UNDERGRADUATE HANDBOOK

DEPARTMENT OF CHEMISTRY
UNIVERSITY OF OKLAHOMA

WELCOME

We are delighted that you have chosen to major in the Department of Chemistry and Biochemistry. Students have many different reasons for choosing to major with us. Some plan to pursue an advanced degree in chemistry or biochemistry, with a goal of becoming a faculty member or researcher; some expect to join a chemical company directly after receiving the bachelor's degree; others want to use their background in chemistry and biochemistry as a foundation for a medical career; still others know they enjoy chemistry, but have no definite career plans. This handbook has been prepared to familiarize you with the degree programs available, to assist you in choosing the course options best suited to your needs, and to provide you with access to individuals and offices that can provide career planning advice. The information provided here is supplementary to the official statement of regulations outlined in the university's General Catalog, which can be viewed online at: http://catalog.ou.edu.

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We hope that this handbook is helpful to you as you pursue your undergraduate degree. If you have any additional questions, please contact the Department of Chemistry and Biochemistry at (405) 325-4811 or the College of Arts and Science's Academic Advising Office at (405) 325-4411

Updated September 4, 2019

I. ACADEMIC ADVISING

The Chemistry and Biochemistry has advising offices located in the Chemistry Building Annex, Room 214 and in Ellison Hall, Room 124. Your advisor will be assigned alphabetically. While there are multiple advisors for the Chemistry department, you must see your assigned advisor, exceptions will not be made.

You may schedule an appointment your advisor on http://iadvise.ou.edu.

IT IS VERY IMPORTANT TO REGULARLY CHECK YOUR OU E-MAIL ACCOUNT, AS IT IS AN OFFICIAL UNIVERSITY MEANS OF CONTACTING ALL STUDENTS! IF YOU DO NOT CHECK YOUR OU E-MAIL ACCOUNT, YOU WILL MISS IMPORTANT MESSAGES FROM OUR OFFICE AND OTHER UNIVERSITY OFFICES!

How do I get advised?

Current Chemistry, Biochemistry and Chemical Bioscience majors in the College of Arts and Sciences will schedule appointments on iAdvise or by calling their advisor's office. You must be advised in order to enroll. All students should be advised before their enrollment windows open each semester, otherwise necessary classes may become full. After the student and advisor agree upon a course schedule, the advisor will remove the student's advising hold. Then the student should be able to enroll (once their enrollment window opens) via the online enrollment site, barring any other enrollment stops (such as a bursar stop for overdue fees, or a college stop for academic deficiency). Students should check the online enrollment site FAQ section for instructions on using the site.

IT IS THE STUDENT'S RESPONSIBILITY TO MAKE AN ADVISING APPOINTMENT. APPOINTMENTS FILL QUICKLY, MAKE AN APPOINTMENT EARLY IN THE SEMESTER TO ENSURE YOU WILL BE ADVISED BEFORE YOUR ENROLLMENT WINDOW OPENS.

II. PREPARING FOR POST-GRADUATION

Majors in pre-health programs.

Pre-medical, dental, optometry, physician's assistant, veterinary and podiatry students should contact the pre-medical advising office, located in Cate 1 room 415 The Pre-Med advisor is Dustye Bailey (405-325-2457). The Pre-med club also periodically sponsors programs about medical careers. Students can schedule an appointment through the https://iadvise.ou.edu/ appointment system.

Pre-Pharmacy, Communication Sciences & Disorders, Dental Hygiene, Nursing, Nutritional Sciences, Occupational Therapy, Physical Therapy, and Radiologic Technology students are advised through University College (Wagner Hall, Rm 100; 325-3521).

Majors who want to pursue graduate studies in chemistry or biochemistry.

If you are planning for graduate studies in chemistry and biochemistry, the following are important considerations:

We strongly encourage all students to get hands-on research experience with a faculty research group. You should try to begin research no later than your first semester as a junior. This will make it possible for you to: 1) learn whether you enjoy research; 2) reach a satisfying level of accomplishment on your research project; and 3) establish a close relationship with your faculty supervisor that will enable her or him to provide a knowledgeable reference letter. Your research also can serve as the basis for a senior thesis. Your research supervisor also can provide advice about graduate schools. You may consult the listing of faculty and their research interests that appears on our website at http://www.ou.edu/content/cas/chemistry/research.html in choosing a research group. There is usually no formal application process, and the work requirements and duties can vary from group to group. Students just need to contact a faculty researcher to see if they can join their research group.

Students going on to graduate school should expect to receive offers of assistantships or fellowships if they have good undergraduate records. You should reconsider the advisability of graduate study if institutions are unwilling to provide support for your graduate study.

For entrance into the best graduate programs, you will need a high G.P.A. (exceeding 3.50). Additionally, you should have engaged in research with a faculty member and be in a position to receive a strong recommendation from your research mentor.

Be sure to explore summer research opportunities. Many universities offer summer research experiences for undergraduates. Stipends are usually provided to cover expenses (and perhaps a little more) and the experience adds to your credentials for graduate school. These research programs vary widely in eligibility requirements, stipend paid to students, and research specialization. Generally, these programs are for students who have finished their junior year. In rare cases, sophomores may be accepted. Further information on summer research programs is available in Appendix VIII as well as online at http://www.ou.edu/cas/chemistry/undergraduate-programs/summer-research-programs.

The American Chemical Society has a guide called "Planning for Graduate Education in Chemistry", which is available online at http://www.acs.org/content/acs/en/education/students/graduate/gradschool.html.

Majors who plan to seek employment after receiving the baccalaureate degree.

Be sure to make optimal use of Career Services, OMU 323 (325-1974; http://www.ou.edu/career). They offer help with resumes, credential files, and also coordinate on-campus job interviews by major industries. Additionally, the Advising Office will have some vocational information from the American Chemical Society (www.acs.org) and other sources that you can consult. Students should also utilize the major employment websites to see what types of jobs are currently available and to get an idea of available salaries. A list of these sites is available in Appendix VII of this handbook.

III. DEGREE PROGRAMS

There are four degree options for majors in the Department of Chemistry and Biochemistry:

Major	Degree
Chemistry, Professional (B175)	Bachelor of Science in Chemistry
Biochemistry (B100)	Bachelor of Science in Biochemistry
Chemistry and Biochemistry, Standard (B170)	Bachelor of Science
Chemical Biosciences (B155)	Bachelor of Science

The **Chemistry (Professional) major** (B175) is most suitable for majors who plan to pursue a graduate degree in chemistry or a job in the chemical industry after obtaining their baccalaureate degree. It covers all of the fundamental areas of chemistry, and is certified by the American Chemical Society. The professional degree program also is a good choice for students who begin their chemical studies unsure of their ultimate degree goal. This is because it is often easier to switch from the professional degree program to one of our other degree programs than it is to switch to the professional option from the standard option or biochemistry degree program. While this degree is the best overall preparation for a graduate program in Chemistry, it is not a required degree for graduate study in chemistry or biochemistry. Some students prefer to take one of the other degree programs so that there is room in their schedules to take additional courses outside chemistry that meet their career goals.

The **Biochemistry major** (B100) is appropriate for students with a strong interest in biochemical/biomedical research or who are interested in entering a health profession, as Biochemistry focuses on the chemistry of living organisms. It includes a biochemical laboratory course, a course in microbiology, and an additional advanced biochemistry lecture.

The **Chemistry & Biochemistry (Standard) major** (B170) allows for a choice in some of the advanced coursework instead of laying out a specific set of courses. It allows students with other interests to have a bit more flexibility in developing a curriculum that best suits them (such as students working on a second major or pre-professional requirements).

The **Chemical Biosciences major** (B155) is for students who are specifically focused on entering a health profession (medical school, pharmacy school, dental school, etc.) and who do not have an interest in a chemistry or biochemistry graduate program or a career in the chemical industry. It *may* prepare students for a graduate program in biomedical studies (depending on individual program entrance requirements). It is not a preferred choice for students who are unsure about what they want to do after graduation, as the career options are more limited compared to the Chemistry or Biochemistry degrees.

Degree sheets for these majors can be found in Appendix IX and at http://checksheets.ou.edu.

TABLE I. COMPARISON OF REQUIRED MAJOR COURSES

Courses	Standard Degree	Professional Degree	Biochemistry Degree	Chemical Biosciences Degree
GENERAL CHEMISTRY	1315/1335 and 1415/1435, or 1425	1315/1335 and 1415/1435, or 1425	1315/1335 and 1415/1435, or 1425	1315/1335 and 1415/1435, or 1425
ORGANIC CHEMISTRY	3064 and 3164	3064 and 3164	3064 and 3164 OR 3053, 3153 and 3152	3053, 3153 and 3152
QUANTITATIVE ANALYSIS	3005	3005	3005	Not required
PHYSICAL CHEMISTRY	3423 & 3421 and 3523 & 3521	3423 & 3421 and 3523 & 3521	3423 & 3421 and 3523 & 3521	3453 & 3451

ANALYTICAL CHEMISTRY	4023	4023 and 4033	Not required	Not required
INORGANIC CHEMISTRY	optional, see "additional major requirements"	4333	Not required	Not required
BIOCHEMISTRY	3653	3653	3653, 3753, 4753	3653 & 3753
CAPSTONE	4913, 4923, 4933	4913, 4923 or 4933	4913, 4923 or 4933	4913, 4923 or 4933
ADDITIONAL MAJOR REQUIREMENTS	One course from: 4033 or 4444 Three hours from: 3753, 4333, 4753, or 4970	CHEM 4444	BOT/MBIO/ZOO 4843	BIOL 1124, MBIO 3813 & 3812, MBIO 4843 One lecture/lab combo from: BIOL 3103/3101, 3203/3201, 3333/3342, or 4244; Minimum three hours from: BIOL 2124, 2234, 3113, 3214, 4223, MBIO 4823 or MBIO 4833

We emphasize that the requirements in Table I are the minimum major requirements for each degree option. You may find, for example, that you wish to take both CHEM 4033 and 4444, even though only one of the two courses is required for the Standard option. This table does not include university and college general education requirements.

Table II provides a list of all the undergraduate courses in Chemistry and Biochemistry, the prerequisites for each course, and the semesters they are offered.

TABLE II: LIST OF UNDERGRADUATE CHEMISTRY COURSES ** Grade of 'C' or better is required in all major coursework.

