiences, coursework, and achievements during your time at Rice are more important for job or graduate school applications than the type of degree you earn. With that said, the B.S. degree is designed to provide the experiences necessary for a career in chemistry, including pursuing graduate school or laboratory research jobs in chemistry-related fields. On the other hand, the B.A. degree is designed for students interested in a broad range of careers that value scientific knowledge, rigorous analytical skills, and quantitative abilities, but who are not as interested in laboratory research. Health professions and high school teaching are two examples of careers for which the B.A. degree is good preparation. Because it has lower credit hour requirements, some students find the B.A. degree convenient as part of a double major. Please seek advice from an academic advisor to determine which degree is best suited for your career path.

I want to earn degrees in both Chemistry and History (or any other major). Can I do it? Yes. Although it is demanding, many students do complete the requirements for two majors in disparate fields. Note that Rice offers two options in this case: a "double major" or a "dual degree." The majority of such students complete a "double major," which is earned by completing the requirements for a B.A. in two different disciplines. A "dual degree" requires the completion of two different bachelor's degrees (i.e. B.A. and B.S.) in two different disciplines and at least 30 additional semester hours at Rice beyond the hours required for the first degree. More information may be found in the General Announcements.

I will complete all of the requirements for my major but how can I be sure I have my 60 hours outside the major? All courses not specifically applied to your major requirements count as "outside" the major, even courses taken in the same discipline. For example, if you complete all the course requirements listed for a B.A. in Chemistry and take two extra CHEM courses, those courses count toward the additional 60 hours needed to graduate. Please review your Degree Works account with an academic advisor to audit your graduation requirements.

For Freshmen:

Should I take PHYS 101/102, PHYS 111/112, or PHYS 125/126? All three sequences fulfill the physics requirement for the B.A. and B.S. in Chemistry. PHYS 101/102 is intended for students majoring in engineering or the physical sciences, PHYS 125/126 for bioscience and premedical students, and PHYS 111/112 for particularly well-motivated students with a strong interest in the physical sciences. You may refer to the Office of Academic Advising (OAA) for more information on course placement.

Which Chemistry class should I take as a freshman? Most freshmen will take a full-year course in general chemistry (CHEM 121/122/123/124). However, there are three options depending on your background. Students with AP/IB Chemistry or similar credit can choose to take CHEM 201/205 or can go directly to organic chemistry (CHEM 211 or 319) during their freshman year. See the section "Which Chemistry Class is Right for Me?" for more information.

I have AP/IB Chemistry credit. Will this satisfy pre-health professions requirements? This is a question that must be answered on a case-by-case basis. AP/IB credit will satisfy some pre-medical requirements for many, but not all, medical and other health professional schools. Students need to consult with the OAA or each school for their AP/IB policies.

For Current Majors:

Should I take CHEM 211/212 or CHEM 319/320? In brief, chemistry majors should take CHEM 319/320. Both CHEM 211/212 and CHEM 319/320 count toward the undergraduate chemistry degrees, and both are excellent sequences that have been well-liked by students in recent years. CHEM 211/212 is primarily taught as a large lecture course with smaller discussion groups, while CHEM 319/320 are much smaller courses —12 to 25 students — and are intended for students considering chemistry as a major and those in related fields with a strong interest in chemical research. Taught in small groups, CHEM 319/320 minimizes traditional lecture time, and significant course time is spent on small group problem-solving work and applying fundamental concepts to new application, mechanism and arrow-pushing, and multistep synthesis. Memorization is de-emphasized. Both courses use the same textbook, though CHEM 319/320 may cover 1-2 additional chapters of material that are more important to chemists than a general audience. CHEM 320 also serves as an introduction to the department and to independent research in chemistry. Some class discussion is designed to help students find a research lab in chemistry and to work toward a career related to chemistry.

Can I pursue summer school, study abroad, and internship opportunities as a CHEM major? Chemistry course credit earned from summer school and study abroad programs is allowed. Interested students should refer to the Transfer Credit Policy found in this booklet and obtain approval from the transfer credit advisor in advance of enrolling in summer coursework. The Department encourages student participation in study abroad programs. Course substitutions completed through summer school and study abroad programs must be approved through the Office of the Registrar and the Department of Chemistry. Most students who want to do internships complete them in the summer, but academic-year internships are also possible. Please consult with the Study Abroad office and an academic advisor to design a four-year schedule that allows for study abroad and/or internship opportunities.

If I'm not doing well in one of my prerequisites, should I not be a CHEM major? Many successful chemists have struggled in undergraduate courses. You can overcome adversity if chemistry is the field you want to study. There are many reasons why students do not perform at their best, and there are tremendous resources at Rice to help. However, it is the student's responsibility to take initiative when they are struggling in a course, and their greatest mistake is to wait too long before seeking academic assistance. Students should consult their professor for help with a specific course, utilize their residential college's Academic Fellows/Mentor Society, and see an academic advisor to discuss options if they are struggling with multiple courses.

Can I Pass/Fail a chemistry course as a CHEM major? Courses taken as Pass/Fail cannot be used to meet major requirements. If required courses are taken pass/fail, the Registrar will replace the P with the letter grade earned during the final degree audit. If you have multiple courses that could be used to fulfill the same major requirement, address any potential problems with your major advisor prior to your final degree audit.

Can I earn credit for chemistry research? Yes, you may enroll in Research for Undergraduates (CHEM 391/491/492/493) to earn credit for independent research. B.S. students must complete 8 credit hours of chemistry research (corresponding research courses in other departments in Science and Engineering may only be used towards this requirement with departmental approval). CHEM 391 is the standard independent research course for first-time lab students, while CHEM 491 is for continuing lab students that is repeatable for credit. The Chemistry Honors Research Program, CHEM 492/493, offers students in their final year at Rice the opportunity to perform a two-semester, individual chemistry research project. These courses function as a pair and must be taken in the same academic year. Students must formally apply into CHEM 492/493 with the recommendation of their research professor. The course requires students to complete a research proposal, a public presentation of findings, and a formal report or thesis. For more information, refer to the Undergraduate Research Opportunities section.

How do I get involved in chemistry research? There are many ways to find research opportunities as a Rice undergraduate. The most common method to join a lab in the Chemistry Department is to contact the faculty member directly about working in their lab for course credit. CHEM 110 Freshman Chemistry Seminar and CHEM 320 Organic Chemistry II are both classes which actively help students find a suitable research lab. For more information and suggestions, please refer to the How Do I Find a Research Opportunity? section.

Life After Rice:

What are some post-graduation options for me if I graduate with a CHEM degree (aside from medical school or grad school)? You have many options, especially if you are not geographically limited. Often, these are jobs in chemical industry (including biotechnology) or science education. Other relevant career paths include conservation, science writing, science policy, scientific/medical illustration, forensic science, management consulting, and patent law. Please meet with your Chemistry major advisor and the Center for Career Development for more information.

Which graduate programs have recent CHEM undergraduates been accepted to? In the past five years, our recent Chemistry majors have gone on to graduate school (Harvard, MIT, Northwestern, Caltech, UC Berkeley, and more), as well as medical, pharmacy, and dental schools.

