The PhD in Biochemistry

The University of Colorado established a semi-independent Biochemistry Division within the Department of Chemistry and Biochemistry in 1986. The current research in the division spans a wide range of fields from bioinformatics and cellular and molecular biology to synthetic and biophysical chemistry. Specific areas of focus in the Biochemistry Division are: (1) nucleic acid chemistry and biochemistry, including RNA structure and function and mechanisms of transcription and replication, (2) signal transduction, and (3) structural biology, including X-ray and NMR, proteomics and informatics.
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The University of Colorado Boulder

Vision for 2030: The University of Colorado at Boulder will become a leading model of the "new flagship university" of the 21st century—by redefining learning and discovery in a global context and setting new standards in education, research, scholarship, and creative work that will benefit Colorado and the world.

Other Campuses in the CU System

The University of Colorado System consists of three campuses: the University of Colorado, Boulder, the University of Colorado, Denver and Health Sciences Center, and the University of Colorado, Colorado Springs. There is considerable interaction among the campuses: many faculty have appointments in the graduate programs at more than one campus, and many students carry out some of their research at or in collaboration with labs at other campuses.

New Student Orientation

Incoming students are required to participate in the Biochemistry orientation takes place prior to the beginning of fall semester. During this time, students are introduced to the City of Boulder, the University, the Biochemistry program and the students and staff of our participating departments. Specific activities include orientations run by Chemistry and Biochemistry, and The Graduate School, meetings with the Biochemistry Graduate Program Director, a department dinner.
New Student Information

From Acceptance to Enrollment
Applicants will be informed in writing of their acceptance status in March following the recruitment weekends. The offer letter includes your annual salary information for the AY 2014/2015 the offer was $29,000 per year. Students who have been accepted are asked to sign and return their acceptance letter no later than April 15. The Office of Admissions will send you an email asking you to confirm your “intent to enroll” online. Once you have completed this process, you will be able to register for your IdentiKey, your CU email address, apply for your Buff OneCard, register for classes (we will take care of registration for you) etc.

Before Classes Begin

Once you are enrolled at CU, there will be a lot to do before you actually arrive! If you are new to CU-Boulder, please complete these action items as soon as possible (it is possible to complete these items prior to arriving at the university):

- Activate your CU Login Name and IdentiKey Password (link) [http://www.colorado.edu/oit/identikey](http://www.colorado.edu/oit/identikey)
- Activate your CU-Boulder email (link) [http://www.colorado.edu/oit/email](http://www.colorado.edu/oit/email)
- Apply for your Buff OneCard (link). [http://services.jsatech.com/index.php?cid=59](http://services.jsatech.com/index.php?cid=59) The Buff OneCard is your key to most services and events at CU
- RTD Bus Pass is also at the Buff OneCard Office in C4C (Center for Community) on the West campus room N180
- Once you have your BuffOne Card you can get a prox-card for building access. Bring your BuffOne card to JSCBB A171D and Maryellen Ansell or Angela Janacek will grant you building access and keys if needed.
- Men – remember to complete the Selective Service information. (link) [http://www.colorado.edu/registrar/selective-service-requirement-extended](http://www.colorado.edu/registrar/selective-service-requirement-extended)
- Submit immunization records to Wardenburg Heath Center using (link) [http://www.colorado.edu/healthcenter/forms/required-immunization-forms](http://www.colorado.edu/healthcenter/forms/required-immunization-forms)
- Check out the CU-Boulder campus map (link) [http://www.colorado.edu/healthcenter/forms/required-immunization-forms](http://www.colorado.edu/healthcenter/forms/required-immunization-forms)

Registering for Classes:

- If you are a new first year student, we will complete your first semester registration for you
- You should become familiar with the MyCUInfo system (link) and the registration process. In your second year and beyond you will be completing you own registration. Second year students begin taking elective courses toward their Biochemistry PhD course work requirement.
Unless already a Colorado State resident, all students must complete the **Tuition Classification Information** [link](http://registrar.colorado.edu/students/tuition_classification.html) so that you qualify for in-state tuition at the end of your first year at CU-Boulder.

**Retirement Fund**

The University requires domestic employees to contribute to a retirement fund; however, **full-time students are exempt from this**. You must be enrolled to be a student, so if you are a domestic student and are not enrolled by the fall add deadline, you will have 8% of your salary deducted and placed in a retirement fund! It is, therefore, **very** important to be enrolled by the due date each semester. International students are not subject to this as they are not eligible to participate in the University retirement plan. During the summer, students are not typically enrolled, and as such, 8% of domestic students’ salary will be deducted and placed in a retirement account. There is no way around this as it is a University requirement.

**Other Actions To Take Before Classes Begin - ALL students should complete:**

- Students must select or waive the university insurance by the semester deadline through the online student portal at mycuinfo.colorado.edu [link](https://portal.prod.cu.edu/MyCUInfoFedAuthLogin.html). The University pays for about 80% of you insurance fees and the department of Biochemistry will add an additional $500 per year ($250 each term) for first year students. There may be a small balance to pay the first year. In the second year and further years you may be responsible to pay a portion of insurance fees.

