Human Medical Genetics and Genomics Program

SCHOOL OF MEDICINE

UNIVERSITY OF COLORADO
ANSCHUTZ MEDICAL CAMPUS

STUDENT HANDBOOK

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HMGGP Website

Information in this handbook is subject to change at any time without prior notice

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Program Guidelines Disclaimer

As a member of the HMGG PhD Program, you are expected to adhere to all established policies and procedures of the University, the Office of Research Edcuation, the Graduate School and this PhD Program.

CU Anschutz – University Policies	https://catalog.ucdenver.edu/cu-anschutz/university-policies/
Office of Research Education	https://medschool.cuanschutz.edu/ore/forms-and-resources
Graduate School	https://graduateschool.cuanschutz.edu/forms-resources/resources

For any policies, please make sure to review the Graduate School Policies and Procedures.

Program Overview

The Human Medical Genetics and Genomics Graduate Program at CU is an interdisciplinary, interdepartmental program designed to coordinate outstanding graduate training and research opportunities in all aspects of Human and Medical Genetics. We and the HMGGP faculty are committed to nurturing and sustaining a dynamic and outstanding program that provides training and mentorship to the next generation of leaders in the fields of human and medical genetics and genomics.

These fields have expanded way beyond the horizon that was visible at the culmination of the Human Genome Project at the turn of this century. Rapid advances in high-throughput and low-cost technologies have enabled the discovery of thousands of genetic variants and genes critical to development, physiology, and diseases both common and rare. The vastness and complexity of the data generated by these technologies have instigated major strides in statistical and computational methods and tools for analyzing these data to generate hypotheses and gain insights. At the same time, advances in experimental systems and tools have enabled direct interrogation of genetic mechanisms of disease pathophysiology. We are in an exciting time where these experimental and computational advances are now leading to effective tests for rapidly identifying genetically susceptible individuals and new technologies for personalized treatment or even prevention of these diseases, contributing to overall improvement of health and quality of life for everyone. It is the mission of the Human Medical Genetics and Genomics Graduate Program to be at the forefront of this revolution.

The Human Medical Genetics and Genomics Graduate Program is built on close engagement with our students, who are integral to our ongoing mission to build towards the future. The Program is continually adding new Training Faculty, providing students with an outstanding group of scientists from whom to select as Thesis Advisors and Mentors. Our goal is to provide students with a world-class graduate training experience in an interactive and collaborative environment that allows for an individualized learning experience.

- Code of Conduct

HMGGP is committed to fostering an environment that is not only productive and innovative but also welcoming, respectful, and enjoyable for everyone. Our collective success depends on the well-being and support of all members, and our program's Code of Conduct outlines the values and expectations that guide our interactions. HMGGP's CoC is consistent with and in service of the Chancellor's Vision on an Ethical Culture, which includes compliance with the university's commitment to upholding the highest ethical, professional, and legal standards (by being aware of and following established policies, standards, laws and regulations, reporting concerns, and working together to resolve them).

Office of Research Education Contacts

Program Co-Director: Arjun Krishnan, PhD

- Email: arjun.krishnan@cuanschutz.edu

Program Co-Director: Kelly Sullivan, PhD

- Email: kelly.d.sullivan@cuanschutz.edu

ORE Program Administrator: Vanessa Medina

- Email: vanessa.medina@cuanschutz.edu

Office of Research Education (located in the Fitzsimons Building, 5th Floor West, Suite W5107)

Angie Ribera: Associate Dean of Research Education, angie.ribera@cuanschutz.edu

- Point of contact for faculty, program, and organizational concerns and planning

Jodi Cropper: Business Services Program Director, jodi.cropper@cuanschutz.edu

- Point of contact for financial and organizational planning concerns and coordination

Morgan Texeira: Program Manager, morgan.texeira@cuanschutz.edu

- Point of contact for program specific concerns and additional point of contact for Program Administrators

Stephen Frazier: Business Service Professional, stephen.frazier@cuanschutz.edu

- Point of contact for ORE administrative concerns, organizational planning and ORE leadership availability

BSP & MSTP Requirements

Students transferring to HMGG from the Biomedical Sciences (BSP) or Medical Scientist Training (MSTP) programs may have different credit/course requirements (see appendix 3). Applications for transfer will be evaluated based on thesis lab availability, transcripts, and performance on the preliminary exam and in rotation labs. It is important to understand that transfer from either program into the HMGG depends on a HMGG faculty member agreeing to accept the student into their lab for their thesis work.

MSTP Students should enter a thesis lab with 27-33 graduate credits, including graduate core. They have also completed/will complete the MSTP Preliminary Course focused on grant writing in Spring term of their transfer year. This course covers F31 grants, but also F30 grants which are specific to dual-degree trainees. The MSTP administration will review student transcripts with the PhD Program Administrator at time of transfer and will confirm that all expected graduate credits have posted for program review and evaluation.

MSTP students have already selected and been accepted into a thesis lab within the selected PhD program. They will enter the program under this lab's support immediately upon transfer and should not incur charges to the PhD program at any point in training absent the need for gap funding/support. As such please consider this transfer to be equivalent to a second year PhD student. Time to degree is a very important metric for the NIH and the program's T32 grant. MSTPs are expected to complete their PhD training within four years of entering lab. Of course, mitigating circumstances can occur. The MSTP Administration should be alerted to any significant progress concerns which may impact a student's ability to graduate within the expected time frame. This can be accomplished by meeting, email, or committee meeting notes as appropriate.

- MSTP students should contact MSTP Administration to obtain the program specific lab mentor agreement to review lab mentor responsibilities, curriculum requirements and other expectations related to the research portion of training. **MSTP students must have thesis committee meetings every 6 months** regardless of their PhD program. Each MSTP student's thesis committee should have a faculty member representing MSTP. Students should discuss MSTP faculty representation with the Director or Associate Program Director to identify suitable candidates.
- Throughout the Thesis stage of training, MSTPs are required to register for the *Longitudinal Foundations of Doctoring* (FOD) course in 2 terms annually (Fall and Spring). They will enroll into the *Capstone Return-to-Clinics* course in their last year of thesis training, replacing FOD in the spring term. The MSTP mentor is responsible for covering the costs for these courses and agrees to this as part of the MSTP-specific mentor letter.

Curriculum Overview

Registration Process

- Academic Calendars (see The Graduate School calendar)
- Register for Classes (see The Graduate School)
  - All basic science PhD students must register for a minimum of 5 credits (fall and spring semesters), 1 credit of 8990 (summer semester), and anything above the minimum credit level will need approval from faculty mentor.
  - First year students, BSP and MSTP students should work with their program directors, program administrators, and faculty mentors as there will be additional credit requirements associated with their progress in the program.
  - The paying of tuition, fees and student health insurance occurs the week following the deadline for semester add/drop period, which can be found on the academic calendar. The Program Administrator will complete the process of submitting the appropriate form to the Bursar's Office. For those students receiving financial aid, please work with the Program Administrator to avoid any disruption in aid awarding.

