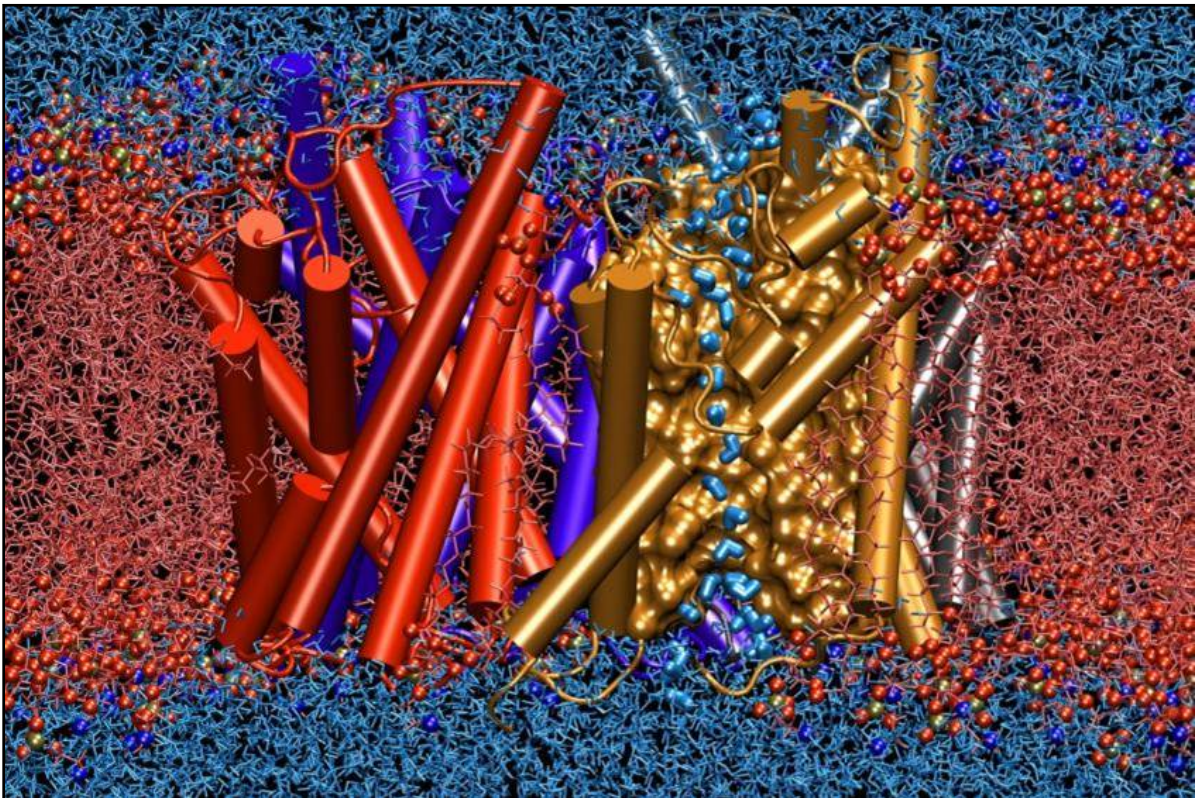# Computational Bioscience Program

SCHOOL OF MEDICINE

UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

2020-2021
Student Handbook

Computational Bioscience Program Administration
Research Complex 1, South Tower | Room 9112
https://www.cuanschutz.edu/graduate-programs/computational-
bioscience/home
Ph: 303-724-3350

Table of Contents

CPBS Faculty and Staff (Note that website is most up-to-date listing of core and associate facutly)

Faculty	Email	Office Location	Phone
Larry Hunter, Ph.D. Director of CPBS Professor, Dept. of Pharmacology	Larry.Hunter@ucdenver.edu	AMC Campus RC1-S, 6100	303-724-3574
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Kevin Cohen, Ph.D., Instructor, Dept. of Pharmacology	Kevin.Cohen@gmail.com	AMC Campus RC1-S, 6115	(303) 724-8619
Robin Dowell, Ph.D. Assistant Professor, CU Boulder Dept. of Molecular, Cellular and Developmental Biology	Robin.Dowell@colorado.edu	CU Boulder Camus Porter Biosciences, B160A	303-492-8204
Debashis Ghosh, Ph.D. Professor & Chair, Dept. of Biostatistics and Informatics	Debashis.Ghosh@ucdenver.edu	Fitzsimons Bldg. W3104	303-724-4365
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Katerina Kechris, Ph.D. Assistant Professor, Dept. of Biostatistics and Informatics	Katerina.Kechris@ucdenver.edu	AMC Campus Building 500, W3133	303-724-4363
Ryan Layer, Ph.D. Assistant Professor, CU Boulder Computer Science	ryan@layerlab.org		
Sonia Leach, Ph.D. Associate Professor, National Jewish Hospital Center for Genes, Environment, and Health	Sonia.Leach@gmail.com	NJH, 1400 Jackson St Denver, CO 80206	303-388-4461
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David Pollock, Ph.D., Director of Graduate Studies Associate Professor, Dept. of Biochemistry and Molecular Genetics	David.Pollock@ucdenver.edu	AMC Campus RC1-S 10111	303-724-3234
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Caitlin Moloney Program Administrator	Caitlin.Moloney@ucdenver.edu	AMC Campus RC1 South 9112	303-724-3350
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Computational Bioscience Educational Mission Statement

The Computational Bioscience Program of the University of Colorado School Of Medicine is dedicated to training computational biologists who aspire to achieve excellence in research, education and service, and who will apply the skills they learn toward improving human health and deepening our understanding of the living world.

The Computational Bioscience Program provides graduates with the foundation for a lifetime of continual learning. Our curriculum integrates training in computation and biomedical sciences with student research and teaching activities that grow increasingly independent through the course of the program. Our graduates are able to do independent computational bioscience research, to collaborate effectively with other scientists, and to communicate their knowledge clearly to both students and the broader scientific community.

The Computational Bioscience Program is committed to continually reviewing and improving its curriculum as the science and practice of bioinformatics evolves. The following four goals represent the foundation of the computational bioscience graduate education program at the University of Colorado.

Educational Goals and Objectives

Knowledge Goals

Graduates demonstrate their knowledge of core concepts and principles of computational bioscience, and the ability to apply computation to gain insight into significant biomedical problems. This knowledge includes mastery of the fundamentals of biomedicine, statistics and computer science, as well as proficiency in the integration of these fields. Graduates contribute to the discovery and dissemination of new knowledge.

Knowledge Objectives

1. Demonstrate knowledge of the scientific principles that underlie the current understanding of molecular biology, statistics and computer science.
2. Demonstrate an ability to productively integrate knowledge from disparate fields to solve problems in biomedicine using computational methods.
3. Demonstrate knowledge of the types and sources of data most commonly used in computational bioscience, including knowledge of all major public data repositories.
4. Demonstrate the knowledge of the classes of algorithms most often applied in computational bioscience, and their domains of applicability.
5. Demonstrate an understanding of the principles and practice of the scientific method as applied in computational bioscience, including experimental design, hypothesis testing, and evaluation of computational systems.