- Get your Colorado driver’s license and register to vote in Colorado [link](http://www.coloradolicenseservices.org/)

- Download a current version of Microsoft Office [link](http://www.colorado.edu/oit/msca)— this software is available for free once you are on CU payroll (optional)

- Register your bike at the Bike Station [link](http://ecenter.colorado.edu/transportation/bike/station) east of the University Memorial Center (UMC): Bring $10 and your Buff OneCard

**Moving to Boulder**

You may wish to begin looking for housing before you arrive. Below are some resources:

- Off Campus Housing Office [link](http://ralphieslist.colorado.edu/) (UMC 313, 303-492-7053)
- Rent Boulder Now [link](http://rentbouldernow.com/)
- Housing Helpers-Boulder [link](http://www.housinghelpers.com/BOULDER-272-1.html)
- Graduate Housing [link](http://housing.colorado.edu/residences/apartment-life/apartments)

Here are some other resources to find affordable housing closer to campus.

- Craig’s List-Boulder [link](http://boulder.craigslist.org/)
- Zumper [link](https://www.zumper.com) Description: Free map-based search for home & apartment rentals, with real-time updates. Also available on iOS & Android.
Boulder, Colorado is a wonderful place to live and explore. Below are some useful links. City of Boulder homepage: http://www.bouldercolorado.gov/
State of Colorado homepage: https://www.colorado.gov/colorado-living-here/

Establishing In-state Residency

**NOTE:** If you are an out-of-state domestic student, take IMMEDIATE action to gain residency. Instructions to do this are at: http://registrar.colorado.edu/students/tuition_classification.html

It takes exactly one year to gain residency. It is important that you act as soon as possible as your non-resident status may affect the possibility of future funding opportunities, as non-resident tuition waivers are substantially more expensive than resident waivers.

Because domicile is defined as a true, fixed, and permanent home, persons who are physically present in Colorado only on a temporary basis cannot establish domicile merely by taking these actions. Thus, establishing a new domicile requires actual residence on a permanent basis.

As specified by law, the Tuition Classification Officer considers the following evidence (and any additional relevant information) when evaluating requests for in-state tuition.

- **Payment of Colorado state income tax** (if your income is sufficient to be taxed). All taxable income accrued after you move to Colorado, regardless of source, must be reported to the Colorado Department of Revenue. You should file part-year resident returns for each state of residence for the year you move into Colorado. For subsequent years, you should file a full-year resident Colorado return and a nonresident return for any other state in which you are required to file. For additional information, contact the Colorado Department of Revenue, 1375 Sherman Street, Denver, CO 80203; telephone 303-238-7378.
- **Colorado driver's license**. If you have a driver's license from another state, you must apply for a Colorado driver's license within 30 days of moving to Colorado (if you are employed) or within 120 days (if unemployed). If you do not drive, you may obtain a Colorado identification card. These documents are available from the Driver's License Division, located in Boulder at 28th Street and Iris Avenue; telephone 303-442-3006. For the identification requirements for a Colorado license or ID, see http://www.revenue.state.co.us/my_dir/wrap.asp?incl=fagdrli/fagdrli1
- **Colorado vehicle registration**. If your name is on the title of your motor vehicle (owner or co-owner) you must register it in Colorado within 90 days of moving to Colorado (if you are employed) or within 180 days (if unemployed). This law applies to any vehicle you have, if you are the registered owner. Contact your county clerk for vehicle registration. Boulder County vehicle registration information is available from the
County Clerk, 1750 33rd St.; telephone 303-413-7710. If your vehicle is in another family member’s name, you do not have to register the vehicle.

- **Voter registration** in Colorado. You may register to vote with your county clerk, or when you obtain your Colorado driver’s license, as soon as you move into the State. Boulder County voter registration information is available from the County Clerk, 1750 33rd St.; telephone 303-413-7740. You can register to vote in Colorado online at [www.GoVoteColorado.com](http://www.GoVoteColorado.com).

- **Permanent employment** or acceptance of future permanent employment in Colorado.
- **Ownership of residential real property in Colorado that is your primary residence.** Ownership of vacation or income property is not an indication of domicile.
- **Graduation from a Colorado high school.**
- **Continued residence in Colorado** during the summer or during other periods when not enrolled as a student or during periods between academic sessions.
- **Other factors particular to your situation** may be considered also, and should be documented.

### Facilities and Computing

#### Card Access

Your Buff OneCard is your key to all kinds of services and events here at CU-Boulder. It is necessary for admittance to the Recreation Center, checking out library books and some printing services. The Buff OneCard office is located in the Center for Community (C4C) room N180. They can also be reached by phone at 303-492-0355. [www.buffonecard.com](http://www.buffonecard.com)

**For JSCBB** - Bring your BuffOne card to JSCBB A171D and Maryellen Ansell or Angela Janacek who will grant you building access and keys if needed.

