Oberlin College

Department of
Chemistry & Biochemistry

Majors Handbook

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updated 4/6/2020

The Department of Chemistry & Biochemistry

Department Website

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Department Office
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Campus Resources

Academic Advising Resource Center (AARC)
Office of the Registrar
Carnegie Building 113
440-775-8450
aarc@oberlin.edu
registrar@oberlin.edu

Career Development Center
Stevenson Hall, Longman Commons
440-775-8140
career@oberlin.edu

Center for Student Success
Student Academic Success Programs
Peters Hall 118
css@oberlin.edu
sas@oberlin.edu

Center for Learning, Education and Research in the Sciences (CLEAR)
Science Center N376
440-775-6137
clear@oberlin.edu

Course Catalog
http://catalog.oberlin.edu/

International Student Resource Center
Wilder Hall 208
440-775-8462
Josh.Whitson@oberlin.edu

Multicultural Resource Center
187 N Professor St
440-775-8802
mrc@oberlin.edu

Office of Undergraduate Research
Peters Hall G27/28
440-775-6973
our@oberlin.edu

Office of Winter Term
Carnegie Building 124
440-775-6499
winterterm@oberlin.edu

Outside Resources

American Chemical Society (ACS)
https://www.acs.org/content/acs/en/education/students/college.html

Research Experiences for Undergraduates (REU)
https://www.nsf.gov/crssprgm/reu/

Introduction

The Majors Handbook for chemistry and biochemistry is primarily intended for prospective majors and new majors, but also may be helpful to those further along in the program. This handbook serves as a guide to course selection, research opportunities, and involvement in the life of the department and is to be used in conjunction with the Oberlin College Course Catalog and the department website. Of course, more specific advice will come from your academic advisor in the department. Brief biographies of the department faculty and staff are included in this handbook.

What is a chemistry or biochemistry major at Oberlin? The major in chemistry or biochemistry is a rigorous introduction to the principles and practices in the chemical/biochemical sciences. The program has been approved by the American Chemical Society, the chemist's professional organization. The major prepares one well for future employment in many arenas, including the chemical industry or academic/government laboratories, and for post-graduate education, including PhD and MD programs. About 20 – 25 students graduate from Oberlin with the major each year.

What does one do with a BA in chemistry or biochemistry from Oberlin? The department annually publishes a report, aptly titled *Annual Report of the Department of Chemistry and Biochemistry*, that you may obtain in hard copy from the department office or electronically from the department website. The report describes among other things the plans of the most recently graduated class of majors and the careers of those who graduated earlier. A summary of one recent cohort provides a representative snapshot of what our majors do. At graduation, 40% planned to take jobs for at least a year or two, 40% were set to enter graduate school, and 20% planned medical studies. Fifteen years later, those same 23 grads had 10 PhD degrees, six MD degrees, and five other post-graduate degrees. They were employed in industry (35%, many in information technology), as physicians (20%), as professors (20%), as lawyers (10%), and as musicians (10%). Most of our alumni earn a post-baccalaureate degree, and all are gainfully employed in a wide variety of fields.

How does one become a chemistry or biochemistry major? You will need an advisor from the department. If you have someone in mind, you can ask them directly, if not, consult the chair about selecting an advisor. You will need to fill out the Major Declaration form with your new advisor, then have it signed by the chair and submitted to the Registrar.

Curriculum

The department offers two majors, chemistry and biochemistry. A minor in chemistry is also offered. The Oberlin College Course Catalog contains course descriptions and a discussion of the curriculum necessary for the BA degree and careers in chemistry and biochemistry. Department advisors and pre-med advisors will have more specific advice. The following recommendations supplement those comments.

Chemistry Major

General Chemistry		
	101 Structure & Reactivity	102 Principles of Chemistry
Core Courses		
	205 Organic Chemistry	211 Analytical Chemistry
	213 Inorganic Chemistry	339 Quantum Chem. & Kinetics
Advanced Courses		
Category I	254 Bioorganic Chemistry	325 Organic Mechanism & Synth.
	327 Synthesis Laboratory	405 Topics in Organic Chemistry
Category II	323 Materials Chemistry	
	341 Trace Analysis	361 Bioanalytical Chemistry
	349 Chem. & Stat. Thermodynamics	

The minimum major in chemistry requires Introductory Chemistry (CHEM 103 may replace CHEM 101/ 102), the four Core Courses, and 2.5 courses in the Advanced category, including at least 0.5 course from each of the two Categories and one advanced laboratory course (marked in italics in the above table). Offerings for half-course credit are CHEM 323, 361, and all 400-level courses. The major also requires MATH 134, and PHYS 103/104 (or PHYS 110/111).

Biochemistry Major

General Chemistry		
	101 Structure & Reactivity	102 Principles of Chemistry
Core Courses		
	205 Organic Chemistry	211 Analytical Chemistry
	213 Inorganic Chemistry	
	339 Quantum Chem. & Kinetics OR 349 Thermodynamics	
Biochemistry Courses		
	254 Bioorganic Chemistry	374 Biochemistry
Advanced Courses		
	407 Topics in Biochemistry	

The minimum major in biochemistry requires Introductory Chemistry (CHEM 103 may replace CHEM 101/102), the four Core Courses, and the two Biochemistry Courses. The major also requires BIOL 213, MATH 134, and PHYS 103/104 (or PHYS 110/111).