Communication Skills Goals

Graduates demonstrate interpersonal, oral and written skills that enable them to interact productively with scientists from both biomedical and computational domains, to clearly communicate the results of their work in appropriate formats, and to teach others computational bioscience skills. Graduates are able to bridge the gap between biomedical and computational cultures.

Communication Skills Objectives

1. Communicate effectively, both orally and in writing, in an appropriate range of scientific formats, including formal presentations, collaborative interactions, and the critique of others' work.
2. Demonstrate familiarity with both biomedical and computational modes of expression, and be able to communicate clearly across disciplinary boundaries.
3. Demonstrate commitment and skill in teaching to and learning from students, colleagues, and other members of the scientific community.

Professional Behavior Goals

Graduates demonstrate the highest standards of professional integrity and exemplary behavior, as reflected by a commitment to the ethical conduct of research, continuous professional development, and thoughtfulness regarding the broader implications of their work.

Professional Behavior Objectives

1. Act in an ethically responsible manner, displaying integrity, honesty, and appropriate conduct at all times.
2. Recognize the limits of one's knowledge, skills, and behavior through self-reflection and seek to overcome those limits.
3. Always consider the broad significance of one's professional actions, including their implications for society and the living world.

Self-Directed and Life Long Learning Skills

Graduates demonstrate habits and skills for self-directed and life-long learning, and recognize that computational bioscience is a rapidly evolving discipline. Our focus is on the development of adaptive, flexible and curious scientists who comfortably assimilate new ideas and technologies during the course of their professional development.

Self-Directed and Life Long Learning Skills Objectives

1. Recognize the need to engage in lifelong learning to stay abreast of new technologies and scientific advances in multiple disciplines.
2. Locate, evaluate and assimilate relevant new knowledge and techniques from a wide variety of sources.

The Graduate School
Directory

David Engelke, Ph.D., Dean…..David.Engelke@ucdenver.edu

Lauren Field, Executive Asst. to the Dean……………...……….…. Lauren.Field@ucdenver.edu

Inge Wefes, PhD., Associate Dean.……………………………………. Inge.Wefes@ucdenver.edu

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Pat Goggans, Events Coordinator ………………………………………Pat.Goggans@ucdenver.edu

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Susan Nagel, Business Manager …………………………………… Susan.Nagel@ucdenver.edu

Bruce Mandt, Ph.D., Director of Postdoctoral Office….…………… Bruce.Mandt@ucdenver.edu

Graduate School Policies & Procedures—Please visit the Graduate School's website (https://graduateschool.ucdenver.edu/forms-resources) to access the most up-to-date version of this document

Ph.D. Comprehensive Examination Packet information:

After completing or registering for all program-required non-dissertation coursework, and concurrently with applying for admission to candidacy for the Ph.D., students must take a comprehensive examination in their respective discipline. This examination (written or oral or both) will test a student's mastery of a broad field of knowledge, not merely the formal coursework which he/she has completed. This examination **must be completed no later than the end of the student's third year.** Students must complete 30 credit hours of didactic coursework to be eligible to schedule this exam. Additional instructions and deadlines for completion of the forms are provided on the graduate school website.

Ph.D. Dissertation Defense Packet information:

Once a student has completed their dissertation and before the degree is conferred, a final examination on the dissertation and related topics is conducted in two parts, an oral presentation of the dissertation research that is open to the public, and a closed examination conducted by the examining committee. 30 credit hours of doctoral thesis credit is required to schedule the thesis defense. This examination must be completed no later than the end of 7 years or sooner dependent on your mentor. Instructions and deadlines for completion of the forms are provided on the graduate school website.

Other Important Contacts

Student Services .... https://www.ucdenver.edu/anschutz/studentresources/student-assistance/Pages/default.aspx

Ombudsman's Office.............................. https://www1.ucdenver.edu/offices/ombudsoffice

Keeping In Touch

Email

You will be issued a campus email address, which you should check frequently. The new password and your username provide access to:

- campus e-mail
- the student portal, http://www.ucdenver.edu/UCDAccess
- computers in the library, labs, etc.
- student printing & other UNIVERSITY domain resources.

Email Listserves

After receiving your campus email account, you will be added to the CPBS mailing list. This list will keep you informed about seminars, meetings and let you send out messages to the entire CPBS group.

Program Website

https://www.cuanschutz.edu/graduate-programs/computational-bioscience

Other Things You Should Know…

Weekly Events

Students are required to attend Monday Seminars and monthly Journal Club meetings. Seminars are held on Mondays from 10:30-11:30am. Due to COVID-19, all seminars will be held virtually in the 2020-21 academic year. A list of events can be found on our website - just click on the events tab.

Travel instructions

1. First you must obtain approval from your advisor or Dr. Hunter (first year students) for any travel. **Due to COVID-19, there will be very little, if any, approved travel for the 2020-21 academic year.**

2. You must add Kathy Campbell & Caitlin Moloney as a delegate for both your financial and travel in Concur

3. After your travel is approved by Dr. Hunter, notify Kathy Campbell & Caitlin Moloney of your detailed travel plans. Please specify name of conference or school you are visiting, purpose, dates of travel, destination, preferred departure times and frequent flyer accounts (if applicable).

   - Booking flights and making hotel reservations is done in Concur via the CU Expense System. See directions below.

   - Making hotel reservations is your responsibility. You will book and pay for your hotel, then be reimbursed after the travel is complete. You must present a detailed receipt to be reimbursed.

   - Upon completion of your trip, you may be reimbursed for additional costs such as ground transportation and baggage. It is very important that you obtain an ITEMIZED receipt for any expenses you wish to claim. Please turn in all itemized receipts to Kathy Thomas & Caitlin Moloney promptly. More information on travel is available at https://www.cu.edu/psc/payables/travel.htm

   - After returning from a conference you'll be asked to give a brief presentation of the meeting highlights and your participation.

Tutoring

Tutoring is available on an individual basis. Dr. David Pollock (David.Pollock@ucdenver.edu) should be contacted immediately if you need assistance with any course work, English, or writing. Depending on your needs, some tutoring may be paid by the department or program to help ensure your success.

Advising

General academic advising is done by the program administrator, Caitlin Moloney. Be sure to meet with her prior to registration and before completion of program milestones (prelims, comps, etc.) to ensure you are adhering to the graduate school rules. Once students have passed their comprehensive exam, they are admitted to candidacy for their Ph.D. At this point, students are required to meet with their full thesis committee at least once per year, though twice per year meetings are advisable.

Priorites in the first few weeks

Orientation

All new students must attend the in-person and on-line orientation, as per the Graduate School.

Payroll

It is important to establish a checking account as soon as possible. The University issues all paychecks, including student fellowship and stipends, as direct deposits. Students should be sure to have a voided check available when filling out payroll forms. Each student is required to produce a driver's license (or state ID) and a social security card for payroll purposes.

