



Computational Bioscience Program

SCHOOL OF MEDICINE

UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

2026-2027 Program Handbook

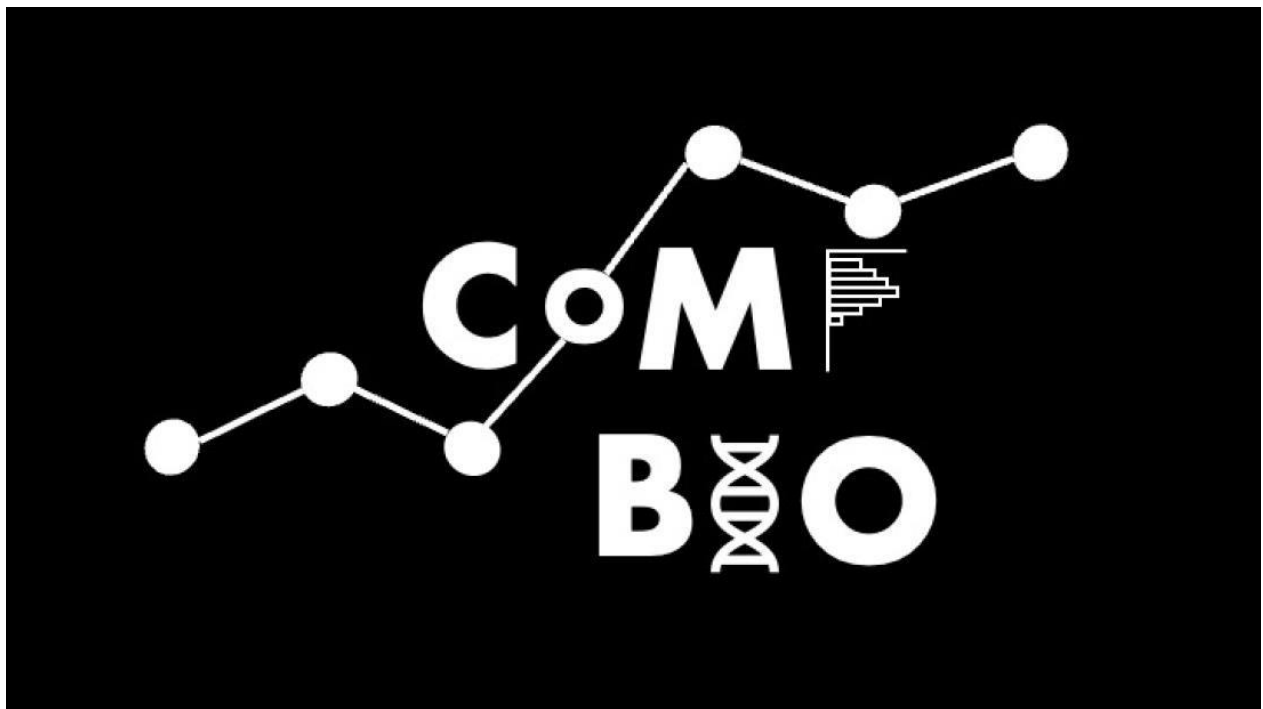


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Program Guidelines Disclaimer

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

The program leadership reserves the right to update this handbook over the course of the year. Updates may include changes to curriculum, course structure, requirements, or new program initiatives. When changes are made, the program leadership will communicate them promptly and transparently to all current students and will implement them in a way that is fair and that keeps student training and wellbeing at the center.

Updates: What's New in 2026–2027

- **New core curriculum:** Six required core courses replace the prior course structure, organized as a two-year arc across Years 1 and 2. Year 1 courses begin in Fall 2026; Year 2 courses begin in Fall 2027.
- **New Preliminary Exam format:** The qualifying exam, administered in June, is now a Scientific Reasoning Examination. See **Appendix 2** and the Preliminary Exam section.
- **Specialization tracks and electives:** A new structured elective system organized around four specialization tracks replaces the prior elective list. Taken in Year 2 Spring. See **Appendix 3**.