Starting chemistry / Advanced Placement. Most students begin their study of chemistry with CHEM 101, 102. Students with strong preparation should consider starting with CHEM 103, a one-semester, faster-paced introduction to chemistry. Entering students who have scored 4 or 5 on the Chemistry Advanced Placement (AP) examination of the Educational Testing Service or scored 6 or 7 on the Higher Level International Baccalaureate (IB) Chemistry exam can receive transfer credit equivalent to CHEM 101 (one full course) and begin college chemistry with CHEM 102 or 103. Note that calculus is a co-requisite for CHEM 103. Students must relinquish AP or IB credit if the corresponding coursework is repeated at Oberlin. Those with A-levels scores of A*, A, or B can also begin college chemistry with CHEM 103.

Students with exceptional high school preparation in mathematics and chemistry, and either an AP score of 4 or 5 or an IB higher-level chemistry exam score of 6 or 7 may petition the department chair to enroll in CHEM 205, Organic Chemistry. Upon successful completion of CHEM 205, the student would also receive credit for CHEM 103 instead of CHEM 101.

Later courses. Completing as many core courses as possible by the end of junior year will permit you a wider and more informed choice of advanced courses and better prepare you for research opportunities. Because analytical chemistry CHEM 211 helps students develop skill in accurate laboratory measurements, there are advantages to taking it early. To take physical chemistry CHEM 339 as a junior, you must complete MATH 134 no later than the fall semester of junior year and PHYS 111 (or 104) no later than the spring semester of junior year, concurrent with CHEM 339. Biochemistry (CHEM 374) is intended for biochemistry majors, usually taken in the fall of senior year, and builds upon fundamentals from BIOL 213 and CHEM 254, both prerequisite courses. These pre-reqs can be taken in any order or concurrently.

The minimum major will prepare students for employment and graduate study. However, the best preparation for competitive graduate and professional programs involves additional advanced courses and laboratory work, related courses in other departments, and research experience. In particular for chemistry majors, a second course in organic chemistry (CHEM 254 or 325) is essential, and thermodynamics (CHEM 349) is recommended. Also take advantage of opportunities to learn to search, access, and assess the chemical literature. Majors planning graduate studies in biochemistry or molecular biology should consider taking upper level biology courses. Chemistry and biochemistry majors are also encouraged to take additional courses in computer science and modeling, mathematics, and statistics. The specific courses chosen will depend in part on the intended area of specialization. Consult early with your major advisor as you plan your choice of electives.

Biochemistry majors simultaneously complete nearly all the natural science coursework typically required by medical schools. Chemistry majors planning careers in medicine or dentistry should complete eight hours of biology with laboratory. Other courses should be planned in consultation with the Health Professions Office in The Career Center and your pre-medical advisor.

Some typical course schedules that demonstrate how the major curriculum can be completed in four years are given in Appendix I.

Research Experience

Advanced laboratory experience is highly advisable, whether in advanced laboratory courses or in the research laboratory. Every major is encouraged to participate in research, particularly those intending an advanced degree. The PhD in the chemical sciences is a research-intensive degree, so students considering PhD programs should have experience with and an inclination towards laboratory research. Research experience at Oberlin may be gained through a Winter Term project, through summer research, or during the academic year (CHEM 525, 526), in each instance working closely with a faculty mentor. The research interests of the department faculty are described in brief in the Faculty section of this handbook. Look for advertising from the department office regarding research opportunities at the start of the academic year, in late October (for Winter Term) and in late February (for summer). Since the number of students who can be accommodated on most projects is limited, students are encouraged to consult with faculty members as early as possible. Details on these opportunities for research experience are given below.

During the *Academic Year* Honors students and research students are active in faculty laboratories. The principal elements of the Honors Program are a year-long research project (CHEM 525 and 526 for at least 1.5 course credit and Winter Term), a formal written thesis, an oral examination administered by a chemist/biochemist from another institution, and two public presentations – one after Winter Term and one at the end of the spring semester.

The process in matching student to faculty research mentor begins in the student's junior year. Exploratory conversations with faculty members and current Honors students should occur in the fall. In the spring semester, students receive written descriptions of the faculty research projects and a detailed description of the Honors program. High-achieving students must apply for acceptance into the Honors program. Applicants should discuss involvement in the Honors program with their academic advisors and with potential faculty mentors. Candidates submit ranked lists of four preferred mentors/projects along with their applications. Students are accepted into the Honors program and matched with research advisors at a meeting of the department faculty.

Seniors who are not in the Honors program and those in earlier years are encouraged to participate in research during the academic year. These students should explore research opportunities and contact faculty members directly. Though Honors students receive priority, every effort is made to accommodate the interests of all majors who wish to participate in research. A research student can participate one or both semesters, usually writes a short final report on their work, and may give a public oral presentation.

