A. I’m thinking of being a Chem or Biochem major. What can I do with this degree?

If you are considering a switch to biochemistry or chemistry degree, please feel free to make an appointment in the chemistry office to see an advisor to discuss your options. We are a small department and have about 150 majors, graduating about 30 per year. About 70% of our majors from the department pursue some type of graduate degree, but those that don’t want to do this are very employable in chemical industry. The Chemistry and Biochemistry Department has the highest percentage of its graduates attend medical school than any other major/department on campus. Our students who want to work in industry typically find a job fairly quickly in the field and there are many local companies who look to hire our graduates. Many of our students pursue research in the department and work with faculty members in the academic year and over the summer.

| Career Outcomes for Chemistry/Biochemistry Graduates |
|-----------------|-----------------|-----------------|------------------|-------------------|-----------------|-----------------|
|                 | N               | Med/Dental School | Pharmacy/Nursing/PA | Other Grad | Grad School Chem/Bio* | Employed in Science | Employed | Lost |
| Total 2008-2013 | 211             | 38               | 27                | 11      | 69                | 40              | 17       | 9    |
|                 | 18%             | 13%              | 5%                | 33%     | 19%               | 8%              | 4%       |

The American Chemical Society takes a lengthy look at careers in the chemical sciences that can be found here: [https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers.html](https://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers.html)

Chemist careers cover a large range of interests, from public health, medicine, and drug development to environmental protection, materials development, forensics, art restoration, and product formulation, development and sales. Furthermore, chemistry is an area of critical need in most states for K-12 education. Business Insider, Forbes and other sources routinely publish lists of the most valuable college majors, and chemistry/biochemistry majors are always very highly ranked with high starting salaries and low unemployment rates.
B. Travel Abroad

Chemistry and Biochemistry students sometimes struggle to find opportunities to study abroad that won’t set them back in the curriculum and that are related to their course of study. Last spring, Dr. Kate Mullaugh and Dr. William Veal offered two different courses for students interested in environmental science as it intersects with different cultures and ecosystems. Students visited local communities from their home base at the University of Georgia’s field station near San Luis. The opportunity will be available again in Maymester 2020 for your planning. https://dar.uga.edu/costa_rica/index.php/campus/UGACR_360_Photos

The Department is entering into a partnership with the University of Aalen, located in the economic center of the Swabian Alps in Southern Germany. Aalen is known for recruitment of a diverse international student body and welcomes students to participate in their business and STEM focused curriculum. The spring term is from Mid-march through August and could feature classes in bioanalytical and instrumental chemistry as well as other courses in culture, language, and business. We hope to have students participating in the program in March 2020. Our first student from Aalen will be arriving this spring to work in Dr. Forsythe’s lab.

The Center for International Education at the College of Charleston also has programs in many English-speaking countries that might be a good fit for a science student to continue their studies while also gaining an abroad experience.

C. Internships

The Department of Chemistry and Biochemistry has several industry partners in the area that would like to host student interns during the school year or the summer. These are great opportunities for students to gain valuable experience in the workforce. Students can earn credit for an internship experience in Chem 381 and get paid by the company. Students must work 45 hours per semester (~4 hours per week) to earn one credit hour and can earn up to 4 credits in a term scaling that up. Please contact the main office if you are interested in pursuing this type of experience. You can also browse the Career Center’s Handshake system to find internship opportunities all over the country and even overseas. If you are contemplating working in industry, this type of experience can help you develop a competitive application and position you for a higher starting salary.


A frequent lament in student course evaluations for Chem 111 and Chem 112 are that the classes go too fast. This spring, we are offering a section of Chem 111 and a section of Chem 112 that meet 200 minutes per week instead of 150. This extra 50 minutes of instruction will allow your instructor to go a little slower over the material and to do more problem solving in
class with you. The classes will still cover the same material, will still be for 3 credits, and will still require the co-requisite lab. We encourage you to take the extended section if you are anxious about Chem 111 or Chem 112 or know that this type of extra time will help you succeed in the course. Dr. Forconi is teaching the extended Chem 111 section MWF at 10:00 with the additional class period being Tuesday 10:50-12:05. Dr. Lavrich is teaching the extended Chem 112 section T/R 9:25-10:40 with the additional class period being Monday 9:00-9:50.