Course Number	Course Title	Prerequisite Coursework	Lab?
1315	General Chemistry I (F, Sp, Su)	MATH 1503 or MATH 1643 or Math ACT ≥ 25	Yes
1335	General Chemistry I: Signature Course (F)	2 years high school chemistry, OR AP Chemistry, OR 4 years high school science and 4 years high school math.	Yes
1415	General Chemistry II (F, Sp, Su)	CHEM 1315 with grade of 'C' or better	Yes
1435	General Chemistry II: Signature Course (Sp)	CHEM 1315 (grade of A or B recommended) or CHEM 1335	Yes
1425	Honors General Chemistry (F)	Permission of Honors College; STEM major and 4 years of high school math and 1 year of chemistry, or permission from instructor	Yes
3064	Organic Chemistry I (for majors) (F)	CHEM 1415 or 1435 or 1425	Yes
3164	Organic Chemistry II (for majors) (Sp)	CHEM 3064 with a grade of 'C' or better	Yes
3053	Organic Chemistry : Biological Emphasis(I) (F, Sp, Su)	CHEM 1415 or 1435 or 1425	3152
3152	Organic Chemistry Biological Laboratory (F, Sp, Su)	CHEM 3053 or concurrent enrollment	n/a
3153	Organic Chemistry: Biological Emphasis (II) (F, Sp, Su)	CHEM 3053 with grade of 'C' or better	3152
3005	Quantitative Analysis (F, Sp, Su)	CHEM 1415 or 1435 or 1425	Yes
3453	Basic Physical Chemistry (Sp)	CHEM 1415 or 1425 or 1435; MATH 1823 or 1914; PHYS 2424 or 2524	3451
3451	Basic Physical Chemistry Lab (Sp)	CHEM 3453 or concurrent enrollment	n/a
3421	Physical Chemistry Lab (I) (F, Sp, Su)	CHEM 3423 or concurrent enrollment	n/a
3423	Physical Chemistry I (F, Sp, Su)	CHEM 1415 or 1435 or 1425; MATH 2423 or 2924 or concurrent enrollment	3421
3521	Physical Chemistry Lab (II) (F, Sp)	CHEM 3523 or concurrent enrollment; CHEM 3421 with grade of 'C' or better	n/a

3523	Physical Chemistry II (F, Sp)	CHEM 3423 with grade of 'C' or better	3521
3653	Introduction to Biochemistry (F, Sp, Su)	CHEM 3013 or 3053 or 3064	No
3753	Introduction to Biochemical Methods (F, Sp)	CHEM 3653 or concurrent enrollment	Yes
4023	Instrumental Methods of Chemical Analysis (F)	CHEM 3005	4033
4033	Instrumental Methods of Chemical Analysis Laboratory (Sp)	CHEM 4023	n/a
4333	Advanced Inorganic Chemistry – Periodic System (F)	CHEM 3053 or 3064	No
4444	Advanced Synthesis and Spectral Characterization (F)	CHEM 3164 or (3152 and 3153)	Yes
4753	Principles of Biochemistry I (F)	CHEM 3153 or 3164; CHEM 3653; CHEM 3423 or 3453; CHEM 3753 and BIOL/MBIO/PBIO 4843 strongly recommended	No
4913	Capstone—Senior Thesis (F, Sp, Su)	Permission of department (3 semesters research)	No
4923	Capstone—Senior Project (topic varies) (F, Sp)	Permission of department	No
4933	Capstone—Current Topics in Biochemistry (F, Sp)	Permission of department (3653, 3753, 1 semester physical chemistry w/lab)	No
4970	Special Topics in Chemistry and Biochemistry (varies)	Varies with course content.	
3960	Honors Reading (F, Sp, Su)	Permission of instructor and permission of Honors College	
3980	Honors Research (F, Sp, Su)	Permission of instructor and permission of Honors College	
3990	Independent Study (F, Sp, Su)	Permission of instructor (graded S/U)	
4990	Independent Study (F, Sp, Su)	Permission of instructor (letter graded)	
4232	Glassblowing	Permission of instructor (course is not acceptable for major credit)	

Other courses outside of the Chemistry Department:			
BIOL 1124	Introduction to Biology (F)	None listed.	Yes
BIOL 2124	Human Physiology (F, Sp, Su)	BIOL 1114 and BIOL 1121 with a grade of C or better, or BIOL 1124 with a grade of C or better; a course in chemistry or physics with a grade of C or better.	Yes
BIOL 2234	Introduction to Human Anatomy (F)	BIOL 1114 and BIOL 1121 with a grade of C or better, or BIOL 1124 with a grade of C or better, sophomore standing, and permission of department.	Yes
BIOL 3103	Principles of Physiology (F, Sp)	BIOL 1124, or BIOL 1114 and BIOL 1121; and Biology 1134, or permission of instructor.	3101
BIOL 3101	Principles of Physiology Lab (Sp)	BIOL 3103 or concurrent enrollment	
PBIO MBIO BIOL 3113	Cell Biology (F, Sp)	BIOL 1114, or BIOL 1124, or BIOL 1134, or Botany 1114, and Chemistry 3053.	No
BIOL 3203	Animal Development (Sp)	Prerequisite: BIOL 1124, or BIOL 1114 and BIOL 1121; and BIOL 3333; and BIOL 1134. (Sp)	3201
BIOL 3201	Animal Development Lab (Sp)	Prerequisite: BIOL 3203 or concurrent enrollment. (Sp)	n/a
BIOL 3214	Comparative Vertebrate Anatomy (F)	BIOL 1114 and BIOL 1121, or BIOL 1124, or BIOL 1134, or equivalent.	Yes
BIOL 3333	Genetics (F, Sp)	BIOL 1124, or BIOL 1114 and BIOL 1121; BIOL 1134 recommended.	3342
BIOL 3342	Genetics Lab (F)	BIOL 3333 or concurrent enrollment, or equivalent.	n/a
MBIO 3813	Fundamentals of Microbiology (F, Sp)	BIOL 1005 or BIOL 1134 or PBIO 1114 or BIOL 1114, and CHEM 3013 or CHEM 3053 or CHEM 3064.	3812

MBIO 3812	Fundamentals of Microbiology Lab (F, Sp, Su)	Credit or concurrent enrollment in MBIO 3813.	n/a
BIOL 4223	Cellular and Molecular Neurobiology		No
BIOL 4244	Animal Histology (F, Sp)	BIOL 3103 and BIOL 3113 or permission.	Yes
MBIO 4823	Pathogenic Microbiology and Immunology (F)	MBIO 3812 and MBIO 3813.	No
MBIO 4833	Basic Immunology (Sp)	One semester of organic chemistry, and an introductory biology course, plus one of the following: 3813 and 3812, Zoology 2124, 3113, 3204, 3333 or biochemistry or graduate standing and permission.	No
BIOL/MBIO/ PBIO 4843	Introduction to Molecular Biology (F, Sp)	MBIO 3812 and 3813, or PBIO 1114, or BIOL 1114, or BIOL 1124, or BIOL 1134, and one course in organic chemistry. Note that 4843 will usually conflict with CHEM 3423 in the spring and with CHEM 3523 in the fall;	No

Capstone Requirement

The University requires a capstone course for all students who began their higher education in Fall 1990 or later. The Department of Chemistry and Biochemistry has three capstone courses:

Senior Thesis (CHEM 4913). This involves a long-term research project directed by a faculty member. Students will formally enroll in CHEM 4913 in their expected final semester of study. However, because attainment of a satisfactory level of research requires considerable time in the laboratory, students should begin a project no later than the first semester of the junior year. Then they will be in a position to complete their project and write it up during the semester they are enrolled in CHEM 4913. Students can enroll in CHEM 3990 or 4990 for research done prior to the semester of enrollment in CHEM 4913. Generally, students should average at least 10 hours of research per week in order to make satisfactory progress. The senior thesis will fulfill the Honors Thesis requirement for Honors College students.

Senior Project (CHEM 4923). This is a varying-topic lecture course designed to cover topics of current interest and importance in chemistry. The topic will vary depending on the specialty of the instructor. Problem solving skills and analysis of current literature are emphasized. An extensive final report based on a literature search is required. There is currently no lab for this course.

Current Topics in Biochemistry (CHEM 4933). This course is designed for students with interests in biological and medical applications of chemistry. It will have two lectures each week and may include laboratory work. The course will focus on one or more current topics of biochemical interest, with a reasonably broad scope, but including examination of moral and ethical issues associated with the topic. Guest seminar speakers may include departmental faculty as well as Health Sciences Center faculty.
The Capstone is a major requirement, so a grade of "C" or better must be obtained.

Mathematics Requirements

Each of the three degree programs has the same mathematics requirements as shown in Table III.

TABLE III. MATHEMATICS REQUIREMENTS IN THE THREE CHEMISTRY AND BIOCHEMISTRY DEGREE PROGRAMS

All four majors	Math 1823, Calculus and Analytical Geometry I or Math 1914, Differential and Integral Calculus I
All majors except Chemical Biosciences	Math 2423, Calculus and Analytical Geometry II or Math 2924, Differential and Integral Calculus II

Students must take MATH 2423, “Calculus and Analytical Geometry II”, prior to or concurrently with CHEM 3423, “Physical Chemistry I”. It is recommended that students complete 2423 before taking Physical Chemistry.

Either fewer or additional mathematics courses may be required, depending on students’ performance on mathematics placement exams. If students are found to be unprepared for MATH 1823, “Calculus and Analytical Geometry I”, they are placed into one of the following courses:

Math 0123 Intermediate Algebra	Math 1503 Intro to Elementary Functions	Math 1523 Elementary Functions

Students who want beginning placement above MATH 1823 (Calculus and Analytical Geometry I) must take an advanced standing examination, such as AP or CLEP exams. A description of the ALEKS Mathematics assessment and ACCUPLACER Reading and Writing/English assessments can be found in Appendix II.

Physics Requirements

For all four degree programs, students must take a two-semester sequence of physics courses. There is a choice: PHYS 2414 and 2424, "Physics for Life Science Majors" (trigonometry based) or PHYS 2514 and 2524, "Physics for Engineering and Science Majors" (calculus based). The 2514/2524 sequence is preferred, as it is better preparation for the Physical Chemistry courses.
Chemistry Professional and Chemical Biosciences majors must also take the Physics laboratory courses, PHYS 1311 and PHYS 1321.

Biological Science Requirements

Students must take a life science course as part of the University-wide and College of Arts and Sciences general education requirements. The course must appear on the approved course list of general education courses found in the Class Schedule and be offered in one of the following areas: plant biology, microbiology, biology, or health and sports sciences. Biochemistry majors as well as pre-health majors should take BIOL 1114/1121, Intro to Zoology and Intro to Zoology lab, or BIOL 1124, Introductory Biology, as they are prerequisites for BIOL/MBIO/PBIO 4843 and many higher-level pre-health program courses.