Winter Term is a good time for students, even those only in their first year, to secure additional experience in chemistry through a laboratory project, reading project, and or computer project. Many of the on-campus laboratory projects involve research or experiment development for

courses. Off-campus Winter Term projects are another way that students obtain useful experience. Many students locate such possibilities on their own. For others, the Alumni Office and the Career Center are sources for names of persons who can direct off-campus projects. Students interested in medicine have found that a Winter Term project in a medical laboratory, a hospital, or a doctor's office is a good way to build their resumes. Chemistry faculty members are available to serve as the faculty sponsors of students who do off-campus projects.

Summers allow majors to gain significant research experience either at Oberlin or elsewhere. At Oberlin, summer researchers, typically rising juniors and seniors, work full-time with faculty mentors for eight to ten weeks between May and August and are paid a stipend. Many universities and some colleges have similar programs. Information about summer research opportunities in chemistry at other institutions may be found at web sites describing programs such as NSF-REU and SURF, and on postings available on the bulletin board outside of the department office. Students may also find it worthwhile to seek unadvertised positions in universities in their home areas by sending letters of inquiry and resumes to department chairs. Start a search for summer employment in January.

Consult the department's web site (under Student Projects) or the department's *Annual Report* for a list of last year's research students and project titles. Also take a look at the Presentations and Publications sections of the *Annual Report* to note that many research students give presentations at local and national chemistry meetings and are co-authors on faculty publications.

Extra-Curricular Opportunities

Seminar Program

Each semester, the Department of Chemistry & Biochemistry offers 4-6 oral presentations given by distinguished chemical scientists from around the country, as well as department faculty who have recently been on research leave. The seminar program provides a window into the various areas of chemistry, some of which are not covered in our regular curriculum, and into the wide variety of professional settings that chemists find themselves, ranging from academic laboratories to museums to ocean-going vessels. Conversations with seminar speakers are also an excellent way to learn about educational and employment opportunities after Oberlin. When possible, the department allows a few students to sign up (on bulletin board outside the department office) to have lunch with the guest, and seminars are usually preceded by a short social time where other students can meet the speaker. Notices of seminars are posted outside the department office and on other bulletin boards in the Science Center. A list of last year's seminars may be found in the department's *Annual Report*. Seminar time is usually 4:45-5:45 p.m. Wednesday afternoons. Chemistry and biochemistry majors are expected to attend every seminar.

Majors Committee

The majors committee serves as a liaison between chemistry majors and the department. Committee members provide advice to the faculty on new hires for temporary or continuing positions in the department after meeting with the candidates and hearing their classroom presentations. The committee organizes social events to promote interaction between majors and faculty and staff. The annual T-shirt contest and T-shirt sales are held by the committee with the help of the department's administrative assistant.

Tutoring

Majors often organize evening and weekend sessions to provide group assistance to students enrolled in introductory and organic chemistry.

Oberlin's quantitative skills center, CLEAR, has two kinds of employment opportunities for students interested in tutoring and peer mentorship. Students can serve as drop-in tutors on a range of quantitative subjects or as mentors in the OWLS program, which is for specific classes such as CHEM 101. For information on these programs go to new.oberlin.edu/office/clear.

In addition, the Center for Student Success hires chemistry and biochemistry majors as individual tutors, upon recommendation of a faculty member. Through service-learning, some majors tutor students in the Oberlin public schools.

Employment in the Department

A limited number of jobs, such as laboratory teaching assistants, graders, stockroom assistants, safety assistants, and office assistants, are available to students each semester. Open positions are advertised during the prior semester. Contact Dr. Cristinel Mîinea, the department Laboratory Instructor & Manager, if you would be interesting in working for the department next semester.

Life After Oberlin

EMPLOYMENT AFTER GRADUATION

Some chemistry majors take jobs immediately after graduation from Oberlin. Because chemistry is important to so many areas of science, opportunities for these graduates are quite diverse. Most of these jobs are in industry or academia and involve laboratory activities such as chemical synthesis, analytical work, quality control, environmental monitoring, and basic and applied research. Other jobs have been in the Peace Corps, high school teaching, marketing, and computer programming. Some majors seek immediate long-term employment; others seek one- to three-year temporary employment before beginning graduate or professional studies.

Long-Term Employment

If you are seeking immediate employment, your most important single resource on campus is the staff of the Career Center. You should get in touch with them immediately in the fall of your senior year and become a regular visitor to their offices and web site. They can provide advice on specific aspects of the job-hunting process, such as resume preparation, interviewing, and locating jobs. The Career Center is also the focal point for companies that send recruiters to campus. Sign up for an interview with any company that looks remotely interesting. A few early interviews for experience with the process almost surely will be helpful.

The resume is an important summary of your skills and background. Although the Career Center can provide a great deal of general guidance for preparing a resume, *also discuss your resume with one or more people experienced in your field*. Your advisor and other faculty members who know you well will be glad to help.