How important is my GPA for getting into graduate school? Admissions committees typically place considerable weight on the GPA, especially in math and science courses. The admission committee will also place a heavy emphasis on undergraduate research experience and the recommendation of the student's research mentor. However, every part of each student's application is examined closely by the admissions committee, so there is no single element that would make or break a student's admission. Among other factors, students with a strong research record that includes publication in a peer-reviewed journal are looked upon especially favorably.

What are good resources for investigating my options and choosing graduate schools to apply to? First, examine the American Chemical Society website. Second, speak with your Chemistry major advisor and research advisor to find ideal graduate programs to which you should apply that best match your research interests and career path.

Which Class is Right for Me?

The Department of Chemistry offers many different pathways that all lead to the successful completion of a BA or BS degree in chemistry. Students without AP or equivalent credit have the simplest decision making process: enroll in CHEM 121/123 in the Fall semester. Students entering with AP credit or other equivalent preparation have the most flexibility in course selection and they have three different options, which can described below.

Option 1: Take none of your AP Chemistry credit
Fall: CHEM 121/123 - General Chemistry I and General Chemistry Lab I
Spring: CHEM 122/124 - General Chemistry II and General Chemistry Lab II
This is the standard introductory chemistry sequence and the classes that **most students** will take. If you took AP Chemistry, but you do not feel confident in the level of your chemistry preparation from your AP or equivalent work, this is the best option for you. One advantage of this approach is that you will see many of the same topics which you covered in AP Chemistry again and will have an opportunity to reinforce your existing knowledge. This should also make this course somewhat easier for new matriculates. The disadvantage is that you can not use credit for both your AP work and CHEM 121 / 123.

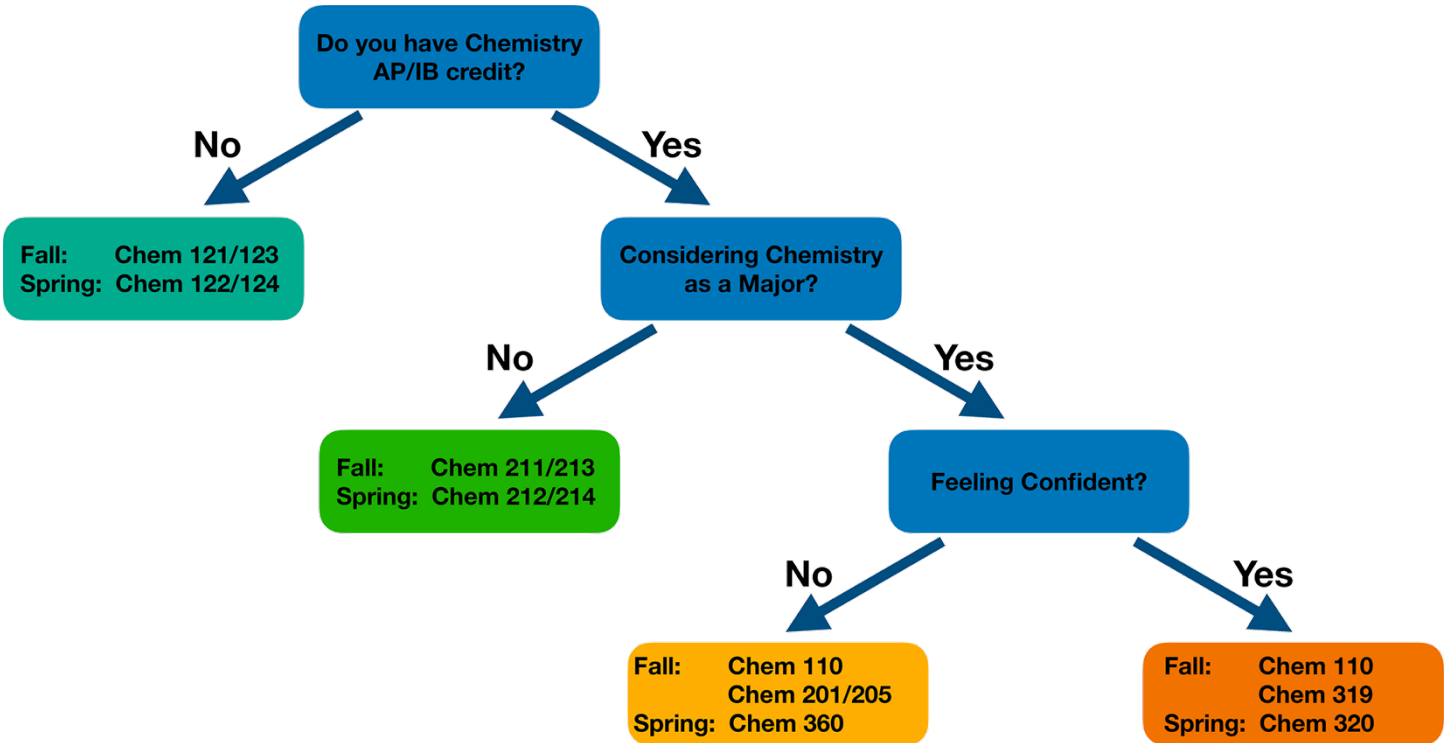
Option 2: Take one semester of your AP Chemistry credit
Fall: CHEM 201/205 - Advanced Topics in General Chemistry and Advanced Topics in General Chemistry Lab
Spring: CHEM 360 - Inorganic Chemistry
This pathway is recommended for students with AP or equivalent credit who are considering a major (BA or BS) in chemistry. CHEM 201/205 is a more advanced version of General Chemistry and it is designed for incoming students with AP or equivalent credit. The course assumes that you have a good background in introductory chemistry and it will focus on the more advanced topics for upper-level chemistry courses. CHEM 201/205 is one semester long, compared to CHEM 121/122/123/124, which is two semesters. This option allows you to take your AP credit for first semester general chemistry and replaces your second semester of general chemistry AP credit. CHEM 201/205 satisfies the prerequisites for any course requiring CHEM 121/122 /123 /124. Upon completing this course, students intending to major in chemistry are recommended to take CHEM 360 in the Spring.

Option 3: Take both semesters of your AP Chemistry credit
Fall: CHEM 211 or CHEM 319 - Organic Chemistry I
Spring: CHEM 212 or CHEM 320 - Organic Chemstry II
These are the organic chemistry I and II options. Students intending to major in chemistry should enroll in CHEM 319/320, while other students should enroll in CHEM 211/212. Taking organic chemistry in the first year is only available to students who have AP or equivalent credit for General Chemistry. The advantage of taking the full year of Chemistry AP credit is that it facilitates students seeking to take additional upper level courses, double major or reduce their courseload during their junior/senior years. The disadvantage is the challenge presented by the organic curriculum for new matriculates. Students not intending to major in chemistry, but who have AP or equivalent credit, can also consider taking no chemistry course in the Fall semester and starting CHEM 211 in the Spring semester.

Note about AP and equivalent credit: Students with AP credit will receive credit for CHEM 111/112/113/114. These credits are the equivalent to CHEM 121/122/123/124 for any prerequisites, but they do not count towards the Group 3 distribution requirement.

Note for pre-medical students: Please consult with the Office of Academic Advising (OAA) for advice on which path is best for you, as some medical schools do not accept Chemistry AP credit.

