Cancer Biology PhD Program

GRADUATE SCHOOL
UNIVERSITY OF COLORADO
DENVER| ANSCHUTZ MEDICAL CAMPUS

Student Handbook
2024-2025

2024 Retreat at Cheyenne Mountain Resort

CANCER BIOLOGY PhD PROGRAM
University of Colorado
Anschutz Medical Campus
12801 E. 17th Ave.,
MS 8116
Aurora, CO 80045

https://www.cuanschutz.edu/graduate-programs/cancer-biology/home

October 2024

Program Director

Rebecca Schweppe Ph.D.
Rebecca.Schweppe@cuanschutz.edu

Associate Director and GAC Chair

Benjamin Bitler, PhD
Benjamin.Bitler@cuanschutz.edu

Program Administrator

Evelin Zumba
Evelin.Zumba@cuanschutz.edu

Steering Committee

Rebecca Schweppe, Ph.D. (Endocrinology/Medicine) – Program Director Ben Bitler, Ph.D. (OBGYN) – Associate Director, Graduate Advisory Committee
Cecilia Caino, Ph.D. (Pharmacology) - DEI Committee
Mercedes Rincon, Ph.D. (Immunology/Microbiology) – Curriculum Committee
Diana Cittelly, Ph.D. (Pathology) Admissions Committee
John Tentler Ph.D. (Oncology/Medicine) – Seminar Committee
Rui Zhao Ph.D. (Biochemistry and Molecular Genetics) – Membership Committee
Mary Reyland, PhD (Craniofacial), and Scott Cramer (Pharmacology) -Cancer Biology T32 PI
Siddhartha Mitra, PhD and Benjamin Bitler, PhD – Graduate Council Faculty Representative

Disclaimer for Student Handbook

This handbook, which includes parts of the Graduate School Policies and Procedures and the Cancer Biology Graduate Program Guidelines, does not constitute a contract with the University of Colorado Anschutz Medical Campus Graduate School, either expressed or implied. The Cancer Biology Graduate Program reserves the right at any time to change, delete, or add to any of the provisions at its sole discretion. Furthermore, the provisions of this document are designed by the Program to serve as firm guidelines rather than absolute rules, and exceptions may be made on the basis of extenuating circumstances. Finally, in some cases the program has elected to impose standards that differ from the graduate school. In these instances, program rules supersede graduate school rules. The Graduate School Policies and Procedures, as well as additional resources are available at: https://graduateschool.cuanschutz.edu/forms-resources/resources

Graduate School
UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

Academic Calendar – Fall 2024

This calendar:
- applies to MS and PhD programs affiliated with the Graduate School on the **Anschutz Medical Campus.**
- only includes deadlines pertaining to coursework or those managed through UCDAccess.

For deadlines pertaining to graduation, please see the Graduation Deadlines document on the Graduate School website.
For policies, procedures and deadlines related to the tuition waiver benefit, please visit the Employee Services website.

Month	Day	Deadline	Notes
June 2024	3	First day to submit a **new** non-degree application or **continuing** non-degree course permission form.	Taking a class requires active non-degree student status. Continuing non-degree students must submit a signed course permission form to enroll every semester.
	10	First day to apply for Fall graduation in UCDAccess.	If you intend to graduate in Fall, you must complete this online application. If you do not, you will not be eligible to receive your degree until Spring.
July 2024	1	Course enrollment for Fall begins in UCDAccess	
August 2024	2	Last day to petition for resident (in-state) student/tuition status.	Funded PhD students who do not establish residency by second year may have to pay the tuition difference.
	5	Last day to submit a **new** non-degree application or a **continuing** non-degree course permission form.	See June 3 for more info.
	26	First day of Fall full semester classes.	
September 2024	2	Labor Day Holiday	No classes. Campus closed.
	6	Last day to add/drop courses in UCDAccess. * Courses dropped after this date will appear on your transcript with a grade of "W." * Students will be charged all tuition and fees for any course dropped after this date. * Students will be charged a $60 late fee to add courses after this date.	After this date: • use the small Add/Drop Form to modify credits or add classes if already enrolled in at least one (1) credit. • students who have not registered in any classes must use the Registrar's Registration Form and get the Assistant Dean's signature. • use the Registrar's Course Withdrawal form to withdraw from (drop) a class.
		Last day to apply for graduation in UCDAccess.	If you intend to graduate in Fall, you must complete this online application. If you do not, you will not be eligible to receive your degree until Spring.
November 2024	28-29	Thanksgiving Holiday	No classes. Campus closed
December 2024	9-13	Final Examination Week	
	13	End of semester	Fall 2024 degrees will be awarded effective this date.
	18	Final grades due (noon)	

Spring 2025	January 15	Martin Luther King Day	No classes. Campus closed.
	January 20	First day of classes	
	February 17	President's Day	No classes. Campus closed.
	March 17-21	Spring Break	No classes. Campus open.
	May 16	End of semester	
	May 19	Commencement & Convocation	
Summer 2025	June 2	Classes begin	
	July 4	Independence Day Holiday	No classes. Campus closed.
	August 15	End of semester	

TABLE OF CONTENTS

Academic Calendar with holidays	*preceding*
Contacts	6
General Academic Information	7
Course of Study	9
Graduate School Standards	19
Program Obligations and Record Keeping	20

Appendices:

Appendix 1: Preliminary Exam information and rubric
Appendix 2: Electives
Appendix 3: Comprehensive Exam information and rubric
Appendix 4: Cancer Biology Program Committee Meeting Form
Appendix 5: Current Cancer Biology Graduate Program Students
Appendix 6: Cancer Biology Graduate Program Faculty and Research Interests
Appendix 7: Useful information for first-year students
Appendix 8: ORE policy on External Employment for Graduate Students
Appendix 9: CANB Mentor and Mentee Mutual Expectations and AAMC Mentee-Mentor compact

ORE and GRADUATE SCHOOL CONTACTS

School Of Medicine – Office of Research Education

Angie Ribera, Ph.D., Associate Dean 303-724-2911

Graduate School - Dean's Office, Fitzsimmons Building (formerly named Building 500), 5th Floor

https://graduateschool.cuanschutz.edu/forms-resources/resources

Jennifer Richer, Ph.D., Dean 303-724-2911

Bruce Mandt, Ph.D., Associate Dean and Director, Postdoctoral Office and Career Development 303-724-2930

Kristine Sikora, Ph.D., Associate Dean and Director of Recruitment. 303-724-4379

Graduate School – Admissions and Student Progress

Teresa Bauer-Sogi, Director of Academic Services and Student Services 303-724-2918

Maddie Parker, Principal Professional, Academic Services maddie.parker@cuanschutz.edu

For other Graduate School Staff and contacts, please visit their website:

https://graduateschool.cuanschutz.edu/about-us/contact-us

GENERAL ACADEMIC INFORMATION

The Graduate Program in Cancer Biology is part of the Graduate School of the University of Colorado, which is an equal opportunity institution. The Graduate School is under the leadership of Jennier Richer, Ph.D. There are many resources available on the Graduate School website, https://graduateschool.cuanschutz.edu, including but not limited to Policies and Procedures, Academic Honor Code, and Code of Conduct, etc. The information through the website applies to students in all programs, and it should be used as the primary source for information regarding rules, regulations, procedures and policies. The purpose of the Cancer Biology (CANB) student handbook is to relay additional information specific to the CANB Program.

Student Support

At present, students accepted in the Ph.D. program are provided full tuition, health and dental insurance, and a stipend of $38,110 per year for living expenses (for the academic year 2024-2025). Continued support is contingent upon satisfactory academic and research performance by the student. When a student enters a thesis lab, the thesis mentor assumes complete responsibility for the student's stipend, tuition, fees, and associated research costs.

Graduate students admitted to the Cancer Biology Graduate Program are considered full time students and, per NIH policy, are expected to devote a minimum of 40 hours to their PhD training. Students may wish to take on additional paid employment for financial reasons or to gain experience in teaching, industry or explore other career opportunities. This may be complementary and beneficial to their training and professional development in University of Colorado graduate programs. Please refer to **Appendix 8** for the full policy

In-state Residency Status

New students must immediately obtain documentation to support the petition for State Residency. This is a very important priority for first year students and the process should be started as soon as you arrive on campus. After the first full year, funding will be available (assuming satisfactory academic progress) only if the student qualifies as an in-state resident.* The documents that must be obtained include local checking account, driver's license or State ID, and voter's registration, as well as proof of Colorado domicile. Further information will be provided during the Graduate School Orientation and by the Registrar's Office throughout the year. Please refer to the registrar's website for detailed information: http://www.ucdenver.edu/anschutz/studentresources/Registrar/StudentServices/Residency/Pages/Residency.aspx

*International students cannot gain residency and will remain at an out-of-state tuition rate; they are NOT personally responsible for the tuition differential.

Checking Account

It is important to complete your W4 and direct deposit set up as soon as possible. The University issues all paychecks, including student stipends, as direct deposit. Students will receive their pay in the form of a pay card in the mail if they don't complete their direct deposit set up in UCDAccess prior to payroll running in their first month. Program Administrator will provide W4 and direct deposit instructions.

CU Anschutz Medical Campus Identification Card

Everyone on campus must carry a CU Anschutz Medical Campus picture ID. This ID serves many purposes including enabling students to access the library, obtain parking, gain access to buildings, and attend special University functions. To gain access to restricted lab areas please speak with the departmental administrator for your mentor's department.

Insurance
Each semester students will be auto enrolled in the Student Health Insurance plan, unless the student has comparable insurance and submits a waiver to the Student Health Insurance Office. The Office of Student Insurance is the best resource for Insurance questions: https://www.ucdenver.edu/life/services/student-health/insurance/Pages/default.aspx.

E-mail Access and Address
Graduate students establish their CU Anschutz email address following the matriculation instructions from the Graduate School. Contact the Office of Information Technology for help with any email access issues: https://www.ucdenver.edu/offices/office-of-information-technology.

Your.Name@cuanschutz.edu e-mail address will be the primary form of communication between you and the university (i.e. CANB Program, Graduate School, Program Administrator, Bursar's Office, etc.). Please check it often so as not to miss important information.

CANB PROGRAM INFORMATION

GOALS OF THE PROGRAM
The goal of the Cancer Biology (CANB) Program is to provide interdisciplinary training at the cutting edge of cancer research so as to best prepare students to compete in a biomedical research environment increasingly focused on translational applications of basic science research. While the primary focus of the Cancer Biology Graduate Program is basic science and translational research, students will also be exposed to many aspects of clinical science as they relate to the study of cancer, including cancer therapeutics, epidemiology and prevention. After the initial period of coursework, students choose their specialty fields from a diverse list of mentors and topics. The Program draws on faculty from many different departments within the medical campus and offers a wide range of research opportunities. Students proceed with research in their specialty areas until the generation and defense of a thesis leads to the award of a Ph.D. in Cancer Biology.

GRADUATE ADVISORY COMMITTEE (GAC)
During the first year, CANB students will meet with their GAC mentor or as a group with the GAC at the beginning of each rotation to discuss the student's progress in the Program and to address any issues that may arise. The CANB graduate students will meet as a group with Dr. Schweppe and the GAC chair quarterly to discuss issues relevant to the program. The students will be expected and encouraged to seek advice from the Program Director, GAC advisory, and/or other Cancer Biology faculty members prior to lab rotations, the comprehensive examination, and at other times when the student requires faculty consultation. Students are expected to choose rotation faculty from an approved list of faculty members provided by the program. If a student would like to rotate with faculty member who is not on the list of approved faculty, please contact the program directors for approval. Useful information for rotations is included in **Appendix 7**.