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- **Research Studios:** A required team-based research experience begins in Year 2. See the Research Studios section.
- **Doctoral Pathways:** The program now formally recognizes five pathways to doctoral completion, declared at the Comprehensive Exam. See the Doctoral Pathways section.
- **Research Internship:** A required research internship, positioned in Summer of Year 4 into Year 5, has been added. See the Research Internship section.
- **Non-credit workshop series:** Two required non-credit workshops run alongside Year 1 coursework: a Scientific Communication & Fellowship Writing Workshop in Fall and a Critique & Close Reading Workshop in Spring.
- **AI Use Policy:** Restructured into two parts with guidelines for coursework and a disclosure-based framework for PhD milestone documents. See **Appendix 6**.
- **Yearly Planning Meeting:** Replaces the prior IDP self-assessment tool. Required annually, with a September deadline. See the Yearly Planning Meeting section.
- **Interview Instructions and Rubric:** A standardized rubric for faculty and students evaluating prospective student candidates during interview days has been added. See the Recruitment section.
- **Pre-Comprehensive Exam publication policy:** A new policy governs eligibility of papers published before the Comprehensive Exam for inclusion in the dissertation. See the Thesis Defense section.
- **Mentor-Mentee Compact:** Required at the start of each rotation, beginning Fall 2026.
- **Education Assistant and Teaching Assistant structure:** EAs are a required experience in Year 2. Paid TAs are being planned to be available beginning Year 3.
- **Publication requirement updated:** The thesis defense publication requirement has been clarified to include pathway-specific evidence. See the Thesis Defense section.

Program Overview

MISSION STATEMENT

The Computational Bioscience Program at the University of Colorado Anschutz School of Medicine trains researchers at the intersection of biomedical informatics, mechanistic modeling, and artificial intelligence (AI). Our graduates work across the full biological-to-clinical spectrum, from molecular mechanisms and neural circuits to imaging systems and clinical workflows. They are trained to do rigorous, reproducible computational science and to direct it toward questions that matter.

The program organizes doctoral training around the lifecycle of computational science: scientific question, biomedical data, computational and AI models, causal reasoning, validation, and translation. Every student builds a common foundation in mathematical and computational reasoning, biomedical and clinical domain knowledge, AI systems and their limits, and the statistical and causal tools needed to defend what an analysis supports. Specialization in one of four research tracks gives that foundation depth and direction: (A) Bioinformatics and Computational Biology, (B) Computational Neuroscience, (C) Imaging Informatics, or (D) Clinical Informatics.

The program trains scientists. That means graduates who can be held accountable for what they produce, who can direct inquiry toward questions worth asking, and who can show their reasoning clearly enough that others can build on it. Those qualities come from sustained training and sustaining them is what this program is for.

EDUCATIONAL GOALS AND OBJECTIVES

The program's six core competencies define what a CPBS graduate can do. They serve as the foundation for how we teach, how we assess, and how we support student development.

1. Domain expertise: Graduates develop enough depth in their chosen biomedical or clinical domain to formulate computationally tractable questions with real scientific significance, and to interpret results in the context of what they mean for the field. Computational work without domain grounding produces findings that are technically correct and scientifically empty.

2. AI orchestration and verification: Graduates can manage AI and computational systems as a critical part of their workflow. This entails decomposing problems, validating outputs, identifying failure modes, and distinguishing what a system contributed from what they verified. This is what makes it possible to stand behind a published result and give an honest account of how it was produced.

3. Problem formulation and scientific judgment: Graduates can pose well-formed research questions, ensure those questions are biologically or clinically meaningful (not just statistically tractable), and defend why a given question is the right one to pursue.