First Year Class Selection Flow Chart



Notes:

• All of these paths include courses that satisfy the requirements of the chemistry major.

• Chemistry 110 is a 1 credit, half semester course which can only be taken in your first year and is intended to introduce you to the chemistry faculty and their research interests. It is a great way to start planning on what research you might do as a chemistry major.

• Chemistry Majors will also need Phys 101*/102* and Math 101/102. Physics offers three variations on their first year course (101/102, 111/112 and 125/126). Any of these variations satisfy the chemistry major.

• Pre-medical students should consult a premed advisor regarding medical school course requirements with regard to AP credit and its suitability for medical school admissions.

Degree Requirements for the B.S. in Chemistry

The B.S. in Chemistry requires at least 129 credit hours, including at least 69 credit hours of chemistry requirements (listed below in a checklist format).

General Chemistry

Course	Semester Taken	Year Taken	Credits
CHEM 121 / 111			3
CHEM 201 / 122 / 112			3
CHEM 123 / 113			1
CHEM 205 / 124 / 114			1
CHEM 110*			

Chemistry Foundation

Course	Semester Taken	Year Taken	Credits
CHEM 211 / 319			3
CHEM 301			3
CHEM 302			3
CHEM 330			3
CHEM 360			3
BIOC 301			3
CHEM 110 / 220*			1

*BIOC 201 is a prerequisite for BIOC 301, but the Biosciences Department confirmed that CHEM majors are waived from the BIOC 201 prerequisite. Students need to special register for BIOC 301.

*CHEM 110 or 220 is recommended (not required) of all B.S. majors prior to enrolling in CHEM 391.

Mathematics*

Course	Semester Taken	Year Taken	Credits
MATH 101/105			3
MATH 102/106			3
MATH 212/222			3

*The Department of Mathematics may, after consultation with a student concerning his/her previous math preparation, recommend that a student be placed into a higher level math course than that for which the student has received official credit. The Department of Chemistry will accept this waiver of the math classes upon a written confirmation of the waiver from the Department of Mathematics and upon the student's successful completion of the higher level math course. Note: MATH 211 is encouraged for students interested in graduate study.

Physics

Course	Semester Taken	Year Taken	Credits
PHYS 101/111/125			4
PHYS 102/112/126			4

Advanced Laboratories *Complete 3 of 5*

Course	Semester Taken	Year Taken	Credits
CHEM 365			2
CHEM 366			2
CHEM 367			2
CHEM 368			2
BIOC 311			2

Research *At Least Eight (8) Credit Hours*

Course	Semester Taken	Year Taken	Credits
CHEM 391*			
**			
**			
**			

*Normally completed before the end of junior year. Enrollment in CHEM 391 (at least 3 credits) requires advance permission. See course guide for details.

**Additional independent research or laboratory coursework in chemistry must be completed to total eight (8) credit hours (including CHEM 391). This requirement may be satisfied by taking one or more of the following: (i) CHEM 491, (ii) CHEM 492 and 493, and (iii) additional laboratory course(s) in chemistry at the 300-level or above. Up to two (2) credits of CHEM 700 may be used toward this requirement.

Advanced Work *Complete Twelve (12) Credit Hours*

Each student must complete advanced work that satisfies one of the specialization tracks listed below. A student may, with the approval of the Director of the Undergraduate Program, propose a track in another specialization. See the General Announcements for details.

Course	Semester Taken	Year Taken	Credits

Specialization in Biological and Medicinal Chemistry
CHEM 212/CHEM 320, BIOC 302, Six (6) additional credit hours

Specialization in Inorganic Chemistry and Inorganic Materials
CHEM 475, CHEM 495, Six (6) additional credit hours

Specialization in Organic Chemistry
CHEM 212/CHEM 320, CHEM 401, Six (6) additional credit hours

Specialization in Physical and Theoretical Chemistry
CHEM 420, CHEM 430, Three (3) credit hours from CHEM 415, 531, or 559, Three (3) credit hours of advanced coursework in PHYS or MATH

"Advanced coursework" includes CHEM 212, CHEM 320, BIOC 302, and chemistry courses at the 400-level or higher. Courses in other departments at the 400-level or higher with substantial chemistry content may count toward this requirement with approval of the Director of the Undergraduate Studies (Dr. Jeffrey Hartgerink).

B.S. in Chemistry – Sample Degree Plan without Chemistry AP credit (Path 1)

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**15 credits**
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Laboratory I	1	CHEM 124	General Chemistry Laboratory II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
FWIS	First Year Writing Seminar	3	DIST	FWIS/Distribution Course	3
CHEM 110	Freshman Seminar in Chemistry	1	LPAP	Lifetime Phys. Activity Elective	1
SOPHOMORE		**14 credits**	**SOPHOMORE**		**17 credits**
CHEM 319	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 360	Inorganic Chemistry	3
MATH 212	Multivariable Calculus	3	CHEM 365	Organic Chemistry Lab	2
DIST	Distribution Course	3	CHEM 391	Research for Undergraduates	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
JUNIOR		**15 credits**	**JUNIOR**		**14 credits**
BIOC 301	Biochemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 301	Physical Chemistry I	3	CHEM 330	Analytical Chemistry	3
CHEM 491	Research for Undergraduates	3	CHEM 368	Chemical Measurement Lab	2
DIST	Distribution Course	3	CHEM 491	Research for Undergraduates	3
OPEN	Open Elective	3	DIST	Distribution Course	3
SENIOR		**17 credits**	**SENIOR**		**14 credits**
CHEM 492	Undergrad. Honors Research	5	CHEM 493	Undergrad. Honors Research	5
CHEM 4XX	Adv Chem. Lecture Course	3	CHEM 4XX	Adv Chem. Lecture Course	3
CHEM 4XX	Adv Chem. Lecture Course	3	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

Total = 121 credit hours

Note: While the above sample degree plan suggests 19 credit hours of independent research, the B.S. degree requires only 8 credit hours. There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year – consult with your major advisor about your course plan.

B.S. in Chemistry – Sample Degree Plan with Chemistry AP Credit (Path 2)

FALL			SPRING		
FRESHMAN		**15 credits**	**FRESHMAN**		**14 credits**
CHEM 201	General Chemistry	3	CHEM 360	Inorganic Chemistry	3
CHEM 205	General Chemistry Laboratory	1	MATH 102	Single Variable Calculus II	3
MATH 101	Single Variable Calculus I	3	PHYS 102	Electricity & Magnetism (with lab)	4
PHYS 101	Mechanics (with lab)	4	DIST	FWIS/Distribution Course	3
FWIS	First Year Writing Seminar	3	LPAP	Lifetime Phys. Activity Elective	1
CHEM 110	Freshman Seminar in Chemistry	1			
SOPHOMORE		**14 credits**	**SOPHOMORE**		**17 credits**
CHEM 319	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 330	Analytical Chemistry	3
MATH 212	Multivariable Calculus	3	CHEM 365	Organic Chemistry Lab	2
DIST	Distribution Course	3	CHEM 391	Research for Undergraduates	3
OPEN	Open Elective	3	DIST	Distribution Course	3
			OPEN	Open Elective	3
JUNIOR		**15 credits**	**JUNIOR**		**14 credits**
BIOS 301	Biochemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 301	Physical Chemistry I	3	CHEM 491	Research for Undergraduates	3
CHEM 491	Research for Undergraduates	3	CHEM 368	Chemical Measurement Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**17 credits**	**SENIOR**		**14 credits**
CHEM 492	Undergrad. Honors Research	5	CHEM 493	Undergrad. Honors Research	5
CHEM 4XX	Adv Chem. Lecture Course	3	CHEM 4XX	Adv Chem. Lecture Course	3
CHEM 4XX	Adv Chem. Lecture Course	3	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3			

Total = 120 credit hours

Note: The above sample degree plan assumes that Chemistry AP credit was earned upon entering Rice, which would satisfy CHEM 111/113. While the above sample degree plan suggests 19 credit hours of independent research, the B.S. degree requires only 8 credit hours. There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year- consult with your major advisor about your course plan.