COURSE OF STUDY

A. Cancer Biology Graduate Training Program Curriculum.

YEAR ONE
1st Semester – Fall

Course Title	Registration Info	Credits
Foundations in Biomedical Sciences	*BMSC 7806	6
Core Topics in Biomedical Sciences - A *student may select topic*	**BMSC 7810	2
Core Topics in Biomedical Sciences - B *Cancer Biology - required by program*	**BMSC 7810	2
Responsible Conduct of Research	BMSC 7811	1
Research in Cancer Biology	CANB 7650 (001)	1
Research in Cancer Biology	CANB 7650 (002)	1
Cancer Biology Journal Club	CANB 7613 (001)	1
Research in Progress Seminar	Attendance Required	0

*BMSC 7806 Foundation in Biomedical Sciences – Section 001
Course Director: Drs. C. Musselman, L. Heasley, K. Fantauzzo, R. Prekeris, C. Pearson, J. Moore
This section of the course covers basic biochemistry, molecular biology, genetics, and cell biology.

BMSC 7810 Sections 001-010
First year students will register for two sections, one section in Core Topics A (Section 001-005) and one section in Core Topics B (Sections 006-010). Each section is a 3-week intensive special topics course, the Core Topic A sections start immediately after BMSC 7806 followed by Core Topic B sections. Course offerings vary by year but includes topics courses in immunology/microbiology, stem cell and regenerative medicine, developmental biology, cancer biology, and exploratory data analysis in R/R Studio. An updated list of the course offerings will be provided to students prior to registration in the fall. CANB are **required** to take the section offered by the CANB program, "Principles of Cancer Biology". Please see descriptions below. First-year students who would like to take Core Topics offerings other than the options that are strongly encouraged should consult with the Program Director prior to enrollment.

**BMSC 7810 Core Topics in Biomedical Sciences: *Students can select any one topic from the Core Topic A list (2 credits). CANB students must select Principles of Cancer Biology as their CoreTopic B (2 credits) = 4 credits in total*

Core Topics B – November 22 – December 13, 2024
Sec 011 – Principles of Cancer Biology (REQUIRED)
Course Director: Dr. John Tentler

2nd Semester – Spring

Course Title	Registration Info	Credits
Molecular Mechanisms of Cancer Biology	CANB 7600	4
*Pathobiology of Cancer	CANB 7610 or 7611	1
**Grant Writing in Cancer Biology	CANB 7690	1
Electives (as desired; see **Appendix 2**)		variable
Research in Cancer Biology	CANB 7650 (001)	1
Research In Progress seminar	Attendance Required	0

*MSTP students in the CANB program are exempt from CANB 7610/7611 and CANB 7690.

**CANB students must complete five semesters of CANB 7613 with one semester of CANB 7690 counting towards the overall total of six required semesters.

Summer Semester

Doctoral Thesis*	CANB 8990	1 credit

Preliminary Exam: Preparation for the preliminary exam begins at the end of spring courses. The exam is administered in early to mid-June (date determined on year-by-year basis). Refer to section (C) for more information.

YEAR TWO

1st Semester – Fall

Course Title	Registration Info	Credits
*Introductory Biostatistics	BMSC 7820	3
Research in Cancer Biology	CANB 7650 (sec 0V3)	1
**Cancer Biology Journal Club	CANB 7613	1
Research In Progress seminar	Attendance Required	0
***Electives (as desired)		Variable

*All students (including MSTP) are required to take a biostatics course. Other biostatistics courses may fulfill this requirement upon approval of the Program Directors.

**BSP or MSTP students joining CANB may count BSP journal club or Molecules & Medicine, respectively, toward one semester of CANB Journal Club requirements. If there is a conflict between Journal Club and an elective or other required class, it is possible to take your final semester of Journal Club later. Reach out to the Journal Club Director and Program Directors to confirm.

***BSP and MSTP students who did not take Responsible Conduct of Research (BMSC 7811) will take this course in the fall of their 2nd year.

***At least 3 credits of electives are required for this program. More can be taken if desired. **The elective requirement should be completed by the end of your 2nd Year.** Note: the purpose of the elective is to expand your knowledge base beyond cancer biology. Therefore, no more than one elective credit can be from a special topics in cancer biology course. Please contact the Program Director if you have any questions regarding this requirement. You can find a list of approved electives that count toward this requirement in **Appendix 2** of the Handbook. MSTP students have typically met the elective requirement upon entering the program, which should be verified with the program director.

2nd Semester – Spring

Course Title	Registration Info	Credits
Electives (as desired)		Variable
*Pathobiology of Cancer	CANB 7610 or 7611	1
Research in Cancer Biology	CANB 7650 (sec 0V3)	Up to 4 credits
Cancer Biology Journal Club	CANB 7613	1
Research In Progress seminar	Attendance Required	0

*MSTP students in the CANB program are exempt from CANB 7610/761

Summer Semester

Doctoral Thesis	CANB 8990	1 credit

Important: A student must **complete or be registered for in the semester of their comprehensive exam, 30 credit hours** (not including CANB 8990 hours) before taking the exam. Any student passing 30 credits of course work that has *not* taken his/her comprehensive exam must continue to register for CANB 7650-0V3 until the exam is taken; or the student may appeal to the Program Director and Program Advisor for permission to start registering for CANB 8990.

Following the completion of the required coursework and comprehensive examination, students will register for the appropriate credit hours of CANB 8990 to maintain full-time status until the thesis defense. (Note: another 30 credit hours of Doctoral Thesis (CANB 8990) are required **before** defending, so switching as soon as the requirements are completed is prudent).

Comprehensive Exam: Students may take their comprehensive exam as early as the summer semester in Year 2, but must take the exam before the start of the second semester of Year 3. See section (E.) Comprehensive Exam, and **Appendix 3** for details regarding the exam format and preparation. A meeting with the GAC Chair will be held in the summer/fall of the 2nd year to review the policy and procedures surrounding the comprehensive exam.

YEAR THREE

1st Semester – Fall

Course Title	Registration Info	Credits
Electives (as desired)		Variable
Research in Cancer Biology	CANB 7650 (0V3) **or** CANB 8990 if post-comps	Variable
Cancer Biology Journal Club	CANB 7613	1
Research In Progress seminar	Attendance Required	0

2nd Semester - Spring

Course Title	Registration Info	Credits
Electives (as desired)		Variable
Doctoral Thesis	CANB 8990	5 credits
Cancer Biology Journal Club	CANB 7613	1
Research In Progress	Attendance Required	0

Summer Semester

Doctoral Thesis	CANB 8990	1 credit

YEAR FOUR (and beyond)

Course Title	Registration Info	Credits
Electives (as desired)		Variable
Doctoral Thesis	CANB 8990	Up to 5 credits
*Cancer Biology Journal Club	CANB 7613	0

*Students are not required to register for Journal Club after the first semester of their 4th year (or after 6 completed semesters of registration), but it is expected that they will continue to attend.

Ethics Refresher Course: An eight-hour refresher course is required for all students every 4 years. This means all our **5th year students** will take BMSC 7811 to fulfil this requirement. Registration is not required but you will need to contact the Program Administrator for Pharmacology for more information on sitting in on the course.

Summer semester

Doctoral Thesis	CANB 8990	1 credit; 5 credits if you are defending in the summer

Important Registration Notices:

- It is important to note that ALL students must register for 5 hours for the fall and spring semesters to be considered full time, and 1 credit hour of CANB 8990 during the summer semester. All students are required to register for classes or thesis hours every semester.

- It is the student's responsibility to register for classes in a timely manner – all late fees and finance charges will be the responsibility of the student.

Additionally:

Attendance at Cancer Biology Research in Progress series is mandatory. **Thursdays at 10:30 am**
This time will be used by current CANB Program students, prospective CANB faculty candidates, and Cancer Center T32 postdoctoral fellows. You are expected to attend and sign in before the start of each seminar. All students are expected to attend in-person. Please contact Dr. Schweppe and Evelin Zumba if you need to miss a seminar or attend virtually.

Cancer Biology Thesis Defense Seminars
All students are expected to attend thesis defense seminars. These occur at different days and times, so please plan accordingly when announcements are sent.

Cancer Biology/Cancer Center **Tuesdays at 12 Noon**
Guest Speakers of both programs will present at this day and time. There will be a CANB Program Meet and Greet hosted on these days. All students are expected to attend the seminar and meet and greet with outside speakers. This is an excellent opportunity to network, and we strongly advise students to take advantage of this opportunity.

Other seminars
There are several seminar series that often have cancer-related seminars; seminar titles are typically posted and emailed or can be found in the Cancer Center online newsletter. Seminar series of potential interest include but are not limited to (attendance is not mandatory):

Cells, Cancer and Development seminar series Wednesdays at noon
Molecular Biology Program seminar series Thursdays at noon
Pathology Grand Rounds/Cancer Biology Training Program Fridays at noon
Endocrinology Research Conference Wednesdays at 11 am
Head and Neck Seminar Series. Mondays at 9 am

B. Laboratory Rotations. Students must perform three rotations before the start of their second year. Rotations enable the student to explore and compare several areas of cancer biology research and aid in the choice of a mentor and project for thesis work. Rotations also allow program faculty to evaluate the motivation, technical skills, and intellectual preparedness of students to undertake independent research. Please see **Appendix 7** for Rotation resources.

C. Rotation Selection: Students start their first rotation in the fall semester, spending three months in each of three laboratories. We encourage you to set up your first rotation prior to arriving on campus. Please reach out to your GAC advisor, Dr. Bitler, or Dr. Schweppe (Program Director) regarding selection of rotation mentors. Your peer mentor and current students are an excellent source of advice as well. We strongly recommend that you wait until you are on campus before you set up your second and third rotations. We have program events at the beginning of the academic year that are designed specifically to highlight the wide variety of research opportunities available in cancer biology. **Students are expected to select mentors from an approved list of rotation mentors within the cancer biology program for all three of their rotations.** Potential faculty mentors should be contacted several weeks or more before the start of the rotation. MSTP students do two rotations in total, during the summers of the first and second year of Medical School.

Rotation Expectations: For professionals in training, it is not appropriate to require a minimum number of hours for rotation work. Strong self-motivation is an absolute essential characteristic for an independent scientist, and we expect our students to demonstrate this quality throughout their training. In this regard, students should expect to frequently be in the lab beyond the normal working hours, i.e. at evening, on weekends, and possibly over vacation days during the term. In order to maximize the success of your rotation, we recommend setting up regular meetings with your faculty rotation mentor, drafting the specific aims and hypothesis with your mentor, and presenting your aims, hypothesis, and data in lab meetings throughout your rotation. An Aims page that is approved by the mentor must be submitted to the program within 2 weeks of the start of each rotation. A major part of the mentor's rotational assessment (as well as his/her willingness to accept a student) will be based on the degree and quality of lab effort. At the same time, it is critical for students to keep up with their coursework and to pass examinations. Students should always discuss time off and/or vacation days with their lab mentor in advance, both in their lab rotations and once they enter a thesis lab. A short-written evaluation of the student's rotation will be provided by the rotation mentor (see **Appendix 7)**. We strongly encourage students to meet with their rotation mentor to discuss their evaluation. Rotation grades are assigned by the rotation mentor following the rotation seminar.

Rotation Seminar: At the end of the rotation the student will present a post-rotation seminar. This seminar is an essential component of the research rotation and should be prepared with the help of the research mentor. Rotation seminars are 10-12 minutes in length with up to 3 additional minutes for questions. See **Appendix 7 for the rotation talk evaluation form.**

D. Preliminary Exam. The University of Colorado Graduate School requires two exams for students, a Preliminary Exam and a Comprehensive Exam. Cancer Biology students, like most basic science graduate students, take a Preliminary Exam in June at the end of their first-year coursework. The format of this exam will be determined by the steering committee and may be changed at any time on the recommendation of the steering committee. The exam is not designed to test rote memory but instead to determine whether students can integrate their knowledge so that they can formulate scientific questions and understand how to test them. The goal of the preliminary exam is to catch deficiencies and provide a holistic evaluation of each student. Then, deficiencies can be addressed by the mentor/mentee pair prior to the comprehensive exam. Exact details will be given several weeks in advance of the exam. Continuation in the program is dependent on the student achieving a passing score. Under exceptional circumstances, a student who fails the preliminary exam may petition the CANB Steering Committee and may be allowed to retake all or part of the exam. The decision of the Steering Committee will be final. Please see **Appendix 1** for the exam rubric.