#### Computing Facilities

There are several computer labs across campus available to students. Lab access may be limited to certain program members have restricted hours. The Office of Information Technology has availability information for all computer labs here: [http://webdata.colorado.edu/labs/map/](http://webdata.colorado.edu/labs/map/)

JSCBB Biochemistry computing is run by the department of Chemistry and Biochemistry. Nate Campbell is the director and to get started and connected to the building computer facilities. His contact information is 303-492-6131, [Nathan.Campbell@colorado.edu](mailto:Nathan.Campbell@colorado.edu). In order to expedite any technical problems you may have in the department, we have an online ticket system that will allow you put in trouble tickets that are handled by the ChemIT team.
Simply go to http://chemserve.colorado.edu/help  Do not hesitate to put in IT Tickets, for they are the quickest and easiest way to get solutions to your technology problems. You will also need to be assigned a copy code to print and make copies on the building photocopy machines.
Lab Space

In your first year lab space will be provided by your rotation lab host. After completing your first year you will select your home lab to complete your dissertation research and lab space is provided to all Biochemistry graduate students in their home lab.

Parking and Transportation

Driving/Parking
Parking and Transportation Services (PTS) [http://www.colorado.edu/] helps students and their visitors with their transportation needs with an emphasis on safety and sustainability. They provide options for car sharing, student shuttles, bike programs, carpool, and permit parking.

Academic Year Permits: There are two types of student permits available. These are [Campus Resident](http://www.colorado.edu/) and [Commuter](http://www.colorado.edu/). Permit rates vary based on the proximity of the lot to campus and duration of the permit. You will need your Identikey, password, and vehicle registration to purchase a permit.

Parking Maps: [http://www.colorado.edu/parking/maps/](http://www.colorado.edu/parking/maps/)

Riding the Bus
RTD Student Bus Program: The RTD Student Bus Program ([http://ecenter.colorado.edu/transportation/bus/collegepass](http://ecenter.colorado.edu/transportation/bus/collegepass)) provides a separate card and free rides to all local and regional RTD buses (Skyride to DIA is an additional $5 charge) and light-rail. All students paying tuition can pick up their pass at the Buff OneCard office at Center for Community (C4C) N180.

Buses: Most buses run every 10 to 15 minutes during peak hours on weekdays and weekends.

- **The Buff Bus** – runs from main campus to Williams Village (operated by CU)
- **The Hop** – connects downtown, University Hill, campus, and the 29th Street Mall
- **The Dash** – runs along South Boulder from Lafayette to Louisville to Boulder
- **The Stampede** – runs along Colorado Ave, 30th, and connects to main campus
- **The Skip** – runs north and south along Broadway from Front Range to Greenbriar
- **The Bound** – runs from Iris to Baseline and along 30th
- **#B/BX** – goes to Denver
- **AB** – goes to the Denver International Airport ($5 charge for round trip with Eco-pass)

For schedules and routes, download this [mobile app](http://www.colorado.edu/) or visit [RTD](http://www.colorado.edu/) to find schedules.
Biking

The Bike Station [http://ecenter.colorado.edu/transportation/bike/station](http://ecenter.colorado.edu/transportation/bike/station) provides a place for students to register, repair, borrow, or get advice about bikes and pick up maps for paths around Boulder.

CU-Boulder’s Environmental Center [http://ecenter.colorado.edu/index.php](http://ecenter.colorado.edu/index.php) also has information on alternative modes of transportation and has bikes available for rent.

[www.gobikeboulder.net](http://www.gobikeboulder.net) provides information about biking in the city of Boulder.

Biochemistry TA/RA Pay

**Current annual salary for all Biochemistry students is $29,000 per year.**

**1st Year Students**

Work as TAs and are paid at a monthly rate of approximately $1932 from September 1- May 31. Summer pay makes up this pay difference and monthly pay is approximately $3519 from June 1-August 31. First years also receive a graduate fellowship of $1000 per year and a department fellowship of $500 per year. These fellowship help pay the student fees and cover the cost difference for the student health insurance. This $1500 is applied to the students account in the Bursar’s office $750 each term. Please budget carefully. Tuition is paid for in full by the department when you work as a TA or RA.

- **Tuition**: Paid in full when working as TA or RA
- **Health Insurance**: $1,695/per term – 90% is covered by the Graduate School-about $1,525
  - your responsibility is about $170
- **Fees**: First year fees are approximately $500


**Human Resources**

New students will be asked to provide documents so that department can set you up in the payroll system. You will be asked to provide a completed **I-9 form**; a completed **W-4 form**; a current passport OR drivers license, AND social security card. If you have questions about this process please contact [Kim Kelley](mailto:Kim.Kelley@colorado.edu) (JSCBB A171C).

Here is the new employee link to hr/payroll [https://www cu edu/pbs/newempl.html](https://www.cu.edu/pbs/newempl.html)

**Banking**

The University processes payroll **only by electronic deposit**; therefore, we need your banking information once you arrive. We will need a routing slip from the bank you choose to do business with or a voided check in order to set up direct deposit of your paycheck. If you do not have a U.S. bank account currently, or if you wish to change to local bank, Boulder has many banks and credit unions to choose from. There is even one credit union with a branch on
campus in the UMC building next to Cristol Chemistry, Elevations Credit Union (http://www.elevationscu.com/).