Year 1

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Foundations in Biomedical Science	BMSC 7806	6
Core Topics in Biomedical Sciences – A **Evolution Genetics & Genomics**	BMSC 7810 - 004	2
Core Topics in Biomedical Sciences – B (student may select topic)	BMSC 7810	2
Topics in Human Genetics	HMGP 7610	1
Rotation 1	HMGP 7650 (001)	1
Rotation 2	HMGP 7650 (002)	1
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**

Survey of Genetics	HMGP 7600	4
Topics in Human Genetics	HMGP 7610 (001)	1
Bioinformatics Course (Student may select topic)	*See Appendix 7 for more information	*Based on topic selected
Rotation 3	HMGP 7650 (001)	1
Summer Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	HMGP 8990	1

- **Graduate Advisory Committee**
  During the first year, until students have selected a Thesis Advisor and formed a committee, the Graduate Advisory Committee (GAC) will serve as the student Advisors. New students will meet with the GAC periodically; this is a time to express any concerns or difficulties, to ask any questions that have arisen, and to discuss potential future rotation choices or the choice of thesis lab. Students are encouraged to engage the GAC with any academic or programmatic concerns throughout their first year.

- **Rotations**
  Students are required to complete three lab rotations in their first year. A week before the start of the rotation, students are required to submit the HMGG Pre-Rotation Form with their mentor's name for approval from the Program Directors to proceed with the mentor selected.

  After identifying a rotation mentor, students will submit the ORE Milestone Rotation Request. The Program will communicate instructions and submission deadlines. Three forms will be submitted throughout the academic year. Furthermore, to align and clarify expectations and to ensure that students have access to all necessary resources for success, students and rotation mentors must meet and fill out mentor-mentee compacts.

  Students will give a post-rotation seminar to develop public presentation skills—key for career success. Talks are typically 12 minutes, though the exact length may vary yearly, and will be announced by their rotation mentor or a member of the rotation lab. Students are expected to rehearse with their lab and rotation mentors before the public presentation.

  At the conclusion of the rotation, students will be required to submit a Post-Rotation Paper and fill out an evaluation of their rotation mentor and rotation mentors will evaluate their students. The Post-Rotation paper and feedback are due the Friday after the rotation talk. These results will be communicated to the GAC and the PDs and relayed to the interested parties as necessary.

  For additional information on rotations and rotation seminars, including guidelines for presentations, please see Appendix 1.

- **Preliminary Exam**
  The Preliminary Exam, taken in the summer after Year 1, provides faculty with an important tool to evaluate the students' broad knowledge base obtained from coursework in Year 1, as well as their scientific writing capabilities. Please see the Examinations Section for more information.

- **Transfer to Thesis Lab**
  Students should reflect on their rotation experiences and discuss lab choices with rotation mentors and the GAC. Students transfer to their thesis labs on July 1st. The Program Directors, and the Program Administrator should be notified of the choice of mentor on or before June 15, except in the rare case of a 4th rotation. See Appendix 1 for information on 4th rotations. After the thesis lab is

chosen, the Program Administrator will route the Predoc Financial Support Agreement for signatures.

- **Residency**
  Per University policy, it is required that students begin the process of establishing their residency as soon as they accept their offer to join the PhD program. This process must be started promptly to ensure you meet the necessary deadlines by the end of your first year. For more information, please visit the University website – Residency. Students who do not obtain Colorado Resident Status as defined by the Registrar (with the exception of international students) will be required to pay the difference between in-state and out-of-state tuition beginning the Fall of year 2.

Year 2

- Minimum registration requirement for full-time graduate students is 5 credits. Anything above 5 credits must be approved by faculty mentor.

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Research (Pre-Comps)	HMGP 7650 (0V3)	1-5 (variable)
Responsible Conduct of Research	BMSC 7811	1
Topics in Human Genetics	HMGP 7610 (002) *section 002 is ONLY for 2nd year students	1
Biostatistics Course (Student may select topic)	*See Appendix 7 for more information	Variable
Bioinformatics Course (Student may select topic) **If not completed in Year 1*	*See Appendix (8) for more information	Variable
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Research (Pre-Comps)	HMGP 7650 (0V3)	1-5 (variable)
Topics in Human Genetics	HMGP 7610 (002) *section 002 is ONLY for 2nd year students	1
Elective (Student may select topic)	*Based on topic selected	Variable
Summer Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	HMGP 8990	1

- **Seminars & Research Update Talks**
  - In-person attendance at seminars is a requirement for all HMGGP students.
  - Seminars are Thursdays, 1 – 2 PM.
  - 2nd year HMGGP students are required to give a half-hour (including Q&A) presentation on their current research.

- **Comprehensive Exam**
  Some students will be ready to plan their comprehensive exam late in year 2. Please see the Examinations Section for more information.

Year 3+

- Minimum registration requirement for full-time graduate students is 5 credits. Anything above 5 credits must be approved by faculty mentor.
- Students defending in the current semester must register for 5 credits of HMGP 8990. If a student is defending in between semester dates as defined by the Academic Calendar, the student must register for 5 credits of (Program) 8990, in the proceeding semester of the scheduled defense date.

Fall Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	HMGP 8990	1-5 (variable)
Topics in Human Genetics (Required for 3rd year students ONLY)	HMGP 7610 (003)	1
Spring Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	HMGP 8990	1-5 (variable)
Topics in Human Genetics (Required for 3rd year students ONLY)	HMGP 7610 (003)	1
Summer Semester: Required Courses		
Course Title	**Registration Information**	**Credits**
Doctoral Thesis	HMGP 8990	1

- **Seminar & Research Update Talks**
  - In-person attendance at seminars is a requirement for all HMGGP students.
  - Seminars are Thursdays, 1 – 2 PM
  - 3rd year and beyond, HMGGP students are required to give a half-hour Thesis Update Talk (including Q&A) on their current research.

- **Thesis Committee Meetings**
  Students are required to meet with their TAC annually. The program recommends that students meet with their TAC once every six months. It is the student's responsibility to schedule these meetings and inform the Program Administrator of your TAC meeting date. Students should notify their TAC of their Thesis Update Talk and the annual meeting should be scheduled in close proximity to the talk.

- **Thesis Defense**
  Students typically defend in years 4+. Please see the Examinations Section for more information.

Examinations and Evaluations

Preliminary Exam

Every first-year student takes the Preliminary Qualifying Exam at the end of the first year of graduate school. The exam committee is comprised of three to four faculty members

- **Format of Preliminary Exam**
  - **Written Component:** As specified by the Preliminary Exam Committee, each student will write a research proposal based on one of two provided papers. Each proposal is limited to 3-5 pages and will present and test at least one hypothesis derived from the findings in the paper. Each proposal should include the following: background, critical summary of the major findings and the significance of the findings, a future hypothesis that you propose, specific aims, and experiments to test your hypothesis. Each proposal must draw from everything that you have learned, not just what is in the papers. The focus will be on evaluating the student's ability for critical assessment of research findings, and the ability to propose and test a research hypothesis. The written proposals must be the student's own original work and must be submitted to the HMGGP office by the time specified by the Committee.
  - **Oral Component:** The purpose of the oral exam is two-fold. One is to test the student's ability to explain and defend the hypotheses and experiments proposed in their written proposal. Two, the written proposal will serve as a departure point to test the student's knowledge of human medical genetics and genomics and other relevant topics covered in graduate course work up to that point, including Core Course and HMGP 7600. The student will be expected to answer general knowledge questions on topics both related and unrelated to the proposal. The oral exam will last approximately one to two hours. It will begin with a brief (10 minute) summary slide presentation of the student's proposal, followed by a question period.

- **Format of the Written Section of the Preliminary Exam**

  Overall format: 1/2-inch margins; single-spaced; 12-point Times New Roman or 11-point Arial as the minimum font size; strict page limit of 3 pages total, not including references and cover page. The section limits below are only guidelines; you must decide for yourself how to optimally allocate 3-5 pages total.