For example, the 2022-2023 academic year the exam consisted of a short-written proposal followed by an oral

exam. An exam committee consisting of a minimum of three CANB faculty members will evaluate each student. To strive to achieve uniformity and fairness for both the written and oral examination, all students will be scheduled for the oral portion of their prelim over a one-to-three-day period.

For the written component the students will be given a selection of seminal papers representative of each block of the Molecular Mechanisms of Cancer Course (CANB 7600) and will choose one on which to write a three-page proposal that will include the following:

1) An abbreviated Specific Aims page, which includes the student's own original hypothesis stemming from the findings of the paper.
2) Background, Significance and Rationale, which includes a brief background on the scientific topic, critical summary of the major findings in the paper and their significance to the field of cancer biology.

3) Experimental Approach, which includes a series of experiments to test the hypothesis (*see below for more detailed instructions* for the written document).

Students can discuss their ideas with their peers, but the written document should not be reviewed by anyone until it is submitted to the preliminary exam committee.

The student will have two weeks to complete the written portion of the exam and will submit the written document 10 days before the oral exam component. The written component will be checked for plagiarism. Any plagiarism will initiate an academic honor code review.

For the oral exam students will be expected to expand upon their written document and be able to critically analyze the manuscript and defend their new hypothesis, specific aims, and experiments. The oral exam questions will extend beyond the written document to test for overall comprehension of material learned in the Core Course and the Cancer Biology sequence 7600/7690.

Possible outcomes of the Preliminary Exam
Pass (no conditions)
*Conditional Pass (conditions must be detailed)
Fail (the student must leave the graduate program).

*Conditions should be met within three months of the exam, if not sooner, as indicated by the committee. Conditions that cannot be met in such a time would become an F. If the conditions of a conditional pass are met in the timeline requested by the committee this conditional pass will be converted to a pass. It is important to remember that a conditional pass is not a fail and is meant to ensure the success of our students. Please see **Appendix 1** for more detailed information and timeline.

E. Transfer to Thesis Lab. An important aim of the rotations is to enable the student to find a thesis mentor. Within one month of the completion of the three rotations for regular graduate students or two rotations for MSTPs, the student should come to a mutual agreement with a faculty member to act as thesis mentor. The Student Advisor and the Program Director must formally approve the choice of a thesis advisor. Under some circumstances a co-mentor (co-advisor) may be required by the Program. Co-mentors must be full training faculty in the Program. The co-mentoring plan must be approved by the Program Director and Student Advisor (a template is available from the program director). **Official transfer to the thesis lab takes place on July 1**. Under exceptional circumstances and at the discretion of the Program Director, a student may be allowed to perform an additional rotation for the express purpose of enhancing the mentor selection process. Although the Program will assist the mentor selection process, it is ultimately the student's obligation to identify a thesis lab by the beginning of the second academic year. Failure to identify a suitable lab by this time will result in dismissal from the Program. Upon entering a thesis lab, it is highly recommended that the mentee and mentor develop a compact as a framework or developing a positive mentoring relationship. Please see **Appendix 9** for an example of Mentor and Mentee mutual expectations and a Mentor-Mentee compact from the AAMC.

F. Comprehensive Exam. Successful completion of the Comprehensive Exam admits the students to

Candidacy for the Ph.D. degree in Cancer Biology. This exam can be taken as early as the spring semester of the second year, but is usually taken in the fall semester of the third year. The exam must be completed by the end of the fall semester of the students third year. It is highly recommended that the student carefully read the Graduate Student Handbook on Comprehensive Examination policies and deadlines and complete the required forms from the Graduate School (Request for Examination and Application for Admission to Candidacy) well ahead of the planned examination. Forms must be completed and submitted to the CANB Program Administrator four weeks before your scheduled exam date. Failure to meet the required deadline might result in rescheduling your exam. Forms are available from the Graduate School and must be approved by the Program Director and submitted to the CANB Program Administrator for final approval and submission back to the Graduate School. Please meet with or email your Program Administrator once you've selected an exam date to begin working on your exam paperwork. The date of the Comprehensive examination and the composition of the committee must be registered with the Graduate School. **Note:** A student must be registered at the time he/she takes the Comprehensive Examination and must have completed, or be registered for, a minimum of 30 units of course work (not including units of CANB 8990).

Exam Format: The Comprehensive Exam consists of a written and oral component. Students will write a 7-page (excluding references) hypothesis-driven proposal in the format of an NIH pre-doctoral fellowship. CANB 7600 and CANB 7690 are designed to help prepare students with writing and defending this exam proposal. The proposal should be related to the student's thesis research and a model figure describing the Aims is strongly encouraged. The written proposal must be distributed to the Comprehensive Exam Committee at least two weeks prior to the oral examination. Each student will be individually administered an oral exam on their proposal. The Comprehensive Exam Committee will be chosen by the student in conjunction with the Student Advisor and the Program Director. **The committee should consist of four members from within the CANB training faculty and one member from outside the program.** Please see the ORE policy on "Conflict of interest and undue influence" for committee member selection: https://medschool.cuanschutz.edu/docs/officeofresearcheducationlibraries/default-document-library/ore-policy-on-conflict-of-interest-and-undue-influence-6-1-24.pdf The committee is typically set up the semester before, or at least five months before, the comprehensive exam date. The committee must be approved by the Program Director and Program Administrator. Upon passing the exam the student is advanced to candidacy and is expected to assemble a thesis committee. See **Appendix 3:** "Format for Preparation of the Written Portion of the Comprehensive Exam Cancer Biology Graduate Program" for specific details and timeline. The written component will be checked for plagiarism. Any plagiarism will initiate an academic honor code review.

Oral Exam: The examination will consist of a 20-minute presentation by the student followed by questions from the Comprehensive Exam Committee. In the oral examination, the student must adequately demonstrate the scientific knowledge and ability to defend their written proposal and demonstrate an in-depth knowledge of cancer biology. In addition, they must satisfy the overall requirements for the examination as set forth by the Graduate School Policies and Procedures, available here: https://graduateschool.cuanschutz.edu/forms-resources/resources. As stated in the Graduate School Policies and Procedures, the comprehensive examination, "will test your mastery of a broad field of knowledge, not merely the formal coursework completed." You can anticipate both specific questions on the written and oral proposal and general knowledge questions in the broad area of Cancer Biology. A rubric for the comprehensive exam is in **Appendix 3**.

Possible Results for Comprehensive Exam
Pass (no conditions)
Conditional Pass (conditions must be detailed)
Fail (the student must leave the graduate program)

After passing the Comprehensive Exam, the student becomes a candidate for Ph.D. The following years are devoted to research on their thesis project.

G. Thesis Research: Students will generate an original body of research that constitutes a significant contribution to the field of cancer biology. The student and faculty member together plan a thesis project; however, the thesis research is the responsibility of the student, who must be able to conceive, carry out and write up (a thesis) a significant body of work in a logical manner. Doctoral level work requires a close collaboration with a faculty mentor; it is the responsibility of the student to establish and maintain that relationship. Program faculty are always available for consultation and advice; however, it is the responsibility of the student to seek them out. It is worth repeating that strong self-motivation is an absolutely essential characteristic for a successful scientist. Students should expect to frequently be in the lab beyond the normal working hours, i.e. evenings, weekends, and possibly over vacation days during the term. Students should always discuss time off and/or vacation days with their lab mentor in advance, both in their lab rotations and once they enter a thesis lab.

Note: All notebooks, original data and reagents from rotational and thesis work are the property of the advisor and must be left with the advisor at the completion of the work.

Thesis Committee: By February 1 of their 3rd year, students must establish a Thesis Committee and communicate this to the Program Administrator, Program Director and the Student Advisor. The specific composition of the committee should be determined in consultation with their thesis advisor and approved by the Program Director. In most cases this committee will be identical or similar to the comprehensive exam committee. The purpose of the committee is to guide and evaluate the progress of the student during their thesis research. It cannot be emphasized enough, however, that each student is ultimately responsible for his/her own progress.

The committee should be composed of four CANB faculty members and one faculty member from outside the program. A committee of three CANB faculty and two outside members is allowed with the approval of the Program Director. The thesis advisor is not a voting member of this committee. The Chair of the thesis committee must be a member of the Cancer Biology Program; he/she serves as the advisor to the student and monitors their progress. **Any changes to the thesis committee must be discussed and approved by the committee chair and the program director.**

Students are required to meet with their committee at least once each year; however, it is HIGHLY recommended that the committee meet every 6 months and more frequently in the year prior to the thesis defense. It is strongly encouraged that the student coordinate this meeting with their update talk (see below). The **committee meeting update form**, **Appendix 4**, and available from the Program Administrator, must be filled out and sent to the committee members and the Program Administrator at least 5 days prior to the committee meeting. Failure to do so may result in having to reschedule the meeting. This form includes a brief written summary of progress made on the stated aims, and updates on manuscripts, grants and presentations. The form should also contain an updated individual development plan (IDP: https://myidp.sciencecareers.org/). The IDP should be updated on an annual basis and included on every committee meeting form in order to discuss with your committee. The committee meeting should begin with a short private meeting between the committee faculty and student, followed by a private meeting between the committee faculty and advisor. It is the responsibility of the Committee Chair to post a brief written summary of each committee meeting on the Predoc Progress Assessment web site - http://predocprogress.ucdenver.edu/. If a summary is not provided by the Committee Chair, please follow up with your Chair and Program Director.

H. Update Talks: Students will give an annual report on the progress of their thesis research to the Cancer Biology Faculty and Students in the form of a 30-minute seminar once every academic year beginning in their 2nd year. The update talk should include one slide on rigor and reproducibility of the research presented. For example, briefly describe how cell lines and key reagents were authenticated, and what statistical methods were used. The update talk should be coordinated with the thesis committee meeting. It is the responsibility of the Committee Chair to post a brief critique of the yearly seminar on Predoc Progress Assessment web site - http://predocprogress.ucdenver.edu/. Students actively writing their thesis may be exempt at the discretion of the Program Director.

I. Thesis Completion: Upon completion of a body of original research that constitutes a significant contribution of new knowledge to the field of cancer biology, students will write a Ph.D. thesis containing this information and defend this document at an oral examination scheduled by the CU Anschutz Graduate School.

The student must meet with the thesis committee and receive formal approval to begin writing the thesis. Check with the Graduate School for current deadlines, thesis format requirements, and required paperwork prior to writing the thesis and scheduling the defense.

Guidelines: A successful thesis presents a problem-orientated, original and substantive investigation. The methodology and results contained in the thesis must be conclusive and of high quality. The standards are to be those maintained by quality, peer-reviewed scientific journals. The rules of the University of Colorado Graduate School concerning a Ph.D. thesis are as follows: "All doctoral students are required to submit a thesis (or dissertation) to the Graduate School as partial fulfillment of the requirements of the degree of Doctor of Philosophy. The form and scope of this thesis is determined by the student, the thesis advisor, the advisory committee, and the Program. The thesis should be based upon original investigation and showing mature scholarship and critical judgment as well as familiarity with tools and methods of research. It must be essentially approved by the examining committee before the final examination can be taken."

Publication Requirement: Publications are the culmination of the research done in the lab. It is the obligation of all scientists to share their findings with their peers and the public. **Students are required to have at least one primary, first-author paper submitted and in review at a peer-reviewed journal at the time of their thesis defense. The student's manuscript should be the focus of their thesis work. Under exceptional circumstances, co-first author publications may fulfill this requirement with approval of the steering and thesis committees. The decision to let the student defend is at the discretion of the thesis committee and student's mentor.**

Please start working towards this goal as soon as you enter your thesis lab. Please note that one first-author manuscript under review is the minimum requirement. It is expected that students map their "units of publication" in order to be as competitive as possible for their future career endeavors. Our graduates have an average of four publications.