University-Wide General Education and College of Arts and Sciences Requirements

All undergraduates in Chemistry and Biochemistry must fulfill both the University-wide general education requirements and the College of Arts and Sciences course requirements to earn a bachelor's degree. In both of these cases, the courses must be selected from an approved course list (see the online enrollment site at http://www.one.ou.edu and use the 'Course Search' option to see a list of the available university-wide General Education approved courses in each Gen Ed category; a full listing of all general education courses is also available at http://www.ou.edu/gened/courses.html). Sometimes, courses are approved too late to be included in the list. If you are a transfer student, all courses you took at another school that equate with OU general education courses will automatically count for general education credit. In addition, some courses at other colleges don't equate with OU courses, but have been approved for general education credit. If you took a course at another institution that you believe should fulfill general education credit, consult your academic advisor or a College of Arts and Sciences advisor to determine whether or not the course you took has been approved for credit. As long as a course has not been denied credit, the course might be approved by the appropriate department.
Students with strong high school backgrounds often place out of one or more course requirements, most frequently those in English Composition, U.S. History and American Government. The following list includes both university-wide general education requirements and College of Arts and Sciences requirements:

Core Area I. **Symbolic and Oral Communication**

- *English Composition*. (2 courses, 6 hours) English 1113 and English 1213 OR Expo 1213.
- *Foreign Language.* (3 courses, 13 hours) You must fulfill the general education requirement of two courses in the same language as well as the College of Arts and Sciences requirement of a foreign language course at the intermediate (2000)-level, or have demonstrated proficiency at one or more of these levels through the Foreign Language Placement Test (see page 10). While high school foreign language courses may fulfill the university requirement for introductory foreign language courses, they cannot fulfill the Arts & Sciences intermediate course requirement. Placement tests are available in the Department of Modern Languages, Literatures & Linguistics (Kaufman Hall, room 228).
- *Mathematics*. (1 course, 3 hours) Chemistry and Biochemistry Department majors easily fulfill the mathematics requirement through courses required for the major. Placement tests are available in the Math department, as well as the Assessment office.

Core Area II. **Natural Science**

(2 courses, 7 hours) This must include a biological and a physical science course, one of which must include a laboratory (CHEM 1315 will fulfill the physical science with lab requirement). Biology 1124 or 1114/1121 is usually recommended for the biological science requirement.

Core Area III. **Social Science**

(2 courses, 6 hours) Students must take Political Science 1113 (U.S. Government) and one additional social science course from the approved list.

Core Area IV. **Humanities**

- *Understanding Art Forms.* (1 course, 3 hours) You must select one 3 credit-hour course from this area.
- *Western Civilization and Culture.* (2 courses, 12 hours) You must take United States History (History 1483 or 1493) and one additional course from the approved course list. The second course cannot be History 1483 or 1493.
- *Non-Western Cultures.* (1 course, 3 hours) Students must select one course from the approved course list
- *Upper Division Humanities* All College of Arts & Sciences students must also take 6 additional hours of upper-division Humanities coursework (approved for General Education credit). This requirement can be fulfilled by any combination of art form, western civilization and culture, or non-western culture.

Core Area V. **Senior Capstone Experience**

You will fulfill this requirement by taking one of the capstone courses required for majors in the Department of Chemistry and Biochemistry (see p. 7).

NOTE: If you have earned an Associate's Degree, you should be exempt from the lower division (1000- and 2000-level) general education requirements. You will not be exempt from the College of Arts and Sciences foreign language requirement or upper division humanities requirement.

Other Requirements.

Additional information concerning degree requirements is printed on the second page of the Arts and Sciences degree requirements check sheets (Appendix IX). Because each student has a unique background and interests, course schedules will vary and should be worked out in consultation with an academic advisor.

APPENDIX I

Faculty and Their Primary Research Interests

The department has a large faculty body with an extensive variety of research interests. The various research topics include but are not limited to:

- **Structural biology**
- **Natural products**
- **Molecular pharmacology**
- **Drug design and discovery**
- **Medicinal chemistry**
- **Energy conversion and storage, including solar energy harvesting**
- **Polymer chemistry**
- **Nanotechnology**
- **Proteomics**
- **Protein folding**
- **Genomics**
- **Analytical instrumentation**
- **Biomaterials**
- **Organic chemistry of single walled carbon nanotubes**
- **Organometallic chemistry**
- **Enzymology**
- **Biosynthesis**
- **Cell membrane biochemistry**

Please visit the individual faculty web pages for much more detailed information on their research:
http://www.ou.edu/content/cas/chemistry/research/faculty.html

APPENDIX II

ASSESSMENT PLACEMENT TESTING

Testing Overview

The University of Oklahoma considers appropriate course placement to be essential to success in all academic areas. In order to assist students in selecting the proper Math and English courses, the University College Assessment Center offers placement testing throughout the week and online.
Contact the Assessment Center at 325-4336 (ucac@ou.edu for their most up-to-date hours. Students who have a permanent or temporary disability which will prevent them from taking the test under standard conditions should notify their advisors and the Assessment and Learning Center. Special accommodations can be arranged by calling the Assessment Center at 325-4336, Wagner Hall room 270. More information is available online at http://www.ou.edu/univcoll/about/placement_tests

TYPES OF TESTS

Reading

All incoming OU students with an ACT reading sub-score of an 18 or less are required to take a reading assessment to determine whether they must take a developmental reading course before moving on to higher reading leveled courses. There are no enrollment restrictions for students with an ACT reading sub-score of 19 or higher. Here is additional information about Reading Assessment:
http://www.ou.edu/univcoll/about/placement_tests/Reading_Assessment

Writing

All incoming OU students with an ACT English sub-score of an 18 or less are required to take a writing assessment to determine whether they must take a remedial English course before moving on to ENGL 1113. There are no enrollment restrictions for students with an ACT English sub-score of 19 or higher. Here is additional information about the Writing Assessment:
http://www.ou.edu/univcoll/about/placement_tests/Writing_Assessment

Mathematics

The University of Oklahoma requires first-time OU students without a math offer or transfer students without an equivalent transfer math course to take an ALEKS mathematics assessment to determine their proper placement. The ALEKS Placement Assessment covers material from basic math through pre-calculus and will provide an accurate description of a student's math skills and a recommended course placement. Here is additional information about Math Assessment: http://www.ou.edu/univcoll/about/placement_tests/Math_Assessment

The information regarding testing was obtained from the Assessment Center. Additional information regarding the assessment tests used at the University of Oklahoma may be obtained by contacting the Assessment Center, Wagner Hall 270, (405) 325-4336 (ucac@ou.edu).

APPENDIX III

Foreign Language Placement Testing

Foreign language placement testing is done through the Department of Modern Languages, Literatures and Linguistics. Testing is done in the Language Learning Center, Room 228 of Kaufman Hall. Placement exams are mandatory for students with two or more years of the target language if they were completed within the past five years. If a student has had less than two years of high school language study or has had no formal language study, they may either take the exam or sign a Statement of Background waiver. Any questions should be directed to the Language Learning Center, Room 228, Kaufman Hall, (405)-325-1352. More information is available online at https://llc.ou.edu/

APPENDIX IV

Gaining Advanced Credit in Chemistry

Students may gain advanced credit in Chemistry three ways:

- Pass the CLEP Chemistry exam with a grade of C or better;
- Pass the AP-CEEB Chemistry exam with a score of 4 or 5;
- Pass the departmental advanced placement exam offered by the Independent Study testing office (325-1921; http://www.ou.edu/content/outreach/cidl/testing-center.html).

APPENDIX V

Study Abroad Opportunities

There are several international study programs available. Students interested in studying abroad should contact the Education Abroad Office (325-1693; Farzaneh Hall room 144). OU has reciprocal exchanges set up with over 100 schools in over 40 countries. http://www.ou.edu/cis/education_abroad.html

APPENDIX VI

Frequently Asked Questions

How do I get research experience?

Students interested in gaining research experience should ask departmental faculty about possible openings in their labs. There is no formal application process, and the requirements will vary from lab group to lab group. Other local options include checking other departments (such as Microbiology or Biology), the OU Health Sciences Center (http://www.ouhsc.edu) and the Oklahoma Medical Research Foundation (http://www.omrf.org/) for openings. Note that it may be difficult to receive academic credit for off-campus research. Students should also check into the various Summer Undergraduate Research programs that are mentioned in the advising office email newsletter each spring. For more information on Summer Research programs, please refer to Appendix VIII.

How do I declare or change my major?

The application for admission to OU asks each applicant to choose their intended major. However, students often change their major after they begin their studies. To declare Chemistry or Biochemistry as a major (or to change to another Arts & Sciences major), students should go to the Arts & Sciences Student Services Office in the Ellison Hall lobby to change their major.
Students changing majors to another college within OU should contact that college to get information on their procedure for declaring a major.

How much credit can I get for Independent Study, Chem 3990 and Chem 4990?

You can apply a total of 12 hours of independent study to your graduation requirements, 6 hours from each course (1-3 hours per semester). Chem 3990 is S/U graded, while Chem 4990 is letter graded. The application forms are available at Ellison Hall, room 124.

What are Capstones, and how are they different?

Capstones are courses that require students to draw upon all their studies in their major field. CHEM 4913 is the Senior Thesis capstone, and typically requires 3 semesters of research prior to enrollment. This is the best capstone if you are planning on attending a graduate program in Chemistry or Biochemistry. CHEM 4923 is a lecture course involving tests, quizzes, and written reports. And CHEM 4933 is the Biochemistry capstone, which is a lecture course that may have a lab component.
Please refer to page 7 for more details.

What scholarships are available?

All OU students should check with the Financial Aid Office (http://www.ou.edu/financialaid) to see what university scholarships, loans, grants, etc. are available. Another good source of scholarship information is http://www.fastweb.com.
The Chemistry & Biochemistry Department does have a few merit-based undergraduate awards available each year. These range in value from a few hundred dollars up to about $1200. Nominations are solicited from departmental faculty.

How do I get advised and enroll in my classes?

The department begins advising each semester approximately one month before enrollment begins for the following semester. Undergraduate students in the department will be responsible for making an appointment on iAdvise before their window opens. When they come to their advising appointment, students should have an idea of what they want to take in the upcoming semester. *Students are strongly encouraged to familiarize themselves with their degree requirements.* After the student and advisor agree upon a course schedule, the advisor will remove the student's advising stop. Then the student should be able to enroll via the online enrollment site, barring any other enrollment stops (such as a bursar stop for overdue fees, or a college stop for academic deficiency). Students should check the online enrollment site FAQ section for instructions on using the site.

What are the different areas of chemistry?

Many areas and sub-disciplines of chemistry and biochemistry overlap each other as well as other fields outside of chemistry and biochemistry. Nonetheless, primary sub-discipline labels are still attached to many of the faculty in consideration of their broadly identified "current primary area of interest" and/or their primary area of didactic concentration during their graduate and/or postdoctoral studies.