  - **Content format:**
    - Background (up to 1 page): brief, focused summary of the literature relevant to the studies in the paper, including importance/significance of the topic and what prompted these studies to be undertaken.
    - Key findings and their Significance (up to 1/2 page): a critical (point out strengths and weaknesses) discussion of what the authors did and how they did it, the experimental findings in the paper, what do the findings mean or not mean, and why, and why this is important to the field.

  NOTE: It is not necessary that you accept the author's findings or agree with their conclusions. But whether you agree or disagree with the authors, you will need to defend your position with supporting evidence both in the written and oral sections.

  - Your (new) Hypothesis and two specific aims: addressing the next logical step in this line of investigation (i.e.: Given your assessment of the findings in this paper, what would you do to take this line of research to the next step, why that is important, and how would that advance knowledge?)
  - Experimental Design to address the Aims (up to 1 and 1/2 pages); for each Aim, discuss:

- Rationale: Why do you propose these studies?
- Experimental approach: What experiments will you do to accomplish the Aim? Give sufficient experimental detail to allow the reader to evaluate your understanding of the methods and whether those methods are applicable, feasible, and sufficiently definitive to achieving your stated Specific Aim. As appropriate, consider and discuss statistical power requirements.
- Expected findings, possible pitfalls, possible alternative findings and interpretations, possible alternative approaches: What results do you expect; what could prevent the experiments from working the way you expect; what could you do if the experiments do not work the way you expect?

NOTE: If during your literature search, you find a paper that has already carried out an extension of this work, either by these authors or by other investigators, you must a) go no farther in reading that paper and b) chose a different Aim. You are on your honor in this regard.

- **Grading of Preliminary Exam**
  The exam is graded Pass/Fail/Pass with Conditions. If formal conditions or other deficiencies are noted during the exam, the student will develop a plan to address these weaknesses. In some cases, re-examination may be required. In all cases, problems noted during the exam should be addressed by the end of the fall semester of the second year. All students will be uniformly evaluated and scored based on a preliminary exam rubric.

- **Policies for BSP Students**
  Every first-year student takes the Preliminary Qualifying Exam at the end of the first year of graduate school. BSP students that plan to join **HMGG** will participate in the program's preliminary exam.

- **Policies for MSTP Students**
  MSTP trainees transferring into **HMGG** current preliminary exams are accepted as an equivalent to the program preliminary exam. MSTP trainees will complete an MSTP specific preliminary exam prior to program transfer.

Yearly Planning Meeting **(Individualized Development Plan)**

At the beginning of each academic year, every student in the program is required to hold a yearly planning meeting with their PhD advisor(s) and inform the PDs and the PA by the end of September about the outcomes of this meeting by emailing a completed, signed 2-page worksheet (which also serves as a guide to structure the meeting). The yearly planning meeting is an avenue for you (the student) and your PhD advisor(s) to discuss where you were and to plan where you are going next. The goals of this meeting are to celebrate accomplishments, set short-term and long-term research and career goals, help make rapid progress by prioritizing projects and identifying barriers, clarify and solidify relationships by giving honest constructive criticism, and clarify expectations in both directions and constructively address any disagreements.

As you progress through your current position here, these yearly meetings will provide you and your advisor with regular opportunities to develop and execute a plan that can ensure that you attain a satisfying career. And, since you need different things at different times, these meetings will give you both a chance to take a birds-eye-view of your accomplishments and goals, which your advisor can use to tailor their advice to be most helpful in your particular circumstances.

This document contains detailed instructions on how to hold a productive yearly planning meeting, along with a simple 2-page worksheet to provide the meeting some structure.

Comprehensive Exam

At the beginning of the second year of study HMGG students will begin preparing for the Comprehensive Exam. It is highly recommended that students familiarize themselves with the Comprehensive Exam policies and deadlines and discuss forms and timelines with the Program Administrator well ahead of the planned examination so all required paperwork can be completed on time. A student must be registered at the time they take the Comprehensive Exam.

- **Timing and requirements of the Comprehensive Exam**:
  - Students are required to take the Comprehensive Examination for admission to candidacy for the Human Medical Genetics and Genomics Ph.D. by October 1 of the student's third year.
  - All students who take the Comprehensive Exam must have passed a Preliminary Exam.
  - At the time of taking the Comprehensive Exam, students must have taken or be enrolled to take 30 didactic course credits.
  - Students who have joined HMGG directly must also have passed all required coursework from Year 1.
  - Students who joined HMGG through BSP or MSTP should review the requirements in Appendix 2.

- **Formation of Comprehensive Exam Committee:**
  - The Comprehensive Exam Committee (CEC) shall consist of a minimum of five Graduate Faculty members.
    - The CEC will consist of a Chair who must be a member of the HMGGP Graduate Training Faculty. The student's Thesis Advisor, and at least three other members of the Graduate School Faculty Directory, at least one of whom must NOT be a member of the HMGGP Graduate Training Faculty.
    - The student's thesis advisor acts as an observer during the exam, taking notes and answering questions from the committee when the student steps out. The mentor does not provide or determine the scoring.
  - The proposed composition of the CEC will be due to the Program Directors and Program administrator by November 1st of the second year and must be approved by the Program Directors.
    - The student should discuss with their thesis advisor an appropriate group of faculty, then contact the faculty members to determine their interest. Often faculty like to meet with the student to discuss the project prior to committing to being on the committee.
  - Students must meet with their CEC at least once before the exam. This meeting can be held soon after the formation of the CEC, but no later than April 1. This introductory meeting should be limited in scope. Students may share up to five slides introducing themselves and their project very broadly – no data should be included. The goal of the meeting is to familiarize ethe committee with the student and their project and to set expectations for the examination for the student in terms of format and content.
  - Following the introductory meeting, students may consult committee members separately beforehand about subject areas for the actual exam.
  - As you prepare for your Comprehensive Exam, please ensure that all your committee members have a faculty appointment listed in the Graduate School Faculty Directory.

- **Required Forms to Schedule Comprehensive Exam:**
  - Graduate School - Resources & Forms - CU Anschutz
    - App Candidacy form

        - Exam request form
    - Once a date has been set with your committee, you must contact your Program Administrator to initiate forms. You will also discuss room bookings at this time. All forms must be submitted to the Administrator at least a month prior to the exam date.

- **Format of the Comprehensive Exam**
  The exam centers on a student preparing a 7-page thesis proposal, written in the format of a NIH-type F31 (NRSA) grant proposal with just the research components — 1-page Specific Aims and 6-page Research Strategy — (minus the training component description, budget, etc.). References are additional to the 7 pages. The proposal must be submitted to the committee at least **two weeks before** the exam.
  Students must demonstrate deep scientific understanding and defend their proposal. The exam tests broad knowledge beyond coursework.
  The exam includes:
    - Students will schedule 2 ½ hours for the examination.
    - The examination format is a 30-minute, oral, formal summary of the proposal by the candidate followed by a closed-door exam with the CEC:
        - With the student in the room:
            - For a period lasting 1.5-2 hours, faculty on the Exam Committee will ask the student questions.
        - With the student & thesis advisor out of the room:
            - The Exam Committee will evaluate the student's proposal and oral presentation.
        - With the student out of the room:
            - The committee will then explicitly discuss each of the criteria, apply a rating in each area, and then decide whether to give the student an overall score of Pass, Pass with Conditions, or Fail.
            - All Committee members will sign the DocuSign form, indicating the result of the exam.

- **Grading the Comprehensive Exam**
  The exam is graded Pass/Pass-with-Conditions/Fail. With the Pass-with-Conditions grade, the Exam Committee outlines remedial actions to be taken by the student and a timeline. The Exam Committee also completes an evaluation of the student's performance. Within this report, the Committee scores the student in a variety of different areas, including knowledge of concepts and the quality of the oral presentation. The evaluation and scores are based on a rigorous Comprehensive Exam rubric. The Committee typically also provides constructive scientific feedback on the proposed project.