**Criminal Background Check**
All incoming graduate students are subject to a criminal background check. You will receive an e-mail invitation from a company called "HireRite" regarding the background check sometime in early to mid June. PLEASE do not ignore this email! If you do not respond, you will not be paid on time. If you have any questions about this, please contact our departmental payroll liaisons are Megill Stewart (megill.stewart@colorado.edu), Kim Kelley (kkelley@colorado.edu).

**Graduate Student Resources**

**Information Technology Services**
The University of Colorado enrollment process automatically establishes new e-mail accounts assigned to you on our campus server. Generally, e-mail addresses are of the form firstname.lastname@colorado.edu, though for some names, this might not be available. Specific information about setting up your account will arrive with the information from the University. See http://www.colorado.edu/ITS/students/ for more information.

**Departmental Email Lists**
There are several email lists used by various groups in the Department of Chemistry & Biochemistry for official business, to which you will be added once ITS creates your e-mail account. These lists are for Departmental business, and will provide information about events occurring within or related to the Chemistry department or Graduate School Program throughout the academic year. Only official CU e-mail addresses are approved for these lists.

**University and Departmental Rules**
Students are responsible for being familiar with the University’s and the Chemistry Department’s graduate rules. A PDF version of the Departmental Graduate Rules can be found by going to the Department Graduate Rules link at http://www.colorado.edu/chemistry/graduate/Chem_Grad_Rules.pdf. You can read the University Graduate School Rules by going to http://www.colorado.edu/graduateschool/policies/downloads/GSRules_REV.pdf.

**Student Fees**
You will be responsible for student fees each semester. In your first year, 2013 - 2014, these fees will be deducted from your Graduate Fellowship, but you will need to set funds aside for these fees each semester after that. A detailed list of fees can be found here: http://bursar.colorado.edu/tuition-fees/tuition-and-fees-rate-sheets/

**Health Care Information**
You will be automatically enrolled in the Wardenburg GOLD plan. IQ Biology will pay the premium for the first two years. Years three and after will be either partially or fully paid for by
your department, depending on their policies. For more information on Wardenburg GOLD, please go to http://www.colorado.edu/healthcenter/insurance.

The Graduate School
Graduate students should visit the graduate school website http://www.colorado.edu/GraduateSchool/ for any information about graduate life including academic forms, calendar events and information about funding, professional development, policies, and various resources. Incoming students should complete a recommended checklist http://www.colorado.edu/admissions/graduate/admitted-students of items and tasks posted on the website.

United Government of Graduate Students (UGGS)
The United Government of Graduate Students is the primary advocacy group for graduate and professional students on the CU-Boulder campus. UGGS is committed to enhancing the graduate student experience at the University by interacting with the University administration and the University of Colorado Student Union (UCSU) concerning issues such as financial aid, graduate stipends, health care, tuition and fees and graduate student well-being. Graduate students from each department and program are solicited to serve on the UGGS Assembly, ensuring a diverse and complete representation of the graduate student body. Visit: http://uggs.colorado.edu/.
CU-Boulder Policies

**Honor Code**
CU students are expected to abide by a student-run honor code. The Honor Code Committee consists of representatives from the student body, the faculty, and the administration with the purpose of curbing academic dishonesty while building the campus community. Unacceptable behavior regarding plagiarism, cheating, fabrication, aid or academic dishonesty, lying, bribery, and threats are all outlined [here](http://honorcode.colorado.edu/).

**Classroom Behavior**
Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with differences of race, color, culture, religion, creed, politics, veteran's status, sexual orientation, gender, gender identity and gender expression, age, disability, and nationality. Class rosters are provided to the instructor with the student's legal name. Your instructors will gladly honor your request to address you by an alternate name or gender pronoun. Please advise them of this preference early in the semester so that they may make appropriate changes to my records. Policies can be viewed [here](http://www.colorado.edu/policies/student-classroom-and-course-related-behavior) and the student code is available [here](http://www.colorado.edu/studentaffairs/studentconduct/#student_code).

**Disability Services**
Disability Services offers various accommodations to students eligible for assistance. Accommodations include extended time on exams, distraction-reduced testing environment, readers, interpreters, note-takers, alternative text formats such as audio books or Braille, and more. To qualify students must demonstrate need by showing documentation with proof of disability. More information is available at the Disability Services [website](http://disabilityservices.colorado.edu/).

**Religious Accommodations**
Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. Instructors may have a different set of policies in place for each course. Full details are available [online](http://www.colorado.edu/policies/observance-religious-holidays-and-absences-classes-andor-exams).
**Discrimination and Harassment**

The University of Colorado at Boulder Discrimination and Harassment Policy and Procedures, the University of Colorado Sexual Harassment Policy and Procedures, and the University of Colorado Conflict of Interest in Cases of Amorous Relationships policy apply to all students, staff, and faculty. Any student, staff, or faculty member who believes s/he has been the subject of sexual harassment or discrimination or harassment based upon race, color, national origin, sex, age, disability, creed, religion, sexual orientation, or veteran status should contact the Office of Discrimination and Harassment (ODH) at 303-492-2127 or the Office of Student Conduct (OSC) at 303-492-5550. Information about the ODH, the above referenced policies, and the campus resources available to assist individuals regarding discrimination or harassment can be obtained here. [http://hr.colorado.edu/dh/Pages/default.aspx](http://hr.colorado.edu/dh/Pages/default.aspx)

**Help! Assistance for students in distress**

Graduate studies can be exhilarating, challenging, and, at times, overwhelming. It is rarely mistaken as being an "easy" route by anyone's measure, and if you find you have entered a particularly difficult time period, know that you are not alone.