In addition to the Career Center, you should be aware of other sources of information about job opportunities. Announcements of jobs sent to the department are posted on the bulletin board outside the department office. *Chemical and Engineering News*, a weekly magazine of the American Chemical Society, has a section on employment and is available in Science Library. Other journals such as *Science* and *Physics Today* have similar sections, though not as focused for chemists. Local newspapers or ones from selected cities available in Mudd Library will be helpful if you have a specific geographical location in mind. You may also wish to take the initiative by sending your resume directly to a company in which you are interested. For addresses, consult the Career Center, which has useful resources such as *Job Opportunities in Engineering and Technology*. Company activities, locations, and addresses to write to are among items covered; governmental agencies are also included. Finally, be sure that at least some chemistry faculty members know of your job interests. Faculty often hear of opportunities informally and can bring these to your attention if they are aware of your plans.

One other step you may wish to take is to join the American Chemical Society (ACS) as a student member. The cost of membership is low to students and has several advantages. Among these is your own subscription to *Chemical and Engineering News* and an opportunity to

use the ACS Employment Clearing House. The latter operates online and at national ACS meetings to bring employers and prospective employees into contact with one another. Attendance at a national ACS meeting offers the opportunity to interview with many prospective employers over a period of one or two days. ACS members also have access to the ACS Job Bank which is available online from the ACS home page at www.acs.org. Students who satisfy ACS guidelines are certified to the Society by the department and are eligible for full membership upon graduation. The Cleveland section of the ACS regularly advertises local employment opportunities.

Temporary Employment

If you are seeking temporary employment as a secondary school science teacher, seek information about private schools from the Career Center. (Private schools often do not require the education courses and student teaching that are necessary for public school teaching certification.)

If you are seeking temporary employment as a research technician, you do not need to contact employers (except for those who directly contact the department) until spring of your senior year or even early summer after graduation. You need to personally submit inquiry and resumes to departments in universities, medical schools and hospitals where the research is done. Put your resume on file in Personnel or Human Resources offices only if you are told to do so by the department you visit. (Often the Human Resources offices do not learn about such temporary job openings until after they are filled.)

PhD Programs in the Chemical Sciences

The PhD rather than the Masters degree is the common next step for students wishing further education in the chemical sciences. Students interested in pursuing graduate study in chemistry/biochemistry or related fields should plan to submit applications by the end of the fall semester of the senior year for admission the following September. Ideally at least some preliminary thinking about fields of study and available graduate programs should occur by late spring of the junior year, *e.g.* around registration time, but an early start in the fall of the senior year provides adequate time. Resources are available to help you with selecting and getting accepted into a graduate program.

A great starting point for available information on graduate programs in chemistry and related fields is at the American Chemical Society web site. The URL is www.acs.org/education. Under the heading *Students* click on the *Graduate/Postdoctorate* link. The *Planning for Graduate School* document and the *Directory of Graduate Research* site will probably be most helpful to you. In addition, the American Chemical Society conducted a survey (www.acs.org/gradsurvey) of its graduate student members in 2013. The survey included 2,992 respondents, the majority

of whom were doctoral students, and a total of 269 U.S. colleges and universities were represented. The survey focused on career plans and preparation, student-advisor relationships, and support mechanisms for graduate students.

Early in the process you should talk with your adviser or another faculty member about your plans. This conversation can help sort out your interests and identify an area of chemistry in which you wish to concentrate. Talk with at least one faculty member whose expertise is in that area; he or she will be able to help you identify graduate programs that are strong in your area of interest and often can supplement written sources with personal knowledge about institutions and individual researchers. Faculty members also may be acquainted with the experiences of recent Oberlin graduates at institutions you are considering. During the year, be sure to talk to seminar speakers who represent your areas of interest.

A useful resource is *Peterson's Guide to Graduate Programs* that is issued in several volumes. All are available in the Career Center and online at www.petersons.com/graduate-schools.aspx#/sweeps-modal. Each two-page listing describes such things as programs of study, facilities, costs, financial aid, community, application procedure, and faculty. Departments offering only a masters degree are included.

All graduate departments have web sites that describe their programs and faculty research. Often information on the web site is the most up-to-date, especially about faculty.

Getting accepted to graduate school is competitive, but every Oberlin chemistry student can reasonably expect to be admitted to at least one graduate program. Only an unusually weak record or a late-developing interest in chemistry would require a student to enter a masters program first. Many students apply to too many schools, not recognizing the high acceptance rate, even for Oberlin students with modest GPAs. A reasonable number of applications is about five spread over a range of recognized quality. Include one or two schools that should accept you but not for certain, and one of lower quality that is virtually certain to admit you. Selection of your list of schools is best done in consultation with one or more faculty members. Their knowledge of how Oberlin graduates with academic records similar to yours have fared in various graduate programs will help you place your own situation in a broader perspective.

After settling on departments of interest, probably more than the number to which you will eventually apply, contact each to request information. Graduate programs have departmental information on the web and many have applications on-line. In your initial inquiry, request application materials for admission and for financial support. Ask specifically about fellowships for entering graduate students as well as about teaching assistantships. Deadlines for submission of application materials will be specified by each school. Early submission may result in early consideration in cases where admission is done on a rolling basis.

Several recommendations will be required for each application. Graduate school admissions committees are particularly interested in your promise as an independent researcher. Letters from faculty members at Oberlin and elsewhere who have supervised you in a research setting outside of the classroom are the best means by which committees can evaluate this promise.