Preparation of the Thesis: Written Ph.D. thesis approval from the chair of your thesis committee is required prior to scheduling of the thesis with the Graduate School. The Thesis Approval Form may be obtained from the Program Administrator. Furthermore, the thesis advisor must find the thesis acceptable prior to submission to the rest of the committee. The student's PhD thesis advisor should review, provide feedback and approve the written document prior to submitting to the thesis committee. The thesis will be checked for plagiarism. Any plagiarism will initiate an academic honor code review.

Thesis Defense: The thesis defense is the final examination of the thesis and related topics. It includes an oral presentation of the salient points of the research, its conclusions and its integration with the rest of the field. One slide on rigor of the presented research should also be included. Arrangements, including the submission of all required forms, Request for Examination and Biosketch, for the thesis defense must be completed and submitted to the CANB Program Administrator four weeks before your scheduled defense date. Your completed and approved paperwork must be submitted to the Graduate School by your Program Administrator at least two weeks before your exam date for final approval. All documents must be processed through DocuSign and your Program Administrator will provide you with guidelines. The student must be registered for five credits of CANB 8990 at the time of the thesis defense. Degrees are conferred in May and December; for information regarding deadline dates please refer to the resource labeled "Graduation Deadlines for the Anschutz Medical Campus" on the Graduate School website: https://graduateschool.cuanschutz.edu/forms-resources/resources.

The oral presentation will take the form of a seminar and is open to the entire community. The thesis defense will occur immediately following the seminar and will take the form of questioning by the thesis committee on details of the written document, as well as their general knowledge of their field of research and cancer biology. The final decision regarding the result of the thesis defense is made by the thesis committee. The student must receive affirmative votes from the majority of the committee to pass. The examination may be attempted only once. Disqualification of the thesis examination results in dismissal from the Graduate Program without a degree.

Thesis Revisions: All corrections to the written thesis must be completed within 60 days from the date of the thesis defense and the signed written document submitted to the Graduate School at that time. Exceptions require written approval by the majority of the thesis committee members and the thesis advisor. The student is responsible for providing a completed electronic copy/pdf of their final thesis to the Thesis Advisor, the Program and the Graduate School.

J. Career Development Opportunities: The Graduate School at the University of Colorado Denver and Anschutz Medical Campuses offers a variety of career development workshops, seminars, and training programs. These opportunities are coordinated by the Career Development Office (CDO) and trainings focus on the non-research-based skills that are essential for any successful scientific career: communication, leadership and management, and professionalism. These workshops and seminars are offered many times throughout the year and range from short one-hour lunch sessions to multi-day sessions. More information about the workshops, additional career development resources, and a schedule of events can be found on the CDO website: https://www.cuanschutz.edu/offices/career-development.

GRADUATE SCHOOL STANDARDS

You can find the Graduate School Policies and Procedures listed as "Graduate School Policies and Procedures" on the Graduate School Resource page here:
https://graduateschool.cuanschutz.edu/forms-resources.

A. Credits: The Graduate School requires at least 30 semester hours in didactic coursework (core courses, lab rotations/research - CANB 7650 and program electives) **and** 30 semester hours of thesis research for the Ph.D. (CANB 8990). All work undertaken as a graduate student must be in compliance with the academic Code of Honor (see Appendix A of CU ANSCHUTZ MEDICAL CAMPUS Graduate Student Handbook).

B. Maintenance of a 3.0 GPA: All students must maintain an average of "B" or better in their coursework. Students are expected to earn a "B" or better in all required courses. Only in exceptional circumstances a "B minus" in a required course may be acceptable, as determined by petition to the Steering Committee.

C. Preliminary Exam: In order to continue in the program, a student must pass the Preliminary Exam prior to starting their second year.

D. Remedial and Disciplinary Actions: Students whose cumulative GPA falls below 3.0 will be placed on Academic Probation by the Graduate School. They have two semesters in which to raise their GPA to 3.0 or above for removal from Academic Probation. The University of Colorado System Rules require that after a student is put on academic probation, he/she must maintain a 3.0 in all subsequent semesters. Failing to meet either condition will lead to immediate dismissal from the Graduate School. A "B minus" or below in any required course is considered unsatisfactory academic progress, and more than one "B minus" or below is grounds for dismissal from the Program. A graduate student who receives an unsatisfactory grade in a course (a B minus or below) may be required to repeat that course upon the recommendation of the Steering Committee. All grades received will appear on the student's transcript.

The steering committee and/or GAC will meet to determine the student's progress. If the student is performing satisfactorily, they will be removed from probation. If the committee determines that the student has not made satisfactory progress, the chair of the thesis committee, the thesis advisor and the student will meet with the Cancer Biology Steering Committee and/or GAC, and the following determinations will be made:

- the student is not in good academic standing and will be placed on probation again for not more than 30 days.
- the student is not in good academic standing and will be released from the program.
- the student is in good academic standing.

All meetings will be thoroughly documented, and the documentation given to the Program Administrator for placement into the student's file.

E. Academic Honor Code: Education at CU Denver | Anschutz is conducted under the honor system. All students who have entered graduate and health professional programs should have developed the qualities of honesty and integrity, and each student should apply these principles to his or her academic and subsequent professional career. All students are also expected to have achieved a level of maturity which is reflected by appropriate conduct at all times. Expectations, definitions, and procedures regarding graduate student conduct are outlined in the Academic Honor Code and the Student Code of Conduct (below). You can find the Academic Honor Code on the Graduate School Resource page here: https://graduateschool.cuanschutz.edu/forms-resources.

F. Code of Conduct: The University strives to make the campus community a place of study, work and residence where people are treated, and treat one another, with respect and courtesy. The university views the student conduct process as a learning experience which can result in growth and personal understanding of one's responsibilities and privileges within both the university community and the greater community. Students who violate these standards may be subject to the actions described below. These procedures are designed to provide learning opportunities dedicated to fairness to all who are involved in the conduct process.

As members of the University of Colorado Denver | Anschutz community, students are expected to uphold university standards, which include abiding by state, civil, and criminal laws and all university laws, policies and standards of conduct. These standards assist in promoting a safe and welcoming community; therefore, all students must uphold and abide by them. You can find the Student Code of Conduct on the Graduate School Resource page here: https://graduateschool.cuanschutz.edu/forms-resources.

G. Change in Thesis Lab: If a student leaves a thesis lab (but is still considered by the Cancer Biology Steering Committee to be in good academic standing) the student has the current semester (but no more than 90 days) to relocate to another thesis lab and determine a new thesis advisor. In the event that a new thesis laboratory cannot be identified, the student will be dismissed from the Program.

H. Time Limit of Ph.D. Studies: Students have eight years from the time they enter Graduate School to complete all requirements for the degree. Continuation after six years requires the approval of the student's thesis committee and the Steering Committee.

I. Leave of Absence: Students who need to leave a graduate program for a period of time (up to one (1) year) should consult their program directors for guidance on a Leave of Absence (LOA). Personal LOAs are reviewed and approved entirely through the program and ORE. Medical LOAs are managed through the CU Anschutz Student Outreach and Support Office in collaboration with the program and the ORE. An approved LOA pauses the student's academic record and automatically extends the time limit for completing a degree by the equivalent amount of time that the student spends on leave. Requests for LOA that exceed one (1) year maybe approved with sufficient justification to the Dean of the Graduate School. Students who do not return from their approved LOA will be considered to have withdrawn from their program and will either be required to formally re-apply for admission, or, at the discretion of the program, may be re-admitted through an expedited process.

PROGRAM OBLIGATIONS AND RECORD KEEPING

A. Program Transfer: For students matriculating directly into Basic Science Programs, there is an expectation that you will remain in that Program. You have matriculated into that Program by virtue of having applied and being accepted. Thus, there is a substantial bilateral commitment. Transferring from a Program, at any point, is actively discouraged. If there are issues with an individual mentor or a perceived lack of research laboratory options, it is expected that solutions will first be explored within the Program. Program transfer will only be approved under exceptional circumstances, and then only after successful completion of the preliminary exam at the end of the first year.

B. Attendance: All graduate students are required to attend post-rotational seminars and Thesis Defense Seminars of the other students in the program. All students are also required to attend the Cancer Biology Research in Progress series and annual retreat.

C. Student's File: A file for each student will be kept by the Program Administrator. All relevant records should be given or emailed to the Program Administrator for the files, including published abstracts and papers, notifications of awards and honors, and copies of forms filed with the Graduate School. These files should reflect the total record of the student during his/her entire graduate career. The records can be examined by the student at any time.

D. Participation in Recruitment Functions: During February/March each year, prospective student applicants visit our program for interviews. It is in the Program's best interest to attract and retain the best of these prospective students. To do this we need the help of current students and Cancer Biology faculty who can convince these individuals that our Program is the best for pursuing a Ph.D. in cancer biology. When asked, please be willing to spend some time with prospective students during dinners or other functions. Our Cancer Biology Program can only flourish with your help.

E. Vacation and Holidays: Graduate students shall receive all University holidays and no more than 14 calendar days (counting all days Monday through Sunday) of vacation per annum, with no year-to-year accrual. Students shall continue to receive stipends during vacations and holidays. In the Graduate School at CU-Anschutz Medical Campus, the times between academic terms and the Summers are considered active parts of the training period and are not necessarily free times. Students taking courses are expected to attend all classes and take all exams as scheduled. They should not take vacations when classes or exams are scheduled. For advanced students, vacation time should be arranged with the dissertation advisor.

F. Sick Leave and Other Leave: Graduate students may continue to receive stipends for up to 15 calendar days (counting all days Monday through Sunday) of sick leave per annum, with no year-to-year accrual. Under exceptional circumstances, additional sick days may be granted following a written request and approval by the student's program director. Sick leave may be used for the medical conditions related to pregnancy and childbirth. The Leave Policy can be found on the Graduate School Resources page here: https://graduateschool.cuanschutz.edu/forms-resources.

https://www.cuanschutz.edu/docs/librariesprovider138/denver-anschutz-graduate-school/resources/graduate-school-policy-for-phd-student-vacation-and-leave.pdf

Students are required to keep a record of their leave through their home division or department.

Appendices

Appendix 1: Preliminary Exam information and rubric
Appendix 2: Electives
Appendix 3: Comprehensive Exam information and rubric
Appendix 4: Cancer Biology Program Committee Meeting Form
Appendix 5: Current Cancer Biology Graduate Program Students
Appendix 6: Cancer Biology Graduate Program Faculty and Research Interests
Appendix 7: Useful information for first-year students
Appendix 8: ORE policy on External Employment for Graduate Students
Appendix 9: CANB Mentor and Mentee Mutal Expectations and AAMC Mentee-Mentor compact

Appendix 1

Cancer Biology Preliminary Exam

The goal of the CANB Preliminary Exams is to assess students' mastery of cancer biology, in particular the foundational knowledge gained in first year coursework, and to assess students' ability to develop, support, and test a research hypothesis.

To accomplish this, the exam consists of a written proposal and a comprehensive oral exam. An exam committee of 3-5 Cancer Biology faculty members will evaluate each student. The committee will strive to achieve uniformity and fairness for both the written and oral examination. A grade of **Pass**, **Fail**, or **Pass with Conditions** will be given, based approximately equally on the written and oral components (see below).

A student passing with conditions may be asked to revise the written proposal, retake the oral exam, or both, as deemed appropriate by the exam committee. Other conditions are developed on a per-case basis in collaboration with the student's research mentor. In case of a grade of fail, further discussion of appropriate action will be referred to the steering committee.