- **Analytical Chemistry:** Analytical Chemistry is a discipline within chemistry and biochemistry which is substantially focused upon the identification, determination, and quantitation of various bio/chemical substances and/or classes of substances. Thus, analytical chemists are generally more concerned with chemical and physical properties of matter that will allow the distinguishment of such species. Likewise, analytical chemists are more broadly concerned with the instrumentation and procedures employed in the identification and measurement of chemicals. Many individuals would more strongly associate analytical chemists, as opposed to chemists of other sub-disciplines, with the applied areas of electrochemistry, spectroscopy, separations, and equilibrium/kinetics.
- **Biochemistry:** Biochemistry is a study of the chemistry of life. The discipline includes a study of the structure of proteins and other macromolecules and how they are formed and organized into what we see as parts of the body, organs, organelles and cells. Proteins are multifunctional and an important part of Biochemistry is devoted to an understanding of how they work, including a study of metabolism as it relates to the utilization of nutrient to create energy or build molecules needed by the body. The structure of other macromolecules such as lipids and complex carbohydrates and how they are made and work is also studied. The storage and transmission of genetic and other information is also considered. Finally, the discipline includes a study of how the above processes are regulated. Closely related to this is a study of how cells and organisms grow, differentiate and reproduce. Underpinning all of the above are the tenets learned in Physical, Organic, and Inorganic Chemistry. In addition, it is impossible to describe the study of the above without a working knowledge of Analytical Chemistry.
- **Chemical Education:** Next to parents, educators have the greatest influence on a young person's development. They are not only teachers but also role models and mentors. Teachers of chemistry--whether in colleges, high schools, middle schools, community colleges, or graduate schools--say helping shape the lives and minds of students is the most satisfying aspect of their work. It is the reason they have chosen teaching as the career in which to practice their knowledge of chemistry.
- **Inorganic Chemistry:** Inorganic chemistry is concerned with the structure, properties, and reactions of all compounds not derived from hydrocarbons. It has applications in every aspect of the chemical industry, including catalysis, materials science, pigments, surfactants, coatings, medicine, fuel, and agriculture. Inorganic chemists are employed in fields as diverse as the mining and microchip industries, environmental science, and education. Their work is based on understanding the behavior and the analogues for inorganic elements, and how these materials can be modified, separated or used often in product applications.
- **Organic Chemistry:** Organic chemistry is the branch of chemistry that deals with the structure, properties, and reactions of compounds that contain carbon. It is a highly creative science. Chemists in general and organic chemists in particular can create new molecules never before proposed which, if carefully designed, may have important properties for the betterment of the human experience. The very foundations of biochemistry, biotechnology, and medicine are built on organic compounds and their role in life processes. Most all of the modern, high tech materials are composed, at least in part, of organic compounds.

- **Physical Chemistry:** Physical chemistry is concerned generally with the structure, energy, and transformation of matter, placing special emphasis on the principles of quantum mechanics, thermodynamics, statistical mechanics, and kinetics. Physical chemists are focused on understanding the physical properties of atoms and molecules, the way chemical reactions work, and finding out 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.

What careers are available?

Careers range from hands-on lab work to medical fields to working in business with chemical companies. It is impossible to briefly describe all the job opportunities available. Students are encouraged to check the following websites for more information (also refer to Appendix VII):

- "College to Career" (a description of careers in chemistry): http://www.acs.org/content/acs/en/careers/college-to-career/chemistry-careers.html
- Chemjobs.net: http://www.chemjobs.net
- Monster.com (largest job search site on the internet; a search for 'chemistry' usually results in more than one thousand job listings): http://www.monster.com

I took a course at another school. How do I transfer it to OU?

All courses must be transferred through the OU Office of Admissions and Records.

Office of Admissions and Records
1000 Asp Avenue room 127
Norman OK 73019-4076
phone: 405-325-2151; email: admrec@ou.edu.

If the course has not already been reviewed for credit at OU, you can have it reviewed by the appropriate university department to determine if there is an equivalent OU course. Some of the transfer equivalencies from other schools can be viewed online here: http://www.ou.edu/content/admissions/home/transfer_equivalencies.html

APPENDIX VII

ONLINE RESOURCES FOR JOBSEEKERS

Career Resources/Employment Guides

- ACS "College to Career" - http://www.acs.org/content/acs/en/careers/college-to-career/chemistry- careers.html
- ACS Careers information center – https://www.acs.org/content/acs/en/careers.html
- OU Career Services office - http://www.ou.edu/career/

Job Listing/ Resume Posting/ Recruiting Sites

- Chronicle of Higher Education Career Network - http://chronicle.com/jobs/
- Career One Stop (sponsored by the U.S. Department of Labor) - http://www.careeronestop.org/jobsearch/findjobs/state-job-banks.aspx
- CareerBuilder- http://www.careerbuilder.com
- CareerSite- http://www.careersite.com
- EmploymentGuide.Com - http://www.employmentguide.com/
- Federal Jobs Digest- http://www.jobsfed.com
- HealthCareerWeb.com - http://www.healthcareerweb.com/
- Monster job openings and career resources- http://www.monster.com/
- USAJobs.com - http://www.usajobs.gov "this is a United States Office of Personnel Management web site. USAJOBS is the Federal Government's official one-stop source for Federal jobs and employment information."

Science or Chemistry-Specific Sites

- Chemjobs.net - http://www.chemjobs.net/ "Chemistry jobs worldwide"
- Medzilla.com - http://www.medzilla.com/ "Outstanding services for employers and professionals in biotechnology, pharmaceuticals, healthcare and science"
- Science magazine career information: http://sciencecareers.sciencemag.org/
- National Academy of Sciences career information- http://www.nationalacademies.org/careerguides/

- On Assignment, Inc - http://www.onassignment.com "On Assignment is changing the world at work in science and healthcare. We're the leader in placing professionals on short, long-term and temp-to-perm assignments."

Resources for Researching Companies/Academic Institutions

- List of all colleges/universities and their webpages- http://www.colleges.com
- American Chemical Society Directory of Graduate Research - http://dgr.rints.com/

Geographic/Salary Information

- CNN Money.com Cost of Living Calculator - http://cgi.money.cnn.com/tools/costofliving/costofliving.html
- Salary.com - http://www.salary.com/ calculate the average salary for a position according to geographic area

APPENDIX VIII

Summer Research Program information

Finding a program: Here are some websites with lists of summer research programs. The programs vary widely in the content and scope of what they cover, and the areas of concentration, ranging from semiconductors and photolithography to marine science research. Students should look through the listings to find a program that is similar to their research interests.
http://www.ou.edu/content/cas/chemistry/undergraduate-programs/summer-research-programs.html - List of upcoming programs for which the department has received announcements this year.
http://www.acs.org/content/acs/en/education/students/college/research.html - ACS Undergraduate Research in Chemistry website. Provides information regarding research and a link to research listings.
http://www.nsf.gov/crssprgm/reu/reu_search.jsp - National Science Foundation "Search for an REU Site" search page.

Applying to a program: Application requirements also vary widely from program to program. Usually the more prestigious programs will have higher requirements. Many programs require applicants to submit copies of their transcripts and most also want one or two letters of recommendation from faculty. Some want applicants to provide a short essay. *Be sure to check the details of each program for specific requirements!*

Eligibility: Some programs are aimed at students with experience in a specific area; others are open to students with no research experience. Many are limited to U.S. citizens or permanent residents (usually funded by the NSF), but some are open to international students. Some will have higher GPA requirements and increased course requirements. Some are targeted at students who are between their junior and senior years while participating in the program, while others are open to sophomores as well. *Once again, be sure to check the details of each program for specific requirements!*

Stipends: These vary from program to program, usually in the range of $2,500 to $5,000 for the summer. Most programs offer free or reduced-cost housing, some offer health insurance for the summer, and many offer travel allowances.

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN CHEMISTRY
COLLEGE OF ARTS AND SCIENCES
THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education:

Summer 2018 through Spring 2019

Minimum Credit Hours and Grade Point Averages Required			
Total Hours —	**120**	Upper-Division Within Total	**48**
Major Hours —	**40**		

Grade Point Averages:

Overall & Major: Combined OU/Transfer - **2.00** OU - **2.00**

48 Upper-Division Hours REQUIRED

Chemistry
(Professional)

B175
Bachelor of Science in Chemistry

OU encourages students to complete at least 30 hours of applicable coursework each year to have the opportunity to graduate in four years.

GENERAL EDUCATION AND COLLEGE REQUIREMENTS
Courses graded P/NP will not apply.

Courses for fulfillment of General Education and College of Arts & Sciences requirements must be from the approved General Education course list published in the Class Schedule or at **http://www.ou.edu/enrollment/home/**.

University-Wide General Education (minimum 40 hours) and College of Arts and Sciences Requirements

Core Area I: Symbolic and Oral Communication (9-22 hours, 3-6 courses)

a. **English Composition** (6 hours, 2 courses)
1. English 1113, Principles of English Composition
2. English 1213, Principles of English Composition, **or** EXPO 1213, Expository Writing

b. **Foreign Language** (0-13 hours in the same language)
The College of Arts and Sciences requirement ***cannot be met by high school coursework.***
1. Beginning Course (0-5 hours) _____
2. Beginning Course, continued (0-5 hours) _____
◆ 3. Intermediate Course (2000 level, 0-3 hours). _____
One course at the intermediate level or demonstrated competency at that level.

c. **Mathematics** (3 hours, 1 course). _____

Core Area II: Natural Science (7 hours, 2 courses) including one laboratory component.

◆ 1.**Biological Science** _____
Chosen from the following approved General Education designators: BIOL, HES, MBIO, or PBIO.

◆ 2.**Physical Science** _____
Chosen from the following approved General Education designators: AGSC, ASTR, CHEM, GEOG, GEOL, GPHY, METR, or PHYS.

Core Area III: Social Science (6 hours, 2 courses)

1. Political Science 1113, American Federal Government
2. _____

Core Area IV: Humanities (18 hours, 6 courses)

a: **Understanding Artistic Forms** (3 hours, 1 course) _____

b. **Western Civilization and Culture** (6 hours, 2 courses)
1. History 1483, U.S., 1492-1865, **or** History 1493, U.S., 1865-Present,
2. _____ (excluding HIST 1483 and 1493)

c. **Non-Western Culture** (3 hours, 1 course):_____

d. **Additional Core IV Humanities courses** (6 upper-division hours, 2 courses at the 3000- 4000-level). Must be outside the major and selected from Understanding Artistic Forms, Western Civilization and Culture, or Non-Western Culture.

◆ 1. _____

◆ 2. _____

Core Area V: Senior Capstone Experience (3 hours, 1 course): _____

◆College of Arts and Sciences Requirements: College requirements are not automatically fulfilled by a previous degree.

Some courses required for the major may also fulfill University General Education and/or College of Arts & Sciences Requirements

MAJOR REQUIREMENTS

A grade of C or better must be earned in each Chemistry course presented for major credit. No grade below a C made in a Chemistry course at OU may be made up elsewhere without prior written approval by the OU Chemistry Department.