Select additional faculty members who know your work well and, if possible, have taught you in recent or upper level courses. Ask each faculty member in person and be prepared to spend some time discussing your plans. Once faculty have agreed to write, you may provide the graduate schools with your list of recommenders. The graduate schools then contact the recommenders by email, and faculty submit their letters and answers to evaluative questions electronically. Writing recommendations is a demanding task. Consequently, you should give those persons who will write on your behalf as much lead time as possible. A month is desirable; less than two weeks may be unworkable. The cover page for a recommendation usually has a place for you to indicate whether you wish to waive your right to see the recommendation. It is to your advantage to waive it.

Respond to acceptances as each arrives, even though you are not yet prepared to make a decision. When you have reached a decision, write a letter of acceptance to your choice and courteously decline the other offers. If you can decline an offer even though your final choice is not yet made, please do so to allow that institution to admit someone else.

Some students prefer to visit schools to which they have been accepted before deciding. Many schools will reimburse costs of a visit. This is usually a worthwhile experience if you have the time and/or resources, but certainly not a necessity. A consultation with your advisor or other faculty member may help you decide in your own case, and if you go, how to get the most from a visit.

Graduate Record Examination (GRE)

Many graduate schools and most fellowship programs require that applicants take the Graduate Record Examination (GRE). The examination results weigh heavily in any admission or award decision. The GRE consists of two parts, a general test and a subject test. The general tests are computer-based and offered year-round at regional centers (not in Oberlin). The subject test covers the field in which you plan to do graduate work (*e.g.* chemistry), is offered on paper only, and is given three times a year (September, October, April) in Oberlin and elsewhere. Each part is about three hours long. An information bulletin about the GREs along with the registration form is available at the Career Center and on-line at www.gre.org. The Career Center usually organizes practices for the general test in the spring.

Students report that the subject test in chemistry is challenging and that the emphases among various areas of chemistry shift somewhat with each test offering. You should review seriously areas of chemistry in which you have not had courses recently. Since the test is comprehensive, it will be advantageous for most students to take it late in the fall of the senior year when they can benefit from having had the greatest number and variety of relevant courses. Practice subject tests are available to test registrants. Please note that some graduate programs no longer require the chemistry subject test and that the subject test in biochemistry, cell and molecular biology was discontinued in 2016.

Financial Support

Admission to a graduate program in the physical sciences invariably includes financial support. In fact, unless there are extenuating circumstances, there is no reason you should begin graduate study without some sort of financial assistance. Typically this support is in the form of a teaching assistantship that entails laboratory teaching, leading recitation sections and/or paper grading for a specified number of hours each week. A small number of departments require every graduate student to serve as a teaching assistant for at least one year. The size of the stipend varies but is adequate for someone to be self-supporting at a modest standard of living. Most departments also waive or pay directly the normal tuition fees as part of the financial support, while others award a larger stipend and have the student pay tuition. Fellowships through the graduate department are rarely available to first year graduate students, but it is still worth inquiring about them in your initial letter requesting application materials.

National Science Foundation (NSF) graduate fellowships provide full support for three years of graduate study at any U.S. university. They are highly prestigious awards, and competition for them is keen. All Oberlin chemistry majors with strong academic records and definite plans to attend graduate school in a scientific field should consult with the chair of the department about applying for these fellowships. *Early planning is essential*, since the application is due in late October. The GRE general test and the subject test in the intended field of graduate study must both be completed no later than September. A strong performance on the GREs is important for NSF applicants. The latest program announcement may be found online at the National Science Foundation: nsf.gov/funding/pgm_summ.jsp?pims_id=6201&org=NSF.

Fellowship programs for graduate study abroad require that applicants be nominated by their undergraduate institution. At Oberlin, these programs are administered by the Office of Fellowships and Awards and the Fellowships Committee of the General Faculty. Some of the named fellowships are the Churchill, Fulbright, Marshall, Rhodes, and Watson Fellowships. To become an applicant for a Churchill Fellowship requires especially early planning. Programs carry certain restrictions such as location of study and career goals. Talk with your faculty adviser if you are interested in any of these programs. Further details may be obtained from the Career Center and online at new.oberlin.edu/office/fellowships.

3-2 CHEMICAL ENGINEERING PROGRAM

Students interested in chemical engineering should consult with Taylor Allen, professor of biology and coordinator of the 3-2 engineering program, during their first year at Oberlin. The Engineering section of the Oberlin Course Catalog provides an introduction to the program. 3-2 engineering students spend three years at Oberlin and then two years at one of the affiliated engineering schools – Washington University in St. Louis, Columbia University, Caltech, and Case Western Reserve University -- to earn a BA from Oberlin and a BS in

engineering. Washington University in St. Louis, one of the cooperating engineering schools, offers a January Term program that is an introduction to engineering. Some Oberlin students interested in the 3-2 program have taken this as a Winter Term project during the sophomore year.

PROFESSIONAL PROGRAMS IN THE MEDICAL/HEALTH SCIENCES

If you are considering a career in the medical/health sciences – human medicine, dentistry, pharmacy, public health, veterinary medicine, etc. – you should contact Justin Crowley, the Pre-medical Program Director (Justin.Crowley@Oberlin.edu) early in your college career. Note: the comments below focus on human medicine and dentistry.