B.S. in Chemistry – Sample Degree Plan with Calculus AB and Chemistry AP credit (Path 3)

FALL			SPRING		
FRESHMAN		**13 credits**	**FRESHMAN**		**15 credits**
CHEM 110	Freshman Chemistry Seminar	1	CHEM 320	Organic Chemistry II	3
CHEM 319	Organic Chemistry I	3	CHEM 365	Organic Chemistry Lab	2
CHEM 366	Inorganic Chemistry Lab	2	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
DIST	Distribution Course	3	FWIS	First Year Writing Seminar	3
SOPHOMORE		**15 credits**	**SOPHOMORE**		**14 credits**
BIOC 301	Biochemistry I	3	CHEM 330	Analytical Chemistry	3
CHEM 367	Materials Lab	2	CHEM 360	Inorganic Chemistry	3
MATH 211	Ord. Diff. Equations	3	CHEM 391	Research for Undergraduates	3
DIST	Distribution Course	3	CHEM 368	Chemical Measurement Lab	2
OPEN	Open Elective	3	MATH 212	Multivariable Calculus	3
LPAP	Lifetime Phys. Activity Elec	1			
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
CHEM 301	Physical Chemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 491	Research for Undergraduates	3	CHEM 491	Research for Undergraduates	3
CHEM 4XX	Adv Chem. Lecture Course	3	DIST	Distribution Course	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
SENIOR		**17 credits**	**SENIOR**		**17 credits**
CHEM 492	Undergrad. Honors Research	5	CHEM 493	Undergrad. Honors Research	5
CHEM 4XX	Adv Chem. Lecture Course	3	CHEM 4XX	Adv Chem. Lecture Course	3
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Total = 121 credit hours

Note: The above sample degree plan assumes that Calculus AB and Chemistry AP credit were earned upon entering Rice, which would satisfy MATH 105 and CHEM 111/112/113/114, respectively. While the above sample degree plan suggests 19 credit hours of independent research, the B.S. degree requires only 8 credit hours. There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year – consult with your major advisor about your course plan.

Degree Requirements for the B.A. in Chemistry

The B.A. in Chemistry requires at least 120 credit hours, including at least 55 credit hours of chemistry requirements (listed below in a checklist format).

General Chemistry

Course	Semester Taken	Year Taken	Credits
CHEM 121/111			3
CHEM 201/122/112			3
CHEM 123/113			1
CHEM 205/124/114			1

Chemistry Foundation

Course	Semester Taken	Year Taken	Credits
CHEM 211/319			3
CHEM 301/302 /BIOC 352			3
CHEM 301/302 /BIOC 352			3
CHEM 330			3
CHEM 360			3
BIOC 301			3

*BIOC 201 is a prerequisite for BIOC 301, but the Biosciences Department confirmed that CHEM majors are waived from the BIOC 201 prerequisite. Students need to special register for BIOC 301.

Mathematics*

Course	Semester Taken	Year Taken	Credits
MATH 101/105			3
MATH 102/106			3
MATH 212/222			3

*The Department of Mathematics may, after consultation with a student concerning his/her previous math preparation, recommend that a student be placed into a higher level math course than that for which the student has received official credit. The Department of Chemistry will accept this waiver of the math classes upon a written confirmation of the waiver from the Department of Mathematics and upon the student's successful completion of the higher level math course. Note: MATH 211 is encouraged for students interested in graduate study.

Physics

Course	Semester Taken	Year Taken	Credits
PHYS 101/111/125			4
PHYS 102/112/126			4

Advanced Laboratories *Complete 3 of 5*

Course	Semester Taken	Year Taken	Credits
CHEM 365			2
CHEM 366			2
CHEM 367			2
CHEM 368			2
BIOC 311			2

Advanced Coursework *Complete Six (6) Credit Hours*

Six (6) credit hours of additional advanced coursework in chemistry. For purposes of this requirement, "advanced coursework" includes chemistry courses at the 400-level or higher. CHEM 212 or CHEM 320 or BIOC 302 counts as "advanced coursework" for purposes of this requirement. Courses in other departments with substantial chemistry content may count toward this requirement with approval of the Director of the Undergraduate Studies (Dr. Jeffrey Hartgerink).

Course	Semester Taken	Year Taken	Credits

B.A. in Chemistry – Sample Degree Plan without Chemistry AP Credit

FALL			SPRING		
FRESHMAN		**14 credits**	**FRESHMAN**		**15 credits**
CHEM 121	General Chemistry I	3	CHEM 122	General Chemistry II	3
CHEM 123	General Chemistry Laboratory I	1	CHEM 124	General Chemistry Laboratory II	1
MATH 101	Single Variable Calculus I	3	MATH 102	Single Variable Calculus II	3
PHYS 101	Mechanics (with lab)	4	PHYS 102	Electricity & Magnetism (with lab)	4
FWIS	First Year Writing Seminar	3	DIST	FWIS/Distribution Course	3
			LPAP	Lifetime Phys. Activity Elective	1
SOPHOMORE		**15 credits**	**SOPHOMORE**		**14 credits**
CHEM 319	Organic Chemistry I	3	CHEM 320	Organic Chemistry II	3
MATH 212	Multivariable Calculus	3	CHEM 360	Inorganic Chemistry	3
DIST	Distribution Course	3	CHEM 365	Organic Chemistry Lab	2
OPEN	Open Elective	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
JUNIOR		**17 credits**	**JUNIOR**		**17 credits**
BIOC 301	Biochemistry I	3	CHEM 302	Physical Chemistry II	3
CHEM 301	Physical Chemistry I	3	CHEM 330	Analytical Chemistry	3
CHEM 366	Inorganic Chemistry Lab	2	CHEM 368	Chemical Measurement Lab	2
DIST	Distribution Course	3	DIST	Distribution Course	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective		OPEN	Open Elective	
SENIOR		**15 credits**	**SENIOR**		**15 credits**
CHEM 4XX	Adv Chem. Lecture Course	3	CHEM 4XX	Adv Chem. Lecture Course	3
CHEM 4XX	Adv Chem. Lecture Course	3	OPEN	Open Elective	3
DIST	Distribution Course	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3
OPEN	Open Elective	3	OPEN	Open Elective	3

Total = 122 credit hours

Note: There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year – consult with your major advisor about your course plan.

Degree Requirements for the B.S. in Chemical Physics

The B.S. in Chemical Physics requires at least 133 credit hours, including at least 73 credit hours of chemistry requirements (listed below in a checklist format).