CHEMISTRY	
1315 General Chemistry, **or**	(5)
1335 General Chemistry I: Signature	
1415 General Chemistry cont., **or**	(5)
1425 Advanced General Chemistry, **or**	
1435 General Chemistry II: Signature	
3064 Organic Chemistry I	4
3164 Organic Chemistry II	4
3005 Quantitative Analysis	5
3421 Physical Chemistry Lab	1
3423 Physical Chemistry I	3
3521 Physical Chemistry Lab	1
3523 Physical Chemistry II	3
4023 Instrumental Methods of Chemical Analysis	3
4033 Instrumental Methods of Chemical Analysis Laboratory	3
4333 Advanced Inorganic Chem.- Periodic System	3
4444 Advanced Synthesis and Spectral Characterization	4
4913 Senior Thesis (Capstone), **or**	
4923 Senior Project (Capstone), **or**	
4933 Current Topics in Biochemistry (Capstone)	
_____	3
3653 Introduction to Biochemistry	3

MAJOR SUPPORT REQUIREMENTS

MATH — one of the following pairs:	
1823 Calculus & Analytic Geom. I, **and**	
2423 Calculus & Analytic Geom. II	
or	
1914 Differential & Integral Calculus I, **and**	
2924 Differential & Integral Calculus II	
_____	3-4
_____	3-4
PHYSICS — one of the following groups:	
2414 Gen. Physics for Life Science	
1311 General Physics Lab I	
2424 Gen. Physics for Life Science	
1321 General Physics Lab II	
or	
2514 Gen. Physics for Engr. & Science	
1311 General Physics Lab I	
2524 Gen. Physics for Engr. & Science	
1321 General Physics Lab II	
_____	4
_____	1
_____	4
_____	1

Free Electives

Electives to bring total applicable hours to 120 including 48 upper-division hours.

INFORMATION CONCERNING GENERAL RULES, REGULATIONS AND MINIMUM REQUIREMENTS

TOTAL HOURS: A minimum of 120 semester hours acceptable toward graduation must be completed.

UPPER-DIVISION HOURS: A minimum of 48 upper-division semester hours acceptable toward graduation must be completed. OU courses numbered 3000 or above are upper-division. Transfer work is counted as lower-division or upper-division credit depending on the level at which it was offered at the institution where it was earned. Two-year college work is accepted only as lower-division credit.

ARTS AND SCIENCES HOURS: At least 80 semester hours of liberal arts and sciences courses are required for a BA degree. At least 55 semester hours of liberal arts and sciences courses are required for a BS degree.

MAJOR WORK: A minimum of 30 semester hours must be earned in the major, including a minimum of 15 credit hours at the upper-division level.

PASS/NO PASS ENROLLMENT: A maximum of 16 semester hours of free elective credit may be attempted under this option.

INDIVIDUAL STUDIES (e.g., courses titled "Independent Study"): A maximum of 12 total semester hours may be counted toward graduation, excluding Honors Reading and Honors Research.

P.E. COURSES: No physical education activity courses will be counted toward the 120 semester hours of acceptable credit for graduation.

SENIOR INSTITUTION HOURS: A minimum of 60 semester hours applied toward graduation must be earned at senior (4-year) institutions.

RESIDENCY:

- At least 15 of the final 30 hours applied toward the degree or at least 50 percent of the hours required by the institution in the major field must be satisfactorily completed at the awarding institution.
- At least 15 semester hours of upper-division major work must be completed in residence at OU.
- OU correspondence courses are ***not*** considered resident credit.
- Credits earned via examination are neither resident nor nonresident credit.

GRADE POINT AVERAGES: Students must earn a minimum overall 2.00 for each of the following: Combined Retention GPA (all college grades), OU Retention GPA, GPA for all major courses, and GPA for all major courses taken at OU. Some schools and departments of the College have higher minimum grade point averages required for their students.

SPECIAL DEGREES: Students may qualify for an Honors degree (cum Laude, Magna cum Laude, or Summa cum Laude) by completing specific requirements of the Honors College. A degree will be earned with Distinction if the student completes at least 60 semester hours at OU with at least a 3.60 combined retention GPA and OU retention GPA. A degree will be earned with Special Distinction if the student completes at least 60 semester hours at OU with at least a 3.90 combined retention GPA and OU retention GPA.

APPLICATION FOR GRADUATION: Students must apply for graduation during the term in which they complete their degree requirements in order to graduate in that term. The graduation application is available on line on your Ozone site. Deadlines for the OU Graduation Application are: **March 1** for Spring certification and the University of Oklahoma Commencement book; **July 1** for Summer graduation certification; and, **October 1** for Fall graduation certification.

Refer to the OU General Catalog for more complete information.

Suggested Semester Plan of Study — Chemistry (Professional) - B175

This plan shows one possible grouping of courses that would allow students to graduate in four years. Please refer to the front of the degree checksheet for official requirements. Students must consult with College of Arts and Sciences and/or Department of Chemistry and Biochemistry academic advisers to verify that courses selected each semester fulfill the recommended plan and satisfy university, College of Arts and Sciences, and Chemistry and Biochemistry major requirements.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	CHEM 1315, General Chemistry, **or** 1335, General Chemistry I: Signature	5	CHEM 1415, General Chemistry cont., **or** 1425, Advanced General Chemistry, **or** 1435, General Chemistry II: Signature	5
	ENGL 1113, Principles of English Composition (Core I)	3	ENGL 1213, Principles of English Composition (Core I), **or**	3
	MATH 1823, Calculus & Analytic Geometry I(Core I), **or** MATH 1914, Differential & Integral Calculus I	3-4	EXPO 1213, Expository Writing (Core I) MATH 2423, Calculus & Analytic Geometry II, **or** MATH 2924, Differential & Integral Calculus II	3-4
	Social Science (Core III)	3	Understanding Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	**14-15**	**TOTAL CREDIT HOURS**	**14-15**
SOPHOMORE	CHEM 3064, Organic Chemistry I	4	CHEM 3005, Quantitative Analysis	5
	PHYS 2514, Gen. Physics for Engineering & Science Majors, **or** 2414, General Physics for Life Science Oriented Majors	4	CHEM 3164, Organic Chemistry II	4
	PHYS 1311, Physics I Lab	1	PHYS 2524, Gen. Physics for Engineering & Science Majors, **or** 2424, General Physics for Life Science Oriented Majors	4
	Biological Science without lab (Core II)	3	PHYS 1321, General Physics Lab II	1
	HIST 1483, United States 1492-1865, or 1493, United States 1865-Present (Core IV)	3	Non-Western Culture (Core IV)	3
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**17**
JUNIOR	CHEM 3421, Physical Chemistry Lab	1	CHEM 3521, Physical Chemistry Lab	1
	CHEM 3423, Physical Chemistry I	3	CHEM 3523, Physical Chemistry II	3
	CHEM 4023, Instrumental Methods of Chemical Analysis	3	CHEM 4033, Instrumental Methods of Chemical Analysis Lab	3
	Western Civilization & Culture (Core IV)	3	P SC 1113, American Federal Government (Core III)	3
	Beginning Foreign Language (Core I)	5	Beginning Foreign Language continued (Core I)	5
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**15**
SENIOR	CHEM 3653, Intro. to Biochemistry	3	§CHEM 4913, Senior Thesis (Capstone), **or**	3
	CHEM 4333, Advanced Inorganic Chemistry—Periodic System	3	§CHEM 4923, Senior Project (Capstone), **or**	
	CHEM 4444, Advanced Synthesis and Spectral Characterization	4	§CHEM 4933, Current Topics in Biochemistry (Capstone)	
	Humanities, upper-division, outside major (Gen. Ed.)	3	Humanities, upper-division, outside major (Gen. Ed.)	3
	Intermediate Foreign Language	3	Free Elective, upper-division (3000-4000-level)	2
			Free Elective, lower- or upper-division	3
			Free Elective, lower- or upper-division	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**14**

§CHEM 4913, 4923, and 4933 are not all offered every semester. Students should plan their capstone experience accordingly.

Bachelor's degrees require a minimum of 48 hours of upper-division (3000-4000) coursework.
This plan of study should not be used in lieu of academic advisement.

Students who transfer from other institutions (particularly community colleges) must verify credit hour and course requirements with their college academic counselor, ELLH 124, 325-4411, **http://ou.edu/cas**.
Please make an appointment for a degree check with your college academic counselor once you have earned 90 hours. Appointments may be scheduled at **https://iadvise.ou.edu/**.

REQUIREMENTS FOR THE BACHELOR OF SCIENCE IN BIOCHEMISTRY
COLLEGE OF ARTS AND SCIENCES
THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education:

Summer 2018 through Spring 2019

Minimum Credit Hours and Grade Point Averages Required			
Total Hours —	**120**	Upper-Division Within Total	**48**
Major Hours —	**36**		

Grade Point Averages:
Overall & Major: Combined OU/Transfer - **2.00** OU - **2.00**

48 Upper-Division Hours REQUIRED

Biochemistry

B100

Bachelor of Science in Biochemistry

OU encourages students to complete at least 30 hours of applicable coursework each year to have the opportunity to graduate in four years.

GENERAL EDUCATION AND COLLEGE REQUIREMENTS
Courses graded P/NP will not apply.

Courses for fulfillment of General Education and College of Arts & Sciences requirements must be from the approved General Education course list published in the Class Schedule or at **http://www.ou.edu/enrollment/home/**.

University-Wide General Education (minimum 40 hours) and College of Arts and Sciences Requirements

Core Area I: Symbolic and Oral Communication (9-22 hours, 3-6 courses)

a. **English Composition** (6 hours, 2 courses)
   1. English 1113, Principles of English Composition
   2. English 1213, Principles of English Composition, **or** EXPO 1213, Expository Writing

b. **Foreign Language** (0-13 hours in the same language)
   The College of Arts and Sciences requirement ***cannot be met by high school coursework***.
   1. Beginning Course (0-5 hours) _____
   2. Beginning Course, continued (0-5 hours) _____

◆ 3. Intermediate Course (2000 level, 0-3 hours). _____
   One course at the intermediate level or demonstrated competency at that level.

c. **Mathematics** (3 hours, 1 course). _____

Core Area II: Natural Science (7 hours, 2 courses) including one laboratory component.

◆ 1.**Biological Science** _____
   Chosen from the following approved General Education designators: BIOL, HES, MBIO, or PBIO.

◆ 2.**Physical Science** _____
   Chosen from the following approved General Education designators: AGSC, ASTR, CHEM, GEOG, GEOL, GPHY, METR, or PHYS.

Core Area III: Social Science (6 hours, 2 courses)

1. Political Science 1113, American Federal Government
2. _____

Core Area IV: Humanities (18 hours, 6 courses)

a: **Understanding Artistic Forms** (3 hours, 1 course) _____

b. **Western Civilization and Culture** (6 hours, 2 courses)
   1. History 1483, U.S., 1492-1865, **or** History 1493, U.S., 1865-Present,
   2. _____ (excluding HIST 1483 and 1493)

c. **Non-Western Culture** (3 hours, 1 course):_____

d. **Additional Core IV Humanities courses** (6 upper-division hours, 2 courses at the 3000- 4000-level). Must be outside the major and selected from Understanding Artistic Forms, Western Civilization and Culture, or Non-Western Culture.