For the written component the students will be given a selection of seminal papers representative of each block of the Molecular Mechanisms of Cancer Course (CANB 7600) and will choose one on which to write a three-page proposal that will include the following:

1) An abbreviated Specific Aims page, which includes the student's own original hypothesis stemming from the findings of the paper.
2) Background, Significance and Rationale, which includes a brief background on the scientific topic, critical summary of the major findings in the paper and their significance to the field of cancer biology.
3) Experimental Approach, which includes a series of experiments to test the hypothesis (*see below for more detailed instructions* for the written document) outline of.

Students can discuss their ideas with their peers, but no one is allowed to provide feedback on their written document until after it is submitted to the exam committee.

The written document and oral exam will be evaluated using the rubric below. The written document will *not* be evaluated on "grantsmanship". The focus will be on evaluating the student's ability for synthesis and critical assessment of research findings, and the development and testing of a scientific hypothesis. The proposal must be the student's own original work and is submitted one week before the oral exam.

The purpose of the oral exam is two-fold. One is to test the student's ability to explain and defend the hypothesis and experiments proposed in the written document. Two, the written document will serve as a departure point to test the student's knowledge of cancer biology and other relevant topics covered in graduate course work up to that point, including the Core Course and Cancer Biology 7600. The student will be expected to answer general knowledge questions on topics related to the proposal or based on graduate coursework. The oral exam will last approximately 60 minutes, consisting of Q&A with the committee. See below for "sample" oral exam.

Students will be tested over 1-3 days. Important note: students are expected *not* to discuss the oral exam content with each other while other students are still taking the exam.

Note
Topic paper choice and full exam submission will mirror an LOI and full grant submission, i.e. failure to meet either deadline will be treated as a late grant submission and will not be accepted. This will constitute a 'fail' on the first exam, with option to re-take the exam.

PRELIMINARY EXAM RUBRIC

The goal of this rubric is to help standardize the preliminary exam process. Its purpose it to improve transparency, calibrate expectations, and ensure CANB students are treated equitably. The exam process is inherently subjective and difficult to standardize. This rubric provides a framework for evaluating the student in the most objective manner possible given the complexities of the exam and is meant to have some flexibility.

This rubric contains examples of exam performance and should not be viewed as a strict checklist.

	KNOWLEDGE AND SCHOLARSHIP Identifies background and existing information.	**score:**
4	• Strong evidence of synthesis of concepts covered in coursework. • Terms, concepts, principles and methods are correct and described in depth. • Clearly identifies research problem in the field, based on prior knowledge. • Critiques prior work on the problem. • Demonstrates command of literature relevant to proposal. • Information presented is appropriately cited.	**comments:**
3	• Evidence of synthesis of concepts covered in coursework. • Terms, concepts, principles and methods are mostly correct and described with sufficient depth. • Identifies research problem in the field, based on prior knowledge. • Some critique of prior work on the problem. • Demonstrates familiarity with the literature relevant to proposal. • Most information presented is appropriately cited.	
2	• Some evidence of synthesis of concepts covered in coursework. • Terms, concepts, principles and methods are mostly correct but lacking important details. • Description of prior knowledge is adequate. • Describes, but does not critique prior work on the problem. • Demonstrates familiarity with the literature relevant to the proposal, but some relevant literature is neglected. • Information presented is cited, but could be improved.	
1	• Little to no evidence of synthesis of concepts covered in coursework. • Descriptions of terms, concepts, principles and methods are insufficient and/or incorrect. • Insufficient description of prior knowledge. • Insufficient description of prior work on the problem. • Insufficient incorporation of literature relevant to the proposal. • Information presented is rarely cited.	
	SCIENTIFIC REASONING AND EXPERIMENTAL DESIGN Describes hypothesis and experiments designed to test it.	**score:**
4	• Hypothesis is clearly stated, along with compelling rationale • Compelling rationale for experimental approach is provided. • Experiments are clearly described and appropriate. • Clearly describes controls and how they impact interpretation of the results. • Alternative experimental approaches are clearly described. • Clearly describes how results impact the hypothesis. • Identifies weaknesses in interpretation. • Alternative results are described, and impact on the hypothesis is considered.	**comments:**

3	• Hypothesis is stated and rationale is provided. • Rationale for experimental approach is provided. • Description of experiments is mostly clear and appropriate. • Controls and their interpretation are described. • Alternative experimental approaches are described. • Describes how results impact the hypothesis. • Alternative results are described and connected to the hypothesis.	
2	• Hypothesis is stated, but rationale is weak and could be improved. • Rationale for experimental approach is provided, but is unclear. • Description of experiments lacks some important details. • Controls are described, but description of interpretation is weak. • Alternative experimental approaches are described, but not developed. • Description of how the results impact the hypothesis lacks depth. • Alternative results are described, but not clearly connected to the hypothesis.	
1	• Hypothesis is unclear and rationale is weak. • Insufficient rationale for experimental approach. • Description of experiments is unclear or inappropriate. • Controls are poorly described. • Alternative experimental approaches are insufficiently described. • Insufficient description of how the results impact the hypothesis. • Alternative results are insufficiently described.	
	WRITTEN COMMUNICATION Communicates knowledge and reasoning through writing and graphics.	**score:**
4	• Writing is exceptionally clear and effective. • Graphics are well-organized. • Terms, concepts, principles and methods are used correctly.	**comments:**
3	• Writing is mostly clear and effective. • Most aspects of graphics are well-organized. • Most terms, concepts, principles and methods are used correctly.	
2	• Some aspects of writing are clear and effective. • Some aspects graphics are well-organized. • Some terms, concepts, principles and methods are used correctly.	
1	• Writing is unclear and ineffective. • Graphics are disorganized. • Terms, concepts, principles and methods are lacking and/or incorrect.	
	ORAL COMMUNICATION Communicates scientific knowledge and reasoning through speech and visual displays.	**score:**
4	• Oral communication is exceptionally clear and effective. • Graphics are well-organized. • Response to questions consistently incorporates appropriate evidence. • Response to questions is reflective.	**comments:**
3	• Most of oral communication is clear and effective. • Most graphics are well-organized. • Response to questions often incorporates appropriate evidence. • Response to questions with occasional prompting or “leading” required.	

2	• Some aspects of the oral communication are clear and effective. • Some aspects of the graphics are well-organized. • Response to questions incorrectly, even after prompting or “leading”.	
1	• Oral communication is unclear and ineffective. • Graphics are disorganized. • Fails to respond to questions.	

Appendix 2

Electives

Electives are selected based on the student's interests and upon consultation with their rotation mentor and/or CANB Advisor. Other electives may be approved with permission of the Program Director.

Approved electives *(course availability may change)*:

Histophysiology	CANB 7620	3 credits	Usually offered in Spring
Stem Cells and Development	CSDV 7605	4 credits	Usually offered in Spring
Survey of Human Genetics	HMGP 7600	3 credits	Usually offered in Spring
Tissue Biology and Disease Mechanisms	IDPT 7646	3 credits	
Overview of Immunology	IMMU 7530	2 credits	Usually offered in Fall
Molecular Virology and Pathogenesis	MICB 7701	3 credits	Usually offered in Spring
Receptors and Cell Signaling	PHCL 7606	3 credits	Usually offered in Spring
Pharmacology of Anti-cancer Agents	PHSC 7561	2 credits	
Reproductive Endocrinology and Metabolism	RPSC 7801	3 credits	
Special Topics in Cancer Biology	CANB 7602	1 credit	Usually offered in Spring
Special Topics in Immunology	IMMU 7602	1 credit	Usually offered in Fall

* At least 3 credits of electives are required for this program. More can be taken if desired. **The elective requirement should be completed by the end of your 2nd year.** Note: the purpose of the elective is to expand your knowledge base beyond cancer biology. Therefore, no more than one elective credit can be from a special topics in cancer biology course. Please contact the Program Director if you have any questions regarding this requirement. MSTP students have typically met the elective requirement upon entering the program, which should be verified with the program director.

Appendix 3

Comprehensive Exam information

Administrative Requirements:

There are two required forms which can be found on the Graduate School website. These forms must be turned into your Program Administrator at least four weeks before your exam and must be turned into the Graduate School (by your Program Administrator) a minimum of two weeks in advance of your exam. If you do not follow these guidelines, your exam may be delayed.

https://graduateschool.cuanschutz.edu/forms-resources

(Students: Deadlines & Forms)
All forms must be submitted via DocuSign. Make sure to notify your Program Administrator with the date and time approved by your committee before completing any forms.

- Application for Candidacy
- Request to schedule exam

Preparation of the Written Portion of the Comprehensive Exam:

1) Identification of Research Problem: During the 2nd year, the graduate student will, with extensive guidance from the thesis mentor, identify a research problem. This research problem can be within the research area of the intended thesis research or, in fact, can represent the precise research problem that the student and mentor intend to pursue as a thesis project.

2) Establishment of an Exam Committee: The student with guidance from the thesis mentor will identify, contact and retain comprehensive exam committee members with expertise relevant to the research problem. This step should occur mid- to late summer of the 2nd year in order to choose committee members that best match the student's research interests. The committee will be comprised of 4 program members and 1 faculty member outside the Cancer Biology program. All members must have a graduate school appointment, although it is possible to get a temporary "special" appointment for a faculty member for the purpose of sitting on a graduate committee. To assure that all the conditions are met, the composition of the committee must be approved by the Program Director and Associate Program Director (please copy the Program Administrator who can check the status of graduate school appointments).

    a. Pre-comps committee meeting: There is no requirement for a pre-comps committee meeting. If the student elects to have a meeting it should be used as an opportunity for the student to get to know their committee members and to give them a basic overview of the project (a 30-45 min meeting is sufficient). It should not be used for the purpose of critiquing the student's comprehensive exam proposal.

3) Setting a Date: The student and exam committee faculty should schedule a date for the Comprehensive Exam as early as possible (up to several months in advance). This will prevent major delays in the exam date due to schedule conflicts and provide a clear timeline for the preparation of the proposal. Remember - both forms must be turned into your Program Administrator four weeks before your exam, and submitted to the Graduate School for final approval a minimum of two weeks in advance of your exam or you may have to reschedule.

4) Approval of Hypothesis and Specific Aims: The goal of this step is to help the student develop a significant, interesting and testable hypothesis accompanied by a set of Specific Aims that will directly test the hypothesis, not simply describe or explore a research area. Approximately ten weeks before the Comprehensive Exam, the student works with their mentor to prepare a one-page document

including a description of the problem, hypothesis and specific aims similar to the “Specific Aims” page of a NIH R01 grant. This is then submitted to the members of the Comprehensive Exam committee (hard copy or by e-mail). Within one week of receipt, the committee members will provide comments, either in writing or preferably in person, to the student to improve the significance of the problem, focus the hypothesis, strengthen the Specific Aims, etc.

5) Preparation of Document: Following approval of the one-page Specific Aims, the student prepares a full proposal (7 pages including Specific Aims) complete with Background/Significance, Preliminary Data and Experimental Plan, Anticipated Problems/Alternative Approaches, and Authentication of Key Biological and/or Chemical Resources sections. Rigor should be included in the proposal itself to address the number of replicates, statistical and power analyses, and gender. The proposal should also include a reference section (see NIH guidelines) that does not count towards the 8-page limit. The student is strongly encouraged to obtain feedback from other post-comp students as the mentor should not be involved in preparation of the document (see below). The final draft must be submitted to the committee members at least two weeks before the oral comprehensive exam data (see step two above) as dictated by Graduate School rules.

6) Preparation for Exam: In the preceding eight weeks, the student with assistance from program administration will reserve a room for the oral exam (or Zoom under certain circumstances), submit the required paperwork to your Program Administrator and prepare a 15-to-20-minute oral presentation of the proposal.

Special Notes:

Formatting: You document should be formatted according to the NIH guidelines. It should be single-spaced in Times Roman 12pt or Arial 11pt. Margins should be 0.5 inches all around. Figures and figure legends (10 pt font minimum) must be large enough to be easily read.