Taxes

https://business-news.ucdenver.edu/2017/03/08/student-organization-offers-free-tax-assistance/

You should contact a tax professional if you have questions about filing taxes. Appointees to the training grant should be aware that taxes are not withheld, so you should plan accordingly if you are a training grant appointee.

Establishing Residency

(The following pertains only to out-of-state students)

*Refer to the Registrar's website (link below) for the most complete and up-to-date information.

New non-resident students must immediately obtain documentation to support the Petition for State Residency. First-year students must make collecting this documentation a priority. Funding will be available, assuming satisfactory academic progress, only if the student qualifies as an in-state resident after the first year of study. To be awarded in-state tuition status at the beginning of your second year you must establish that you have resided in the state for a year and established several kinds of connections to the state. It is important that these "connections" be established as soon as you arrive in the state to show the one-year history required by the University. Some things that can support these connections are a signed lease, rent receipts, utility bills in your name, a Colorado driver's license and license plates, and voter registration.

Prior to the start of your second academic year you must fill out and have notarized the Petition for In-State tuition classification and submit this along with your supporting documentation to the office of Admissions. Petition forms are available in the Admissions office. Notaries can be found in the Financial Aid Office, the Chancellor's office, and the Graduate Nursing office. Failure to complete the In-State tuition classification process could jeopardize your continued financial support in the Computational Bioscience Program.

For complete directions on establishing Colorado in-state residency for tuition purposes please consult the Registrar's website at:

http://www.ucdenver.edu/anschutz/studentresources/Registrar/StudentServices/Residency/Pages/Residency.aspx

Get Connected

Get your student ID card

NOTE: The below information is for future reference. As of fall 2020, only students, faculty and staff that have been <u>officially invited</u> to campus should come to campus due to COVID-19; this is in effect until at least the end of the 2020 calendar year.

UC Denver access control cards are issued to all students by the ID Badging Office located in Fitzsimons Building, 1st floor, north of the cafe, in room N1207. During orientation, photos are taken and ID cards and RTD College Passes are issued. Student ID/access cards are NOT made available until you have paid your matriculation fee AND attend orientation – all students are scheduled to have pictures taken and IDs distributed by your school/program. Access Control cards serve the dual purpose of identification on campus and after normal business hours access control at a number of exterior and interior locations. Your card can be programmed to allow after hours parking in all gated lots (6 p.m. – 6 a.m. MF, and all day Saturday/Sunday) on the Anschutz Medical Campus. If you choose to request parking after hours (6 a.m. – 6 p.m.), your ID will be programmed for that access as well – you must check in at the Parking Office in Fitzsimons Building, 1st Floor west side of the Food Court seating area, to have your card programmed for after-hours parking. There is a $10 fee to activate your card for any parking service. Students who withdraw or graduate are required to return the access control card –access and therefore, access to buildings/labs/parking is removed from your card upon graduation. Lost cards are replaced at no charge the first time. Fees are charged for subsequent losses.

Register for classes

The UCDAccess online Student Self-Service Portal allows you to apply for financial aid, search for your classes on various criteria, view real-time numbers of seats available, enroll and pay for your classes, order transcripts, and more. To log into the UCDAccess portal you will need your official University username and password. http://www.ucdenver.edu/UCDAccess Consult with your Program Administrator regarding your schedule of courses.

Enroll in Student Health Insurance

All degree and specific approved, certificate-seeking students enrolled in five or more credit hours <u>must take the School of Medicine's Student Health Insurance Plan</u> unless they can prove enrollment in other comparable insurance. Students taking under five credit hours in a degree program are also eligible to purchase the SHI Plan by submitting a selection/waiver form by the established deadline.

Please check the Office Student Health Promotion's website for up-to-date information, and for contact information for any health insurance questions:

https://www.ucdenver.edu/life/services/student-health/insurance/Pages/default.aspx

Log into the Employee Portal

As an employee of the University you have access to a portal that will allow you to view your pay advice/check, update your address and emergency contact information, print your W-2, open the expense system and request travel reimbursement, view the holiday schedule and a host of other vital announcements and resources. Go to http://my.cu.edu choose the Denver campus and enter your email login credentials.

Using the CU Expense System

The expense system is used to process travel authorizations and the subsequent reimbursements and is access from inside of the employee portal. To access the expense system, log into my.cu.edu, click on

the "**My Tools**" tab, then click the "**Open CU Expense System**" button. A new screen will open and now you are logged into the expense system.

Set up your profile
The **Profile** area, located along the upper left of the screen, allows you to see personal information and control certain aspects of the Expense System. The EXPENSE PREFERENCES page allows you to designate whether you wish to receive specific system-generated emails, see Expense System prompts, or display certain items.

Set up your delegates
Before you can travel or be reimbursed for anything you must add Kathy Thomas and Elizabeth Wethington as prepare delegates in your expense system profile. A delegate is an individual authorized to act, in the Expense System, on behalf of another person. Delegates are identified on the EXPENSE DELEGATES page, which is located under Profile. Click **Profile** from your Expense System home page (upper left corner of your screen), then click **Expense Delegates** (left-side menu). To add them, click **Add Delegate**. Search for the employee you wish to add as your delegate. You can search by name, employee ID, or email address. Select your delegate from the resulting list. Check the **Can Prepare** checkbox. The **Can View Receipts** checkbox will automatically appear checked as this gives your delegate the ability to view receipt images. If you would like your delegate to receive emails from the Expense System regarding your Expense System tasks (such as status changes, reminder emails, etc.), also check the **Receives Emails** checkbox. Click **Save**; a message will appear confirming your delegate has been saved. Additional directions are located at
https://www.cu.edu/psc/help/od/pdf/Identifying%20Delegates%20SbS.pdf.

Submit a report for reimbursement
After setting up your profile and assigning delegates you should familiar yourself with submitting an expense report.

1. Select the expense report ready for submission from the **Active Work** section of the Expense System home page.
2. The EXPENSE LIST page of the expense report will appear. Review the details entered for each transaction by selecting the transaction on the left side of the screen.
3. To review a transaction's allocation, hover your mouse over the pie-chart icon for the Allocations pop-up to appear.
4. Click **Submit Report**. The Final Review window opens.
5. The certification statement appears in this window, as will all transactions requiring receipts. To review the certification statement, click the **Certification Statement** link. Close the separate window when finished.
6. Verify that all required documentation has been attached and are legible. Close the separate window that opens.
7. If you agree to the University's certification statements, click **Accept & Submit**.

If the Approval Flow page appears, review the approval path and click **Submit Report**. The Report Submit Status window will appear; click **Close**. You have now submitted your reimbursement expense report to your approver. Additional directions are located at https://www.cu.edu/psc/traininghelp/. Click on "online learning resources."