◆ 1. _____

◆ 2. _____

Core Area V: Senior Capstone Experience (3 hours, 1 course): _____

◆ College of Arts and Sciences Requirements: College requirements are not automatically fulfilled by a previous degree.

Some courses required for the major may also fulfill University General Education and/or College of Arts & Sciences Requirements

MAJOR REQUIREMENTS

A grade of C or better must be earned in each Chemistry course presented for major credit. No grade below a C made in Chemistry courses at the upper-division level may be made up elsewhere without prior written approval by the OU Chemistry Department.

CHEMISTRY		
1315 / 1335	General Chemistry, **or** General Chemistry I: Signature	(5)
1415 / 1425 / 1435	General Chemistry cont., **or** Advanced General Chemistry, **or** General Chemistry II: Signature	(5)
3064 / 3164	Organic Chemistry I, **and** Organic Chemistry II	
	or	
3053 / 3152 / 3153	Organic Chemistry I: Biological, **and** Organic Chemistry Lab, **and** Organic Chemistry II: Biological	
	_____	3-4
	_____	2-4
	_____	0-3
3005	Quantitative Analysis	5
3421	Physical Chemistry Lab	1
3423	Physical Chemistry I	3
3521	Physical Chemistry Lab	1
3523	Physical Chemistry II	3
3653	Intro. to Biochemistry	3
3753	Intro. to Biochemical Methods	3
4753	Principles of Biochemistry I	3
4913 / 4923 / 4933	Senior Thesis (Capstone), **or** Senior Project (Capstone), **or** Current Topics in Biochemistry (Capstone)	
	_____	3
BIOL/MBIO/PBIO		
4843	Intro. to Molecular Biology	3

MAJOR SUPPORT REQUIREMENTS

MATH		
1823 / 1914	Calculus & Analytic Geom. I, **or** Differential & Integral Calculus I	3-4
2423 / 2924	Calculus & Analytic Geom. II, **or** Differential & Integral Calculus II	3-4
PHYSICS		
2414 / **and** / 2424	Gen. Physics for Life Science / **and** / Gen. Physics for Life Science	
or		
2514 / **and** / 2524	Gen. Physics for Engr. & Science / **and** / Gen. Physics for Engr. & Science	
	_____	4
	_____	4

Free Electives

Electives to bring total applicable hours to 120 including 48 upper-division hours.

INFORMATION CONCERNING GENERAL RULES, REGULATIONS AND MINIMUM REQUIREMENTS

TOTAL HOURS: A minimum of 120 semester hours acceptable toward graduation must be completed.

UPPER-DIVISION HOURS: A minimum of 48 upper-division semester hours acceptable toward graduation must be completed. OU courses numbered 3000 or above are upper-division. Transfer work is counted as lower-division or upper-division credit depending on the level at which it was offered at the institution where it was earned. Two-year college work is accepted only as lower-division credit.

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MAJOR WORK: A minimum of 30 semester hours must be earned in the major, including a minimum of 15 credit hours at the upper-division level.

PASS/NO PASS ENROLLMENT: A maximum of 16 semester hours of free elective credit may be attempted under this option.

INDIVIDUAL STUDIES (e.g., courses titled "Independent Study"): A maximum of 12 total semester hours may be counted toward graduation, excluding Honors Reading and Honors Research.

P.E. COURSES: No physical education activity courses will be counted toward the 120 semester hours of acceptable credit for graduation.

SENIOR INSTITUTION HOURS: A minimum of 60 semester hours applied toward graduation must be earned at senior (4-year) institutions.

RESIDENCY:

- At least 15 of the final 30 hours applied toward the degree or at least 50 percent of the hours required by the institution in the major field must be satisfactorily completed at the awarding institution.
- At least 15 semester hours of upper-division major work must be completed in residence at OU.
- OU correspondence courses are ***not*** considered resident credit.
- Credits earned via examination are neither resident nor nonresident credit.

GRADE POINT AVERAGES: Students must earn a minimum overall 2.00 for each of the following: Combined Retention GPA (all college grades), OU Retention GPA, GPA for all major courses, and GPA for all major courses taken at OU. Some schools and departments of the College have higher minimum grade point averages required for their students.

SPECIAL DEGREES: Students may qualify for an Honors degree (cum Laude, Magna cum Laude, or Summa cum Laude) by completing specific requirements of the Honors College. A degree will be earned with Distinction if the student completes at least 60 semester hours at OU with at least a 3.60 combined retention GPA and OU retention GPA. A degree will be earned with Special Distinction if the student completes at least 60 semester hours at OU with at least a 3.90 combined retention GPA and OU retention GPA.

APPLICATION FOR GRADUATION: Students must apply for graduation during the term in which they complete their degree requirements in order to graduate in that term. The graduation application is available on line on your Ozone site. Deadlines for the OU Graduation Application are: **March 1** for Spring certification and the University of Oklahoma Commencement book; **July 1** for Summer graduation certification; and, **October 1** for Fall graduation certification.

Refer to the OU General Catalog for more complete information.

Suggested Semester Plan of Study — Biochemistry - B100

This plan shows one possible grouping of courses that would allow students to graduate in four years. Please refer to the front of the degree checksheet for official requirements. Students must consult with College of Arts and Sciences and/or Department of Chemistry and Biochemistry academic advisers to verify that courses selected each semester fulfill the recommended plan and satisfy university, College of Arts and Sciences, and Biochemistry major requirements.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	CHEM 1315, General Chemistry, **or** 1335, General Chemistry: Signature	5	CHEM 1415, General Chemistry cont., **or** 1425, Advanced General Chemistry, **or** 1435, General Chemistry: Signture	5
	ENGL 1113, Principles of English Composition (Core I)	3	ENGL 1213, Principles of English Composition (Core I), **or**	3
	MATH 1823, Calculus & Analytic Geometry I (Core I)	3	EXPO 1213, Expository Writing (Core I)	
	Social Science (Core III)	3	MATH 2423, Calculus & Analytic Geometry II	3
			Understanding Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	**14**	**TOTAL CREDIT HOURS**	**14**
SOPHOMORE	CHEM 3064, Organic Chemistry I	4	CHEM 3005, Quantitative Analysis	5
	PHYS 2514, Gen. Physics for Engineering & Science Majors, **or** 2414, General Physics for Life Science Oriented Majors	4	CHEM 3164, Organic Chemistry II PHYS 2524, Gen. Physics for Engineering & Science Majors, **or** 2424, General Physics for Life Science Oriented Majors	4 4
	Biological Science (Core II)	4		
	HIST 1483, United States 1492-1865, **or** 1493, United States 1865-Present (Core IV)	3	Non-Western Culture (Core IV)	3
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**16**
JUNIOR	CHEM 3421, Physical Chemistry Lab	1	CHEM 3521, Physical Chemistry Lab	1
	CHEM 3423, Physical Chemistry I	3	CHEM 3523, Physical Chemistry II	3
	CHEM 3653, Intro. to Biochemistry	3	CHEM 3753, Intro. to Biochemical Methods	3
	Western Civilization & Culture (Core IV)	3	P SC 1113, American Federal Government (Core III)	3
	Beginning Foreign Language (Core I)	5	Beginning Foreign Language continued (Core I)	5
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**15**
SENIOR	CHEM 4753, Principles of Biochemistry I	3	§CHEM 4913, Senior Thesis (Capstone), **or**	3
	PBIO/BIOL/MBIO 4843, Intro. to Molecular Biology	3	§CHEM 4933, Current Topics in Biochemistry (Capstone) (spring-only course)	
	Humanities, upper-division, outside major (Gen. Ed.)	3	Humanities, upper-division, outside major (Gen. Ed.)	3
	Intermediate Foreign Language	3	Free Elective, upper-division (3000-4000-level)	3
	Free Elective, upper-division (3000-4000-level)	3	Free Elective	3
	Free Elective	1	Free Elective	3
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**

§CHEM 4913 and 4933 are not all offered every semester. Students should plan their capstone experience accordingly.

Bachelor's degrees require a minimum of 48 hours of upper-division (3000-4000) coursework.
This plan of study should not be used in lieu of academic advisement.

Students who transfer from other institutions (particularly community colleges) must verify credit hour and course requirements with their college academic counselor, ELLH 124, 325-4411, **http://ou.edu/cas**.
Please make an appointment for a degree check with your college academic counselor once you have earned 90 hours. Appointments may be scheduled at **https://iadvise.ou.edu/**.

REQUIREMENTS FOR THE BACHELOR OF SCIENCE
COLLEGE OF ARTS AND SCIENCES
THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education:

Summer 2018 through Spring 2019

Minimum Credit Hours and Grade Point Averages Required			
Total Hours —	**120**	Upper-Division Within Total	**48**
Major Hours —	**36-37**		

Grade Point Averages:

Overall & Major: Combined OU/Transfer - **2.00** OU - **2.00**

48 Upper-Division Hours REQUIRED

Chemistry and Biochemistry

(Standard Option)

B170

Bachelor of Science

OU encourages students to complete at least 30 hours of applicable coursework each year to have the opportunity to graduate in four years.

GENERAL EDUCATION AND COLLEGE REQUIREMENTS
Courses graded P/NP will not apply.

Courses for fulfillment of General Education and College of Arts & Sciences requirements must be from the approved General Education course list published in the Class Schedule or at **http://www.ou.edu/enrollment/home/**.

University-Wide General Education (minimum 40 hours) and College of Arts and Sciences Requirements

Core Area I: Symbolic and Oral Communication (9-22 hours, 3-6 courses)

a. **English Composition** (6 hours, 2 courses)
   1. English 1113, Principles of English Composition
   2. English 1213, Principles of English Composition, **or** EXPO 1213, Expository Writing

b. **Foreign Language** (0-13 hours in the same language)
   The College of Arts and Sciences requirement ***cannot be met by high school coursework.***
   1. Beginning Course (0-5 hours) _____
   2. Beginning Course, continued (0-5 hours) _____

◆ 3. Intermediate Course (2000 level, 0-3 hours). _____
   One course at the intermediate level or demonstrated competency at that level.

c. **Mathematics** (3 hours, 1 course). _____

Core Area II: Natural Science (7 hours, 2 courses) including one laboratory component.

◆ 1.**Biological Science** _____
   Chosen from the following approved General Education designators: BIOL, HES, MBIO, or PBIO.

◆ 2.**Physical Science** _____
   Chosen from the following approved General Education designators: AGSC, ASTR, CHEM, GEOG, GEOL, GPHY, METR, or PHYS.

Core Area III: Social Science (6 hours, 2 courses)

1. Political Science 1113, American Federal Government
2. _____

Core Area IV: Humanities (18 hours, 6 courses)

a: **Understanding Artistic Forms** (3 hours, 1 course) _____

b. **Western Civilization and Culture** (6 hours, 2 courses)
   1. History 1483, U.S., 1492-1865, **or** History 1493, U.S., 1865-Present,
   2. _____ (excluding HIST 1483 and 1493)

c. **Non-Western Culture** (3 hours, 1 course):_____

d. **Additional Core IV Humanities courses** (6 upper-division hours, 2 courses at the 3000- 4000-level). Must be outside the major and selected from Understanding Artistic Forms, Western Civilization and Culture, or Non-Western Culture.