The Department will offer Chem 232, the second semester of organic chemistry, as a hybrid online course. The primary instruction will take place online but there will also be a required in-person meeting on Wednesdays from 6:00-6:50 and the co-requisite lab will also be in-person and on campus. Dr. Van Horn will be teaching this course. Dr. Van Horn will not be offering a separate practicum section for this course.

E. Development of New Chemistry BA requirements

The Department has approved a new set of requirements for the Bachelor of Arts in Chemistry that we hope will make the degree more flexible for students. It is currently in the curriculum approval process on campus; it typically takes the full year for all the approvals before it would go into effect in the Fall 2019-20 catalog. Stay tuned for the announcement of those changes late in the spring if you are contemplating a BA in Chemistry. Note that the current requirements for the Chem BA will still satisfy the new requirements, but other course combinations will as well.

F. Spring 2019 Special Topics and Elective Courses

New!

Chem 483  Product Stewardship in Industrial Chemistry, taught by Dr. Fred Gouzoules. Tuesdays 6:00-6:50

Dr. Fred Gouzoules is recently retired from chemical industry and has offered to teach a course for us specifically for students intending to work in chemical industry. It will give you something to talk about at your job interviews and will give you unique insight into issues at play in chemical production. We are also inviting area companies to send their current employees so it might be a great chance for students to meet people in Charleston who are working in the chemical industry.

Product stewardship is the practice of identifying the health, safety, environmental and social issues associated with commercial products and managing them to achieve human and environmental protection while delivering maximum economic value. It is fundamentally involved at the intersection of technology and business in the global chemical industry, from early research and development activities through commercialization and ultimately to end-of-life cycle. Because of the inherent hazards and exposure risks with chemicals (versus other global commodities), and as a result of high-profile incidents over four decades, product
stewardship in the chemical industry has now become an essential part of a sustainable chemical enterprise.

The course will examine for the basic principles and methods of implementing a product stewardship program, conducting product risk assessments, analyzing compliance requirements, and initiatives to enhance this approach to thoughtful product design and marketing relative to internal economic pressures and those from external influencers. The course will provide insights into chemical industry company dynamics (of different functional disciplines within an organization) and provide information to better prepare students for potential professional placement at the BS level in the industry. The course would also be useful to new hires in the industry, working in production technical, product development and marketing positions.

**Chem 483/483L, Bioanalytical Chemistry**, co-taught by Dr. Jay Forsythe and Dr. Michael Giuliano. Mondays 2:00-6:00

This course focuses on the analysis of biological molecules by modern mass spectrometry (MS) and nuclear magnetic resonance (NMR) techniques used in clinical, biochemical, and pharmaceutical research. It is primarily lab-based, such that students will gain hands-on sample preparation, instrument operation, and data analysis training. This will be fantastic preparation for anyone thinking about graduate school in biochemistry or chemistry and for anyone hoping to pursue a career in chemical industry. The course pre-requisites are Chem 220 and Chem 351.

*Chem 483L (Bioanalytical Chemistry) will count towards the elective lab credit hours needed for the biochemistry major!*

**Chem 103, Calculations in Chemistry**
Online, 1 credit, Express II taught by Dr. Jim Deavor

This course is designed to prep students for enrollment in Chemistry 111. It reviews basic math skills and chemistry skills that may be rusty from years of separation from high school background.

**Chem 183, Special Topics, Chemistry of Wine**, 6:30-8:10, Mondays, 1 credit; Express II Course. Taught by Dr. Mike Cohen, adjunct faculty in the School of Business and the Department of Chemistry

This is a course taught by Dr. Mike Cohen, who has a unique background in biochemistry, business, viniculture and viticulture. Trained as a wine sommelier, Dr. Cohen will lead students through the chemical processes used to make wine and the agricultural factors that lead to unique chemical composition and flavor of varieties of wine. **You must be 21 to take this course.** If you want to enroll, please come to the Chemistry Main Office in SSMB 324 and bring your ID. Pre-requisite is Chem 111 or Honors 190.
Chem 230, Introduction to Organic, Express II, 1 credit, online  
Taught by Prof. Lisa Barker

This 1-credit, Express II course is for students who wish to review and preview material relevant for success in organic chemistry. Perfect for Chem 112 students who intend to take Chem 231 in Fall 2019 or in the Summer.