4. Reproducibility and professional computational practice: Graduates produce organized, version-controlled, documented, testable research code and infrastructure. As pipelines get larger and easier to generate, the operative question becomes whether another lab can trust your computational science. Answering that question is a technical skill and a professional obligation.

5. Translation and communication: Graduates can move across the full cycle from biological or clinical question to computational approach to results to interpretation, and communicate that work clearly to biologists, clinicians, other computational researchers, and the public. This is the rarest capability among computational researchers and the one that most distinguishes graduates in practice.

6. Critical evaluation and quantitative rigor: Graduates understand the mathematical and statistical foundations of the methods they use. This includes why an algorithm works, when it applies, and where it fails. They can engage with AI and ML as informed practitioners rather than users of black boxes, and they can recognize and refuse to reproduce the methodological errors common in the computational biomedicine literature.

GRADUATE ADVISORY CHAIR (GAC)

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During the first year, CPBS students will meet with the GAC monthly to discuss the students' progress in the Program and to address any issues that may arise. The CPBS graduate students will meet as a group with Program Directors every semester to discuss issues relevant to the program. The students will be expected and encouraged to seek advice from the Program Directors, GAC, and/or other Computational Bioscience faculty members prior to lab rotations, the Comprehensive Exam, 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 a faculty member who is not on the list of approved faculty see **Appendix 8**, please contact the Program Director for approval. Useful information for rotations is included in **Appendix 9**.

ADVISING

General academic questions can also be directed to the Program Administrator at any time. Students should meet with the Program Administrator before completing any program milestone (Preliminary Exam, Comprehensive Exam, etc.) to confirm they have met all administrative requirements.

Once students have passed their Comprehensive Exam, they are admitted to candidacy for their Ph.D. At this point, students are required to meet with their full thesis committee at least once per year, though meetings twice per year are advisable.

We encourage all students to build a diverse mentoring team. Your primary thesis mentor is the foundation of that team, but a rich mentoring network extends beyond a single advisor. Look to develop relationships with other faculty inside and outside the program, senior graduate students, postdocs, and colleagues from other institutions. Mentors can support scientific development, career planning, specialized skills, and anything else where an experienced perspective is useful. Regularly scheduled conversations (whether weekly, monthly, or each semester) tend to be more productive than ad hoc check-ins.

PROFESSIONAL BEHAVIOR GOALS

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

Professional Behavior Objectives

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

SELF-DIRECTED AND LIFE-LONG LEARNING SKILLS

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

Self-Directed and Life Long Learning Skills Objectives

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

Office of Research Education Contacts

Program Co-Director: Arjun Krishnan, PhD

- Email: arjun.krishnan@cuanschutz.edu

Program Co-Director: James Mithcell, PhD

- Email: James2.mitchell@cuanschutz.edu

ORE Program Administrator: Abby Redwine

- Email: abby.redwine@cuanschutz.edu

Office of Research Education (located in the Fitzsimons Building, 1st floor East. Q20-E1334)

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
- Point of contact for student and related concerns

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

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

Miriam Venzor: Academic Services Coordinator, miriam.venzor@cuanschutz.edu

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

BSP & MSTP Requirements

Students transferring to the Computational Bioscience PhD Program from the Biomedical Sciences (BSP) or Medical Scientist Training (MSTP) programs may have different credit/course requirements see **Appendix 1**. 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 Computational Bioscience PhD Program depends on a Computational Bioscience PhD Program faculty member agreeing to accept the student into their lab for 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. 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 been posted.

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, absent a need for gap funding. Please consider this transfer to be equivalent to a second-year PhD student. Time to degree is a key metric for the NIH and the program's T15 grant. MSTPs are expected to complete their PhD training within four years of entering the 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)

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- [Register for Classes](#) (see The Graduate School)
 - All basic science PhD students must register in a minimum of 5 credits each Fall and Spring semester and 1 credit of 8990 each semester. Credits above the minimum require faculty mentor approval.
 - First year students, BSP and MSTP students should work with their Program Directors, Program Administrator, 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 handle the appropriate forms. Students receiving financial aid should coordinate with the Program Administrator to avoid disruption.