Student Financial Support

As a Ph.D. student in the Computational Bioscience Program you are provided full tuition, health and dental insurance, and a stipend of $31,000 for living expenses (for the academic year 2020-2021). All future funding is dependent on satisfactory academic progress in the program (**see research rotations**) and selection of thesis advisor and at the end of the first-year. Once accepted into a thesis laboratory, your tuition, stipend, and benefits will be funded by your advisor. It is very important that you successfully complete the required research rotations during the first-year, in order to maintain funding. Students who perform exceptionally well in the first year may be awarded funding from our National Institutes of Health,

NLM training grant. In addition to providing full tuition, health and dental insurance, and a stipend of $31,000 for living expenses, the training grant may cover the cost of travel to conferences and computer equipment for your research. The stipend is paid monthly via direct deposit, on the last working day of each month.

Each student is responsible for books, housing, and any other expenses not specifically mentioned above. The Program Administrator will obtain a copy of the students' bills following registration for the current semester. The Program Administrator will ensure that all appropriate charges on the student bills are paid. It is only necessary to deliver a copy of your bill to the Program Administrator if there is a problem or question. Each student is personally responsible for late fees and fines, so it is critical that all necessary registrations are completed on time. Students registering past the semester registration deadline are assessed a $60 late registration fee, which is also the student's responsibility by explicit policy of the Assistant Dean of the Graduate School.

Student expenses, including the stipend, will be paid until graduation as long as the following conditions are met:

1. Student maintains satisfactory academic progress (see above)
2. Student becomes eligible for in-state tuition after the first-year.
   a. Students who fail to qualify for in-state residency will be responsible for the difference between in-state and out-of-state tuition.
2. Student passes the Preliminary Examination at the end of the first year.
3. Student completes the University Comprehensive Examination by the end of the third academic year.
4. Student's chosen dissertation advisor is able to provide support during the research phase of the Program.
   a. If the advisor can no longer fund the student, it is the student's responsibility to make other arrangements. The program will assist in this effort to the best of its ability.
5. Student schedules the Dissertation Defense within approximately five years of entering the Program.

Degree Requirements and Coursework
Required Courses
The "required" credit hours in the Computational Bioscience Program, which must be completed at UCD-AMC, include a minimum of 30 semester credit hours of Computational Bioscience courses and 30 semester hours of doctoral thesis research. Students may transfer up to 20 semester hours from prior work. The required Computational Bioscience courses in the program are described below. Consequently, 20 credit hours of relevant graduate-level course work can be taken at AMC, other CU campuses or other universities within the United States and transferred into the program. Relevant course work must be distributed equally among Human Biology, Math/Statistics and Computer Science. In order to meet the requisite credit hour requirements, the student must successfully pass (B or better) selected courses that fulfill the above conditions during the first four semesters of the program. If the student has coursework they wish to transfer into the program, they must discuss with the Program Director which credits would be acceptable, then fill out the necessary paperwork with the Program Administrator.

Noncredit Library Tutorials:

Students must complete the BITS and NCIB library tutorials described on page 28 in addition to credit coursework described below.

Biomedical Sciences "Core" Courses

This is a set of interdisciplinary courses required for first year graduate students enrolled in basic science Ph.D. programs at UCD|AMC. The objective of the courses is to provide the basic science information and introduction to the skills required for a successful research career in all disciplines of modern biomedical sciences. Topics cover the fundamentals of biochemistry, molecular biology, cell biology, developmental biology, molecular genetics and biomolecular structure. Specialty topics required by individual programs are taken usually during the spring semester of the first year, and in some cases in the second year to round out the curriculum.

Administrative Assistant/Office of the Dean of the Graduate School

Pat Goggans, Events Coordinator in the Graduate School, is the administrative assistant for the IDPT Core Courses. Ms. Goggans office is located in Academic Office 1, Room 1501. 303-724-5878; email: Pat.Goggans@ucdenver.edu Graduate School. Please contact Ms. Goggans for administrative matters including problems downloading course documents.

Biomedical Sciences Core Course	Course Information	Credits
Foundations in Biomedical Sciences IDPT 7806	Foundations in Biomedical Sciences	6
Core Topics A in Biomedical Sciences IDPT 7810 (then appropriate section)	Held for 3 weeks after IDPT 7806	1 to 2
Core Topics B in Biomedical Sciences IDPT 7810 (the appropriate section)	Held for 3 weeks after IDPT 7810 Core Topics A courses	1 to 2

Computational Bioscience Required Coursework:

CPBS 7711 Methods and Tools in Biomedical Informatics (Taken in fall of your First Year)

Credits: 4 semester hours
Status: Required
An introduction to the theory and practice of bioinformatics and computational biology. Topics include: the analysis of macromolecular sequences, structures, gene expression arrays, proteomics, and management of the biological literature.

This is a team-taught course. You will get a chance to meet and interact with each of the core faculty in the computational bioscience program.

CPBS 7712 Research Methods in Biomedical Informatics (Taken in spring of your First Year)

Credits: 4 semester hours
Prerequisite: CPBS 7711

Status: Required
How to plan, develop, execute and report on research in computational biology. In this course, each faculty member in the computational bioscience program will present a number of lectures on the research currently being conducted in their laboratory. Students will plan, execute and report on a research project of their own. This course is a stage in the transition from well-educated students to independent researchers.

This is a team-taught course. You will get a chance to meet and interact with each of the core faculty in the computational bioscience program.

Please note: *during the upper years of the program it's encouraged that students serve as the Teaching Assistant for one of the above courses. This is a great resume builder and further solidifies your Bioinformatics knowledge.*

CPBS 7605 Ethics in Bioinformatics
(Taken Fall of 1st or 2nd Year as indicated by Program Administrator)
Credits: 1 semester hour
Status: Required
Discussion of professional conduct, social implications of research and questions raised by biomedical research with an emphasis on topics relevant to computational biologists. Active student participation in required.

BIOS 6606 Statistics for the Basic Sciences*
Credits: 3 semester hours
Prerequisite: permission of instructor
Status: Required
This course provides an overview of fundamental concepts in statistics such as hypothesis testing and estimation and it provides an overview of statistical methods (for example, regression and analysis of variance) that apply to many areas of science.
*Students may take an alternative statistics course if their background would benefit from a more upper level stats course. Acceptable substitutes are BIOS 6611 or BIOS 6631; Katerina Kechris or Debashis Ghosh can advise you on what to take if you are not sure what would be best for you. If you are considering any other statistics course in lieu of one of these 3 courses, please contact the program director for approval.

CPBS 7650 Research Rotations (2 Required)
Credits: 1 semester hour
Prerequisite: permission of instructor
Status: Required
This requirement is designed to give the student a better understanding of other sciences, promote collaboration between departments, and communicate effectively with biologists and scientists. The student must pick from Associated Faculty and ask permission to join their lab plus decide on a project, complete and submit the pre-rotation laboratory agreement, and deliver a short seminar at the time of completion. It is considered a tool for selecting a dissertation subject.

CPBS 8990 Doctoral Thesis
Credits: 30 semester hours
Prerequisite: Successful completion of required Computational Bioscience courses.
Status: Required
Doctoral study for the Ph.D. degree by students in the Computational Bioscience program only.

Annual Grant Proposal Requirement
Upper level (post comprehensive exam students) are highly encouraged to work with their mentor and submit a grant proposal to pursue self-funding. At least one per academic year should be planned and submitted.