Thesis Defense

- **Thesis Committee Formation**
    - The Thesis Committee must consist of at least five Graduate Faculty members. Most commonly, the composition of the Thesis Committee is the same as the Comprehensive Exam Committee, but this is not required.
    - Students must establish a committee with a minimum of 5 members, at least 3 of whom must be members of the Human Medical Genetics and Genomics Program Training Faculty including the faculty mentor (cannot be thesis chair).
    - 1 of the members must be a non-HMGGP faculty member. This allows for one member who is external to the UCD|AMC faculty, as may be appropriate for the inclusion of Committee members with special expertise, if appropriate.

- The Chair must be a member of the HMGGP Graduate Training Faculty.
- Thesis committees should not be just populated by friends of the PhD advisor. Students should strive to create a committee with diverse, independent voices who can not only provide different scientific expertise but also serve as an advocate for and support system for the student uncoupled from the advisor.

The membership of the Committee must be approved in writing by the Program Directors.

- **Timing and requirements of the Thesis Defense**:
  - One first author research publication, resulting from the student's thesis project in their mentor's laboratory, must be submitted and under review at the time of thesis defense.
  - At the time of the defense, the student must have taken or be registered for at least 30 HMGP 8990 course credits.
  - If defending after the semester ends, you must register for 5 credits of 8990 in the proceeding semester. (Thesis defenses must be tied to the end of the semester deadlines dates please see the links below)
  - Students should schedule a defense date at least 6 weeks in advance of the anticipated date.
  - Students are generally required to submit their final thesis to the Thesis Committee at least two weeks prior to the defense date.
  - A student must receive approval from the thesis committee prior to moving forward to schedule a defense date.

- **Thesis Defense**
  - The thesis defense consists of:
    - ~50-minute public oral presentation by the student
    - A 1-2-hour closed-door meeting with the Thesis Committee.
  - The closed-door defense begins with the Thesis Committee Chair outlining the goals and mechanics of the meeting.
    - Typically, the meeting consists of faculty taking turns asking questions.
    - Based on the written thesis document, the oral presentation, along with interactions at the defense, the Thesis Committee will assign a score of Pass, Pass with Conditions, or Fail to the defense.
  - Most commonly, a student will Pass their defense, although Thesis Committee members may have specific points that they would like a student to address in the written thesis document. These are conveyed either in writing or in one-on-one meetings.
  - In cases in which there are more significant deficiencies in the thesis, the Thesis Committee may assign a score of Pass with Conditions. When this occurs, the Thesis Committee chair will provide a timeline for the student to address the concerns in a revised thesis document. This timeline must be within constraints imposed by the Graduate School. According to Graduate School policy, the final, formally approved dissertation must be submitted to the Graduate School within 60 days of the thesis defense unless an extension is approved by the Graduate School.

- **Required Forms:**
  Graduate School - Resources & Forms - CU Anschutz
  - Below forms must be submitted 4 weeks before the exam:
    - Biosketch Form (This is a graduate school form, not the NIH form)
    - Exam request form

- The Thesis Approval form should be initiated prior to your exam date and completed by Graduate School Deadlines (see Deadlines tab, Graduation Deadlines Thesis for appropriate year).
- Watch how to prepare the correct forms and upload your dissertation.
- The Defense Report, which is the form on which Committee members indicate the score of Pass, Pass with Conditions, or Fail, will be sent directly to the committee by the Graduate School.

Policies and Procedures

Human Medical Genetics and Genomics Program

- **Academic Progress and Remedial and Disciplinary Actions**

  Students must follow the academic schedule in the Handbook. Unexcused delays in meeting requirements may lead to dismissal. In rare cases, the Program Directors may allow remediation with added conditions. Failure to meet these will result in dismissal.

  Financial support depends on satisfactory academic progress. Support ends 30 days after a dismissal recommendation. Satisfactory academic progress is defined as:
  - **Human Medical Genetics and Genomics courses**: Grade **B or better** required (B– or below = fail).
    - A single failing grade may be remediated (usually via independent study & make-up exam).
    - Grades below C or lack of remediation options require retaking the course.
    - Failed remediation will result in a dismissal recommendation.
  - **Other courses**: Grade **B or better** required.
  - Only **one failing grade** is allowed across all required courses.
  - Students must pass **preliminary and comprehensive exams**.

  Academic and programmatic progress will be tracked by the PDs, PA, GAC, and TAC, and students who are underperforming will receive guidance and support, however, failure to meet the above requirements will result in dismissal from the program. Students should take care to monitor their own progress and seek support when necessary.

  Unsatisfactory progress in dissertation work is cause for serious concern. The Thesis Committee for each student, which meets with the student and mentor every six months, will assess progress.
  - If the Thesis Committee deems progress inadequate, the student and thesis mentor will meet with the Program Directors, the Thesis Committee chair, and the Program Directors to ascertain whether the student can continue in the program. A recommendation of dismissal is a possible outcome of these deliberations.
  - If the student is allowed to proceed further, an additional unsatisfactory assessment of thesis work will be cause for a mandatory recommendation for dismissal to the Graduate School without further review, subject only to appeal by the student (see appeals).

- **Appeals**

  A student will have 7 days to appeal any decision by the Program Directors that affects them. Such appeals must be in writing and emailed to the Program Directors and chair of the Program Directors. The Program Directors will respond to appeals within 7 days of receipt. Students will be given the opportunity to meet in person with the Program Directors to discuss their appeal if they desire.

  Unchallenged decisions or decisions after appeal to the Program Directors regarding the correction of academic deficiencies are final. Decisions regarding recommendation for dismissal to the Graduate School may be appealed to the Dean of Graduate Studies.

- **Procedure for leave reporting**

  Policies for vacation and leave for HMGG students are the same as for other students at CU Anschutz. These are outlined on the Resources page of the Graduate School website under the Policies tab.

  - **Vacation and Holidays** - Trainees may receive the same vacations and holidays available to individuals in comparable training positions at the grantee or sponsoring institution. Trainees shall continue to receive stipends during vacations and holidays. At academic institutions, the time between semesters or academic quarters (including summer) is considered an active part of the training period, not a vacation.

    If student funding is obtained from a source other than the NIH, the other funding institution may provide leave guidelines that differ from those outlined above. In such cases, the guidelines from the relevant funding institution shall apply.
  - **Sick Leave and Other Leave** - Trainees may continue to receive stipends for up to fifteen calendar days of sick leave per year. Under exceptional circumstances, this period may be extended by the awarding component in response to a written request from the training Program Directors or the sponsor. Sick leave may be used for the medical conditions related to pregnancy and childbirth pursuant to the Pregnancy Discrimination Act (42 USC 2000 e (k)).
  - **Parental Leave** - Trainees may also continue to receive stipends for up to sixty calendar days of parental leave per year for the adoption or the birth of a child when those in comparable training positions at the grantee or sponsoring institution have access to paid leave for this purpose. Either parent is eligible for parental leave. For trainees, the use of parental leave must be approved by the training Program director. A period of terminal leave is not permitted and payment may not be made from grant funds for leave not taken.
  - **Unpaid Leave** - Individuals requiring extended periods of time away from their research training experience, which could include more than fifteen calendar days of sick leave, or more than sixty calendar days of parental leave must seek approval from the awarding component for an unpaid leave of absence. Approval for a leave of absence must be requested in advance by the training grant Program Director and be countersigned by an authorized institutional official.
  - **Leaves of Absence** - During a leave of absence, documentation to suspend the period of appointment must be completed by submitting an amended Statement of Appointment Form and a Termination Notice. These forms should be submitted to the awarding component at the beginning of the leave. At the resumption of NRSA support, the reappointment must be documented on another Statement of Appointment Form.