Chem 343, Introduction to Modeling in Chemistry, 11-11:50 Mondays, 1 credit (lecture), taught by Dr. Clyde Metz

This course is a must-have for anyone thinking about graduate school in chemistry. Almost every field of chemistry benefits from computational modeling, and this course introduces students to this important sub-discipline of chemistry. The course covers an introduction to computer modeling of various properties and structures of molecules, thermodynamic properties and structures of simple crystals, and the kinetics of chemical reactions. The pre-requisite is Chem 231.

Chem 422, Environmental Chemistry, 10:00-10:50, MWF, 3 credits, taught by Dr. Kate Mullaugh

This course will provide an introduction to chemical topics relevant to environmental issues such as atmospheric chemistry, climate change and water quality. The course will also include discussions about analytical and instrumental methods relevant to this area. The pre-requisite is Chem 220/220L.

Chem 431, Advanced Organic Chemistry, 10:50-12:05, TR, 3 credits, taught by Drs. Barker, Heldrich and Van Horn

This course is typically offered every other year and provides an in depth look at organic chemistry current research and mechanistic questions.

Chem 483/483L, Special Topics: Industrial Chemistry, 12:00-4:00, Friday, 2 credits, taught by Dr. Neal Tonks

This course will teach students about industrial research problems and students will be working in the lab on a real research problem. This is a terrific course for students who are intending to work in industry or students who want even more experience using instruments and synthetic techniques. The pre-requisite for this course is Chem 371 or a relevant research experience in Chemical Synthesis as part of Chem 481, 397, or Chem 482 with permission of instructor.
**Chem 356, Biochemical Basis of Disease**, 1:00-1:50, Mondays and Wednesdays, 2 credits, taught by Dr. Pam Riggs-Gelasco

This course discusses the biochemical basis of Alzheimer's Disease, Diabetes, Antibiotic Resistance, Obesity, Cardiovascular Disease, and Cancer. The reading is from the primary literature. The time in class is split between lectures from the instructor and students presenting research articles to their classmates. The pre-requisite is Chem 351.

*NOTE: This class will next be taught in Spring 2021.*

**G. What is Physical Chemistry?**

Physical Chemistry is a two-semester sequence, though the order that you take the classes is not fixed. Chem 341 is the study of thermodynamics and kinetic rates. You were introduced to these concepts in Chem 111 and Chem 112, but in this course you will understand how these thermodynamic quantities are mathematically related and how they can be used to predict chemical behavior. Chem 342 is the study of quantum mechanics. Again, you were introduced to these concepts in Chem 111---orbitals, quantum numbers, spectroscopy, and line spectra. In Chem 342, you will mathematically derive these concepts and learn more about how spectroscopy is built on transitions between energy levels in atoms and molecules. Both of these courses use a lot of math and hence the pre-requisite is either Math 229 or Math 221 (in addition to Chem 220). Labs in both courses explore mathematical predictions and modeling of chemical and physical behavior. The American Chemical Society describes the work of a physical chemist like this:

*Physical chemists are focused on understanding the physical properties of atoms and molecules, the way chemical reactions work, and what these properties reveal. Their work involves analyzing materials, developing methods to test and characterize the properties of materials, developing theories about these properties, and discovering the potential use of the materials. Using sophisticated instrumentation and equipment has always been an important aspect of physical chemistry. Most physical chemistry labs are full of analytical instruments, which can include lasers, mass spectrometers, nuclear magnetic resonance, and electron microscopes.*

*Physical chemists’ discoveries are based on understanding chemical properties and describing their behavior using theories of physics and mathematical computations. Physical chemists predict properties and reactions of chemicals, then test and refine those predications. They use mathematical analysis and statistics on huge datasets, sometimes with millions of data points, to reveal hidden information about compounds, materials, and processes. They may also conduct simulations, developing mathematical equations that predict how compounds will react over time.*