◆ 1. _____

◆ 2. _____

Core Area V: Senior Capstone Experience (3 hours, 1 course): _____

◆ College of Arts and Sciences Requirements: College requirements are not automatically fulfilled by a previous degree.

Some courses required for the major may also fulfill University General Education and/or College of Arts & Sciences Requirements

MAJOR REQUIREMENTS

A grade of C or better must be earned in each Chemistry course presented for major credit. No grade below a C made in Chemistry courses at the upper-division level may be made up elsewhere without prior written approval by the OU Chemistry Department.

CHEMISTRY		
1315	General Chemistry, **or**	(5)
1335	General Chemistry I: Signature	
1415	General Chemistry cont., **or**	(5)
1425	Advanced General Chemistry, **or**	
1435	General Chemistry II: Signature	
3064	Organic Chemistry I	4
3164	Organic Chemistry II	4
3005	Quantitative Analysis	5
3421	Physical Chemistry Lab, **and**	1
3423	Physical Chemistry I	3
3521	Physical Chemistry Lab, **and**	1
3523	Physical Chemistry II	3
3653	Introduction to Biochemistry	3
4023	Instrumental Methods of Chemical Analysis	3
4033	Instrumental Methods of Chemical Analysis Laboratory, **or**	
4444	Advanced Synthesis & Spectral Characterization	
_____		3-4
Three hours from:		
3753	Intro. to Biochemical Methods	
4333	Advanced Inorganic Chemistry	
4753	Principles of Biochemistry I	
4970	Special Topics/Seminar in Chemistry & Biochemistry	
_____		3
4913	Senior Thesis (Capstone), **or**	
4923	Senior Project (Capstone), **or**	
4933	Current Topics in Biochemistry (Capstone)	
_____		3

MAJOR SUPPORT REQUIREMENTS

MATH		
1823	Calculus & Analytic Geom. I, **and**	
2423	Calculus & Analytic Geom. II	
	or	
1914	Differential & Integral Calculus I, **and**	
2924	Differential & Integral Calculus II	
_____		3-4
_____		3-4
PHYSICS		
2414	Gen. Physics for Life Science, **and**	
2424	Gen. Physics for Life Science	
	or	
2514	Gen. Physics for Engr. & Science, **and**	
2524	Gen. Physics for Engr. & Science	
_____		4
_____		4

Free Electives

Electives to bring total applicable hours to 120 including 48 upper-division hours.

INFORMATION CONCERNING GENERAL RULES, REGULATIONS AND MINIMUM REQUIREMENTS

TOTAL HOURS: A minimum of 120 semester hours acceptable toward graduation must be completed.

UPPER-DIVISION HOURS: A minimum of 48 upper-division semester hours acceptable toward graduation must be completed. OU courses numbered 3000 or above are upper-division. Transfer work is counted as lower-division or upper-division credit depending on the level at which it was offered at the institution where it was earned. Two-year college work is accepted only as lower-division credit.

ARTS AND SCIENCES HOURS: At least 80 semester hours of liberal arts and sciences courses are required for a BA degree. At least 55 semester hours of liberal arts and sciences courses are required for a BS degree.

MAJOR WORK: A minimum of 30 semester hours must be earned in the major, including a minimum of 15 credit hours at the upper-division level.

PASS/NO PASS ENROLLMENT: A maximum of 16 semester hours of free elective credit may be attempted under this option.

INDIVIDUAL STUDIES (e.g., courses titled "Independent Study"): A maximum of 12 total semester hours may be counted toward graduation, excluding Honors Reading and Honors Research.

P.E. COURSES: No physical education activity courses will be counted toward the 120 semester hours of acceptable credit for graduation.

SENIOR INSTITUTION HOURS: A minimum of 60 semester hours applied toward graduation must be earned at senior (4-year) institutions.

RESIDENCY:

- At least 15 of the final 30 hours applied toward the degree or at least 50 percent of the hours required by the institution in the major field must be satisfactorily completed at the awarding institution.
- At least 15 semester hours of upper-division major work must be completed in residence at OU.
- OU correspondence courses are ***not*** considered resident credit.
- Credits earned via examination are neither resident nor nonresident credit.

GRADE POINT AVERAGES: Students must earn a minimum overall 2.00 for each of the following: Combined Retention GPA (all college grades), OU Retention GPA, GPA for all major courses, and GPA for all major courses taken at OU. Some schools and departments of the College have higher minimum grade point averages required for their students.

SPECIAL DEGREES: Students may qualify for an Honors degree (cum Laude, Magna cum Laude, or Summa cum Laude) by completing specific requirements of the Honors College. A degree will be earned with Distinction if the student completes at least 60 semester hours at OU with at least a 3.60 combined retention GPA and OU retention GPA. A degree will be earned with Special Distinction if the student completes at least 60 semester hours at OU with at least a 3.90 combined retention GPA and OU retention GPA.

APPLICATION FOR GRADUATION: Students must apply for graduation during the term in which they complete their degree requirements in order to graduate in that term. The graduation application is available on line on your Ozone site. Deadlines for the OU Graduation Application are: **March 1** for Spring certification and the University of Oklahoma Commencement book; **July 1** for Summer graduation certification; and, **October 1** for Fall graduation certification.

Refer to the OU General Catalog for more complete information.

Suggested Semester Plan of Study — Chemistry and Biochemistry - B170

This plan shows one possible grouping of courses that would allow students to graduate in four years. Please refer to the front of the degree checksheet for official requirements. Students must consult with College of Arts and Sciences and/or Department of Chemistry and Biochemistry academic advisers to verify that courses selected each semester fulfill the recommended plan and satisfy university, College of Arts and Sciences, and Chemistry and Biochemistry major requirements.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	CHEM 1315, General Chemistry, **or**	5	CHEM 1415, General Chemistry cont., **or** 1425, Advanced General Chemistry,	5
	1335, General Chemistry I: Signature	3	**or** 1435, General Chemistry II: Signature	
	ENGL 1113, Principles of English Composition (Core I)		ENGL 1213, Principles of English Composition (Core I), **or**	3
	MATH 1823, Calculus & Analytic Geometry I(Core I), **or**	3-4	EXPO 1213, Expository Writing (Core I)	
	MATH 1914, Differential & Integral Calculus I		MATH 2423, Calculus & Analytic Geometry II, **or**	3-4
	Social Science (Core III)	3	MATH 2924, Differential & Integral Calculus II	
			Understanding Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	**14-15**	**TOTAL CREDIT HOURS**	**14-15**
SOPHOMORE	CHEM 3064, Organic Chemistry I	4	CHEM 3005, Quantitative Analysis	5
	PHYS 2514, Gen. Physics for Engineering & Science Majors, **or**	4	CHEM 3164, Organic Chemistry II	4
	2414, General Physics for Life Science Oriented Majors		PHYS 2524, Gen. Physics for Engineering & Science Majors, **or**	4
	Biological Science without lab (Core II)	3	2424, General Physics for Life Science Oriented Majors	
	HIST 1483, United States 1492-1865, or	3	Non-Western Culture (Core IV)	3
	1493, United States 1865-Present (Core IV)			
	TOTAL CREDIT HOURS	**14**	**TOTAL CREDIT HOURS**	**16**
JUNIOR	CHEM 3421, Physical Chemistry Lab	1	CHEM 3521, Physical Chemistry Lab	1
	CHEM 3423, Physical Chemistry I	3	CHEM 3523, Physical Chemistry II	3
	CHEM 4023, Instrumental Methods of Chemical Analysis	3	CHEM 4033, Instrumental Methods of Chemical Analysis Laboratory	3
	Beginning Foreign Language (Core I)	5	P SC 1113, American Federal Government (Core III)	3
	Western Civilization & Culture (Core IV)	3	Beginning Foreign Language continued (Core I)	5
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**15**
SENIOR	CHEM 3653, Introduction to Biochemistry	3	§CHEM 4913, Senior Thesis (Capstone), **or**	3
	CHEM 4333, Advanced Inorganic Chemistry	3	§CHEM 4923, Senior Project (Capstone), **or**	
	Intermediate Foreign Language	3	§CHEM 4933, Current Topics in Biochemistry (Capstone)	
	Humanities, upper-division, outside major (Gen. Ed.)	3	Humanities, upper-division, outside major (Gen. Ed.)	3
	Free Elective	3	Free Elective, upper-division (3000-4000-level)	3
	Free Elective	1	Free Elective, upper-division (3000-4000-level)	3
			Free Elective	3
			Free Elective	1
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**16**

§CHEM 4913, 4923, and 4933 are not all offered every semester. Students should plan their capstone experience accordingly.

Bachelor's degrees require a minimum of 48 hours of upper-division (3000-4000) coursework.
This plan of study should not be used in lieu of academic advisement.

Students who transfer from other institutions (particularly community colleges) must verify credit hour and course requirements with their college academic counselor, ELLH 124, 325-4411, **http://ou.edu/cas**.
Please make an appointment for a degree check with your college academic counselor once you have earned 90 hours. Appointments may be scheduled at **https://iadvise.ou.edu/**.

REQUIREMENTS FOR THE BACHELOR OF SCIENCE
COLLEGE OF ARTS AND SCIENCES
THE UNIVERSITY OF OKLAHOMA

For Students Entering the Oklahoma State System for Higher Education:

Summer 2018 through Spring 2019

Minimum Credit Hours and Grade Point Averages Required			
Total Hours —	**120**	Upper-Division Within Total	**48**
Major Hours —	**40-42**		

Grade Point Averages:

Overall & Major: Combined OU/Transfer - **2.00** OU - **2.00**

48 Upper-Division Hours REQUIRED

Chemical Biosciences

B155

Bachelor of Science

OU encourages students to complete at least 30 hours of applicable coursework each year to have the opportunity to graduate in four years.

GENERAL EDUCATION AND COLLEGE REQUIREMENTS
Courses graded P/NP will not apply.

Courses for fulfillment of General Education and College of Arts & Sciences requirements must be from the approved General Education course list published in the Class Schedule or at **http://www.ou.edu/enrollment/home/**.

University-Wide General Education (minimum 40 hours) and College of Arts and Sciences Requirements

Core Area I: Symbolic and Oral Communication (9-22 hours, 3-6 courses)

a. **English Composition** (6 hours, 2 courses)
   1. English 1113, Principles of English Composition
   2. English 1213, Principles of English Composition, **or** EXPO 1213, Expository Writing

b. **Foreign Language** (0-13 hours in the same language)
   The College of Arts and Sciences requirement ***cannot be met by high school coursework.***
   1. Beginning Course (0-5 hours) _____
   2. Beginning Course, continued (0-5 hours) _____

◆ 3. Intermediate Course (2000 level, 0-3 hours). _____
   One course at the intermediate level or demonstrated competency at that level.

c. **Mathematics** (3 hours, 1 course). _____

Core Area II: Natural Science (7 hours, 2 courses) including one laboratory component.