Information on admission requirements for individual schools are updated annually for allopathic (MD), osteopathic, (DO), and dental programs. These are available online and from the Pre-medical Program Director. Be sure to check individual requirements for schools you are most interested in attending.

If you are planning to enter medical/dental school in the fall following graduation, nearly all the work toward applying to medical school will happen during the spring and summer of your junior year (or fourth year for double-degree students). Note: the comments below assume this scenario.

Medical College Admission Test (MCAT) and Dental Aptitude Test (DAT)

You should take the admission/aptitude test in the spring of your junior year. MCAT registration materials are available online at www.aamc.org/students/applying/mcat. DAT materials are also available online at www.ada.org/dat.aspx. A serious review of basic chemistry through bioorganic, biology, and physics is essential before taking either test. The combination of BIOL 213 and CHEM 254 provides sufficient preparation for the biochemistry portion of the MCAT. Other areas of the natural sciences, statistics, and the social sciences may also be included on the tests. Very recently, the emphasis on concepts in psychology, sociology, and related areas has been increased. Be guided in your review by the syllabus and sample tests published by MCAT or DAT. Almost every year a commercial review course is available on campus.

The Application Process

You should complete the application process by June following your junior year. Because of the rolling admission process, applications submitted near the deadlines have a negligible chance of success. Most medical/dental colleges use the centralized Association of American Medical Colleges Admission Service (AMCAS at www.aamc.org/audienceamcas.htm), the American

Association of Colleges of Osteopathic Medicine Application Service (AACOMAS at aacomas.aacom.org**)** or the Association of American Dental School Admissions Service (AADSAS at www.adea.org/Pages/default.aspx). Consult the appropriate admissions requirement publication or web sites.

Letters of recommendation are required by all schools. Writing recommendations is a time-consuming business. You should make it as easy and as unhurried as possible for those who agree to write them. Oberlin College provides committee letters to medical schools to accompany your individual letters of recommendation. You will complete the committee letter process in the spring of the junior year. Your letters of recommendation are due in March, so you will need to request letters well in advance of that time. Information about the process is available from the Pre-medical Program Director.

It is important that your completed application and all other required documents be in the hands of the medical or dental school by mid-July at the latest.

Selecting Schools

You should apply to at least a dozen professional schools. There are many factors to consider when selecting a school. Study the schools' admissions profiles to select those you judge you have a reasonable chance for acceptance, and also consider the mission statement, curriculum, and programs offered. Some admission profile information is given in a school's admissions requirement publication, and additional statistics may be available from the Pre-medical Program Director. Include in your list state-supported schools from your state of residence. After preparing your list of schools, discuss it with your academic advisor, premedical advisor, and the Pre-medical Program Director. Remember that in your application you must demonstrate that you have the academic ability to succeed and that you are a good fit for the school.

Department Faculty

Jason M. Belitsky. *Department Chair*. BA, Amherst, 1997; PhD, Caltech, 2002. Postdoctoral Fellow at U. California, Los Angeles (2002-05). Joined the Oberlin faculty in 2005. Sabbatical leave at the U. Michigan (2011-12). He teaches general chemistry, bioorganic chemistry, and biochemistry courses.

His research features an interdisciplinary approach to the study of melanin and other problems in bioorganic chemistry and chemical biology.

Matthew J. Elrod. BA, Grinnell, 1989; PhD, U. California, Berkeley, 1994. Postdoctoral Fellow at MIT (1994-96). Faculty member at Hope College (1996-2001). Joined the Oberlin faculty in 2001. Sabbatical leave at U. Colorado (2004-05). He teaches general chemistry, environmental chemistry, and physical chemistry courses.

His research involves the use of kinetics and mass spectrometric techniques to study reactions relevant to air pollution and global climate change.

Manish A. Mehta. AB, Wabash, 1986; PhD, Yale, 1990. Postdoctoral research at the U. Oxford (1990-91), U. Toronto (1992-93), and U. Washington (1994-97). Joined the Oberlin faculty in 1998. He teaches general chemistry and physical chemistry courses.

His research involves the investigation of the techniques of solid-state nuclear magnetic resonance and the application of those techniques to the elucidation of biomolecular structure.

Catherine M. Oertel. BA Oberlin, 1999; PhD, Cornell, 2005. Postdoctoral Fellow, Cornell U. and Chalmers University of Technology, Sweden, (2004-05). Joined the Oberlin faculty in 2006. Research leaves at U. California, Santa Barbara (2009) and Ohio State University (2012). She teaches general chemistry and inorganic chemistry courses.

Her research involves hydrothermal synthesis and characterization of complex oxides and the use of methods of materials chemistry to study the composition and corrosion of historic organ pipes.

William H. Parsons. BA, Williams, 2007; PhD, Stanford, 2013. Postdoctoral research at The Scripps Research Institute (2013-17). Joined the Oberlin faculty in 2017. He teaches general chemistry and organic chemistry courses.

His research involves the development of covalent chemical probes to study enzyme structure and function, primarily for members of the serine hydrolase family.