We at the Graduate School wish to encourage you to take advantage of the assistance available to you through the following links to help make your time at CU-Boulder as successful and life-enhancing as possible.

**For Students in Distress:**

After Hours Crisis Services: Counseling and Psychological Services, (303) 492-6766

After Hours Victim Assistance: (303) 492-8855 and press "2". See also [http://cuvictimassistance.com/after-hours](http://cuvictimassistance.com/after-hours) for additional 24-hour hotlines

Please check this link for many more available services for graduate students.

[http://www.colorado.edu/GraduateSchool/resources/help.html#students](http://www.colorado.edu/GraduateSchool/resources/help.html#students)
Biochemistry Program Overview and Curriculum

Biochemistry Curriculum

Sixty credit hours of courses are required consisting of:

- 30 hours of research in Chemistry (CHEM-8991)
- At least 15 hours in formal courses (includes core courses)
- 15 credit hours of other courses, such as summer courses, seminar courses, group meeting courses, and research in Chemistry 6901. All students are required to take a one-credit course in Scientific Ethics (CHEM-5776). A 2 semester teaching requirement is part of the PhD curriculum.

Course Requirements

A personal Year by Year student planner is included in this book with more details about your PhD Biochemistry degree requirements. Please use this each year and turn a copy in to Rob Batey at the end of each year and KEEP a copy for yourself and your advisor.

FIRST YEAR FALL SEMESTER

☑ Core Course: Advanced Biochemistry I CHEM-5771 (5 credit hours)
☑ Core Course: Scientific Ethics in Research (CHEM-5776-1 credit hours)
☑ Biochemistry Research Rotation (CHEM-6901-899 3 credits)

FIRST YEAR SPRING SEMESTER

☑ Core Course: Advanced Biochemistry II CHEM-5781 (5 credit hours)
☑ Biochemistry Research Rotation (CHEM-6901-899 4 credits)

SECOND YEAR FALL SEMESTER

☑ Elective Course: Your Choice-check with advisor or grad program director (3 or more credit hours)
☑ Biochemistry Research Lab Course (CHEM-6901-XXX - 3 credits)

Chose your PhD Advisor and Research Lab!
SECOND YEAR SPRING SEMESTER

☐ Elective Course: Your Choice check with advisor or grad program director (3 or more credit hours)
☐ Biochemistry Research Lab Course (CHEM-6901-XXX - 3 credits)

THIRD YEAR FALL SEMESTER

☐ Elective Course: Your Choice If not completed by end of second year and always check with your advisor or grad program director for relevance (3 or more credit hours)
☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

THIRD YEAR SPRING SEMESTER

☐ Elective Course: Your Choice If not completed by end of second year and always check with advisor or grad program director for relevance (3 or more credit hours)
☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

FOURTH YEAR FALL SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

FOURTH YEAR SPRING SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

FIFTH YEAR FALL SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

FIFTH YEAR SPRING SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

SIXTH YEAR FALL SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)

SIXTH YEAR SPRING SEMESTER

☐ Begin Dissertation Research (CHEM-8991-XXX - 5 credits)
Research/Exam Requirements

FIRST YEAR
- Four 8-week research rotations
  
  **MAY OF 1ST YEAR**
  - Choose Research Advisor
  - Written Comprehensive Exam
  
  **JULY 15 of 1ST YEAR**
  - Out of Area Research Proposal

SECOND YEAR
- Before the end of the spring term 2nd year – Complete Oral Comprehensive Exam

DECEMBER OF YEAR 2
- Re-Take Written Comprehensive Exam if not passed last May

EACH YEAR – Beginning 3rd year
- Annual Committee Meetings

BEFORE GRADUATION
- Complete 30 hours of Dissertation Research and successfully defend your thesis.

Activity Requirements

FIRST YEAR
- Biochemistry First Year Faculty Talks
- Biochemistry Retreat
- Teaching Requirement (1 year)
- Transfer Hours (10 graduate level only)

EACH YEAR
- Attend Biochemistry Seminar Series
- Other Seminars of Interest

BEFORE GRADUATION
- Outreach (optional)
- Additional Teaching (optional)
- Internship (optional)
- Applied for Training Grant/Fellowship (optional)
- Oral Presentation (optional)
- Department Services (optional)
- Publications (please list)
**Study Aids**

Student Academic Success Center [http://www.colorado.edu/sasc/](http://www.colorado.edu/sasc/) provide resources that may be helpful in your graduate studies and examinations. Help is also available at the Career Center [http://careerservices.colorado.edu/students/gradStudents.aspx](http://careerservices.colorado.edu/students/gradStudents.aspx)


NOTE: Check AbeBooks.com for used editions. They run about $25

**Tutors**

The Biochemistry PhD Program also provides tutors who help provide additional support to students as needed. Please let the director, your core faculty, or the Graduate Program Assistant.