General Chemistry

Course	Semester Taken	Year Taken	Credits
CHEM 121			3
CHEM 122			3
CHEM 123			1
CHEM 124			1

Chemistry Foundation

Course	Semester Taken	Year Taken	Credits
CHEM 211/319			3
CHEM 215			2
CHEM 301			3
CHEM 302			3

Physics Foundation

Course	Semester Taken	Year Taken	Credits
PHYS 101/111			4
PHYS 102/112			4
PHYS 201			3
PHYS 202			3
PHYS 231			1
PHYS 301			4
PHYS 302			4

Mathematics Foundation

Course	Semester Taken	Year Taken	Credits
MATH 101/105			3
MATH 102/106			3
MATH 211/221			3
MATH 212/222			3

Additional Lecture Courses

Complete Nine (9) Credit Hours from: PHYS 311, PHYS 312, CHEM 360, CHEM 415, or CHEM 420

Course	Semester Taken	Year Taken	Credits

Additional Laboratory Courses

Complete Four (4) Credit Hours from: CHEM 365, CHEM 366, CHEM 367, CHEM 368, PHYS 331, or PHYS 332

Course	Semester Taken	Year Taken	Credits

Note: Up to two (2) hours of CHEM 391, CHEM 491, PHYS 461, or PHYS 462 may be counted toward this requirement.

Additional Mathematics Courses

Complete Six (6) Credit Hours from MATH or CAAM courses at or above the 300-level:

Course	Semester Taken	Year Taken	Credits

B.S. in Chemical Physics - Sample Degree Plan without Chemistry AP credit

FALL			*SPRING*		
FRESHMAN		**16 credits**	**FRESHMAN**		**17 credits**
CHEM 121	*General Chemistry I*	*3*	*CHEM 122*	*General Chemistry II*	*3*
CHEM 123	*General Chemistry Laboratory I*	*1*	*CHEM 124*	*General Chemistry Laboratory II*	*1*
MATH 101	*Single Variable Calculus I*	*3*	*MATH 102*	*Single Variable Calculus II*	*3*
PHYS 101	*Mechanics (with lab)*	*3*	*PHYS 102*	*Electricity & Magnetism (with lab)*	*4*
FWIS	*First Year Writing Seminar*	*3*	*DIST*	*Distribution Course*	*3*
OPEN	*Open Elective*	*3*	*OPEN*	*Open Elective*	*3*
SOPHOMORE		**16 credits**	**SOPHOMORE**		**16 credits**
CHEM 211	*Organic Chemistry I*	*3*	*CHEM 215*	*Organic Chemistry Lab*	*3*
CHEM 213	*Organic Chemistry Discussion*	*0*	*CHEM 360*	*Inorganic Chemistry*	*2*
MATH 211	*Ordinary Differential Equations*	*3*	*MATH 212*	*Multivariable Calculus*	*4*
PHYS 201	*Waves and Optics*	*3*	*PHYS 202*	*Modern Physics*	*3*
PHYS 231	*Elementary Physics Lab*	*1*	*DIST*	*Distribution Course*	*3*
DIST	*Distribution Course*	*3*	*LPAP*	*Lifetime Phys. Activity Elective*	*1*
OPEN	*Open Elective*	*3*			
JUNIOR		**18 credits**	**JUNIOR**		**18 credits**
CHEM 301	*Physical Chemistry I*	*3*	*CHEM 302*	*Physical Chemistry II*	*3*
CHEM 391	*Research for Undergraduates*	*3*	*CHEM 368*	*Chem Measurement Lab*	*2*
PHYS 301	*Intermediate Mechanics*	*4*	*CHEM 491*	*Research for Undergraduates*	*3*
PHYS 331	*Junior Physics Lab I*	*2*	*PHYS 302*	*Intermediate Electrodynamics*	*4*
DIST	*Distribution Course*	*3*	*DIST*	*Distribution Course*	*3*
OPEN	*Open Elective*	*3*	*OPEN*	*Open Elective*	*3*
SENIOR		**17 credits**	**SENIOR**		**17 credits**
CHEM 415	*Chem. Kinetics & Dynamics*	*3*	*CAAM 3XX*	*Adv CAAM Lecture Course*	*3*
CHEM 492	*Undergrad. Honors Research*	*5*	*CHEM 493*	*Undergrad. Honors Research*	*5*
PHYS 425	*Statistical & Thermal Physics*	*3*	*MATH 3XX*	*Adv MATH Lecture Course*	*3*
DIST	*Distribution Course*	*3*	*OPEN*	*Open Elective*	*3*
OPEN	*Open Elective*	*3*	*OPEN*	*Open Elective*	*3*

Total = 135 credit hours

Note: While the above sample degree plan suggests 17 credit hours of independent research, the B.S. degree in Chemical Physics does not require any research credit. There is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year – consult with your major advisor about your course plan.

B.S. in Chemical Physics - Sample Degree Plan with Calculus AB and Chemistry AP credit

FALL			*SPRING*		
FRESHMAN		**16 credits**	**FRESHMAN**		**15 credits**
CHEM 211	*Organic Chemistry I*	*3*	*CHEM 215*	*Organic Chemistry Lab*	*2*
CHEM 213	*Organic Chemistry Discussion*	*0*	*MATH 102*	*Single Variable Calculus II*	*3*
PHYS 101	*Mechanics (with lab)*	*4*	*PHYS 102*	*Electricity & Magnetism (with lab)*	*4*
FWIS	*First Year Writing Seminar*	*3*	*DIST*	*Distribution Course*	*3*
DIST	*Distribution Course*	*3*	*OPEN*	*Open Elective*	*3*
OPEN	*Open Elective*	*3*			
SOPHOMORE		**16 credits**	**SOPHOMORE**		**16 credits**
MATH 211	*Ordinary Differential Equations*	*3*	*CHEM 360*	*Inorganic Chemistry*	*3*
PHYS 201	*Waves and Optics*	*3*	*CHEM 391*	*Research for Undergraduates*	*3*
PHYS 231	*Elementary Physics Lab*	*1*	*MATH 212*	*Multivariable Calculus*	*3*
DIST	*Distribution Course*	*3*	*PHYS 202*	*Modern Physics*	*3*
OPEN	*Open Elective*	*3*	*DIST*	*Distribution Course*	*3*
OPEN	*Open Elective*	*3*	*LPAP*	*Lifetime Phys. Activity Elective*	*1*
JUNIOR		**15 credits**	**JUNIOR**		**15 credits**
CHEM 301	*Physical Chemistry I*	*3*	*CHEM 302*	*Physical Chemistry II*	*3*
CHEM 491	*Research for Undergraduates*	*3*	*CHEM 491*	*Research for Undergraduates*	*3*
PHYS 301	*Intermediate Mechanics*	*4*	*PHYS 302*	*Intermediate Electrodynamics*	*4*
PHYS 331	*Junior Physics Lab I*	*2*	*PHYS 332*	*Junior Physics Lab II*	*2*
DIST	*Distribution Course*	*3*	*DIST*	*Distribution Course*	*3*
SENIOR		**17 credits**	**SENIOR**		**17 credits**
CHEM 415	*Chem. Kinetics & Dynamics*	*3*	*CAAM 3XX*	*Adv CAAM Lecture Course*	*3*
CHEM 492	*Undergrad. Honors Research*	*5*	*CHEM 493*	*Undergrad. Honors Research*	*5*
MATH 3XX	*Adv MATH Lecture Course*	*3*	*CHEM 420*	*Classical & Stat Thermodynamics*	*3*
OPEN	*Open Elective*	*3*	*OPEN*	*Open Elective*	*3*
OPEN	*Open Elective*	*3*	*OPEN*	*Open Elective*	*3*

Total = 127 credit hours

Note: The above sample degree plan assumes that Calculus AB and Chemistry AP credit were earned upon entering Rice, which would satisfy MATH 105 and CHEM 121/122/123/124, respectively. Also note that there is a lot of flexibility in the completion of advanced coursework. However, not all courses are taught every year – consult with your major advisor about your course plan.