Lisa M. Ryno. BS, Trinity, 2008; PhD, The Scripps Research Institute, 2012; Postdoctoral research at U. San Diego (2013-14). Joined the Oberlin faculty in 2014. She teaches general chemistry, bioorganic chemistry and biochemistry courses.

Her research involves the study of bacterial stress signaling pathways and their impact on biofilm composition and antibiotic resistance.

Rachel A. Saylor. BS, Wittenberg, 2010; PhD, U. Kansas, 2015. Postdoctoral Fellow, U. South Carolina (2015-2018). Joined the Oberlin faculty in 2019. She teaches analytical chemistry and general chemistry courses.

Her research focuses on developing and employing analytical techniques to solve neurobiological problems.

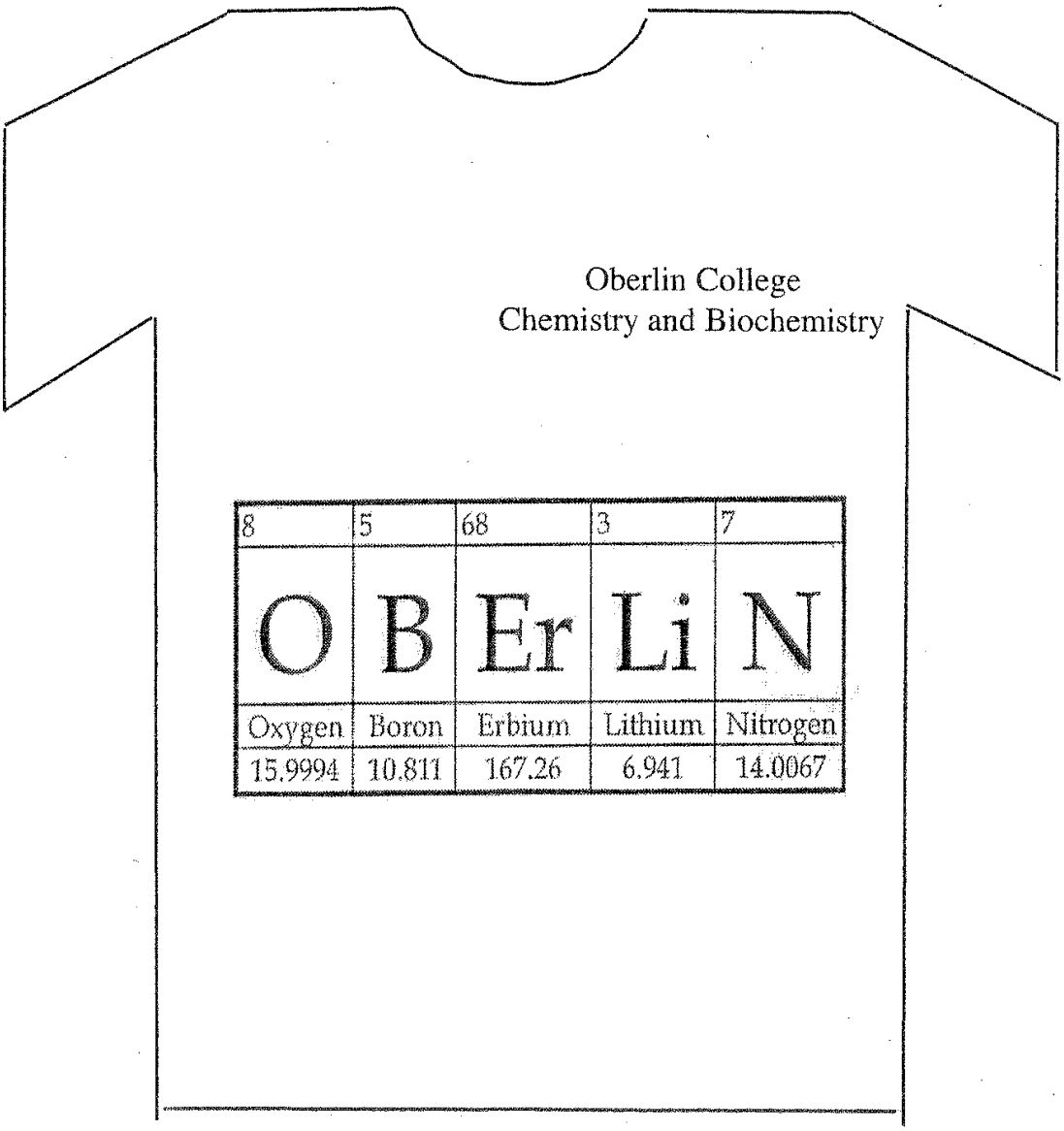
Department Staff

Cynthia M. Manning. Chemistry Resource Coordinator. Joined the department in 1992 as departmental assistant and became resource coordinator in 2000. Before coming to Oberlin she worked in chemical reagent quality control at Ciba Geigy. In addition to handling capital equipment purchasing for the department, she manages the department's safety protocols and coordinates facilities maintenance.

Cristinel P. Mîinea. Chemistry & Biochemistry Laboratory Instructor & Manager. Earned a PhD in Biochemistry from U. Houston in 2002; joined the department in 2019. In addition to his teaching duties, he oversees the general chemistry laboratory program and helps oversee department safety.