Elective Courses
The following courses are optional courses in the program that can be taken for credit and used to fulfill the necessary credit hour limits. It will be possible—and sometimes strongly encouraged—for students to take other graduate level courses (in biology, mathematics and computer science) at UC Denver or from any other UC campus to achieve the appropriate distribution of expertise that the program is seeking in its students. **Students must obtain prior approval from their graduate adviser or program director before taking such courses.** The following list summarizes some of the available courses in biology, mathematics and computer science that have been identified to fill in deficient content areas of study.

Computational Bioscience Electives

CPBS 7620 Genomics (taught by Dr. James Sikela)
Credits: 2+1 semester hours
Cross listed: STBB 7620, HMGP 7620, MOLB 7620

CPBS 7630 Computational Methods for Addressing Big Data Challenges in Biomedicine (taught by Dr. Tzu Phang & Dr. James Costello)
Credits: 3 semester hours

CPBS 7655 Statistical Methods in Genetic Association Studies
Credits: 3 semester hours
Cross listed: BIOS 6655
Prerequisites: BIOS 6612 or permission from instructor

BIOS 7659 Statistical Methods in Genomics (taught by Dr. Katerina Kechris)
Credits: 3 semester hours
Prerequisites: BIOS 6611 or equivalent graduate level statistics course, instructor consent

CPBS 7660 Analysis of Genomics Data Using R and Bioconductor (taught by Dr. Tzu Phang)
Credits: 2 semester hours
Cross listed: BIOS 6660
Prerequisites: BIOS 6611 or equivalent

CPBS 7785 Independent Study
Credits: 1 to 3 semester hours
Prerequisite: BIOI 7711, 7712 and permission of instructor
This course is listed for the benefit of the advanced student who desires to pursue one or more topics in considerable depth. Supervision by a full-time faculty member is necessary.

CPBS 7791 Readings in Computational Bioscience
Credits: 1 semester hour
Prerequisite: permission of instructor

CPBS 7792 Special Topics in Computational Bioscience
Credits: 1 to 3 semester hours
Prerequisite: permission of instructor

Biostatistics Courses

BIOS 6611 Biostatistical Methods I
Credits: 3 semester hours
Prerequisites: Differential Calculus

BIOS 6612 Biostatistical Methods II
Credits: 3 semester hours
Prerequisites: BIOS 6611

BIOS 7711 Longitudinal Data Analysis
Credits: 3 semester hours
Prerequisites: BIOS 6612

BIOS 7712 Special Topics for Correlated Data
Credits: 1 semester hour
Prerequisites: BIOS 7711

Computer Science Electives

CSCI courses are available on the Boulder Campus. See http://www.cs.colorado.edu/courses/catalog/ for complete course descriptions.

CSCI 5314 Algorithms for Molecular Biology
Credits: 3 semester hours
Same as MCDB 5314.
Prerequisites: CSCI 2270 and one of CSCI 3104, CHEM 4711, IPHY 4200 or MCDB 3500.

CSCI 5582 Artificial Intelligence
Credits: 3 semester hours
Prerequisites: CSCI 3155 or equivalent

CSCI 5622 Machine Learning
Credits: 3 semester hours
Prerequisites: Graduate standing or consent of instructor

CSCI 5817 Database Systems
Credits: 3 semester hours
Prerequisites: CSCI 2270. Recommended: CSCI 3287 and CSCI 3753

CSCI 5832 Natural Language Processing
Credits: 3 semester hours
Same as LING 5832
Prerequisites: Graduate standing or consent of instructor

CSCI 7000 Bioinformatics and Genomics
Credits: 3 semester hours
Same as MCDB 5520

Academic Planning

1st Year Curriculum & Milestones				
Fall	**Course**	**Title**	**Credits**	**Total**
	IDPT 7806	IDPT 7806 Foundations in Biomedical Sciences	6	
	IDPT 7810	IDPT 7810 Core Topics in Biomedical Sciences A	2	
	IDPT 7810	IDPT 7810 Core Topics in Biomedical Sciences B	2	
	CPBS 7711	Methods and Tools in Biomedical Informatics	4	
	CPBS 7605	Ethics (offered every other year)	1	
				14-15
Spring	**Course**	**Title**	**Credits**	**Total**
	CPBS 7712	Research Methods in Biomedical Informatics	4	
	CPBS 7650	Research Rotation #1 (required ~Jan.-March)	1	
	CPBS 7650	Research Rotation #2 (required ~March-June)	1	
				6
Preliminary Examination (late June or early July)				
Summer	**Course**	**Title**	**Credits**	**Total**
	CPBS 8990/ CPBS 7650	Doctoral Thesis or Research Rotation #3 (Optional ~July-August)	1	1
Choose mentor (mid-to-late August)				
2nd Year Curriculum & Milestones: Enroll in at least 5 credit hours in fall & in spring				
Fall	**Course**	**Title**	**Credits**	**Total**
	BIOS 6606	Statistics for the Basic Sciences (or alternative statistics course; see above)	3	
	Dept Varies	Elective Course**	1-6	
	CPBS 7650	Research	varies	
				5 min.
Spring	**Course**	**Title**	**Credits**	**Total**
	Dept Varies	Elective Course**	1-6	
	CPBS 7650	Research	varies	
				5 min.
Summer	**Course**	**Title**		
	CPBS 8990	Doctoral Thesis	1	1
Comprehensive Exam/Thesis Proposal				
Years 3-5 Curriculum & Milestones				
	CPBS 8990	Doctoral Thesis*		5 credits/semester in fall & spring; 1 credit in summer
Dissertation Committee meeting and Dissertation update talk – 1 per year each at ~ 6 month intervals				
Dissertation Defense (You must complete 30 credits of CPBS 8990 before or in the semester you				

Total Credits = 60 (30 from coursework and 30 Doctoral Thesis)
*Do not take more than 10 credits of CPBS 8990 before taking the Comprehensive Exam.
**Number of elective credits needed depends upon educational background (Comp Sci, Bio, Math, etc) and number of credits transferred into the CPBS program from other graduate programs.

Research Rotations

In addition to didactic training, research rotations constitute an important component of the first-year of the program, providing students with intensive introductions to experimental design and quantitative data analysis, as well as introducing them to available research opportunities. Each student will conduct rotations in the laboratory of a CPBS faculty member, prior to choosing a primary thesis advisor (at the end of the first year). Students should approach the research rotations with the primary goal of identifying their future thesis advisor. All students are required to complete at least two rotations. This can be supplemented with a third rotation in the summer after prelims with approval of the program director.

Because of the interdisciplinary nature of the CPBS Program and the students who enter the program, the laboratory rotations aim to provide students with the opportunity to broaden their scientific experience in Computational Bioscience and ultimately choose a laboratory for their thesis research. Students should complete and submit a pre-rotation laboratory agreement (available at http://compbio.ucdenver.edu/pages/requiredcourses.html), at least two weeks prior to the start of the rotation and deliver a post-rotation talk at the end of the rotation.