Policies

Transfer Credit Policy

The Department of Chemistry grants transfer credit for chemistry courses taken during the summer or during study abroad programs according to the rules and procedures established in the Rice University General Announcements and as administered by the Office of the Registrar.

In order to satisfy the Department's ruling on transfer credit, the course must typically be taken at a four-year college or university that offers a degree in chemistry certified by the American Chemical Society (information regarding certified programs is available on the ACS website). The course should be one that counts toward the chemistry degree at that school. Prior to registration, students should obtain pre-approval using the Undergraduate Request for Transfer Credit which is available from the Office of the Registrar.

Transfer credit for courses at the 300 level or above are generally not permitted. Exceptions may be granted to students transferring to Rice from another institution or coursework carried out during an approved year abroad.

Courses for transfer credit after matriculation for General Chemistry (CHEM 121 and/or CHEM 122) and the laboratory (CHEM 123 and/or CHEM 124) must contain a laboratory component or must involve co-enrollment in associated lecture and laboratory courses. **Any student who has taken CHEM 121 and/or CHEM 122 at an alternate institution with a laboratory must receive instructor approval to take the lab credit on the Rice campus.**

Students should follow these steps to obtain transfer credit approval:

1. Complete an Undergraduate Request for Transfer Credit form, found on the Office of the Registrar's website.
2. Write a cover letter describing why you wish to obtain transfer credit. Describe the start and end dates, as well as the meeting times of the course during the term. This letter should include your contact information (campus or local address, phone number, email address).
3. Obtain course syllabus and copies of materials from the college or university showing the course number, course description and enough information to indicate that the course to be taken is the equivalent that chemistry majors take at Rice.
4. Deliver all materials to Anita Walker, Undergraduate & Classroom Coordinator, located in Dell Butcher Hall 243. Questions concerning transfer credit should be directed to Ms. Walker at 713-348-4027 or aawalker@rice.edu.

You may elect either to pick-up the processed form or to have it returned via campus mail so that you may submit the form to the Registrar.

Course Load Policy

Students at Rice normally enroll for 15 to 17 semester credit hours each semester. For most students, this allows completion of graduation requirements in 8 semesters. In some instances, a student may feel the need to petition for a registration overload. Petitioning for a registration overload should be a last resort and only for students with truly extenuating circumstances that would necessitate a course overload. Guidelines can be found on the Academic Advising website (https://oaa.rice.edu/policies-and-procedures/overloads-and-reduced-course-loads/overloads). Students must secure permission in writing from either the Office of the Academic Advising or the Chemistry major advisor for course overloads, Dr. Lesa Tran Lu (lesa@rice.edu).

Undergraduate Research Opportunities

Undergraduate students have a unique opportunity to perform research in one of our many interdisciplinary research labs. Most chemistry research students are chemistry majors. Chemistry majors seeking a B.S. degree are required to take at least eight credit hours of research through CHEM 391, 491, 492, and 493.

Although many Chemistry majors work with Rice Chemistry professors, we also encourage and support students doing research in other Rice science departments or in the Texas Medical Center (TMC). To earn credit for your research, students must have their research proposal approved by the CHEM 391/491 Course Instructor. To be approved for credit in the chemistry department, the research should have something to do with chemistry (defined broadly) and should be set up to provide a positive research experience.

Students should expect to spend at least 3 hours per week (or at least 42 hours over the course of the semester) for each credit hour. In the first semester of independent research, students should enroll in CHEM 391 for at least 3 credit hours before the end of their junior year. Prior to enrollment, students must secure a position in a laboratory. In subsequent semesters, students should enroll in CHEM 491 for independent research (or CHEM 492/493 for honors thesis research) and may choose the appropriate number of credit hours with approval from their Research Advisor.

CHEM 491 is repeatable for credit and students wishing to pursue graduate school or other careers in research and applied science are encouraged to gain as much research experience as possible. Students are not limited to one lab, and may choose another lab in subsequent semesters. A major advantage of continuing in one lab may include obtaining results to co-author a publication.

Undergraduate Honors Research, CHEM 492 (Fall) and CHEM 493 (Spring)

The Chemistry Honors Research Program, CHEM 492/493, offers students in their final year at Rice the opportunity to perform a two-semester, individual chemistry research project. These courses function as a pair and must be taken in the same academic year. Course requirements include (but are not limited to) completing a research proposal, a public presentation of findings, and a formal research report or thesis in the Spring term. Students must formally apply into CHEM 492/493 with the recommendation of their Research Advisor. If you are conducting research for a thesis outside the Chemistry Department you must have an on-campus Chemistry Department secondary advisor. Applications must be submitted to the course instructor February 1 - August 1 (early application submission is highly encouraged). Students who complete the Chemistry Honors Research Program are given primary consideration for "Distinction in Research and Creative Work," a university award for select undergraduates, chosen by the Department and granted at commencement, which appears on the transcript and diploma.

How do I register for Undergraduate Research?

First, start planning far in advance. Before enrolling in CHEM 391/491/492/493, you must be accepted into a laboratory (see How Do I Find a Research Opportunity? for more information.) The deadline for course enrollment is several weeks before the start of the semester. Some labs may have extensive laboratory or safety training that must be completed before the start of the semester. Labs at the Texas Medical Center often have access control regulations that require filling paperwork months in advance of starting in the lab.

Once you have secured a research position, you must fill out the online application found on the Chemistry Department website. The online application must be submitted by August 1st for the Fall term, December 1st for the Spring term, or April 1st for the Summer term to ensure enrollment in CHEM 391/491/492/493. Once you have submitted the online application, the Course Instructor will verify your position and proposed research project with the Research Advisor and then submit a registration override via Esther. No paper special registration form is required to be signed or submitted, and only the Course Instructor (not Research Advisors) is authorized to enroll students. If you have any questions about enrollment, please contact the Course Instructor.

How do I find a Research Opportunity?

Where do I start?

If you are a chemistry major, you probably want to begin by looking for positions in the Chemistry Department. Positions are generally not advertised, so the best approach is simply to investigate online and contact any faculty member whose research interests you regardless of whether research opportunities have been posted. To find out which faculty members are working in areas that you find intriguing, please refer to Appendix A, the Chemistry Department website, or the Chemistry Undergraduates Research page on Canvas.