- **AI policy**

  Guidelines for the Use of AI and Machine Learning Tools in HMGG Courses

  The recent emergence of freely accessible Artificial Intelligence (AI) platforms that use large language models and other generative algorithms necessitates new guidelines to ensure that students understand when and when not to use these tools. Their benefits include enhancing scientific writing, accelerating the writing process, and reducing barriers to non-native English speakers. Major potential drawbacks also exist, however, including the potential for false or inaccurate information, breaches of confidentiality, plagiarism, and depriving students the critical tasks of working through problem sets that reinforce core didactic material. Thus, improper use of AI tools has the potential to undermine the learning objectives of the program.

  This policy establishes a simple set of guidelines for acceptable and unacceptable use of AI language model tools in HMGG courses. Our goal is to promote acceptable use of new technology while maintaining our overall goals and standards for training. Failure to follow these guidelines may result in course failure. Any questions regarding this policy and its implementation should be directed to the Course Directors and/or Program Directors.

  Please note that these guidelines are minimum expectations and in cases where guidance is stricter, these policies are superseded by any specific guidelines provided by Course Directors (i.e. you must attend to any guidance provided by Course Directors and instructors for those relevant courses);

Principle Investigators (as a member of a laboratory group, you must respect the wishes of use by your PI); or any other guiding entity (e.g. thesis committees).

Generally acceptable use

If you use AI tools for these purposes, you must be transparent about their use. Citation of any use should be included in the bibliography of your written assignments: include the name of the specific tool (and version) and how it was used. Ex: ChatGPT, v4 was used to evaluate the grammar in this proposal. Suggestions from this evaluation were included in the final draft.

1. Language and grammar checks. Except for course exams (see below), AI tools can be used to check or edit your original text drafts for grammatical errors. This provides an opportunity for you to learn rules and best grammatical practices.
2. Coding help. AI tools can help translate code between computer languages, explain code structures and principles, and teach you to code as a tutor might. These methods can be problematic if too many errors creep in, but in general, you may find it helpful to design your own tutorials driven by your own questions and curiosity that AI tools can help with.

Generally unacceptable use

1. Answering test questions for courses. Exams in HMGG courses are intended to challenge you to think and translate your thoughts into original answers that are then evaluated by the course directors. During course exams, AI tools cannot be used at all, even to make suggestions to improve grammar and clarity in your writing.
2. Deriving answers and generating new text for homework and writing assignments for courses. While AI tools can be used to evaluate the grammar of your own, original written content, and make suggestions to improve grammar and clarity, they cannot be used to generate new content for homework assignments. Also, verbatim use of sentences generated by AI tools will be considered plagiarism.
3. Identifying topics/potential experiments and generating new text for comprehensive exam proposals. These exams are intended to evaluate your ability to identify important scientific problems and experiments that address them, as well as to translate this knowledge into a written grant proposal. While AI tools can be used to evaluate the grammar of your own, original written content, and make suggestions to improve grammar and clarity, they cannot be used to generate new written content in comprehensive exam proposals. Verbatim use of sentences generated by AI tools will be considered plagiarism. In general, you should be able to defend every sentence you write with knowledgeable discourse.
4. Drafting peer review summaries. You may not use AI tools to generate summaries or reviews of your classmates' work. Peer review is an excellent opportunity to sharpen your critical thinking and evaluate alternative ideas on a topic and provides a unique opportunity for practicing concise written communication. Use this opportunity to consider the proposal from your peer and provide your own perspective. Using AI tools to generate summaries or reviews denies you this opportunity and denies your peer from gaining your perspective. Furthermore, uploading content from another individual's proposal to an AI tool may violate confidentiality, as the uploaded content may be disseminated or used for other purposes and without your consent. NIH has recognized this threat recently adopted a policy that prohibits the use of generative AI technologies for the peer review process.

In general, you should follow the principles outlined below as you navigate the use of AI in your graduate work:

Developed collaboratively with Campus Health Sciences Faculty Committee.

We, as members of the AMC Community, strive to be innovative and curious in our approach to the use of new technology. Especially, given our commitment to improving health and biomedical research, we are responsible to approach the use of these tools with integrity and professionalism.

1. Never enter identifiable patient data/information into third party tools.

2. If using tools to assist with clinical decision-making, ensure these are approved by the health system and based on best available evidence.
3. Familiarize yourself with the pitfalls of various tools such as bias, hallucinations, incorrect information. In particular, for our PhD students, all should be aware of the tendency for LLM chatbots to fabricate fake citations and other information.
4. Be vigilant about the presence of biases in work generated by AI/ML; strive to mitigate the dissemination of these biases.
5. Avoid use of AI/ML to replace successful, evidence-based study strategies given concern these tools may negatively impact learning. For example, work through problem sets on your own or with classmates rather than leaning on AI tools. The goal in a PhD program is for you to learn, not to check boxes.
6. Critically evaluate any AI/ML generated responses with knowledge from course work and other resources.
7. Be honest and transparent about the use of AI and ML tools in curricular work such as studying and assignments. Citation of use should include name of the specific tool (and version) used and how it was used (e.g. editing first draft for grammar; syntax help in Python code). Ex: ChatGPT, v4 was used to edit my first draft for clarity and brevity.
8. Failure to cite use of outside tools may be considered plagiarism and will be addressed in the same way other academic professionalism lapses would be.
9. Approach new technology and tools with curiosity but always maintain intellectual integrity.

v.1 2024, sources CSD guidelines, Campus Guidelines, HMGG directors

- **Communication**
  - Please be sure to note the announcements posted on the several bulletin boards located outside of the Graduate Training office, the HMGGP Administrative offices, and the Lounges. Email to your assigned cuanschutz.edu (domain address) is the primary form of written communication both within the Program and the University as a whole. Please check your email regularly: as a minimum, twice a day.

- **External Employment:** 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.

Office of Research Education

- Office of Research Education
- Conflict of Interest (reference to Comps and Thesis committees)
  - Honor Code and Committee Procedures
- Anschutz Email address communication
- Student Badge Requirement
  - Everyone on campus must carry a CU Anschutz Badge. The Office of Research Education will facilitate the badging process for new students. This identification badge serves many purposes including enabling students to access university buildings and laboratories, utilize the library, obtain parking, and keep our campus secure. It is the student's responsibility to keep their badge on them and visible at all times. Lost or stolen badges should be immediately reported to the Badging Security Office or University Police (after hours).
- Financial Aid for Graduate Students
- Residency
- Tuition, fees and stipend
  - All incoming Graduate Students are offered a financial aid package from the Graduate School that includes an annual stipend of **$41,912** (approved for Academic Year **2025 -**

2026), tuition costs, and payment of individual student health insurance and activity fees. The Stipend is evaluated on an annual basis for the cost of living. Please note that this support covers the period July 1, through June 30 for continuing PhD students, and August 15, through June 30 for first year PhD students. Payment of annual stipend, along with tuition costs, fees and individual health insurance is dependent upon satisfactory academic progress as defined in the Graduate School and Program policies.