How to select a lab for rotation

After reviewing the work being conducted in the lab of your interest, make an appointment to speak with the PI and have an idea ready for the type of work you are interested in. It is the student's responsibility to take the initiative to contact a rotation advisor and arrive at an agreement with the advisor in a timely manner.

What happens during rotations?

Students are expected to devote non-classroom time to the rotation. This works out to approximately 25 hours per week for 12 weeks. You will be given space and are expected to join in discussions with the group. Your project should be discussed with the PI or a senior member of the lab at the beginning of the rotation and when formulating your project you should focus on identifying a specific hypothesis or claim, explaining why the hypothesis is interesting to test, defining what method could be used to test it and defining the appropriate way to report results to be meaningful for your chosen research area. Although a fully completed project is desirable, the short rotation period may not allow this in which case you should end your rotation with an analysis of what has been learned to this point, and what steps would be necessary for this to be a fully completed project. The most important aspect of the rotation is familiarizing yourself with the work of the lab, participating in meetings, discussions, and seminars, and reporting on the project to the extent that it was completed.

Annual Rotation Schedule (approximate only):
January – March (12 weeks @ 25+hr/wk)
March- June (12 weeks @ 25+hr/wk)
July – August (6 weeks @ 40+hr/wk)

Students are required to complete two rotations but may complete three rotations; speak with program director if interested in a third rotation.

Post-rotation talk

Post-rotation talks are scheduled at the end of each rotation project period and are similar to 'lightning talks' at a conference or symposium. You should prepare a 4-6 slide presentation and include title, introduction, hypothesis, results, methods, conclusions, and acknowledgements. You should be prepared to speak for 10-15 minutes, including time for audience questions. Your talk should focus on a specific hypothesis or claim, and explain why the hypothesis is interesting to test, what method you chose to test it, what the outcome of the test was, and why the outcome is meaningful and significant for your chosen research area. If you have worked on the same project outside the rotation period, you must clearly distinguish what you did during the rotation period from your other work. You should review the content of your presentation with your rotation advisor prior to giving the talk. Ideally, you will have been discussing

your rotation with your advisor weekly, thus the contents of your talk will not be a surprise to anyone. Rotations are graded by the faculty at large, rather than by your rotation advisor, so your talk reflects on your advisor as much as it does on you.

Preliminary Examination

The preliminary examination is a broad-based written examination given at the end of each student's first year. It covers the didactic material presented during CPBS 7711 and CPBS 7712, and incorporates a week-long programming problem. The exact format of the examination, time and number of questions, may change on an annual basis but typically, the layout is as follows:

Day One: Short Answer Essays—several questions are presented and you must answer a certain number of them. These responses from you are due at the end of the day.

Day Two: Long Answer Essay—you are given one question that you must answer fully. This response from you is due at the end of the day.

Day Three: Programming—a programming question is given and you will have approx. 1 week to develop your program and submit. Be sure to include information for the grader on how to run the program.

A passing grade is required for continuation in the program. In the case of a failing grade, it is entirely at the discretion of the preliminary exam committee whether to permit re-examination on all or part of the requirement, or to terminate the student's matriculation. Assuming successful completion of the preliminary examination requirement, a student may immediately begin work in a dissertation laboratory and become eligible to take the University comprehensive examination.

The statement below clarifies the Graduate School policy on students who do not pass the preliminary exam. Passing the exam requires that a student earn a passing grade on all parts of the exam if the exam is separated into multiple days; failure on either part results in failure of the entire exam. From the Graduate School Policy and Procedures Guide:

"Each Program is responsible for ensuring that students are qualified for doctoral studies by passing a comprehensive examination or a combined preliminary and comprehensive examination. If a program evaluates students' preparedness with a separate preliminary examination, it must be administered equitably to all students, with the limited exception of programs that require a student to have a master's degree before entering doctoral training; a master's degree may exempt the student from the preliminary examination but cannot exempt the student from the comprehensive examination."

In addition to the program having the discretion to allow a student to retake the preliminary examination, the program has full responsibility for designing the compensatory examination and for determining what constitutes a passing grade.

Selecting A Thesis Advisor

The selection of a thesis advisor is one of the most important decisions a student will make during the course of their graduate career. Each student must select a thesis advisor from among the Core Training Faculty. The first year of the training program is designed to provide each student with an opportunity to interact with the faculty so that they feel familiar with the faculty members and their respective research interests. The student should know which faculty member whose lab they wish to join on or about the date of the Preliminary Examination; however, a thesis advisor may be selected at any time during the first year. In the unlikely event that a student is unable to select a thesis advisor prior to the beginning of the fall semester of the second year of graduate training, the Program reserves the right to dismiss the student from the program.

Comprehensive Exam & Thesis Defense Exam
Comprehensive Exam

The University-based Comprehensive Examination is an orally defended Doctoral thesis proposal typically taken at or near the end of the second year, although many program students also take it during their third year. It is based on the student's doctoral thesis proposal, but can include other areas of study as well. This exam typically takes the format of presenting the problem, defending its innovation and demonstrating a workable knowledge of the field of study to assure that independent work is eminent.

The student's doctoral thesis committee judges the quality of the examination and makes recommendations for further academic advancement.

It is necessary that students complete all course work or finish all course work in the same semester as the exam, pass their preliminary examination and have a doctoral thesis topic before they can schedule their Comprehensive Examination. After successfully completing this examination and meeting all other Graduate School requirements, students are recognized as formal Ph.D. candidates who can proceed with their independent research work that will ultimately culminate in their Ph.D. dissertation.

You must be registered for coursework during the semester in which the examination is taken.

The Comprehensive Exam contains three major components:

1. The written Doctoral thesis proposal
2. The thesis presentation
3. The oral defense of the Doctoral thesis proposal

After completing or registering for all program-required non-doctoral thesis coursework, and concurrently with applying for admission to candidacy for the Ph.D., you must take a comprehensive examination in your field of concentration and related fields. This examination (written, oral, or both) will test your mastery of a broad field of knowledge, not merely the formal coursework which you have completed. The oral part of the comprehensive examination is open to members of the Graduate Faculty. Students should plan to take this exam by the end of their third year of study. **If you would like to take the exam after the end of your third year, you must get approval from the Program Director, and communicate to the Program Administrator that an extension has been granted.** Under extenuating circumstances, and with the recommendation of the Program Director and concurrence of the Dean, the examination may be taken later than the conclusion of a student's third year of study. A student cannot take the comprehensive examination with less than a 3.00 G.P.A. or before the Graduate School application is submitted and approved. The complete policy and procedure for taking the comprehensive exam is listed on the Graduate School website at www.ucdenver.edu/academics/colleges/Graduate-School under the Students Services--Ph.D. Resources page.