◆ 1.**Biological Science** _____
   Chosen from the following approved General Education designators: BIOL, HES, MBIO, or PBIO.

◆ 2.**Physical Science** _____
   Chosen from the following approved General Education designators: AGSC, ASTR, CHEM, GEOG, GEOL, GPHY, METR, or PHYS.

Core Area III: Social Science (6 hours, 2 courses)

1. Political Science 1113, American Federal Government
2. _____

Core Area IV: Humanities (18 hours, 6 courses)

a: **Understanding Artistic Forms** (3 hours, 1 course) _____

b. **Western Civilization and Culture** (6 hours, 2 courses)
   1. History 1483, U.S., 1492-1865, **or** History 1493, U.S., 1865-Present,
   2. _____ (excluding HIST 1483 and 1493)

c. **Non-Western Culture** (3 hours, 1 course):_____

d. **Additional Core IV Humanities courses** (6 upper-division hours, 2 courses at the 3000- 4000-level). Must be outside the major and selected from Understanding Artistic Forms, Western Civilization and Culture, or Non-Western Culture.

◆ 1. _____

◆ 2. _____

Core Area V: Senior Capstone Experience (3 hours, 1 course): _____

◆ College of Arts and Sciences Requirements: College requirements are not automatically fulfilled by a previous degree.

Some courses required for the major may also fulfill University General Education and/or College of Arts & Sciences Requirements

MAJOR REQUIREMENTS

A grade of C or better must be earned in each Chemistry course presented for major credit. No grade below a C made in Chemistry courses at the upper-division level may be made up elsewhere without prior written approval by the OU Chemistry Department.

CHEMISTRY

1315	General Chemistry **or**	(5)
1335	General Chemistry: Signature	
1415	General Chemistry cont., **or**	(5)
1425	Advanced General Chemistry **or**	
1435	General Chemistry II: Signature	
3053	Organic Chemistry	3
3152	Organic Chemistry Lab	2
3153	Organic Chemistry	3
3451	Basic Physical Chemistry Lab	1
3453	Basic Physical Chemistry	3
3653	Introduction to Biochemistry	3
3753	Intro. to Biochemical Methods	3
4913	Senior Thesis (Capstone), **or**	
4923	Senior Project (Capstone), **or**	
4933	Current Topics in Biochemistry (Capstone)	
	_____	3

BIOLOGICAL SCIENCES

BIOL	1124, Introductory Biology	4
MBIO	3812, Fund. of Microbiology Lab	2
MBIO	3813, Fund. of Microbiology	3
BIOL/MBIO/PBIO	4843, Intro. to Molecular Biology	3

A minimum of four hours chosen from the following BIOL lecture/lab combinations:

3101	Princ. of Physiology Lab, **and**	
3103	Princ. of Physiology	
3201	Animal Development Lab, **and**	
3203	Animal Development	
3333	Genetics, **and**	
3342	Genetics Laboratory	
4244	Animal Histology	
	_____	4-5

A minimum of three hours from the following:

BIOLOGY

2124	Human Physiology	
2234	Intro. to Human Anatomy	
3113	Cell Biology (or MBIO/PBIO 3113)	
3214	Comp. Vertebrate Anatomy	
4223	Cellular & Molecular Neurobiology	

MICROBIOLOGY

4823	Pathogenic Microbiology & Infectious Disease	
4833	Basic Immunology	
	_____	3-4

MAJOR SUPPORT REQUIREMENTS

MATH

1823	Calculus & Analytic Geometry I	
	or	
1914	Differential & Integral Calculus I	
	_____	3-4

PHYSICS

1311	General Physics Lab I	1
1321	General Physics Lab II	1
2414	Gen. Physics for Life Science, **and**	
2424	Gen. Physics for Life Science	
	or	
2514	Gen. Physics for Engr. & Science, **and**	
2524	Gen. Physics for Engr. & Science	
	_____	4
	_____	4

Free Electives

Electives to bring total applicable hours to 120 including 48 upper-division hours.

INFORMATION CONCERNING GENERAL RULES, REGULATIONS AND MINIMUM REQUIREMENTS

TOTAL HOURS: A minimum of 120 semester hours acceptable toward graduation must be completed.
UPPER-DIVISION HOURS: A minimum of 48 upper-division semester hours acceptable toward graduation must be completed. OU courses numbered 3000 or above are up-per-divi sion. Transfer work is counted as lower-division or upper-division credit depending on the level at which it was offered at the institution where it was earned. Two-year college work is accepted only as lower-division credit.
ARTS AND SCIENCES HOURS: At least 80 semester hours of liberal arts and sciences courses are required for a BA degree. At least 55 semester hours of liberal arts and sciences courses are required for a BS degree.
MAJOR WORK: A minimum of 30 semester hours must be earned in the major, including a minimum of 15 credit hours at the upper-division level.
PASS/NO PASS ENROLLMENT: A maximum of 16 semester hours of free elective credit may be attempted under this option.
INDIVIDUAL STUDIES (e.g., courses titled "Independent Study"): A maximum of 12 total semester hours may be counted toward graduation, excluding Honors Reading and Honors Research.
P.E. COURSES: No physical education activity courses will be counted toward the 120 semester hours of acceptable credit for graduation.
SENIOR INSTITUTION HOURS: A minimum of 60 semester hours applied toward graduation must be earned at senior (4-year) institutions.
RESIDENCY:

- At least 15 of the final 30 hours applied toward the degree or at least 50 percent of the hours required by the institution in the major field must be satisfactorily completed at the awarding institution.
- At least 15 semester hours of upper-division major work must be completed in residence at OU.
- OU correspondence courses are ***not*** considered resident credit.
- Credits earned via examination are neither resident nor nonresident credit.

GRADE POINT AVERAGES: Students must earn a minimum overall 2.00 for each of the following: Combined Retention GPA (all college grades), OU Retention GPA, GPA for all major courses, and GPA for all major courses taken at OU. Some schools and departments of the College have higher minimum grade point averages required for their students.

SPECIAL DEGREES: Students may qualify for an Honors degree (cum Laude, Magna cum Laude, or Summa cum Laude) by completing specific requirements of the Honors College. A degree will be earned with Distinction if the student completes at least 60 semester hours at OU with at least a 3.60 combined retention GPA and OU retention GPA. A degree will be earned with Special Distinction if the student completes at least 60 semester hours at OU with at least a 3.90 combined retention GPA and OU retention GPA.

APPLICATION FOR GRADUATION: Students must apply for graduation during the term in which they complete their degree requirements in order to graduate in that term. The graduation application is available on line on your Ozone site. Deadlines for the OU Graduation Application are: **March 1** for Spring certification and the University of Oklahoma Commencement book; **July 1** for Summer graduation certification; and, **October 1** for Fall graduation certification.

Refer to the OU General Catalog for more complete information.

Suggested Semester Plan of Study — Chemical Biosciences - B155

This plan shows one possible grouping of courses that would allow students to graduate in four years. Please refer to the front of the degree checksheet for official requirements. Students must consult with College of Arts and Sciences and/or Department of Chemistry and Biochemistry academic advisers to verify that courses selected each semester fulfill the recommended plan and satisfy university, College of Arts and Sciences, and Chemical Biosciences major requirements.

Year	FIRST SEMESTER	Hours	SECOND SEMESTER	Hours
FRESHMAN	CHEM 1315, General Chemistry	5	CHEM 1415, General Chemistry cont.	5
	ENGL 1113, Principles of English Composition (Core I)	3	ENGL 1213, Principles of English Composition (Core I), **or**	3
	MATH 1823, Calculus & Analytic Geometry I(Core I), **or**	3-4	EXPO 1213, Expository Writing (Core I)	
	MATH 1914, Differential & Integral Calculus I		PHYS 2514, Gen. Physics for Engineering & Science Majors, **or**	4
	Social Science (Core III)	3	2414, General Physics for Life Science Oriented Majors	
			PHYS 1311, Physics I Lab	1
			Understanding Artistic Forms (Core IV)	3
	TOTAL CREDIT HOURS	**14-15**	**TOTAL CREDIT HOURS**	**16**
SOPHOMORE	CHEM 3053, Organic Chemistry	3	CHEM 3152, Organic Chemistry Lab	2
	PHYS 2524, Gen. Physics for Engineering & Science Majors, **or**	4	CHEM 3153, Organic Chemistry	3
	2424, General Physics for Life Science Oriented Majors		MBIO 3813, Fundamentals of Microbiology	3
	PHYS 1321, Physics II Lab	1	Beginning Foreign Language (Core I)	5
	BIOL 1124, Introduction to Biology (Core II)	4	Non-Western Culture (Core IV)	3
	HIST 1483, United States 1492-1865, or	3		
	1493, United States 1865-Present (Core IV)			
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**16**
JUNIOR	CHEM 3653, Introduction to Biochemistry	3	CHEM 3453, Basic Physical Chemistry	3
	MBIO 3812, Fundamentals of Microbiology Lab	2	CHEM 3451, Basic Physical Chemistry Lab	1
	BIOL/MBIO/PBIO 4843, Introduction to Molecular Biology	3	Humanities, upper-division, outside major (Gen. Ed.)	3
	Western Civilization & Culture (Core IV)	3	P SC 1113, American Federal Government (Core III)	3
	Beginning Foreign Language continued (Core I)	5	Intermediate Foreign Language	3
			Free Elective	2
	TOTAL CREDIT HOURS	**16**	**TOTAL CREDIT HOURS**	**15**
SENIOR	CHEM 3753, Introduction to Biochemical Methods	3	§CHEM 4913, Senior Thesis (Capstone), **or**	3
	BIOL/MBIO, Major Group, Lecture	3	§CHEM 4923, Senior Project (Capstone), **or**	
	Humanities, upper-division, outside major (Gen. Ed.)	3	§CHEM 4933, Current Topics in Biochemistry (Capstone)	
	Free Elective, upper-division (3000-4000-level)	3	BIOL, Major Group, Lecture *with Lab*	4
	Free Elective	3	Free Elective, upper-division (3000-4000-level)	3
			Free Elective	3
	TOTAL CREDIT HOURS	**15**	**TOTAL CREDIT HOURS**	**13**

§CHEM 4913, 4923, and 4933 are not all offered every semester. Students should plan their capstone experience accordingly.

Bachelor's degrees require a minimum of 48 hours of upper-division (3000-4000) coursework.
This plan of study should not be used in lieu of academic advisement.

Students who transfer from other institutions (particularly community colleges) must verify credit hour and course requirements with their college academic counselor, ELLH 124, 325-4411, **http://ou.edu/cas**.
Please make an appointment for a degree check with your college academic counselor once you have earned 90 hours. Appointments may be scheduled at **https://iadvise.ou.edu/**.