*Recently, more and more physical chemists have found homes in the emerging fields of materials science and molecular modeling where their skills in analyzing and predicting the behavior of physical properties have exciting new applications.*
H. Success in Organic Chemistry

Organic Chemistry is a class that some students dread taking. Even the New York Times wrote about its challenges: http://www.nytimes.com/2013/11/03/education/edlife/how-to-get-an-a-in-organic-chemistry.html. It is likely the first chemistry course that students take without a frame-of-reference from their high school work and it is a course that does not heavily emphasize the numeric calculations that prevail in general chemistry. Instead, it relies on understanding reactivity of functional groups, the structural features of molecules that guide reactions to occur. It is a course that relies on visualizing in three dimensions (model sets help here!) and a course that requires you to apply your knowledge to new examples. You cannot pass organic by memorizing your way through the examples—instead, you must develop the skills to apply your knowledge to new examples. This is what makes organic challenging. Working through problems is a key factor to succeeding in the course as this provides critical experience in maneuvering electrons to make and break new bonds. An understanding of organic chemistry unlocks the rationale of biological reactions. Our metabolic reactions (glycolysis, Kreb’s cycle, DNA synthesis, etc) and structures of biomolecules all follow the rules of organic reactivity. Understanding organic chemistry will make you a better biologist and will help you understand and see the exquisite chemical rationale for the reactions that occur in the body, for those of you planning to study medicine. For those full details, you should take Chem 351 and Chem 352, the biochemistry sequence.

The Department has implemented four initiatives to help students succeed in Organic Chemistry.

1) LearnSmart Prep: All students taking Chem 231 will complete a required online preparation module called LearnSmart Prep. Chem 231 relies heavily on material in Chem 111 in addition to material in Chem 112. Students are advised to work on this module over the winter break. Details will be emailed in early December. If you took Chem 111 or 112 here recently, this is similar to the online module that was required to begin those courses. Access to the system is purchased for ~$30 and the pre-Organic module provides an extensive review of general chemistry topics relevant to organic and a preview of organic chemistry that will help you with material in Chem 231. Information on how to access the review will be available in early December, so please check your CoC email or check the chemistry department’s webpage for information on how to enroll. There will be an optional review module available for Chem 232 as well.

2) Introduction to Organic Chemistry: We are offering a 1-credit Express II course in Spring 2019 called Introduction to Organic Chemistry, Chem 230. The course reviews important concepts from general chemistry in the context of organic molecules and previews topics in Chem 231. If you will be in Chem 112 in the spring, it would be a good opportunity for you to prepare for organic in the Fall of 2019 or Summer 2019. We are planning to offer it in Maymester as well.
3) **Organic Chemistry Practicum:** Each professor teaching Chem 231, Chem 232, and Hons 192 in the Spring will be offering an optional 1-credit course “Organic Chemistry Practicum” linked informally to their section. If you are enrolling in organic chemistry for Spring 2019, we **highly recommend** that you also enroll in your professor’s section. Your professor will be working through problems with you in this session.

4) **Organic Peer Mentor sessions:** Chem 231, Chem 232 and Hons 192 will have a peer mentor to help students in additional problem solving sessions that will be scheduled throughout the term. These students are upper-level chemistry and biochemistry students that have excelled in organic chemistry. These are non-credit bearing attend-as-you-are-able sessions.

Lastly, we advise all chemistry and biochemistry majors and molecular biology track majors to take their entire organic chemistry sequence at the College of Charleston. Students who transfer all or part of their organic chemistry sequence often struggle in the courses that build on that background (Chem 371, Chem 311, Chem 351, Chem 352 in particular). Graduating seniors from this department score an average in the 85th percentile nationwide in the organic chemistry section of the Chemistry Major Fields Test. Organic is taught at a high level at this institution and it does pay off in the end.

### I. Advice about Sequence Courses

The department offers several linked sequences in the chemistry curriculum: Chem 111-Chem 112 (General Chemistry sequence), Chem 231-Chem 232 (Organic Chemistry sequence) and Chem 351-Chem 352 (Biochemistry sequence). Students who perform poorly in the first class of the sequence often want advice on whether they should proceed to the next class or repeat the first class. For those students struggling with that decision, we are providing you with historical data on success rate in the second course based on grade in the first course.