Year 1

Y1 FALL SEMESTER

Course	Registration	Credit
Mathematical Foundations of ML & Computation (Core 1)	CPBS 7620	3
Survey of Computational Biomedicine (Core 2, first iteration)	CPBS 7712	3
Rotation 1 (required, ~Sep.–Dec.)	CPBS 7650 (001)	3
Program Seminar	Attendance required	0
Scientific Communication & Fellowship Writing Workshop	Non-credit, required	0
Total		9

Scientific Communication & Fellowship Writing Workshop runs parallel to Core 1 and Core 2 throughout the Fall semester: It has two purposes: direct support for students applying to fellowships with fall deadlines (NSF GRFP, NIH F31, DOE CSGF, NSF ACCESS), and broader instruction in scientific writing and communication (grant and manuscript structure, communicating uncertainty honestly, and defending authorial choices). Faculty mentors and advanced students who have won fellowships participate as reviewers and coaches. Attendance is required.

Note on first iterations: The core curriculum reaches its full form over two years, with a "first iteration" launching in a given year and a "target iteration" one year later. Core 1 and Core 2 launch in their first iterations this Fall. The course boundaries and credit structure are fixed; the pedagogy deepens in the second year.

Y1 SPRING SEMESTER

Course	Registration	Credit
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AI Systems for Biomedical Discovery: Orchestration & Verification (Core 3, first iteration)	CPBS 7602	3
Research Methods in Computational Biomedicine (Core 4, first iteration)	CPBS 7601	3
Rotation 2 (required, ~Jan.–Mar.)	CPBS 7650 (002)	1
Rotation 3 (required, ~Mar.–May)	CPBS 7650 (0V3)	1
Program Seminar	Attendance required	0
Critique & Close Reading Workshop	Non-credit, required	0
Total		8

Critique & Close Reading Workshop runs parallel to Core 3 and Core 4. It builds the close reading and critical evaluation skills tested by the Preliminary Exam. Attendance is required.

Preliminary Exam is administered in June (date determined annually). See the Examinations section and **Appendix 2**.

Join thesis lab by July 1. Students should reach a mutual agreement with their thesis mentor by mid-June. Official lab transfer takes place July 1.

Y1 SUMMER

Course	Registration	Credit
Doctoral Thesis	CPBS 8990	1

***MSTP** students in the CPBS program must take CPBS Y1 Fall and Spring Core courses listed above once they join the program.*

Rotations

- **Laboratory Rotations:** Students must complete three rotations before the start of their second year. Rotations allow students to explore research areas, meet potential thesis mentors, and develop relationships with program faculty. Faculty use rotations to evaluate students' intellectual preparation, technical readiness, and motivation. See **Appendix 9** for rotation guidelines and resources.
- **Rotation Selection.** The first rotation begins in the Fall semester; students rotate through three labs across the academic year. Set up your first rotation before arriving on campus, if possible. Reach out to the Program Directors or the GAC for advice on selecting rotation mentors. Current students are also excellent resources. Attend program events at the start of the year. They are designed to give you a thorough view of research opportunities. **Students are expected to select rotation mentors from the approved list of CPBS faculty see Appendix 8.** Contact potential mentors several weeks before the rotation start date.