Kirk Warren. Technical Assistant. With experience in high school teaching and in technical positions in the chemical industry, he joined the department in 2013. Graduated with a chemistry major from Oberlin in 2000. He prepares reagents and sets up equipment and supplies for the general chemistry and organic chemistry laboratories.

Rachel J. Wysocki. Administrative Assistant and Purchasing Technician. Joined the department in 2016. Graduated with majors in creative writing, comparative literature, and French from Oberlin in 2011 and earned an M.F.A. in literary translation in 2014. In addition to managing the day-to-day operations of the chemistry office, she handles non-capital equipment purchasing and related tasks.


Oberlin College
Chemistry and Biochemistry
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APPENDIX I: Sample Course Schedules

CHEMISTRY MAJOR

The following sample schedules outline a couple of the possible ways a chemistry major can be completed in four years. Usually CHEM 101-102 or 103 are completed in the first year and CHEM 205 in the sophomore year. However, a major also can start the core sequence with other courses such as CHEM 211 or 213. Each of the sample minimum major schedules includes two semesters of organic chemistry and two semesters of physical chemistry.

Begin with CHEM 101-102, minimum major

	Fr		So		Jr		Sr	
CHEM	101	102	205	213	211	339	349	361
CHEM				325[1]				
MATH	133	134						
PHYS					110[2]	111[2]		
Courses	2	2	1	2	2	2	1	0.5
Labs/wk	1	1	1	1	2	2	1	0

Begin with CHEM 101-102, enriched major, research

	Fr		So		Jr		Sr	
CHEM	101	102	205	213	327	339	323	254
CHEM			211	325			349	
CHEM							525[3]	526[3]
MATH	133	134						
PHYS					110[2]	111[2]		
Courses	2	2	2	2	2	2	2	2
Labs/wk	1	1	2	1	2	2	2.5	4

[1] CHEM 254 may be substituted for CHEM 325. You may wish to take both CHEM 254 and CHEM 325.

[2] PHYS 103 and 104 may be substituted for PHYS 110 and 111. PHYS 110 and 111 use calculus; PHYS 103 and 104 do not. PHYS 110 and 111 provide better problem-solving experience for CHEM 339 and 349. PHYS 111 has a recommendation of MATH 231.

[3] Variable credit possible. One-half course listed here for fall and one course for spring. CHEM 525 and 526 may be taken for credit multiple times.

BIOCHEMISTRY MAJOR

The following sample schedules outline a couple of the possible ways a biochemistry major can be completed in four years. Usually CHEM 101-102 or 103 are completed in the first year and CHEM 205 and 254 in the sophomore year.

Begin with CHEM 101-102, minimum major, research

	Fr		So		Jr		Sr	
CHEM	101	102	205	254	211	213	374	339[1]
							525[3]	526[3]
BIOL	100[4]		213					
MATH		133	134					
PHYS					110[2]	111[2]		
Courses	2	2	3	1	2	2	1.5	2
Labs/wk	2	1	2	1	2	2	2.5	4

Begin with CHEM 103, enriched major

	Fr		So		Jr		Sr	
CHEM	103	205	211	254	374	213	349[1]	361
BIOL		100[4]	213					310[5]
MATH	134							
PHYS					110[2]	111[2]		
Courses	2	2	2	1	2	2	1	1.5
Labs/wk	1	2	2	1	2	2	1	1

[1] Either CHEM 339 or CHEM 349 satisfies biochemistry major requirements.

[2] see note 2 above under Chemistry

[3] Variable credit possible. One-half course listed here for fall and one course for spring. CHEM 525 and 526 may be taken for credit multiple times.

[4] BIOL 100 (along with CHEM 101, 102 or 103) fulfills the Biology Department prerequisite for BIOL 213.

[5] BIOL 310 is one of several appropriate upper level biology courses with laboratory.

MAJORS IN PREPARATION FOR HEALTH CAREERS

The following sample schedules permit entry into medical or dental school in the fall following graduation from Oberlin College. Note that a chemistry major who takes the medical school-recommended biochemistry course meets the requirements for a double chemistry/biochemistry major. In the sample schedules, the spring semester of the junior year is kept relatively free of science courses for studying for and taking the MCAT examination. Please note that the combination of BIOL 213 and CHEM 254 provides sufficient preparation for the biochemistry portion of the MCAT. See the footnotes under the sample chemistry and biochemistry schedules for information about PHYS 103/104 and PHYS 110/111.

Chemistry / Biochemistry Double Major

	Fr		So		Jr		Sr	
CHEM	101	102	205	213			349	339
CHEM			211	254			374	361
BIOL	100				213			
MATH		133	134					
PHYS					110	111		
Courses	2	2	3	2	2	1	2	1.5
Labs/wk	2	1	2	2	2	1	2	1

Biochemistry Major

	Fr		So		Jr		Sr	
CHEM	101	102	205	254	211	339	374	213
CHEM							525	526
BIOL	100		213					
MATH		133	134					
PHYS					110	111		
Courses	2	2	3	1	2	2	1.5	2
Labs/wk	2	1	2	1	2	2	2.5	4