**Information About the Requirements**

**Lab Rotations**

All first-year Biochemistry students will participate in four, 8-week research rotations in four different labs, in at least two different departments/disciplines. Research rotations should fit with your research interests but challenge you to learn new techniques and be introduced to ideas outside of your primary discipline. First year students conducting research rotations will be registered for 3 credit hours of CHEM 6901-899 in the first semester and 4 credit hours in the second semester. This course is graded.

For each rotation period you will provide us with a ranked list of your “top five” lab preferences. The first rotation must be done in a Biochemistry lab. Every effort is made to give students their first choice of labs for their rotation assignments however we also will be considering other student preferences and availability in each lab so you may not always get your first choice. To help you make an informed decision, please visit the Biochemistry Division’s website’s faculty page [http://chem.colorado.edu/faculty-interests](http://chem.colorado.edu/faculty-interests) to learn about their research and find contact information. In addition to the Biochemistry faculty, it is possible to rotate in the labs of any of the natural science faculty at CU Boulder. Some of the most common departments that Biochemistry students have rotated in are Chemistry, Chemical and Biological Engineering, MCD Biology, Integrative Physiology, Chemical Physics. We are very supportive if interdisciplinary research, so please do consider all of the options CU Boulder has to offer. Here is a link to the academic departments [http://www.colorado.edu/academics/academic-departments](http://www.colorado.edu/academics/academic-departments)
Successful Rotation Tips

Rotation research is an opportunity to explore potential advisors, different departments, and new research techniques. You should meet with several faculty members so that you can get a feel for the various research and mentoring environments. Not sure what to say? Here is some advice on how to prepare for your rotation research projects (click for tips from the Hirschey Lab Blog [http://lab.hirschey.org/resources/advice_blog/files/rotation.html], The UW MCB Transcript [http://depts.washington.edu/mcbnews/archives/1059] and BMCDB Graduate Group at UC Davis [http://bmcdb.wordpress.com/2011/10/08/rotation-pro-tips-for-1st-years/]). Additional thoughts to consider when choosing a thesis labs, also apply when considering a rotation lab. Visit the Washington University St. Louis [http://www.artsci.wustl.edu/~sac/document/ChoosingaThesisLabii.htm] website, to find more advice!

Once you have made your decision, **there is still a lot you can do to get the most out of each opportunity**: we require that you sit down and talk with your PI at the very beginning of the rotation. This conversation is a chance for you to get to know each other and to talk more precisely about how your interests align. So prepare in advance to talk about the things you hope to get out of the laboratory experience and to learn as much as possible about the advisor’s expectations of rotation (and dissertation) students. For example, you may wish to:

- Let your PI know about your research, education and career goals
- Find out what your PI expects as far as
  - Hours per week spent in the lab
  - Events to attend
  - Lab responsibilities to assume
  - Etiquette to follow
  - Skills, techniques and abilities to demonstrate
- Discuss how the PI ultimately decides who to invite to join the lab, and how many dissertation research slots he/she has
- Review possible rotation projects and how they may become thesis projects

It is possible for you to develop rotation projects that span labs within a rotation session or between consecutive sessions. You may also work collaboratively with another student as long as there are specific outcomes expected for each student. You will not be limited to these labs when choosing your PhD advisor(s).

After each rotation, every student will present their results in a short talk. Suggestions for a successful rotation talk:

1. Your PowerPoint presentation should last 10 minutes. After your talk, there will be ~3-5 minutes for questions.
2. About 1 slide per minute is a good general guideline to follow.
3. Include background appropriate for a diverse audience. Explain clearly your interest in the project and why your audience could be too.
4. Be sure to explicitly state the scientific question you were working on, even if your actual research addressed just a small aspect of that larger question.
5. Explain your methods. Technical terms should either be avoided or clearly and succinctly explained.
6. Demonstrate the progress you made toward answering your question of interest. Be sure to explain each of your figures (including labeling any axes) and provide your audience with the main point they should take away from each one.
7. Suggest what one could do as an immediate follow-up to the work you did that would further address your larger question of interest.
8. Engage your audience. It doesn’t hurt to make eye contact, smile, use some (appropriate) humor, ask the audience a question, etc.
9. Be engaged. If you are in the audience, enjoy the opportunity to learn something new and be thinking about a question you could ask the speaker.

**Rotation Dates**

For the **2013/14** academic year the approximate rotation dates are listed below.

- Rotation I: August 26 – October 18
- Rotation II: October 21 – December 20
- Rotation III: January 13 – March 7
- Rotation IV: March 10 – May 9

**Seminars**

You should attend all “Biochemistry and Biophysics Seminars.” Many of these seminars will be drawn from colloquia organized by the various departments. Please check the Biochemistry Website for the dates, times and locations of these seminars, as they vary.