The necessary steps to schedule and take the comprehensive exam are as follows:

1. **Form a Comprehensive Exam Committee**
   Shortly after selecting a thesis advisor, you, in collaboration with your mentor, shall recommend a Comprehensive Exam Committee subject to approval of your Program Director. Inform the Program Administrator of the committee. You must have at least 5 committee members, and a majority of the committee must be members of the program. You must have at least one outside committee member. Your faculty advisor may or may not be a member of the committee, but they cannot be the chair of the committee. Although it is recommended that the Doctoral Thesis Advisory Committee be the same as the Comprehensive Examination Committee, the two committees need not be identical.

   (NOTE: The Doctoral **Thesis Advisory Committee** will serve as an advisory function to you and your mentor, and shall also monitor your progress in generating and/or collecting data to be used in the writing of the doctoral thesis. Your thesis advisor will give you formal permission to write the thesis once sufficient data have been collected and analyzed. The Doctoral Thesis Advisory

Committee shall meet at least once each year, usually during the student's thesis update talk. Records of the meetings and of your progress are maintained; notify the program administrator in writing of your meetings.)

2. **Submit a Doctoral Thesis Proposal**
   Before taking the Comprehensive Examination, you must submit a doctoral thesis proposal to the Program Director and to the Doctoral Thesis Advisory Committee at least two weeks prior to the scheduled examination date, and schedule the examination with the Graduate School by filing all the required Graduate School forms.

A doctoral thesis (written presentation of novel research) is based on original investigations and showing innovation in computational bioscience methodology. The doctoral thesis proposal should be in a format comparable to a National Institutes of Health (NIH) R03 grant submission and should be between 6 and 12 pages long. (http://grants.nih.gov/grants/funding/r03.htm). It is recommended to follow the NIH guidelines to include sections on Significance, Innovation, and Approach. Your Comps paper proposal should:

- Contain an argument regarding the significance of your work
- Address several aims of your work
- Explain your approaches to those aims
- Acknowledge likely pitfalls/fallbacks

3. **Complete the Graduate School Comprehensive Examination Forms**

The Graduate School requires 2-3 forms be submitted in order to take the University Comprehensive Exam. All forms and information are located on their website at
https://graduateschool.ucdenver.edu/forms-resources

The following must be submitted to the graduate school at least one month prior to your exam:
1. *Application for Candidacy* form
2. *Exam Request* form
3. *Transfer of credit* form (if applicable)

DO NOT WAIT TO FILL OUT FORMS—the one month deadline is hard and if something is amiss with your paperwork you will be required to reschedule your examination date.

Comprehensive Exam Format
In seminar format, students will present material from the Doctoral Thesis Proposal to their committee members and the general public. The presentation should last 30-45 minutes and allow time for general questions; then entire seminar plus questions should not exceed one hour. Shortly after the presentation is complete, the public audience members will be dismissed and the oral comprehensive exam will begin. This oral examination will test your mastery of a broad field of knowledge, not merely information from your dissertation proposal or the formal coursework which you have completed.

Funding Proposals
Students who have passed their Comprehensive exam should submit a project proposal to seek funding for themselves at least once during their PhD studies. Please speak to your thesis advisor to determine which sponsor would be most appropriate for your project.

Publications
Students are encouraged, but not required, to have published articles before they exit the program with their doctoral degree.

Doctoral Thesis Update Seminars

After completion of the comprehensive exam students are required to give a thesis update seminar on an annual basis and TAC mandatory meetings annually as well. Update seminars provide a good opportunity for the student's TAC to review the student's progress and to invite input from the faculty as a whole, as well as afford the student opportunities to polish presentation skills. A student in consultation with their advisor, and with the approval of the Program Director, should select an outside committee member (see below) by the date of the first thesis update (i.e., on or around one year in thesis laboratory). Following each committee meeting, regardless of whether the student gives a public presentation, the student and TAC chair will complete an assessment that summarizes what the committee discussed in the meeting. Once annual meetings with the TAC are mandatory but six month meetings are strongly encouraged. Failure to meet annually with your full committee will result in denial of registration for the next academic semester.

Thesis Exam:

Thesis Committee

Please review the information above listed under the Comprehensive Exam committee, as it also lists information about what to expect of your thesis advisory committee once you pass your Comps exam; this committee meets with and advises you until your thesis defense.

Your thesis advisory committee (TAC) will consist of at least 5 members. Typically, 4 of those 5 members are regular program faculty and 1 person is an outside member. However, least 3 of the 5 committee members must be regular program faculty and you must have at least 1 outside member. Your faculty advisor may chair your TAC, but that is not recommended and you must first discuss with the Program Director and get approval from them. Your thesis chair must be a regular faculty member of the program.

You are required to meet with your TAC at least once per year (although more frequent meetings are encouraged) to monitor progress of the project and to provide additional input and suggestions. The student must take the initiative in scheduling TAC meetings. After each committee meeting, the student will complete the Thesis Advisory Committee Meeting Summary with their TAC chairperson. This web form must be completed no later the two weeks following the TAC meeting. If the TAC meeting is accompanied by an annual presentation, then both the presentation and the meeting forms must be completed at http://predocprogress.ucdenver.edu.

Thesis Defense

The student's doctoral thesis advisory committee conducts the "Defense of Dissertation" after completion of the independent research. Arrangements for the final examination must be made through the Graduate School at least one month in advance. Required paperwork are the "*Biosketch*" and "*Exam Request*" forms found on the Graduate School's website (https://graduateschool.ucdenver.edu/forms-resources); please use the link to be sure you are accessing and completing the most up-to-date version of those forms. Please check with the Program Administrator at least one month in advance of your scheduled defense date to ensure all committee members have faculty appointments with the Graduate School.

This doctoral thesis document must be written, approved by an examining committee authorized by the program, and in a final format approved by the Graduate School. A near final draft of the work is submitted to the examination committee at least two weeks prior to the final oral examination (Defense of Dissertation). The examination committee must formally approve the dissertation before the candidate submits a final and appropriately formatted version of the dissertation to the Graduate School. All Graduate School guidelines and specifications must be followed. Students must register for and complete 30 semester hours of doctoral thesis credit (CPBS 8990) to be eligible for the Ph.D. degree; additionally, students must be registered for 5 credits of CPBS 8990 in the semester in which they defend their thesis (which counts towards the required 30 credits of CPBS 8990).

Upon successfully defending the innovation of the problem and student's independent research efforts, the Ph.D. candidate must complete all the contingencies and formal recommendations of the doctoral thesis advisory committee and the Program Director. A final grade for the 30 semester hours of thesis research is assigned only after the student submits the final, approved manuscript, documenting the

completed, innovative and independent research work to the Dean of the Graduate School. If approved by the Graduate School, the Dean of the Graduate School makes a recommendation to the Chancellor, on behalf of the entire graduate school faculty, who then awards the Ph.D. degree to the candidate.

Clarification of Graduate School Policies for Examination Results
Pass
You must receive the affirmative votes of a majority of the members of the committee in order to pass.