There are lots of options for undergraduate research, but do not be overwhelmed by them! It is not possible to collect all of the information about every lab and then put the data through some algorithm to identify the best lab for you. Random circumstance often governs which lab a student joins—many labs are particularly popular at one college because many people join the lab where their friends work. Look for a lab that is interesting to you. Talk to juniors and seniors, as well as your graduate student TAs, about their lab experiences. Which labs do they recommend? Contact chemistry professors with whom you've taken classes for advice about labs. The CHEM 391/491 Course Instructor is happy to meet with you to help identify a good match. If you are serious about joining a particular research group, visit the lab, ask to meet the undergrads already working there, and inquire as to the best method of approaching that particular professor.

How do I contact professors with whom I might want to work?

Do your homework. Most positions are not advertised, but are filled from among the students who contact faculty members. Read about each lab's research and try to talk with current group members to get a feel for the personality and expectations of the faculty member. Write a personal email to the faculty member. Do not send a mass email to multiple faculty members or your email will be considered spam and ignored.

Your introductory email conveys an important first impression and can influence how easy it will be for you to find a lab home. All heads of research labs have either a PhD or an MD degree and should be addressed as "Prof." or "Dr." or and not "Ms., Mrs., or Mr." In your email, tell the professor who you are (name, year at Rice), why you are looking for a position in a research lab, and why you are interested in his or her lab in particular. Describe any relevant course work or prior research experience, even if it was in high school. You also may want to include whether you are looking for a short (1 semester) or longer experience, and how many hours per week you can commit to lab work. If you are considering graduate school after Rice, include this interest in the letter.

How many labs should I contact?

Getting into a lab is partly timing and luck, so do not be discouraged if your first efforts are not successful. It's usually necessary to contact several labs to find a position. If you know someone in a lab where you want to work, ask that person to put in a good word for you. If you are not successful after several attempts, you may wish to ask the Course Instructor for feedback on your contact letter. Additional information about research opportunities and finding an advisor can be found by contacting the CHEM 391/491 Course Instructor.

Are there prerequisite courses I must take before joining a research lab?

Most students joining a lab have some background in inorganic chemistry from a general chemistry course or CHEM 360, and many will have taken organic. You may not have taken courses in other areas of chemistry by the time you join a lab, but you can envision many interfaces between chemistry and other fields. Physical chemistry is a great direction to go if you like physics and chemistry, and bio-organic chemistry is the interface between biological chemistry and organic. People who have strong interests or background in mathematics and/or computer science might consider becoming theoreticians or computational chemists. Rice has a rich history of excellence in nanotechnology, which has applications in almost all areas of chemistry, from biochemistry to materials science.

Should I consider conducting research at the Texas Medical Center?

The Texas Medical Center holds enormous possibilities to do research, and students who are headed to medical school might be particularly interested in the possibility of working at the medical center. Nevertheless, several factors complicate off-campus research, which should not be taken lightly:

1) Travel time — The trip may take 10–35 minutes, depending on where you work, and reduces the amount of time you have to spend in the lab.
2) Hard to drop in for a few minutes — Sometimes when you have a break between classes you will want to drop into lab for a few minutes to start a reaction, check on an analytical run or a calculation, or talk to your professor. These few minutes can often give you a head start or eliminate waiting time when you have your next block of time in the lab. The distance problem can preclude popping in and out of an off-campus lab.
3) Cultural differences between Rice and other TMC institutions — Most labs at the medical center are less accustomed to working with undergraduate researchers and may be less accommodating of undergraduate schedules and instructional needs.
4) Paperwork and safety training courses — Additional paperwork and safety training courses are required for most off-campus labs, so you will have to budget extra time to complete these before beginning research.

However, students who have prepared for these complexities have an unusual opportunity to undertake medical research as an undergraduate student. A hybrid approach is to join a Rice lab that works closely with TMC faculty. Please see the CHEM 391/491 Course Instructor if you would like leads in these directions.

Are there paid research opportunities?

Most undergraduate research during the school year is done for credit. In many labs, paid positions during the school year are limited to lab maintenance or very routine work, and actual research will only be available for students working for credit during the academic year. However, many labs offer some paid positions over the summer. Some professors do try to set up paid research positions during the school year for students who are eligible for work-study. Note: students cannot simultaneously earn course credit and be paid for their research.

Also, there are a limited number of summer research fellowship opportunities within the Chemistry department, such as the Dr. Paul S. Engel Fellowship, the George Holmes Richter Memorial Fellowship and the Zevi & Bertha Salsburg Memorial Fellowship in Chemistry. See the Awards & Fellowships section for more information.

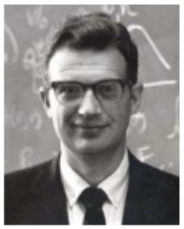
Awards & Fellowships

Undergraduate students have several opportunities to receive awards and summer research fellowships from the Department of Chemistry. Below is some background information on each award. Specific deadlines for the fellowships will be sent out to the Chemistry Undergraduate listserv near the end of the fall semester. Note: students can join the listserv by emailing chemhelp@rice.edu

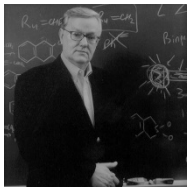
Paul S. Engel Fellowship
Awarded to a promising chemistry undergraduate in partial support of a chemistry summer research internship

Arthur L. Draper Award
Awarded in recognition of exceptional undergraduate performance in chemistry coursework

George Holmes Richter Memorial Fellowship
Awarded to a promising chemistry undergraduate in partial support of a chemistry summer research internship



Zevi & Bertha Salsburg Memorial Fellowship in Chemistry
Awarded to a promising chemistry undergraduate in partial support of a chemistry summer research internship



Ed. Billups Fellowship
Awarded to a promising chemistry undergraduate in partial support of a chemistry summer research internship

ACS Travel Award
Awarded to a chemistry undergraduate to support attendance at the ACS National Meeting in the fall or spring semester

University Awards

The Distinction in Research and Creative Work is a University award for select undergraduates, granted at Commencement, which appears on the transcript and diploma. More specifically, in the Chemistry Department, this award recognizes Rice B.S. chemists whose research discoveries will form a substantial component of an important publication. The submission and review processes are often not fast enough for researchers to see their work in print before graduation. A pre-publication formal description of the research (e.g., a submission-ready manuscript or a CHEM 492/3 Honors Thesis or the equivalent) with a detailed accounting of the nominee's contribution and those of other authors is sufficient. Applicants must also be in good academic standing and have a cumulative GPA of at least 3.30 in courses completed at Rice.

Required Application Materials:

1. Declaration of intention to apply for this distinction.
2. Documentation of research achievement in the form of published papers, theses, pre-publication manuscripts, electronic files of presentations (PowerPoint or poster) given off-campus.
3. A supporting letter from the research advisor which should detail the student's research accomplishments and intellectual contributions.

Deadline for Final Submission of Materials: Last day of classes of semester before graduation

Please send all application materials to Nancy Adler: nbn2@rice.edu

Appendix A: Chemistry Faculty and their Research Interests

Our Department's faculty have a wide variety of research interests and hold joint appointments with Biosciences[1], Bioengineering[2], Chemical & Biomolecular Engineering[3], Computer Science[4], Earth Science[5], Electrical & Computer Engineering[6], Material Science & NanoEngineering[7], Physics & Astronomy[8], and Civil & Environmental Engineering[9]

Pulickel Ajayan[3,7], PhD (Northwestern, 1989). Multi-functional nanostructures and hybrid platforms for energy storage, composites, sensors, electronics, and biomedicine.