[http://chem.colorado.edu/all-events-and-seminars](http://chem.colorado.edu/all-events-and-seminars)

**Faculty First Year Talks**

These faculty talks are an opportunity for students and faculty talk about research topics and ideas, and learn about new discoveries in Biochemistry and other related fields of study. The talks are on Thursday evenings from 5:30 – 6:30 pm. Two faculty members discuss their current research work with the first year students. This provides and opportunity for students to get a glimpse of what cutting edge research is being done inside and outside of the department to facilitate their learning and ideas for the types of research is available.
**Teaching**
All PhD Biochemistry students will teach. This is an essential part of the program and provides students valuable communication and learning skills. These skills will be used throughout the graduate program. If you find that you would like to pursue a career path that involves teaching and research there are also opportunities to do this beyond the first year.

**Exams**
- Written Comp
- Oral Comp
- Final defense

You must be registered as a full time student at CU Boulder for each of these exams.

**Thesis Research**
You will fulfill the PhD requirements of Biochemistry which is 30 credit hours of dissertation research. During the course of the Ph.D. thesis work, students will arrange annual meetings with a thesis advisory committee composed of their research advisor and two other biochemistry faculty. The purpose of these advisory meetings is to ensure the student is making adequate progress on a suitable Ph.D. thesis project. *The final annual meeting should be planned to be about 1 year from the end of the thesis work. For this meeting the advisory committee will be expanded to 5 faculty members: the thesis advisor, three biochemistry faculty and one faculty member from another department.* This committee will become the examination committee that evaluates the results of a completed research program submitted as a thesis for the final examination as described above.

**PhD Dissertation Committee**
Your Ph.D. dissertation committee will be formed as required by the rules of the department of Chemistry and Biochemistry. It will consist of 5 faculty members one of which must be outside the department. The faculty must be participating members of the CU Boulder Graduate Faculty. Most outside department members can be appointed to the CU Boulder graduate faculty by submission of the proper paperwork. Please see the graduate program assistant for more information on this procedure.

**Internships**
These are typically done in the summer months June - August (prior to the first day of classes). Internship opportunities can be found on many of the department websites and from your PI and graduate program director. Here is the link to the career services web site.

[http://careerservices.colorado.edu/students/fallFair.aspx](http://careerservices.colorado.edu/students/fallFair.aspx)
Outreach and Community Engagement
This website serves as a centralized hub for CU-Boulder's outreach and engagement activities across Colorado and beyond. Our goal is to forge new partnerships with citizens, schools, teachers, and communities. http://outreach.colorado.edu/

Other Opportunities
RNA Club, still going strong since its founding nearly 20 years ago in 1986, meets every 2-4 weeks during the academic year, with two research presentations per session. RNA Club attracts speakers from MCDB, Biochemistry, the University of Colorado at Denver and Health Sciences Center, and speakers from biotech companies in and around Boulder that were founded on the basis of research at CU. These companies include Dharmacon, siRNA Therapeutics, and Somalogic.

The Bioinformatics Supergroup meets monthly, and draws researchers from eight departments and programs as well as regularly hosting speakers from the other CU campuses, industry (including Agilent and Dharmacon) and other institutions (including the Whitehead Institute at MIT, The University of Lausanne, and The University of Maryland). It is supported by the STCCR training grant.

The Biophysics Supergroup is part of the Biophysics Program. Each month, members of two labs present their research. Participants come from five departments: Applied Math, Chemical and Biological Engineering, Chemistry and Biochemistry, Ecology and Evolutionary Biology, and MCDB.

The Center for Computational Biology, based in Denver, coordinates bioinformatics and computational biology research across the University of Colorado campuses. It holds a regular seminar series, and also offers a graduate certificate in computational biology.

The BioFrontiers Seminar Series takes place in the Butcher Auditorium of the Jennie Smoly Caruthers Biotechnology Building (JSCBB) from 4-5pm on the second Tuesday of each month during the academic year with occasional special seminars. All of our seminars are open to the public and some are available live streaming on the web.

The Neuroscience Supergroup is run by the Center for Neuroscience, a multidisciplinary training program that includes researchers from over a dozen academic departments and programs ranging from Chemistry and Biochemistry to Computer Science to the Institute for Behavioral Genetics. It meets monthly, with one seminar per month.
CU Biotech Club
The **CU Biotech Club** is a campus-wide club of business, law, science and engineering students and post-docs. If you are interested in a career in biotech or finding out more about the innovation process from research to application, check out their website. You might consider joining the club or attending some of their events.

**Biotechnology Opportunities Seminar Series**
In collaboration with the **CU Biotech Club** and the **Deming Center for Entrepreneurship**, BioFrontiers coordinates the Biotechnology Opportunities Seminar Series (**BOSS**) each year, which is generously sponsored by Jim & Patience Linfield and Cooley LLP. The students and post-docs who develop the BOSS events are paired with high-level industry mentors—relationships that they have often leveraged into internships, continued mentoring and job interviews. The seminars themselves are open to the entire CU community and provide an opportunity to meet industry professionals and learn more about the innovation process.

**Colorado Advantage Preview Weekend for Underrepresented Minority Students**
The **Colorado Advantage** is an opportunity for underrepresented minority seniors interested in graduate education to preview **STEM doctoral programs at CU-Boulder** during a fall weekend. The program is administered by the **Colorado Diversity Initiative**, with financial support from its NSF AGEP grant, the Graduate School, BioFrontiers, the College of Engineering and Applied Sciences, the Office of the President, and enthusiastic commitments from faculty and students across all STEM departments. Current students can help potential applicants explore the campus, tour research labs, and prepare for graduate school. If you would like to participate in the program please contact **Barbara Kraus** at the Colorado Diversity Initiative.