- For first-year graduate students, stipend, tuition, and (individual) health and optional dental insurance benefits are generally supported by the Office of Research Education (ORE).
- Upon successful completion of the Preliminary Exam at the end of year one, and upon identification and acceptance into a thesis laboratory, students are supported by funds provided by their Thesis Advisors and/or by other external sources (i.e., fellowships and awards).
- Following the University Comprehensive Examination (generally at the end of the student's second year), the annual stipend during the thesis years is provided either by the student's Thesis Advisor or by external fellowships.
- Continuation of support is predicated at all times on satisfactory academic progress, as determined by the mentor, the Thesis Advisory Committee, and the Program Directors. The financial obligation for a student does not rest with the actual Human Medical Genetics and Genomics Program.
- Each student is responsible for his or her own books, housing, and any other expenses not specifically mentioned above.
- The Office of Research Education Administrator will obtain a copy of the first-year students' bills following registration for the current semester. The Program Administrator will ensure that all appropriate charges on the student bills are paid. It is only necessary to deliver a copy of the student bill to the Office of Research Education if there is a problem or question.
- Each student is personally responsible for late fees and fines, so it is critical that all necessary paperwork arrives at the Graduate Training office in a timely fashion and that all necessary registrations are completed.
- Any student registering past the semester registration deadline set by the Office of Admissions & Records will be assessed a late registration fee, which is also the student's responsibility by the explicit policy of the Assistant Dean of the Office of Research Education.
- Student expenses, including the stipend, will be paid by the sources detailed above until graduation as long as the following conditions are met by the student:
    1. Maintaining satisfactory academic progress
    2. Achieving eligibility for in-state tuition after the first year. Students who fail to qualify for in-state residency will be responsible for the difference between in-state and out-of-state tuition
    3. Passing the Preliminary Examination at the end of the first year. This requirement applies both to students who may be matriculating directly into the HMGGP degree Program and to students from the Biomedical Sciences Program (BSP) who intend to enter the HMGGP Ph.D. Training Program
    4. Successful completion of the University Comprehensive Examination on or about the end of the second academic year. Students accepted into the Program as second-year degree candidates must pass the Comprehensive Examination at the end of their first year in the Program.

5. Ability of the student's chosen Thesis Advisor to provide support during the research phase of the Program.
6. Scheduling the Thesis Defense within approximately five years of entering the Program.
    a. Office of Research Education rules require that a student defend their Ph.D. within eight years of matriculation. No extensions are permitted.
    b. The NIH generally limits pre-doctoral support to seven years total.

Program Events and Activities

Program Seminar

The HMGG Program Seminar Series is Thursdays from 1:00 - 2:00 pm. The seminar series consists of student thesis update talks, faculty membership talks, and invited guest speaker talks.

- All Human Medical Genetics and Genomics students are required to attend every seminar.
- 1st year Students: At the completion of each required rotation, students must present a post-rotation seminar. In the post-rotational seminar, the student presents the rationale, methods, and results obtained from the rotation project, as well as an interpretation and a discussion of the rotation project results. The post-rotational presentation usually lasts fifteen minutes, with the last three minutes customarily devoted to questions from the audience.
- All second year and above students are required to give a yearly thesis update talk during seminar. This update should be 25 minutes with five minutes for questions.
- All senior students not defending in the fall must present a research in progress talk during the fall semester.

Annual Retreat

HMGG holds a retreat for faculty and student members of the Program. Presenters include HMGGP training and non-training faculty as well as student members.

- The 2025 HMGG Retreat is October 27th at the Donald M. Elliman Conference Center
- Attendance at the retreat is required for all HMGG students. Students should contact the Program Administrator and Program Directors if they are concerned about their ability to attend the retreat. Reasons for required attendance include:
    - The Retreat is the single most important event in the year that exposes students to the variety of human medical genetics and genomics research being conducted at CU Anschutz.
    - The event provides a comfortable, informal venue in which to present your research and discuss science with faculty, post-doc, and student colleagues. This can be great practice for presentations at national conferences later in the year.
    - It helps build community and a culture of connection.
    - It provides an unusual opportunity to have extensive interactions with a top scientist (i.e., Keynote Speaker) from another institution.
    - HMGG students are also expected to present their work, in either posters or short talks.
    - All 2nd years are required to present a poster of their work.

Note: Short talks can count as Research Update Talks for 3rd years and above if so desired.

Student activities

- **Human Medical Genetics and Genomics Journal Club**:

- Thursday mornings weekly except when there is an invited guest speaker during the academic year.
- All HMGG students are required to attend, including presenting articles several times per year.
- Each presenter must invite one faculty member to participate in the discussion.

Recruitment

Around February 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 the Human Medical Genetics and Genomics faculty who can convince these individuals that our Program is the place to be! When asked, please be willing to spend some time with prospective students during dinners or other functions. HMGG can flourish with your help.

Resources and Support

Students can access a variety of campus services through the links provided below. The Office of Student Affairs is committed to supporting CU Anschutz students by offering guidance and assistance in navigating campus resources. For detailed information about available services or to schedule an appointment, please visit the Office of Student Affairs webpages. For additional questions or support, you may contact the office via email at StudentAffairs@cuanschutz.edu.

- Office of Student Affairs
  - Campus Life
  - Student Support
  - Health & Wellness
  - Student Resources
  - Student Services
- Students Resource Directory
  - Includes all campus resources
- Academic Calendar
- Residency
- Badging Office
- Student Parking & Transportation
  - Eco Pass
  - Campus Circulator (Transportation service)
  - Medical Campus Rail Shuttle
- Office of Information Technology
- Student Health Insurance
- Office of Research Education – Concern Reporting Form (Maxient)
- CU Anschutz Student Outreach and Support Referral
- CU Anschutz Student Request for Medical Leave of Absence
- Graduation Deadlines Thesis, Anschutz
- Thesis & Dissertation/ProQuest Format & Guidelines

Appendices

Appendix 1: Rotations and Rotation Seminars

- **Choice of Mentor/Laboratory.** First and foremost, students should choose laboratories and projects that are reasonable possibilities for a student's thesis work. Students should avoid rotations whose main goal is the acquisition of new techniques; there will be plenty of opportunities to learn methods informally among the Program laboratories as the need arises. They should talk to the GAC prior to making rotation decisions. Students should be aware that mentors and their groups put considerable effort into supervision of rotating students. Thus, some faculty may be reluctant to take on a rotation student if they have extensive travel plans, teaching, grant writing, or if their funding is in jeopardy. For these reasons, it is important that students arrange for rotations as far in advance as possible.
- **Rotation Periods:** Each rotation is ~12 weeks in duration. The second and third lab rotation periods include the winter and spring breaks. Students should discuss specific expectations with their rotation advisors for effort during these breaks. The winter break in particular is quite long, running from mid-December to late January (according to the Graduate School calendar), and students should expect to be working in the lab during most of this period. Students should always discuss time off with their lab mentors in advance. If you need a **Fourth Rotation,** you must request approval from your Program Director. The Program Administrator and Program Director will work with the Office of Research Education accordingly
- **Rotation Grades:** Final grades for rotations will be based on the evaluation of the lab rotation advisor. These reports are sent to the student, the Program Directors for HMGG, and Program Administrator. It is also very important that students meet with their rotation advisors after their rotation talks to discuss strengths and weaknesses in performance during the rotation and suggestions for improvement.
- **Rotation Seminar:** Students should consider the following elements when designing their talk:
    - Introduction: a short statement of the question or problem addressed by the rotation.
    - Background: describe the significance of the question in broad terms for a diverse audience. Describe previous work and its relationship to the project.
    - Specific aims: what were the experimental goals proposed to address the hypothesis?
    - Methods and Design: explain any unusual strategies or techniques employed. Results and
    - Conclusions: the results should be presented in a straightforward and logical manner. Conclusions should be summarized briefly.
    - Future direction: at the end of the talk, the student should provide a brief summary of results and how, in the students' opinion, they should be followed upon.