Involvement of Mentor and Committee members: The program realizes that the student’s successful learning of the process of taking a specific scientific idea and expanding it into a relevant research proposal will depend on significant input from faculty members. However, it is important to understand that the comprehensive exam document is the work of the student. It is not a part of mentor's grant, nor is it an adaptation of a previous grant the student (or mentor) may have submitted. Guidance from the mentor should be limited to discussions about the proposed hypothesis and specific aims, with minimal input on experimental design. Students have more latitude with their committee members, and in fact are encouraged to use them as a resource throughout the process. Committee members for instance can provide expert information regarding the weaknesses and pitfalls of specific experiments.

Prior submission of a fellowship: If a student has previously submitted a pre-doctoral grant such as (but not limited to) an NRSA, the mentor must verify that the comprehensive proposal differs by at least 50% from this previous submission.

Appendix 4

Cancer Biology Program Committee Meeting Form

Please fill out the following form and distribute it to your Committee members and Program Administrator no later than one week prior to each committee meeting. This form will serve as a record of your accomplishments and your progress toward completion of your thesis research.

Upon completing this form, please make sure to update your student profile in GAIA with any changes, additions or accomplishments.

Students are required to meet with their committee on an annual basis and highly encouraged to meet with their committee every six months.

Student Name:

Year started graduate school:

Year started thesis project:

Year of comps:

Meeting date:

Committee members (note chair):

Thesis mentor:

Title of project:

Hypothesis:

Specific aims:

Summary of progress since last meeting (organize by aims, as appropriate; discuss any changes in direction; include response to any major critiques from last meeting)

Manuscripts: type and status (primary/review; in prep, submitted, under review, in revision, in press)
Meetings, abstracts and form of presentation (poster/talk)

Fellowships/ Grants (funding agency, name and dates of grant, title of project, total direct costs)

Other experience, accomplishments *(Use additional pages as needed)*

Individual Development Plan (IDP: https://myidp.sciencecareers.org should be updated on an annual basis (at least) and included here for every committee meeting).

Appendix 5

Current Cancer Biology Graduate Program Students

Student	Email	Lab	Matriculation
Purdy, Connor	STEPHEN.PURDY@CUANSCHUTZ.EDU	Ford	2018
Cao, Phoebe	PHOEBE.CAO@CUANSCHUTZ.EDU	Davila	2019
Dahms, Petra	PETRA.DAHMS@CUANSCHUTZ.EDU	Lyons/Prekeris	2019
Aleman, John	JOHN.ALEMAN@CUANSCHUTZ.EDU	XJ Wang (UC Davis)	2020
Corbo, Sophia	SOPHIA.CORBO@CUANSCHUTZ.EDU	Karam	2020
Haque, Parsa	PARSA.HAQUE@CUANSCHUTZ.EDU	Theiss	2020
Keller, Alana	ALANA.KELLER@CUANSCHUTZ.EDU	Sherbenou	2020
Kuo, Li-Wei	LI-WEI.KUO@CUANSCHUTZ.EDU	Richer	2020
Martinez, Abe	ABRAHAM.MARTINEZ@CUANSCHUTZ.EDU	Pearson	2020
Miller, Regan	REGAN.MILLER@CUANSCHUTZ.EDU	Jordan	2020
Steinmetz, Rachel	RACHEL.STEINMETZ@CUANSCHUTZ.EDU	Lyons	2020
Bamberg, Ellen	ELLEN.BAMBERG@CUANSCHUTZ.EDU	Kabos	2021
Fox, Morgan	MORGAN.2.FOX@CUANSCHUTZ.EDU	Cittelly	2021
Hoag, Bridget	BRIDGET.HOAG@CUANSCHUTZ.EDU	DeGregori	2021
Olimpo, Nick	NICHOLAS.OLIMPO@CUANSCHUTZ.EDU	Karam	2021
Ortiz, Daniela	DANIELA.R.ORTIZ@CUANSCHUTZ.EDU	DeGregori	2021
Wilcock, Pearl	PEARL.WILCOCK@CUANSCHUTZ.EDU	Davila	2021
Hoen, Maureen	MAUREEN.HOEN@CUANSCHUTZ.EDU	Karam	2021
Cozzens, Lauren	LAUREN.COZZENS@CUANSCHUTZ.EDU	Lyons	2021
Clarissa Garcia	CLARISSA.I.GARCIA@CUANSCHUTZ.EDU	Witkowski	2022
Carroll, Mary Grace	MARY.CARROLL@CUANSCHUTZ.EDU	Haugen	2022
Dennis, Kady	KADY.DENNIS@CUANSCHUTZ.EDU	Sherbenou	2022
Moskop, Daniel	DANIEL.MOSKOP@CUANSCHUTZ.EDU	Pietras/Jordan	2022
Alvarez, Karen	KAREN.2.ALVAREZ@CUANSCHUTZ.EDU	Cittelly	2023
Beacom, Alexander	ALEXANDER.BEACOM@CUANSCHUTZ.EDU	Nassour	2023
Becks, Alexandria	ALEXANDRIA.BECKS@CUANSCHUTZ.EDU	Lyons	2023
Kyei, Perpetual	PERPETUAL.KYEI@CUANSCHUTZ.EDU	Ernst	2023
Tipton, Madison	MADISON.TIPTON@CUANSCHUTZ.EDU	Henry	2023
Wick, Lars,	LARS.WICK@CUANSCHUTZ.EDU	Zhao	2023
Williams, Jared	JARED.WILLIAMS@CUANSCHUTZ.EDU	Kabos	2023
Martinez, Selena	SELENA.MARTINEZ@CUANSCHUTZ.EDU	Nassour	2023
Bangar, Amandip	AMANDIP.BANGAR@CUANSCHUTZ.EDU	Davila/Verneris	2024
Lin, Scott	SHUJIAN.LIN@CUANSCHUTZ.EDU	Bitler	2024
Aloe, Brooke	BROOKE.E.ALOE@CUANSCHUTZ.EDU	First Year	2024
Lesser, Sidney	SIDNEY.LESSER@CUANSCHUTZ.EDU	First Year	2024
Mikeska, Railey	RAILEY.MIKESKA@CUANSCHUTZ.EDU	First Year	2024
Olusoji, Praise	JESUTOMISIN.OLUSOJI@CUANSCHUTZ.EDU	First Year	2024
Sarioglu Ceyhan, Goksu	GOKSU.2.SARIOGLUCEYHAN@CUANSCHUTZ.EDU	First Year	2024
Zajczenko, Natalie	natalie.i.zajczenko@CUANSCHUTZ.EDU	First Year	2024

Appendix 6

Cancer Biology Graduate Program Faculty and Research Interests

Graduate Faculty	Primary Appointment
Micheal Alberti, MD, Ph.D.	Pathology
Maria Amaya, MD, PhD (Associate)	Hematology
Andrea Bonetto, Ph.D.	Pathology
Benjamin Bitler, Ph.D.	Obstetrics and Gynecology
Cecilia Caino, Ph.D.	Pharmacology
Diana M. Cittelly, Ph.D.	Pathology
James C. Costello Ph.D.	Pharmacology
Kasey Couts, Ph.D. (Associate)	Medicine - Oncology
Scott Cramer, Ph.D.	Pharmacology
Eduardo Davila, Ph.D.	Medical Oncology
James DeGregori, Ph.D.	Biochemistry & Molecular Genetics
Patricial Ernst, Ph.D.	Pediatrics
Joaquin Espinosa Ph.D.	Pharmacology
Lauren Fishbein, M.D., Ph.D.	Medicine - Endocrinology
Heide Ford, Ph.D.	Pharmacology
Mayumi Fujita M.D., Ph.D.	Dermatology
Bryan R. Haugen, MD	Medicine - Endocrinology
Lynn E. Heasley, Ph.D. (Emeritus)	Craniofacial Biology
Cheng-Jun Hu, Ph.D.	Craniofacial Biology
Curtis Henry, PhD	Immunology/Microbiology
Paul Jedlicka, M.D., Ph.D.	Pathology
Antonio Jimeno, M.D., Ph.D.	Medical Oncology
Craig Jordan, Ph.D.	Hematology
Peter Kabos, M.D.	Medical Oncology
Robert Keith, M.D. (Associate)	Pulmonary Sciences
Katja Kiseljak-Vassiliades, D.O. (Associate)	Medicine - Endocrinology
James R. Lambert, Ph.D. (Associate)	Pathology
Ryan Lanning, M.D., PhD. (Associate)	Radiation Oncology
Shi-Long Lu M.D., Ph.D.	Otolaryngology
Traci Lyons, Ph.D.	Medical Oncology
Siddhartha Mitra, Ph.D.	Pediatrics
Jeff Moore, Ph.D.	Cell & Developmental Biology
Joe Nassour, PhD	Biochemistry & Molecular Genetics
Raphael A. Nemenoff, Ph.D.	Medicine - Renal
David Orlicky, Ph.D. (Associate)	Pathology
Philip Owens, Ph.D.	Pathology
Todd Pitts, Ph.D. (Associate)	Medicine-Oncology
Chad Pearson, Ph.D.	Cell & Developmental Biology
Nikita Pozdeyev, M.D., Ph.D. (Associate)	Medicine-Endocrinology
Eric Pietras, Ph.D.	Hematology
Rytis Prekeris, Ph.D.	Cell & Developmental Biology
Mary E. Reyland, Ph.D.	Craniofacial Biology
Jennifer Richer, Ph.D.	Pathology
Mercedes Rincon, Ph.D.	Immunology/Microbiology
Carol Sartorius, Ph.D.	Pathology
Rebecca Schweppe, Ph.D.	Medicine - Endocrinology
Daniel Sherbenou, M.D., Ph.D.	Hematology
Yiqun Shellman, Ph.D.	Dermatology
Matthew Sikora, Ph.D.	Pathology
Jill Slansky, Ph.D.	Immunology
Meredith Tennis, Ph.D.	Medicine - Pulmonary
John Tentler, Ph.D. (Associate)	Medical Oncology
Tamara Terzian, PhD (Associate)	Dermatology
Arianne Theiss, Ph.D.	Medicine - Gastroenterology
Rajeev Vibhakar M.D., Ph.D.	Pediatric Hem/Oncology
Margaret Wierman, Ph.D. (Associate)	Neuroscience
Matthew Witkowsky, Ph.D.	Pediatrics
Christian Young, Ph.D. (Associate)	Pathology
Rui Zhao, PhD.	Biochemistry and Molecular Genetics
Yuwen Zhu, Ph.D.	Immunology

Appendix 7

Useful Information for First Year students

Rotation Student Lab Questionnaire

1) How often and when should I expect to meet with the lab PI? What should I prepare in advance that I should bring to those meetings (notebook, raw data, slideshow presentation, written summary of completed work)?
2) How should I communicate with the PI outside of scheduled meetings?
3) Who is the best person in the lab to consult for day-to-day technical advice?
4) Where can I find descriptions of standard lab protocols? When is it appropriate to search the internet for protocols that I will perform in the lab?
5) What is the expectation for the hours/days I should be working in the lab, in my rotation and if I were to join as a permanent member?
6) What is the preferred notebook format for the lab?
7) How do I order something? When should I re-order a lab supply before it's empty?
8) What do I do with dirty lab dishware?
9) Where are the appropriate waste containers in the lab? **This and number 10 should be done on the mandatory Health and Safety Walkthrough that you should do in each lab at the beginning of walk through and you will sign**.
10) What should I do in the event of a lab safety issue? Where are clean-up supplies? Where is the lab safety reference guide?
11) What areas do I only have access to during business hours (7am-6pm)?
12) Is there a weekly lab meeting or other lab/department events that I should be aware of?
13) How can I contact someone with a lab question after hours?
14) How should I store digital data files from my research in the lab?