Pass with Conditions
The committee may feel that, although you have passed the examination, you should complete additional work. This may be in the form of rewriting submitted work, additional coursework, etc. These conditions must be satisfied within sixty days. Under extenuating circumstances, the graduate Program Director may petition the Graduate School for additional time. You will be considered to have "passed" when these conditions are met. Failure to meet the conditions will result in failure of the examination.
- You should register for dissertation hours as if you had passed without conditions (see the notes under PASS above).

Fail
In the event that you fail the examination, the student may not continue in the program unless a time extension is supported by the program in writing for a retake of the defense.

- You will be required to meet registration requirements for the new examination.

Disciplinary Actions
The University of Colorado Anschutz Medical Campus, consistent with most other educational institutions, has a student honor code (https://graduateschool.ucdenver.edu/forms-resources). The Computational Bioscience Ph.D. Training Program endorses and enforces this honor code. A student who violates the honor code will be called before the Program Director who may assign disciplinary action, up to and including dismissal from the program.

Each student is expected to maintain satisfactory academic progress. A student whose grade point average drops below a 3.0 is placed on academic probation. To be removed from academic probation, a student must achieve a GPA of 3.0 or above for the academic semester following the semester for which the student was placed on probation, and must achieve a cumulative GPA of 3.0 or above within two semesters of being placed on probation. A student who fails to be removed from academic probation within two semesters will be dismissed from the program.

The student requirements described in this handbook must be met by the deadlines stated. The Program Administrator & Director monitor the progress of each student. If they conclude that a student is not meeting the program's requirements in a timely manner, they may request a meeting with that student. After review, the Program Administrator & Director may take any actions deemed appropriate, including placing conditions on the student's continuance in the program or dismissing the student from the program. If a student is in jeopardy of missing a deadline or believes they is not achieving acceptable progress, the student should contact the Program Director immediately. Failure to notify the Program Director of problems in completing requirements can result in dismissal from the program.

Campus Resources
AMC Bookstore
http://www.ucdenver.edu/AMCbookstore

The Anschutz Medical Center Bookstore provides the most complete inventory of Medical and Scientific books in the Rocky Mountain area. Over 3,000 titles are available for immediate shipment including an extensive selection of Medical titles in CD-ROM and PDA formats. Software is available at discounted

education prices for faculty and students. Special orders for books and software are available for titles not in stock. The bookstore carries all books and products necessary for course work at the University of Colorado Denver Anschutz Medical Center.

Health Sciences Library
http://hslibrary.ucdenver.edu/

The UC Denver Health Sciences Library links people, reliable health sciences knowledge, and technology in support of effective learning, quality health care, vital research, and community service. The staff of the library strives for the highest quality services as they enhance access to the knowledge base of the health sciences, instruct users in information retrieval and management techniques, and acquire and organize a specialized collection of electronic, print and other resources in a cost-effective manner.

Location:
> Health Sciences Library | University of Colorado Denver
> Mail Stop A003
> 12950 E. Montview Blvd.
> Aurora, CO 80045 | USA
> Phone: 303-724-2152

Hours: Badge accessible hours: 7am-10pm, adjusted due to COVID. Please check the library's website for the most up-do-date information as changes to hours are likely as the academic year unfolds.

You can book Library meeting or computer training rooms through the ESS scheduling system (https://schedule.ucdenver.edu/emswebapp/) -- come by if you need to find out which rooms, what sizes, etc. The Library has a 40 laptop lab (can be divided into two rooms), televideo conference and A/V capabilities in most rooms, flat screens or projectors for presentations, and a small portable mic for use in

AMC Health Insurance Office
http://www.ucdenver.edu/life/services/student-health

The Anschutz Medical Campus at the University of Colorado provides varied student needs in the area of health. The Student Health Insurance (SHI) Plan is designed to provide students with health care coverage offering a PPO accident and sickness health plan.

All degree and specific approved, certificate-seeking students enrolled in one or more credit hours <u>must take the School of Medicine's Student Health Insurance Plan</u> unless they can prove enrollment in other comparable insurance. See the Office of Student Health Promotion's website for up-to-date information and contact information.

Parking and Transportation
Commuting to Campus
https://www.ucdenver.edu/about/departments/facilitiesmanagement/parkingmaps/pages/parkingmaps.aspx

Public Transportation
The RTD College Pass is available to all active (enrolled) Anschutz Medical Campus degree-seeking students (including the Dental ISP Program). The pass is supported by a mandatory student-use fee; this and other fees are covered by the program in concurrence with your tuition waiver.

The AMC RTD College Pass INCLUDES all regular fixed route service, including bus (local, express, regional), light rail, call-n-Ride, and skyRide service (free to AMC students with RTD College Pass).

Services NOT included in the RTD College Pass program are: access-a-Ride, BroncosRide, RockiesRide and other special event services.

For any term in which the degree-seeking student enrolls for academic credit at Anschutz Campus, the fee will be assessed. Waivers out of the College Pass Program will be allowed only for individual students who meet specific criteria; contact the Student Services office for more information; https://www.ucdenver.edu/anschutz/studentresources/student-assistance/Pages/default.aspx

UC Denver Shuttle Service

The University normally offers a bus service to the Faculty, Staff and Students that runs between the Anschutz Medical Campus (AMC) and the Lawrence Street Center Building downtown (LSC).

This service is free to UC Denver faculty, staff and students with University ID. Frequency of the service may change due to COVID-19.
See the Facilities website for up-to-date information:
https://www.ucdenver.edu/about/departments/FacilitiesManagement/Pages/railshuttle.aspx

University Policies

Honor Code

The Computational Bioscience Ph.D. Program is governed by the Graduate School, and follows guidelines, policies and calendars for the Basic Science departments. For clarification on specific policy questions you can contact the Graduate School by phone 303-724-2915 or email Graduate.School@ucdenver.edu.

The student academic honor and conduct code and forms are located online on the Graduate School's website.

Vacation and Holiday Policy; Sick Leave & Other Leave; and Academic Honor Code

Please visit the Graduate School's website for up-to-date information:
https://graduateschool.ucdenver.edu/forms-resources

Disclaimer

This handbook, which includes parts of the Graduate School Policies, does not constitute a contract with the University of Colorado Denver Graduate School nor with the Computational Bioscience Program, either expressed or implied. Both the Graduate School and the Computational Bioscience Ph.D. Training Program reserve the right at any time to change, delete, or add to any of the provisions or contents at their sole discretion. Furthermore, the provisions of this document are designed to serve as firm guidelines rather than absolute rules and exceptions may be made on the basis of extenuating circumstances.

Cover photo done by individuals at the University of Illinois.
Control of the selectivity of the aquaporin water channel family by global orientational tuning. Tajkhorshid E, Nollert P, Jensen MØ, Miercke LJ, O'Connell J, Stroud RM, Schulten K. Science. 2002 Apr 19;296(5567):525-30

Appendix A: COVID-19 Information

CORONAVIRUS (COVID-19) UNIVERSITY RESOURCES AND GUIDELINES

The most up-to-date resources from the University can be found using the following link:

cuanschutz.edu/coronavirus. Please bookmark this page in order to stay apprised of the latest University updates, resources and guidelines, throughout this pandemic.