Several other specific suggestions for effective talks include:

1. Students should remember that they are addressing a general neuroscience audience and avoid the use of specialty-specific terminologies and jargon.
2. Avoid reading or memorizing your presentation, if at all possible. Wooden, canned deliveries are dull and very hard for audiences to follow. 3. Prepare and use simple, effective visual aids. Remember that effective communication of data and ideas is your goal. Keep text very brief and do not read directly from the screen.4. Both faculty and students are encouraged to ask questions after rotation seminars. A few of these questions may be intended to probe your understanding of your research rather than illuminate an area of confusion. Consider audience questions carefully. Make sure that you understand the question before answering. Repeat the question or ask for a rephrasing if you need to. Take a moment to formulate a coherent answer. If, after contemplation you don't know the answer, don't be afraid to say so. We all get stumped from time to time!

- **Expectations for Effort:** While first year students have a substantial course load, the program expects that sufficient time will be devoted to the rotation project. For professionals in training, it is not appropriate to require a minimum number of hours for rotation work. Strong self-motivation is an 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 be in the lab beyond the normal working hours from time to time, i.e., in the evenings and on weekends. This commitment of time is especially important when long, complex experiments are being done. A major part of the mentor's rotational assessment (as well as their willingness to accept a student) will be based on the degree and quality of lab effort.

Appendix 2: MSTP AND BSP Additional Requirement

Medical Scientist Training Program (MSTP)

- Prior to the Comprehensive Exam, students who join the Pharmacology Program through MSTP must take the following credits of didact pharmacology-related courses. The Pharmacology Program courses are:
  - HMGG 7610(001) – Topics in Human Genetics (Fall & Spring, 1 cr.) Year 1 of being in the HMGG program
  - HMGG 7610(002) – Topics in Human Genetics (Fall & Spring, 1 cr.) Year 2 of being in the HMGG program
  - Biostatistics Course (Fall, variable cr.)
  - Bioinformatics Course (Fall, variable cr.)
  - BMSC 7811 - Ethics in Research (Fall, 1 cr.)
  - HMGP 7600 – Survey of Genetics (Spring, 1 cr.)
  - Elective (min. 2 hours, either fall or spring; consult with mentor)

  Medical Scientist Training Program
  - HANDBOOK

Biomedical Sciences Program (BSP)

- Prior to the Comprehensive Exam, students who join the Human Medical Genetics and Genomics program through BSP must take the didact HMGP-related courses listed Spring of Year 1.
- BSP students must fulfill all HMGG requirements from Spring of Year 1 and beyond.

  Biomedical Sciences PhD Program
  - HANDBOOK

Appendix 3: Thesis Committee Meetings

- **Frequency and Duration of Thesis Committee Meetings**
  - Thesis Committee meetings should occur annually and last 1-2 hours
  - As a student approaches the completion of their thesis research, it may be appropriate to have more frequent meetings.
  - The student and student's advisor are primarily responsible for ensuring that the meetings occur at the appropriate time.
- **Requirements for Thesis Committee Meetings**
  - At least two days prior to the meeting, the student should send the Thesis Committee members an outline of progress since the last committee meeting (or Comprehensive Exam). The outline should be 1-2 pages in length and include the following:
    - An agenda for the meeting, including what the student hopes to get out of the meeting.

        - The objectives of a student's research project, as outlined in the original aims of the comprehensive exam proposal or in revised aims.
        - Progress toward the research objectives.
        - Activities related to the development of professional skills, such as presentations at conferences, attendance at workshops, fellowship applications, and the writing of manuscripts.
        - Activities pertinent to career development, including whether a student has discussed their Individual Development Plan with their thesis mentor.
        - The Thesis Committee chair may provide other, more specific guidelines.
    - Review of progress with student/mentor out of the room
        - Thesis Committee meetings should begin with the student and thesis mentor each providing a brief update of progress with the other party out of the room. This mechanism is intended in part to allow students and faculty to talk openly about mentee/mentor relations.
        - If the committee includes a spouse of the thesis advisor, it is recommended that the spouse should accompany the thesis advisor when they leave the room. This should facilitate a more open discussion.
    - Oral Presentations at Thesis Committee Meetings
        - At the meeting itself, students provide their committee with a semi-formal presentation of their research progress. These presentations typically last ~1.5 hours.
        - Students should explain the background, rationale, and results of their research project. Some of the research described may be work in progress, and students should also use committee meetings to discuss technical problems that they have encountered. Hence, parts of the committee meeting presentation may be more informal.
        - Students should also update committee members on their progress in the development of professional skills and in career development.

- **Evaluation of student progress at Thesis Committee meetings**
    - Thesis Committee meetings are primarily designed as a mechanism for students to get feedback on their science from experts. The committee conveys this information both during the meeting as well as after the meeting through thesis committee report.

- **Summary of the responsibilities of Thesis Committee Chair**
    - After each Thesis Committee meeting, the Chair should e-mail the thesis advisor feedback about mentorship issues that came up during the meeting. If no issues came up, the Chair should e-mail the thesis advisor with a note indicating such.
    - At the Thesis Defense, the Committee Chair will be responsible for securing the student's academic file from the Program Administrator.
    - Throughout a student's dissertation period, the Committee Chair will serve as the primary conduit of information between the students and committee members.

- **Role of Thesis Committee in the final stages of a student's dissertation work**
    - As a student approaches the end of their thesis work, the Thesis Committee plays an especially critical role. It is the job of the Thesis Committee to determine whether a student's research meets the standards for a PhD.
    - Obviously, it is important that a student be in active discussions about completing the thesis with their thesis committee significantly before, perhaps as much as a year prior to, when the student expects to complete their thesis. In the final stages, students should expect to

receive explicit guidance from the thesis committee about their expectations for the student in thesis committee meeting(s) and associated report(s).

Appendix 4: Faculty Information/ Resources

- Faculty information/resources
  - Quick Reference table for membership

Appendix 5: Disciplinary Actions

The University of Colorado Anschutz Medical Campus, consistent with most other educational institutions, has a student honor code. The Human Medical Genetics and Genomics Ph.D. Training Program endorses and enforces this Academic Honor Code. The Academic Honor Code is found on the Office of Research Education website; all students are required to read the Academic Honor Code. Violations of the Academic Honor Code will be handled as detailed in the Academic Honor Code itself and may entail disciplinary action, up to and including dismissal from the Program and from the Office of Research Education.

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

The student requirements described in this handbook must be met by the deadlines stated. The Program Administrator will monitor the progress of each student. If a student is not meeting the Program's requirements in a timely manner, the Program Directors may request a meeting with that student. After review, the Program Directors may take any actions deemed appropriate, including placing conditions on the student's continuance in the Program or dismissing the student from the Program.

Appendix 6: Important Dates and Deadline

FIRST-YEAR STUDENTS

1) First Rotation: August 25 – November 14, 2025
2) Pre-rotation paper for first rotation due on August 29, 2025, by 5 PM
3) Rotation Talk for first rotation: November 13, 2025
4) Post-rotation paper for first rotation due on November 14, 2025, by 5 PM
5) Second Rotation: November 17 – February 20, 2026
6) Pre-rotation paper for second rotation due on November 21, 2025, by 5 PM
7) Rotation Talk for second rotation: February 19, 2026
8) Post-rotation paper for second rotation due on February 20, 2026, by 5 PM
9) Third Rotation: February 23 – May 15, 2026
10) Pre-rotation paper for third rotation due on February 27, 2026, by 5 PM
11) Rotation Talk for third rotation: May 14, 2026
12) Post-rotation paper for third rotation due on May 15, 2026, by 5 PM
13) Preliminary Examination – oral examination is usually held in mid-June and is based on the schedule and availability of the members of the Committee. The actual date will be released on or around May 16, 2026.
14) Join Thesis Laboratory – any time after May 15, 2026, but no later than July 1, 2026.