If you are currently in Chem 231 and are struggling to get a low C or a D, you should consider re-taking Chem 231 lecture before you attempt Chem 232. In general, students do not improve upon their Chem 231 grade when taking Chem 232. Students who earned low, passing grades (C-, D+, D, D-) who attempt Chem 232 often have great difficulty passing Chem 232 and it is indeed rare that their score goes up from what they earned in Chem 231. It is better to get a solid foundation in Chem 231 by repeating it rather than trying to rush through the sequence. A strong performance in organic is likewise critical for successful performance in biochemistry and other upper level courses. If you have questions about whether or not you should repeat organic, please see your organic professor, your advisor, or the Chair. Also, please note that if you take Chem 231 and received a D, then took Chem 232 and also received a D, you will be unable to take Chem 231 again to improve your grade—-you can take it, but it will not count in your GPA average (this is called a repeat exclude). If you are going to repeat Chem 231, do it before you go on to Chem 232. If you pass the lab and elect to repeat the lecture, you do not need to repeat the lab.

For Chem 111 proceeding to Chem 112, students who perform at the D level in 111 perform on average at the D level in 112. Students who scored a C in 111 scored on average a C in 112;
some improved their scores from the C level but some did worse. We recommend a C or higher in Chem 111 before proceeding to Chem 112.

J. The MCAT and Biochemistry

The MCAT now includes Biochemistry as well as other topics that have never been on this admissions test before. In general, AAMC has been selling a first semester biochemistry course as sufficient preparation for biochemistry material. Please note that a look through the topics suggests otherwise.

https://www.aamc.org/students/applying/mcat/map/mcat2015knowledgeconcepts2/368620/bb1cc1d.html

Many of the topics included under the broad heading "Biological and Biochemical Foundation of Living Systems" are covered in SECOND semester biochemistry, Chem 352. For example, bioenergetics, glycolysis, gluconeogenesis, fermentation, citric acid cycle, pentose phosphate pathway, metabolic regulation, ketone bodies, beta oxidation, fatty acid anabolism, oxidative phosphorylation, and glycogen synthesis are all topics covered extensively in Chem 352 but NOT in Chem 351. If you are planning to take the MCAT, you should be planning to take through Chem 352. Some of these topics are covered in Cell Biology or other biology courses, but likely not in the molecular detail that they are covered in Chem 352.

Chem 351 and Chem 352 require Organic Chem 232/232L as a pre-requisite. You cannot take the biochemistry sequence without a full year of organic, so please plan your schedule accordingly. We hope to be able to offer Chem 351 in the Summer to help meet student demand for this new requirement. Lastly, biochemistry is one of the few courses in our department where the lab is not specifically linked as a co-requisite to the lecture course. Chem 354L, the required lab course for biochemistry and molecular biology-track biology majors, can be taken with Chem 351, with Chem 352 or after Chem 352. If you are a chemistry major or regular track biology major or Exercise Science major just wanting to prepare for the MCAT, you do not need to take Chem 354L.

K. Math Requirements for Chemistry and Biochemistry Major

The Math requirement for the Chemistry and Biochemistry degrees is:

Math 120 and Math 229 OR Math 120, Math 220, and Math 221

All math must be completed BEFORE you take Chem 341 and Chem 342. Note that you can take Chem 342 prior to taking Chem 341. Chem 341 is ONLY offered in the Fall semester and Chem 342 is ONLY offered in the spring semester.

The Math 229 course is a 5-credit class that condenses most of the math required for the physical chemistry sequence into one class. It includes a lot of Calc II and Calc III and some linear algebra and differential equations. This class was designed in response to student requests and pleas for better math preparation for physical chemistry. Starting in Fall 2017,
physical chemistry will be taught with the assumption that you have taken Math 229 (or the alternative math sequence of Math 120, Math 220, and Math 221). Note, too, that Math 229 will serve as a co-requisite for Physics 112 instead of Math 220. You may need the help of the Physics department to get enrolled, but they understand that chemistry students are taking slightly different type of math course. If you are considering a math major or minor or a physics major or minor, you should plan on taking the full, traditional sequence of Math courses (120, 220, 221).