CANB Rotation Project Proposal Template

Due 1-2 weeks after starting your rotation

Rotation Project Title:

CANB Rotation #:

Student name:

Mentor name:

Introduction (1 page)

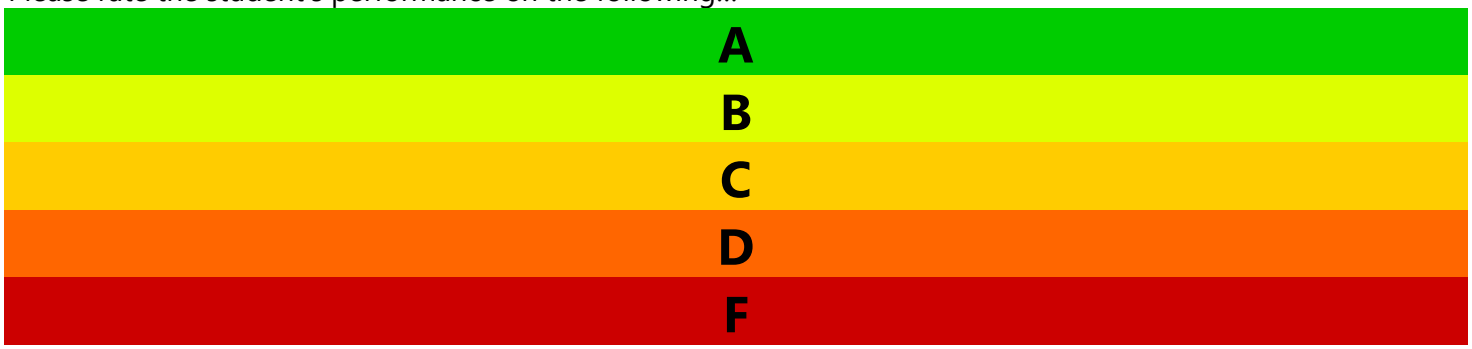
Specific Aims & Brief Methods for Achieving Ams (2 Aims are fine)

References

Rotation Assessment Template

We highly recommend that students meet with each rotation mentor to review their performance during their rotation. This is an excellent opportunity for students to provide feedback on their mentors as well.

Please rate the student's performance on the following…



---

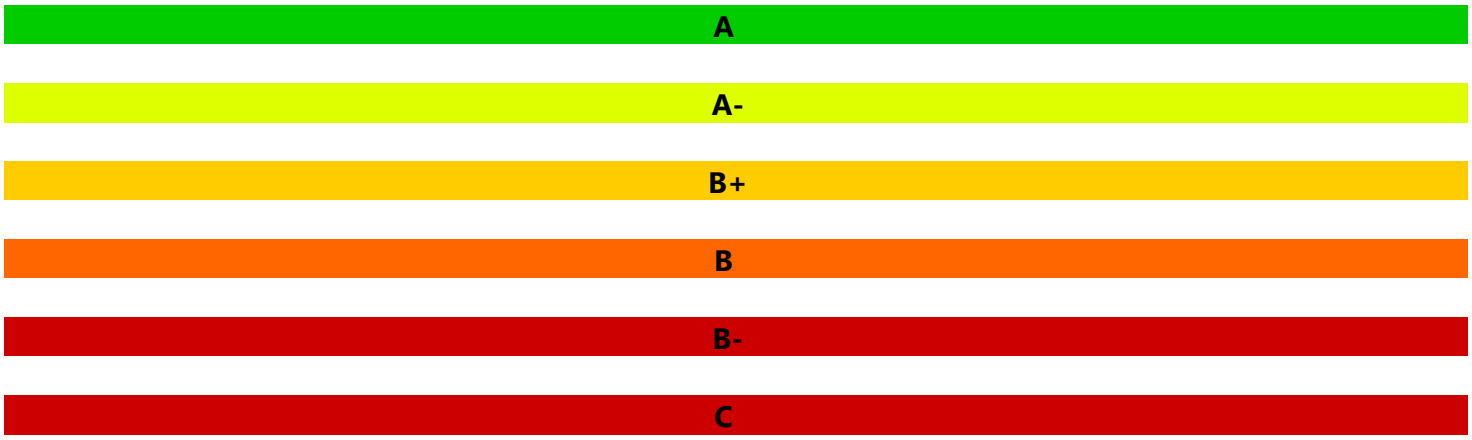
1. Intellectual engagement in research area

2. Accounting for coursework, effort on research participation

3. Areas of strength

4. Areas for improvement

Overall Grade



Rotation Talk Evaluation

Rotation talks are scheduled the Thursday after the end of the rotation
(3 talks for the academic year)

The purpose of the rotation talk evaluation is to provide constructive feedback for students to improve their oral communication skills.

Please provide constructive advice on:

1. Content of the talk

Introduction – does the student state the “big problem” and provide appropriate background?

Hypothesis- is the hypothesis stated and are experimental approaches clearly explained?

Data –Does the student explain the data clearly and summarize the findings from each data slide? Do they draw attention to what is important?

Conclusions – Does the student relate the data back to the “big picture”? Do they do a good job of describing future directions?

2. PowerPoint Presentation

Slides – are the images easy to see (words, graphs, images, etc)?

3. Interaction with the audience

Does the student engage with the audience (eye contact)?

Does the student do a good job of handling questions from the audience?

4. What did you really like about this presentation?

5. What can be improved?

Appendix 8

ORE Policy on External employment for Graduate Students

Background

Graduate students admitted to ORE Programs receive an annual stipend, health insurance coverage and full tuition. They are considered full time students and, per NIH policy, expected to devote a minimum of 40 hours to their PhD training.

Students may wish to take on additional paid employment for financial reasons or to gain experience in teaching, industry or explore other career opportunities. This may be complementary and beneficial to their training and professional development in University of Colorado graduate programs.

Policy

Graduate students, as key personnel substantively involved in research related activities, are subject to the University of Colorado conflict of interest and commitment policy:
"With prior written approval by the dean or appropriate campus authority, faculty and staff members shall be permitted to receive additional remuneration from sources outside the university so long as the activities generating the income do not exceed one-sixth of their time and effort."
In addition, NIH policies state:
"NIH recognizes that student or postdoctoral trainees may seek part-time employment coincidental to their training program to further offset their expenses. Fellows and trainees may spend on average, an additional 25% of their time (e.g., 10 hours per week) in part time research, teaching, or clinical employment, so long as those activities do not interfere with, or lengthen, the duration of their NRSA training."

In accordance with the above policies, Graduate students, **in good academic standing**, may, **with appropriate approval**, work approximately **10 hours per week** in external employment.

Such employment must **be approved in advance,** by the Office of Research Education (ORE), the Students Program Director for first year students, and by Program Director and Thesis advisor for those students who have entered a laboratory or who transfer or are directly admitted to a laboratory.

External employment must not conflict or interfere with any required elements of a student's PhD training or lengthen that training. Examples include but are not limited to: laboratory research, classes, assessments, seminars, journal clubs, lab meetings, retreats and other required program or ORE activities.

Students **must remain in good academic standing** in order to continue their external employment.

Students receiving extramural support for their PhD from training grants or other sources are subject to the requirements and policies of those funding entities and may not be eligible for external employment.

Failure to disclose external employment, falsely reporting or willfully exceeding approved hours will be grounds for disciplinary action and possible dismissal from the PhD program.

Definitions

External employment- any paid (or compensated in kind) work or work product outside of a student's PhD training program and the Office of Research Education.

Good academic standing-maintaining a minimum of a B grade in all classes, rotations and thesis work. Passing Preliminary and comprehensive exams. Meeting other Program requirements, as described in Program Handbooks. Demonstrating satisfactory and timely progress toward the PhD, as determined by the Student's

Advisory/Thesis Committee.

Resolution of problems

Students may appeal denial or rescinding of approval for external employment, on the basis that policies were not followed or applied fairly. Appeals will be reviewed by the Associate Dean for Research Education and their decision will be final. If you have any questions, please make sure to contact the Program Administrator for further information and guidance with any of the processes discussed in this handbook.

Appendix 9

CANB Mentor and Mentee Mutual Expectations

Things that lab members can expect from their faculty mentor

Scientific

Provides advice regarding design of hypotheses aims and experimental design (this can be less as time
Provides feedback when reviewing results of experiments and assists with interpretations/future plans
Stays up to date with current literature in the field and is willing to discuss presentations, meetings/seminars.
Has early and ongoing discussion regarding the hypothesis of the project and aims and experiments
Meets weekly with student and provides student the opportunity to have additional meetings and present to the group in lab meetings
Actively searches for funding opportunities (T32s, F31 and others) and helps you with these grants and writes letters of recommendations and mentor section.
Helps you to choose comprehensive exam and thesis committee members if you join the lab.
Timely advice/evaluations/letters of recommendations
Helps you network with faculty on campus or at other institutions if you need to learn a new technique that the lab doesn't do.
Helps you meet scientists from other institutions at meetings and make connections/ networking

Leadership

Can delegate tasks when appropriate
Provides a neutral forum for discussing both scientific and lab issues
Shows discretion at all times
Shows professionalism at all times
Addresses problems as they arise
Is available for meetings/questions

Things that faculty look for and expect from lab members

Scientific

Do you display a good level of interest in the scientific topic.
Are you careful to plan and document experimental design, methods and results in lab notebooks (hard copy or electronic) and keep raw data well organized in folders on the server and/or electronic lab notebook.
There are lots of different ways to do things in molecular biology. I do not generally mind if people have learned a different way and want to do it their way, but sometimes it is good to see how we do it in our lab first with the person you are working closely with or another lab member.
Try first to design the experiment yourself with the proper controls then talk with me or a senior person in the lab about it.
We want to see that you are starting to critically evaluate your experimental results. Do appropriate statistics and attempt to interpret and present at lab meeting for feedback. Don't just say "well it didn't work – I don't know why," but rather think about whether appropriate positive and negative controls indicate that we can interpret the experiment adequately. Think about what might be done differently the next time. Keep in mind that if you change more than one thing, you won't know why the result changed.
Are subsequent experiments logical extensions of previous experiments?

Work habits

Communicate regarding work hours and vacations.
Is work planned efficiently to optimize the amount that can be done carefully?
Are experiments well planned and performed in a conscientious manner?
What use is made of waiting periods between experiments? Study or read literature.

Keeping up with the literature and other research.

Do you routinely search for and read papers from the lab or other labs that work on similar/related topics?
Do you read papers provided for journal club or other papers that the mentor or lab members suggest?

Creativity and initiative

Try to provide input into the design, execution and analysis of your experiments?
Don't be afraid to ask questions in lab meetings and seminars.
How often do you suggest new approaches or new lines of experimentation for your current project?
How much personal responsibility and initiative do you take for meeting deadlines, designing that interpreting experiments, and writing manuscripts, reviews, and grants (later once you are a permanent member of the lab)?
If you see a problem in the lab, what is your response (ignore it, complain, suggest a solution)?

Communication skills

How effective are your lab meeting presentations and rotation talks?
How do you respond to feedback from the mentor and other members of the lab?

Interactions with others
Do you take notes when learning a new technique from someone in the lab?
Do you leave general lab areas, hoods and equipment clean when you've finished?
Do you return reagents, equipment etc to designated places?
Are you collegial with lab mates when you ask for help or receive/give feedback.

AAMC

Tomorrow's Doctors, Tomorrow's Cures®

Compact Between Biomedical Graduate Students and Their Research Advisors

A framework for aligning the graduate student mentor-mentee relationship

January 2017

Association of
American Medical Colleges

The following members of the compact review team are gratefully acknowledged for their contributions to this update:
Jerome Breslin, PhD, USF Health Morsani College of Medicine
Patricia Cameron, PhD, Augusta University
Lique Coolen, PhD, University of Mississippi School of Medicine
Victoria Freedman, PhD, Albert Einstein College of Medicine
Ambika Mathur, PhD, Wayne State University
Nancy Schwartz, PhD, The University of Chicago
Jodi Yellin, PhD, AAMC

This is a publication of the Association of American Medical Colleges (AAMC). The AAMC serves and leads the academic medicine community to improve the health of all. www.aamc.org

The AAMC is a not-for-profit association representing all 147 accredited U.S. medical schools, nearly 400 major teaching hospitals and health systems, and more than 80 academic and scientific societies. Through these institutions and organizations, the AAMC represents nearly 160,000 faculty members, 83,000 medical students, 115,000 resident physicians, and thousands of graduate students and postdoctoral trainees in the biomedical sciences.