Pedro Alvarez[7,9], PhD (U of Michigan, 1992). Bioremediation of contaminated aquifers, fate and transport of toxic chemicals, and environmental implication and application of nanotechnology.

Zachary Ball, PhD (Stanford, 2004). Chemical biology. Protein chemistry. Organic synthesis, bioinorganic, and medicinal chemistry.

Gang Bao[2], PhD (Lehigh, 1987). Nanotechnologies and biomolecular engineering approaches for basic biological studies and medicine.

Enrique Barrera[7], PhD (UT Austin, 1987). Formation of hybrid nanotube materials and the development of fully integrated nanotube composites.

Cecilia Clementi[3], PhD (International School for Advanced Studies, 1998). Theoretical and computational investigation of protein folding, protein interactions and functions.

Michael Diehl[2], PhD (UCLA, 2002). Biomotor cooperativity, biomaterials, supramolecular biophysics and molecular bioengineering.

Paul Engel, PhD (Harvard, 1968). Free radical initiators, inhibitors of polymerization, free radical of single walled carbon nanotubes with organic free radicals.

Anna-Karin Gustavsson, PhD (University of Gothenburg, 2015). Spectroscopy and Imaging. Development and application of 3D single-molecule tracking and super-resolution imaging throughout mammalian cells

Jason Hafner[8], PhD (Rice, 1998). Application of nanometer-scale tools and materials to problems of biological and biomedical interest.

Naomi Halas[2,6,7,8], PhD (Bryn Mawr, 1987). Nanofabrication chemistry and nano-optics.

Jeffrey Hartgerink[2], PhD (Scripps, 1999). Self-assembly of nanostructured materials with a focus on molecular structures of proteins and peptide based biomaterials for tissue regeneration, drug delivery and other biomedical applications.

John Hutchinson, PhD (UT Austin, 1980). Chemical education

Matthew Jones, PhD (Northwestern, 2014). Nanoparticle synthesis, surface chemistry, supramolecular chemistry, soft matter assembly, and liquid-phase electron microscopy

Anatoly Kolomeisky[3], PhD (Cornell, 1998). Theoretical physical chemistry, biophysics and statistical mechanics. Modeling of biological transport systems and protein-DNA interactions, and investigation of nanocars and other artificial nanoscale devices.

László Kürti, PhD (Penn, 2006). Synthetic Organic Chemistry. Specializes in the development of new catalytic asymmetric transformations, modes of chirality transfer, methods for the synthesis of bioactive N- and O-heterocycles as well as novel aminating agents & transition metal-free amination reactions.

Christy Landes[6], PhD (Georgia Tech, 2003). Experimental physical, biophysical, and nanomaterials physical chemistry; single molecule spectroscopy. Dynamic complexity and its role in biological and synthetic polymer functions.

Stephan Link[6], PhD (Georgia Tech, 2000). Physical chemistry of nanomaterials, nanophotonics and plasmonics, spectroscopy of individual & coupled nanoparticles with applications in opto-electronics, energy, and medicine.

Jun Lou[7], PhD (Princeton U, 2004). Nanomaterial synthesis, nanomechanical characterization and nanodevice fabrication for energy, environment and biomedical applications.

Angel Marti[2,7], PhD (U Puerto Rico, 2004). Development of molecules to diagnose and treat disorders that involve protein aggregates, e.g. Alzheimer's; development of supramolecular materials based on nanoscale building blocks.

Frederick MacKintosh[3], PhD (Princeton, 1989). Fundamental properties of biological and soft matter networks.

Carrie Masiello[5], PhD (U of California, Irvine, 1999). Fundamental mechanisms of the carbon cycle, carbon sequestration, climate change, black carbon, terrestrial-river-ocean biosphere interactions.

Seiichi Matsuda[1], PhD (Harvard, 1994). Bioorganic and organic chemistry, terpenoid biosynthesis, enzyme evolution, redesign of enzymes to have new activities, and genomic approaches to find biologically active molecules.

Antonios Mikos[3,7], PhD (Purdue U, 1988). Synthetic biodegradable polymers as supportive scaffolds for cells, as conduits for guided tissue growth, as specific substrates for targeted cell adhesion, or as stimulants for a desired cellular response.

Emilia Morosan[7,8], PhD (Iowa State, 2005). Design and synthesis of novel magnetic and superconducting materials.

K.C. Nicolaou, PhD (U London, 1972). Specializes in organic chemistry with a focus on the synthesis of natural and designed molecules of biological and medical importance to cancer research.

Jose Onuchic[1,8], PhD (Harvard, 1976). Theoretical and computational methods for molecular biophysics and chemical reactions in condensed matter; protein folding funnels as a mechanism for the folding of proteins.

Matteo Pasquali[3,7], PhD (Minnesota, 1999). Interaction of flow and liquid micro- and nanostructure in complex fluids, with application to the manufacturing of engineered materials.

George Phillips[1], PhD (Rice, 1976). Three-dimensional structure and dynamics of proteins to their biological functions, computational biology.

Peter Rossky[3], PhD (Harvard, 1978). The elucidation of the fundamental molecular-level origins of chemical behavior in condensed phases and clusters.

Gustavo Scuseria[7,8], PhD (U Buenos Aires, 1983). Development of theoretical and computational quantum chemistry techniques (many in the Gaussian program). Application of quantum mechanics to predict the structure and properties of molecules.

Ned Thomas[3,7], PhD (Cornell, 1974). Polymer physics and engineering, photonics and phononics and mechanical and optical properties of block copolymers, liquid crystalline polymers, and hybrid organic-inorganic nanocomposites.

James Tour[4,7], PhD (Purdue, 1986). Organic chemistry, materials science, polymer chemistry, nanoscience, and nanotechnology.

R. Bruce Weisman[7], PhD (U Chicago, 1977). Basic studies of carbon nanotube spectroscopy and photophysics and related analytical, mechanical engineering and biomedical applications.

Julian G. West, PhD (Princeton University, 2017). New synthetic reactions, catalysis design and cancer research.

Kenton Whitmire, PhD (Northwestern, 1982). Inorganic and organometallic chemistry, precursor design for advanced nanomaterials, structural and mechanistic chemistry, catalysis, bioactivity of heavy main group elements.

Peter Wolynes[7,8], PhD (Harvard, 1976). Theoretical chemical physics, theory of glasses, protein dynamics and folding. Stochastic cell biology.

Michael Wong[3,7], PhD (MIT, 2000). Chemical engineering, chemistry, and materials science, functional nanoparticle-based materials.

Han Xiao[1], PhD (Scripps Research Institute, 2015). Synthetic chemistry, chemical biology, molecular biology, cancer biology, and immunology.

Boris Yakobson[7], PhD (Russian Acad. of Sciences, 1982). Theory and modeling of materials derived from macroscopic and fundamental molecular interactions.

Eugene Zubarev[7], PhD (Russian Acad. of Sciences, 1998). Organic chemistry and polymer chemistry, synthesis and characterization of self-assembling molecules.