L. Math Requirements to take General Chemistry (Chem 111 and Chem 112)

Chem 111-Chem 112 is the general chemistry sequence for science majors. Chem 111 requires placement into calculus via the math placement exam OR you must take Math 111 (Pre-calculus) as a pre-req or a co-req with Chem 111. Please note that eligibility to take Math 111 is determined both by the Aleks placement test and also SAT/ACT math section scores. Information about the math placement process can be found here: http://math.cofc.edu/placement-testing/index.php

Many students take this placement exam the summer before their matriculation, but these scores expire 1 year after completion of the exam. You will need to re-take the math placement exam to achieve your correct math placement if your exam is expired as of the registration period. A cautionary note, too, that many students do not do as well on the placement exam if they have not been practicing math for a year or two, so leave time to take the review module to ensure that you are not caught off-guard with a Math 101 placement when you are ready to take Chem 111. Because of these math issues and increasing distance from high school chemistry, we recommend biology majors and other majors needing chemistry begin their chemistry sequence no later than their sophomore year.

Chem 112 requires Math 111 as a pre-requisite or placement into calculus as an active (non-expired) math placement exam at the time of registration.

M. Summer Courses

The following Chemistry courses will be offered in Summer 2019, provided they have sufficient enrollments (historically, they have).

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<tr>
<th>Course</th>
<th>Term</th>
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<tbody>
<tr>
<td>Chem 220/220L</td>
<td>Maymester</td>
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<tr>
<td>Chem 230</td>
<td>Maymester</td>
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<tr>
<td>Chem 101/101L</td>
<td>Summer I</td>
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<tr>
<td>Chem 102/102L</td>
<td>Summer II</td>
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<tr>
<td>Chem 111/111L</td>
<td>Summer I</td>
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<td>Chem 112/112L</td>
<td>Summer II</td>
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<td>Chem 231/231L</td>
<td>Summer I</td>
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<td>Chem 232/232L</td>
<td>Summer II</td>
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<tr>
<td>Chem 351</td>
<td>Summer II</td>
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If you are taking a chemistry course in the summer, please try to limit or eliminate work hours during the summer session you are taking the course. You will need all of your free hours to keep up with the material.

We recommend that chemistry and biochemistry majors take their chemistry courses at the College of Charleston. If you are taking summer courses elsewhere, take them outside the area of chemistry. You should check the transfer equivalency database available on the registrar's website before committing to summer courses elsewhere.

N. Research Participation

The individual enrollment courses the department offers are listed below. To sign up for a research course, you must have arranged to work with a faculty member and have their commitment to mentor you. In general a good time to do that is the semester prior to when you wish to initiate a project. Right now is the perfect time to talk with faculty if you want to try research in the spring. Faculty are very willing to meet with students to discuss research options, so we encourage you to look at our website for the research interests of our faculty and start scheduling conversations with faculty members if research is something that interests you. In general, faculty members appreciate students coming to these conversations with a brief CV/resume of your academic career (courses taken, GPA, intended career goals, other research experiences, etc.). On Thursday, November 15 at 4:00, the School of Science and Math will host a research match-making session where students can meet with faculty to discuss research projects in their lab. Faculty from some labs at MUSC will also be in attendance.

Why should you do research? Research is really the first time you get to practice being a scientist----there isn’t a known outcome and you have to design experiments to test your working hypothesis. You are generating new knowledge instead of learning about previously generated knowledge. Many scientists do research as a career and this is your chance to try it and find out if you like it. (It’s ok if you don’t like it; there are still lots of ways to use your degree in Chemistry and Biochemistry that do not involve research.) Please keep in mind that there are many, many summer undergraduate research programs at major universities all over the country. If you want a change of scenery, many of them in biomedical areas are summarized here: http://www.fredhutch.org/content/dam/public/education/surp/internships.pdf

If you are applying for medical school or graduate school, your programs will expect you to have participated in research as an undergraduate. 90% of our graduates from the past 15 years who went on to pursue a PhD did research at the College of Charleston. The college banners displayed on the third floor represent some of the schools we have sent our students to after graduation. Research is also a beneficial experience for students who plan to work in industry. Our students who have the easiest time finding jobs when they leave here usually did
research in the department. It sets you apart from your competitors and helps you gain new skill sets.