To download this document, go to www.aamc.org/gradcompact.

Introduction

The *Compact Between Biomedical Graduate Students and Their Research Advisors* presents guiding principles intended to support the development of positive mentoring relationships between predoctoral students and their research advisors. A successful student-mentor relationship requires commitment from the student, mentor, graduate program, and institution. This document offers a set of broad guidelines that are meant to initiate discussions at the local and national levels about the student-mentor relationship.

There are several potential uses for this document. Among those suggested are the following:

- As a starting point for discussions between predoctoral students, research advisors, and institutional administrators about the issues addressed by the compact
- As part of the orientation for new predoctoral students
- As part of a regular and ongoing discussion between predoctoral students and their research advisors
- As a source of topics to be discussed in graduate research programs
- As a part of the orientation for new research faculty
- As a source of topics to be discussed in faculty mentorship programs
- As a component of faculty evaluations
- As a tool to initiate the development of additional programs and support services for predoctoral students within a graduate research program

This compact was originally drafted in 2008 in collaboration with representatives of the AAMC Group on Graduate Research, Education, and Training (GREAT Group) and is modeled on the AAMC's *Compact Between Postdoctoral Appointees and Their Mentors*, available at www.aamc.org/postdoccompact. Input on this document was received from GREAT Group representatives and members of the AAMC governance. The document was endorsed by the then AAMC Executive Council on September 25, 2008. In 2016, a team consisting of representatives from the GREAT Group and the AAMC Council of Faculty and Academic Societies (CFAS) reviewed and updated the document. The GREAT Group, CFAS, and AAMC staff leadership provided input on the revised draft.

Compact Between Biomedical Graduate Students and Their Research Advisors

Predoctoral training entails both formal education in a specific discipline and research experience in which the graduate student trains under the supervision of one or more investigators who will mentor the student through graduate school. A positive mentoring relationship between the predoctoral student and the research advisor is a vital component of the student's preparation for future careers and mentoring roles.

Individuals who pursue a biomedical graduate degree are embarking on a path of lifelong learning and are therefore expected to take responsibility for their scientific and professional learning and development from the onset. Graduate students must be in charge and take ownership of their progress through the graduate program. This means seeking guidance on and knowledge about course requirements and program requirements, policies, and procedures. Students must also commit to working on an individual development plan. Faculty members who advise students—with the backing of the graduate program and institution—are expected to fulfill the role of mentor, which includes providing scientific training, guidance, instruction in the responsible conduct of research and research ethics, and financial support. The faculty advisor also serves as a scientific and professional role model for the graduate student. In addition, the advisor offers encouragement as the graduate student prepares an individual development plan and facilitates the experiences and professional skills development essential for a broad set of career paths.

Core Tenets of Predoctoral Training

Institutional Commitment

Institutions that train biomedical graduate students must be committed to establishing and maintaining rigorous graduate programs with the highest scientific and ethical standards. Institutions should work to ensure that students who complete their programs possess the foundational knowledge, skills, and values that will allow them to mature into scientific professionals of integrity. They should have oversight of the graduate curricula, length of study, stipend levels, benefits, career guidance, grievance procedures, and other matters relevant to the education of biomedical graduate students (e.g., consideration of, preparation for, and exposure to various career paths). Institutions should recognize and reward their graduate-training faculty. With changing and diversified biomedical workforce needs, institutions should recognize the necessity of faculty development around multiple career paths for trainees and provide opportunities for faculty to acquire such skills and experiences. Additionally, institutions should also foster an environment that is diverse and inclusive.

Program Commitment

Graduate programs should establish training that prepares students with broad and deep scientific knowledge and the technical, professional, and leadership skills necessary for a successful career in the biomedical sciences. Programs should closely monitor the progress of graduate students during their course of study by establishing milestones and clear parameters for outcomes assessment, as well as maintain and make available career outcomes data.

Quality Mentoring

Effective mentoring is crucial for graduate school trainees as they begin their scientific careers. Faculty mentors must commit to dedicating substantial time to the scientific, professional, and personal development of the graduate student. Whether a faculty member acts as the primary research advisor or sits on a student's advisory committee, a relationship of mutual trust and respect between mentor and graduate student is essential for healthy interactions and to encourage individual growth. Effective mentoring should include teaching the scientific method, providing regular feedback in the form of both positive support and constructive criticism to foster individual growth, teaching the "ways" of the scientific enterprise, and promoting careers by providing or directing students to appropriate opportunities. The best mentors are careful listeners who actively promote and appreciate diversity. They possess and consistently maintain high ethical standards, acknowledge and recognize the contributions of students—in publications and intellectual property, for example—and have a record of research accomplishments and financial support. Finally, it should be recognized that mentoring does not end with a student's completion of the graduate program but continues throughout the student's professional life.

Skill Sets and Counseling for a Broad Range of Career Choices

The institution, training programs, and mentor should provide training relevant to a broad variety of careers that will allow graduate students to appreciate, navigate, discuss, and develop career choices. Effective and regular career guidance activities should be offered.

Commitments of Graduate Students

- **I acknowledge that I have the primary responsibility for the successful completion of my degree.** I will be committed to my graduate education and will demonstrate this by my efforts in the classroom, the research laboratory, and all other related academic and professional activities. I will maintain a high level of professionalism, self-motivation, initiative, engagement, scientific curiosity, and ethical standards, including complying with institutional and research group standards for contributing to an inclusive research environment.

- **I will meet regularly with my research advisor to provide updates on the progress and results of my course work, research, and professional and career development activities.**

- **I will work with my research advisor to develop a thesis/dissertation project.** This will include establishing a timeline for each phase of my work. I will strive to keep engaged with the work, discuss experimental findings and any pitfalls, and meet the established goals and deadlines.

- **I will work with my research advisor to select a thesis/dissertation committee.** I will commit to meeting with this committee at least annually (or more frequently, according to program guidelines). I will discuss my progress to date and be responsive to the advice and constructive criticism from my committee.

- **I will be a good lab citizen.** I agree to take part in shared laboratory responsibilities and will use laboratory resources carefully and frugally. I will maintain a safe and clean laboratory space. I will be respectful of, tolerant of, and work collegially with all laboratory personnel. I will be an active contributing member to all team efforts and collaborations and will respect individual contributions. I will also contribute to an environment that is safe, equitable, and free of harassment.

- **I will maintain detailed, organized, and accurate research records. With respect to data ownership, I acknowledge that original notebooks, digital files, and tangible research materials belong to the institution and will remain in the lab when I finish my thesis/dissertation so that other individuals can reproduce and carry on related research, in accordance with institutional policy.** Only with the explicit approval from my research mentor and in accordance with institutional policy may I make copies of my notebooks and digital files and have access to tangible research materials that I helped to generate during my graduate training.

- **I will discuss policies on work hours, medical leave, and vacation with my graduate program and research advisor.** I will consult with my advisor in advance of any planned absences and apprise my advisor of any unexpected absences due to illness or other issues.

- **I will discuss policies on authorship and attendance at professional meetings with my research advisor.** I will work with my advisor to disseminate all relevant research results in a timely manner before completion of all degree requirements.

- **I will be knowledgeable of the policies and requirements of my graduate program, graduate school, and institution.** I will commit to meeting these requirements in the appropriate time frame and will abide by all institutional policies and procedures.

- **I will attend and actively participate in laboratory meetings, seminars, and journal clubs that are part of my educational program.** To enhance research, leadership, and additional professional skills, I will seek out other enrichment opportunities, such as participation in professional organizations and meetings, student representation on institutional committees, and coordination of departmental events.

- **I will be knowledgeable of all institutional research policies.** I will comply with all institutional laboratory safety practices and animal-use and human-research policies. I will participate in my institution's Responsible Conduct of Research Training Program and practice the guidelines presented therein while conducting my research. I will also seek input on and comply with institutional policies regarding my research design and data analysis.

- **I acknowledge that I have the primary responsibility for the development of my own career.** I recognize that I need to explore career opportunities and paths that match and develop my individual skills, values, and interests to achieve my desired career goals. I understand that there are tools such as the individual development plan that I should use to help me define my career goals and develop my training plan. I will seek guidance throughout my graduate education from my research advisor, career counseling services, thesis/dissertation committee, other mentors, and any other resources that can offer advice on career planning and the wide range of opportunities available in the biomedical workforce.

Commitments of Research Advisors

- **Throughout the graduate student's time in my laboratory, I will be supportive, equitable, accessible, encouraging, and respectful.** I will foster the graduate student's professional confidence and encourage intellectual development, critical thinking, curiosity, and creativity. I will continue my interest and involvement as the student moves forward into a career.

- **I will be committed to meeting one-on-one with the student on a regular basis. I will regularly review the student's progress and provide timely feedback and goal-setting advice.**

- **I will be committed to the graduate student's research project.** I will work with the student to help plan and guide the research project, set reasonable and attainable goals, and establish a timeline for completion of the project.

- **I will help the graduate student select a thesis/dissertation committee.** I will assure that this committee meets at least annually (or more frequently, according to program guidelines) to review and discuss the graduate student's progress and future directions. I understand that the function of this committee is to help the student complete the doctoral research, and I will respect the ideas and suggestions of my colleagues on the committee.

- **I will provide an environment that is intellectually stimulating, emotionally supportive, safe, equitable, and free of harassment.**

- **I will demonstrate respect for all graduate students as individuals without regard to gender, race, national origin, religion, disability or sexual orientation, and I will cultivate a culture of tolerance among the entire laboratory.**

- **I will be committed to providing financial resources, as appropriate and according to my institution's guidelines, for the graduate student to conduct thesis/dissertation research.** I will not require the graduate student to perform tasks that are unrelated to the training program and professional development.

- **I will expect the graduate student to share common laboratory responsibilities and use resources carefully and frugally.** I will also regularly meet with the graduate student to review data management, storage, and record keeping. I will discuss with the student intellectual policy issues regarding disclosure, patent rights, and publishing research discoveries.

- **I will discuss with the graduate student authorship policies regarding papers.** I will acknowledge the graduate student's scientific contributions to the work in my laboratory, and I will provide assistance in getting the student's work published in a timely manner.

- **I will be knowledgeable of and guide the graduate student through the requirements and deadlines of the graduate program and the institution, as well as teaching requirements, if any, and human resources guidelines.**

- **I will encourage the graduate student to attend and present their research at scientific/professional meetings and make an effort to secure and facilitate funding for such activities. In addition, I will provide opportunities for the student to discuss science and their research findings with colleagues and fellow scientists within the institution and broader scientific community—for example, at lab meetings, research days, and seminars.**

- **I will promote the training of the graduate student in professional skills needed for a successful career. These skills include but are not limited to oral and written communication, grant writing, management and leadership, collaborative research, responsible conduct of research, teaching, and mentoring.** I will encourage the student to seek opportunities to develop skills in other areas, even if not specifically required by the student's program. I will also encourage the graduate student to seek input from multiple mentors.

- **I will create an environment in which the student can discuss and explore career opportunities and paths that match their skills, values, and interests and be supportive of their career path choices.** I will be accessible to give advice and feedback on career goals. I will work with the student on an individual development plan to help define career goals and identify training milestones. I will provide letters of recommendation for the student's next phase of professional development.

Association of
American Medical Colleges
655 K Street, NW, Suite 100, Washington, DC 20001-2399
T 202 828 0400
www.aamc.org

16-263 (01/17)