**Student Compensation**
During of graduate school, Biochemistry students are paid an annual stipend of approximately $29,000 Rules governed by the graduate school dictate that students receive their first paycheck on the last business day in September (please budget carefully).

First year Biochemistry PhD students will typically teach and payment for TA work is set each year by the Graduate School. If you are teaching 50% time (20 hours per week) the TA salary is around $1800 per month. You will also receive a $1500 stipend the first year from the university to help with the cost of fees and an additional $500 fellowship from the division to help with the additional cost of health insurance.

Also, please note that during the summer, graduate students are automatically enrolled in the student retirement plan (participation is mandatory) and an additional percentage will be deducted from the stipend. Information can be found [here](http://example.com) and on page 9 of this [document](http://example.com). If you wish to make voluntary contributions to a retirement plan, enrollment [forms](http://example.com) can be found on the CU Boulder website. The summer mandatory retirement contribution is separate from
any voluntary contributions that you may make. Don’t worry; the university isn’t really taking this money from you... it is YOURS! You can take it with you when you graduate and continue to watch it grow until you decide you’re ready to retire!

**Travel Funds**
Please talk with your P.I. or the Graduate Program Director, Rob Batey, about possible travel funding.

**Independent Funding Opportunities**
We encourage all students to seek independent funding opportunities. Having your own funding will provide you with greater flexibility and independence as your pursue your PhD.

The federal government offers a significant number of grants through agencies like the National Science Foundation (NSF), the National Institutes of Health (NIH) and the Department of Defense (DoD). In addition, independent funding for graduate school is also offered by private foundations, public charities, and corporate foundations.

Aid to individuals is usually given in the form of either direct support or fellowships for travel and research in a host country/institution/library. The Foundation Center [www.fdncenter.org](http://www.fdncenter.org) has an extensive list of resources. Additionally, their annual publication *Foundation Grants to Individuals* is an excellent resource. [Gradschools.com](http://www.gradschools.com) lists several funding opportunities specific to doctoral students. Specific funding opportunities include:

- Graduate Research Fellowships (NSF)
- **Ruth L. Kirschstein NRSA Individual Fellowships** (NIH)
- National Defense Science and Engineering Graduate (NDSEG) Fellowships (DoD)
- Ford Foundation Fellowships administered by the National Research Council

**Recruitment Weekends**
Please contact the graduate program assistant if you are interested in helping the recruitment weekends for Biochemistry. Typically the first year students are asked to assist with the majority of the activities.

**Department Annual Retreat**
**Attendance is required** at the annual Biochemistry Division Retreat. This is held every September after the beginning of the fall term.
Calendars and Links
Events and Seminars:  http://chem.colorado.edu/all-events-and-seminars
Graduate School:  http://www.colorado.edu/graduateschool/
Research Institutes:  http://www.colorado.edu/research/research-institutes

Local Biotech Companies
Many biotech companies have been founded on the basis of discoveries made at Boulder. These companies continue to have close ties to the university, including participation in the multidisciplinary research seminars and programs outlined above, placement of graduate students as postdocs or during lab rotations, and donations back to the university. A partial list of Colorado biotech companies includes:

- **Allos** (cancer therapeutics)
- **Avidity** (Molecular Biology Products)
- **Amgen** (therapeutics for arthritis and other diseases)
- **Array Biopharma** (small molecule drug discovery)
- **Biodesix** (rapid discover molecular diagnostics)
- **BioPharm Guy** (Colorado Biotech, Pharma & Life Science company career pages)
- **Boulder BioTechnology** (advanced protein engineering)
- **Boulder Scientific** (organometallic catalysts)
- **Clovis Oncology** (target therapy development)
- **Dharmacon** (nucleic acid synthesis and siRNA design)
- **Eyetech Pharmaceuticals** (pharmaceuticals for eye disease)
- **Gilead** (drug discovery and drug delivery)
- **GE Healthcare Life Sciences** (research, discovery & development, bioprocessing, quality testing & forensics)
- **Heska** (veterinary pharmaceuticals and diagnostics)
- **Myogen** (cardiovascular disease therapeutics)
- **OSI Pharmaceuticals** (cancer therapeutics)
- **Paxis Pharmaceuticals** (palitaxel and related taxenes)
- **Pharmion** (hematology and oncology therapeutics)
- **Proligo** (nucleic acid synthesis)
- **PR Pharmaceuticals** (drug delivery technologies)
- **QLT, Inc.** (cancer, eye diseases and dermatological and urological conditions)
- **Roche** (chemical synthesis of new drugs)
- **RxKinetics** (software development of pharmaceutical research)
- **Sandoz (generics** manufacturing)
- **siRNA Therapeutics** (siRNA and ribozyme based therapeutics)
- **Somalogic** (medical diagnostics development using Selex and Photo Selex)
- **Tapestry Pharmaceuticals** (targeted oncology, gene editing and natural product chemistry)
- **Thermo Biostar** (medical diagnostics)
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