Enrollment in our research courses (see below) requires paperwork and safety training. This can be done when you return in the spring, the first week of school. You will want to get the commitment of a research advisor before you leave for the break, however.

Lastly, for younger majors, in Fall of 2019 we plan on offering a research rotation course for chemistry and biochemistry majors. Students will visit six different labs for two weeks each and learn about the chemistry projects in each lab. You will need to contact the main office for enrollment in the course when registration for the fall term begins.

0. Independent Enrollment Courses

Chem 399, Tutorial: A 3-credit class where a student and faculty member study a topic together in the literature. Meets three hours per week. No lab work. The student and faculty member are not generating new knowledge, but are working to understand the current state of knowledge on a topic. Final project is a written summary of the topic with references.

Chem 481, Introductory Research I: A 2-credit lab (computer or wet lab) experience where a student and faculty member are working towards the generation of new knowledge through application of the scientific method on a research topic. The student is expected to work 6 hours per week. The final project is a written paper, a poster presentation, or an oral presentation. Biochemistry majors counting 481 for their degree requirements must do the written paper option. A pdf file of the final project must be submitted by the last day of class. Students can also get 481 credit for research conducted elsewhere (for example, MUSC) provided the topic is sufficiently close to Chemistry and Biochemistry discipline.

Chem 482, Introductory Research II: A 2-credit lab (computer or wet lab) experience where a student and faculty member are working towards the generation of new knowledge through application of the scientific method on a research topic---usually an extension of the project started in 481, though it doesn’t have to be. The student is expected to work 6 hours per week. The final project is an oral presentation or a poster presentation (at the discretion of the advisor) and a written paper. A pdf file of the final project must be submitted by the last day of class. Students can also get 482 credit for research conducted elsewhere (for example, MUSC) provided the topic is sufficiently close to Chemistry and Biochemistry discipline.

Chem 499, Bachelor’s Essay: This is a year-long, 6 credit course. The student is expected to work 9 hours per week. In chemistry, this experience is expected to be a research experience where a student and faculty member are working towards the generation of new knowledge through application of the scientific method on a research topic. Over the course of the year, the student is expected to give an oral presentation, a poster presentation and to write a substantial written document that details the student’s research and places it into context in
the field. An IP (in progress) grade is assigned for the first term until the entire project is finished; at that point, the first semester IP grade will be replaced with a letter grade.

**Chem 397, Research Experience, Academic Year enrollment:** This is a zero-credit course intended for students who have already completed 481 and 482 or for students who cannot commit enough hours to merit enrollment in 481 or 482. Grading is Satisfactory or Unsatisfactory.

**Chem 397, Research Experience, Summer enrollment:** All students conducting either volunteer or paid research in the summer must be enrolled in Chem 397. This is a zero-credit course. (Note, students can instead enroll in 481 or 482 in the summer, but you will be charged tuition---no tuition is charged for Chem 397). Students are expected to be participants in the department’s research community by attending our weekly summer group meetings. Students who are ready can choose to present their research at these meetings to an audience of students and faculty members. Students are also expected to generate a poster for the Convocation Day poster session.

**Honors Immersed Requirements:** Honors students who want to fulfill their Honors Immersed experience in the Chemistry Department should take the two year sequence of Chem 481/Chem 482/Chem 499. Alternatively, you can now take Chem 481 and a summer Chem 397 experience (typically a full time 10-week experience). Note that the first option requires that you start your research no later than the Fall semester of your junior year and both options require some advance planning. Dual enrollment in 481 or 482 with Chem 499 will not be permitted. Some students have fulfilled this requirement by taking Honors 398, which is a 3-credit course, but many faculty members will not agree to an Honors 398 enrollment for a new student because of the 10-hours per week of mentorship required in that course. Students should not assume they can take Honors 398 in the Chemistry Department the second semester of their junior year. A chemistry or biochemistry honors student does not have to do their research or their tutorial in the Chemistry Department.

**Reminder:**
Don’t forget to like us on Facebook and follow us on Twitter. We post many research and job opportunities on our social media feeds. Search for Chem and Biochem at the College of Charleston on Facebook and CofC Chem and Biochem on Twitter.