SECOND-YEAR STUDENTS

1) Submit and get approval of proposed Comprehensive Examination Committee by Program Directors by November 1, 2025.
2) Introduction meeting with Comprehensive Examination Committee by April 1, 2026

3) Application for Candidacy form and a Request for Scheduling Exam forms need to be completed at least FOUR WEEKS prior to the scheduled Comprehensive Examination
4) Comprehensive Examination has to be completed by October 1, 2026
5) Please refer to handbook under Comprehensive Examination Committee for details on format, expectations and deadlines for the Comprehensive Exam.

THIRD-YEAR STUDENTS

1) Submit and get approval of proposed Thesis Advisory Committee by Program Directors by December 15, 2025.
2) Schedule 1st Thesis Advisory Committee Meeting by April 1, 2026.
3) Please refer to handbook under Thesis Advisory Committee for details on format, expectations and deadlines for the TAC meetings

FOURTH-YEAR STUDENTS & BEYOND

1) Schedule annual Thesis Advisory Committee Meeting – has to be scheduled no later than ONE calendar year after previous TAC meeting. For example, if your past TAC meeting was on April 1, 2025, then the next one has to be completed by April 1, 2026.
2) Please refer to handbook under Thesis Advisory Committee for details on format, expectations and deadlines for the TAC meetings

DISSERTATION DEFENSE

1) The dissertation defense and graduation deadlines are available here, along with instructions for submitting the written thesis using ProQuest.
2) Please refer to handbook under The Doctor of Philosophy Dissertation for details on format, expectations and deadlines for the dissertation defense

The **ACADEMIC CALENDAR** for **2025-26** is available here.

Appendix 7: Guidelines for Statistical and Bioinformatics Coursework

- **Guidelines For Choice of Statistical Coursework**

Statistics offers many important tools for use in the biological sciences. Whether the task at hand is to understand studies that have been conducted or reported in the literature, to design and conduct a new study, or to correctly analyze data, statistics informs the appropriate interpretation of the results with an understanding of the implications for future research. Depending on your research and professional plan and your background in mathematics, there are multiple options for courses in statistics at the University of Colorado Anschutz Medical Campus.

- BMSC7820 Statistics and Data Analyses for the Biomedical Sciences (3.0 cr.) (Fall) This is a semester-long basic introductory level course in applied biostatistics (taught in the Fall Semester) designed for students pursuing graduate degrees in biomedical research. We cover topics such as basic probability; t-, chi-square, and non-parametric tests; linear, logistic and Cox regression models; statistical power and multiple testing; cluster analyses; study design and scientific rigor; and scientific writing of methods and results. The course uses the statistical software package R; guidance and code are for provided for analyses and plot/figure generation. The course is designed to meet the minimum requirements for a biostatistics/statistics course. Students with previous coursework in calculus and linear algebra should consider taking a more rigorous course in applied statistics (e.g., BIOS 6011).

- BIOS6601 Applied Biostatistics I (3.0 cr.) (Fall, Spring, Summer) Applied biostatistical methods including descriptive and statistical inference; odds ratio and relative risk, probability theory, parameter estimation, tests for comparing statistics of two or more groups, correlation and linear regression and overviews of: multiple and logistic regression and survival analysis.
- BIOS6602 Applied Biostatistics II (3.0 cr.) (Spring) Prerequisite: BIOS6601. A continuation of BIOS6601 extending the basic principles of descriptive and inferential statistics of modeling more complex relationships using linear regression, logistic regression, and Cox regression. The statistical package SAS is used extensively
- BIOS6611 Biostatistical Methods I (3.0 cr.) (Fall) Prerequisite: Differential calculus. This is a first course in applied statistics covering elementary probability, descriptive, parametric, and non-parametric methods for one and two sample estimation/testing and some common simple cases of the univariate general linear model. The statistical package SAS is used extensively.
- BIOS6612 Biostatistical Methods II (3.0 cr.) (Spring) Prerequisite: BIOS6611. This is a continuation of BIOS6611 covering univariate linear modeling and emphasizing multiple regression and analysis of variance. Logistic regression and methods for correlated data are also covered. Matrix algebra and the statistical package SAS will be used.

- **Guidelines For Choice of Bioinformatics Coursework**

In addition to knowledge of biostatistics, practical skills in bioinformatics are needed by the majority of HMGG students for their research projects and are viewed as an essential piece of training in genetics and genomics. Most students, whether working on large scale human genetics and genomics studies or in laboratories that use animal models for functional and evolutionary genetics studies will need basic bioinformatics skills in Unix, Python, and R for analysis of datasets such as RNA-seq, for example. To satisfy the 3 credit hour requirement in bioinformatics, students can take any of the following courses.

- CPBS 7605: Ethics in Bioinformatics (Fall every other year; 1.0 cr.) In this course, discussions of professional conduct, social implications of research and questions raised by biomedical research, with an emphasis on topics relevant to computational biologists.
- MOLB 7900: Practical computational biology for biologists: Python (Spring every year; 2.0 cr.) This is a computational biology class aimed at biology PhD students. Topics covered include: basic practices for coding in Python; analysis of standard high-throughput genomic data to study the regulation of gene expression; integration of multiple datasets for genomic analysis; introduction to scientific computing in Python.
- BSBT 6071: Introduction to R Programming (Spring every year; 1 cr.) This course is an introduction to the statistical programming language R geared primarily to biomedical science students with little to no previous programming experience. Basic features of R as a programming language and as scientific computing platform. Basics of data cleaning, visualization, and analysis.
- BSBT 6805: Bioinformatics (Spring every year; 4 cr.) This course will simultaneously introduce students to coding principles (using R) applied to common problems in bioinformatics and data analysis. To this end, students will learn how to import high-throughput data into R, pre-process that data to account for technical anomalies resulting from the acquisition modality (e.g., RNA-Seq, ChIP-Seq), and perform a sequence of statistical analysis (e.g., ANOVA) and data visualization (e.g., heatmaps). At the completion of this course, students will be equipped with coding templates in R that they can apply to data analysis for their own research purposes. Students will also be exposed to more advanced principles of data analysis, such as training machine learning algorithms. These include unsupervised and supervised algorithms, which are commonly used for general data exploration and training diagnostic/prognostic models, respectively.

    - Prereq: Mathematical Foundations: Students are expected to have a solid understanding of calculus and matrix algebra. These mathematical principles are essential for comprehending common data analysis techniques used in bioinformatics.
- *IMMU 6110: Introduction to Bioinformatics (Spring every year; 3.0 cr.) An intensive course aimed to introduce basic theory and concepts of commonly used bioinformatics workflows encountered in immunology and microbiology NGS data sets. This course is also designed as a workshop; all workflows will be directly applied to pre-existing datasets. Pre-requisite: At least one semester of any R programming.

* Will need to request access to enroll in course by the course director.

In the event that a student completes 2.0 cr and is unable to register for another course to reach the 3.0 cr requirement, a student may obtain permission from the Program Directors and Curriculum Committee Chair to complete an online course to satisfy the remaining 1.0 cr.