- **Mentor-Mentee Compact.** At the start of each rotation, both the student and the rotation mentor must complete at [mentor-mentee compacts](#). This brief document aligns expectations and ensures students have access to the resources they need from day one.
- **ORE Milestone Rotation Form.** Use the [ORE Milestone Rotation Request form](#) once you have identified your rotation mentor. Three forms are submitted across the academic year. Follow program-specific guidelines and submission deadlines.
- **Rotation Aims Page.** A specific aims page approved by the mentor must be submitted to the program within one week of the start of each rotation.
- **Rotation Expectations.** Rotations require genuine commitment. Students should set up regular meetings with their rotation mentor, work through specific aims collaboratively, and present data in lab meetings. The mentor's assessment of a student, and their willingness to accept them as a thesis student, is based substantially on the quality and depth of lab engagement. At the same time, keeping up with coursework is equally important. Discuss time off and vacation days with your mentor in advance.
- A short-written evaluation of the student's rotation will be provided by the rotation mentor see **Appendix 9**. 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 each rotation, students present a 10–15 minute post-rotation seminar (plus up to 3 minutes for questions). Prepare this with your rotation mentor. See Appendix 9 for the rotation talk evaluation form.
- **Transfer to Thesis Lab.** 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 Program Directors must formally approve the choice of a thesis mentor. Under some circumstances, a co-mentor 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 Directors (a template is available from the Program Director). Official transfer to the thesis lab takes place on July 1. 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 for developing a positive mentoring relationship. Please see **Appendix 11** for an example of Mentor and Mentee mutual expectations and a Mentor-Mentee compact from the AAMC.
- **Fourth Rotation.** Under exceptional circumstances and at the discretion of the Program Directors, a student may be allowed to perform an additional rotation for the express purpose of enhancing the mentor selection process. Request approval from the Program Directors. The Program Administrator and Program Directors will coordinate with the Office of Research Education.

Research Update Talks- Seminar Series

- Required to attend in-person seminars

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- Wednesday's, 1:00pm – 2:00pm

Preliminary Exam

- See the Examinations section below.

Transferring Thesis Lab

- [Predoc Financial Support Agreement](#) for those faculty mentors who choose to take on a new predoctoral mentee.

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](#).

Year 2

Minimum registration: 5 credits each Fall and Spring semester. Credits above 5 require faculty mentor approval.

Y2 FALL SEMESTER

Course	Registration	Credits
Statistical & Causal Reasoning for Biomedical Data (Core 5, first iteration)	CPBS [TBD]	3
Translational Biomedical Informatics: Deployment & Policy (Core 6, first iteration)	CPBS [TBD]	3
Research (pre-Comps)	CPBS 8990	1
RCR Seminar	BMSC 7811	1
Research Studio	Required (see below)	0*
Program Seminar	Attendance required	0
Electives (with approval)	PD & mentor approval required	variable

*Research Studio may carry designated research credit; registration details will be communicated.

Core 5 (Statistical & Causal Reasoning for Biomedical Data) covers regression and classification as inference, causal structure and DAGs, confounding in observational versus designed data, causal inference methods, experimental design, and the construction of defensible analytical choices. It is placed in Year 2 Fall so students can apply these tools to their own dissertation data. **Core 5 satisfies the program's statistics requirement; no separate biostatistics course is required.**

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Core 6 (Translational Biomedical Informatics: Deployment & Policy) covers clinical workflow and EHR integration, implementation science, regulatory pathways for software as a medical device, algorithmic bias and health equity, privacy and governance, and federated learning. Students carry a semester-long deployment scenario through all stages, from workflow analysis to regulatory mapping to equity audit and proposed fixes.

Y2 SPRING SEMESTER

Course	Registration	Credits
Specialization anchor elective	See Appendix 3	~3
Elective of choice	See Appendix 3	~3
Research (pre-Comps)	CPBS 8990	1–2
Program Seminar	Attendance required	0

Specialization selection. In Year 2 Spring, students pick one specialization, each with an anchor elective (foundational):

- A. Bioinformatics & computational biology: Omics analysis, integration & prediction
- B. Computational neuroscience: Computational & theoretical neuroscience
- C. Imaging informatics: Medical image analysis & computer vision
- D. Clinical informatics: Clinical decision support & mechanistic/predictive modeling

The rest of the electives in Y2 Spring or later to cover 9 of the 30 required credits are the students' to shape by taking approved courses at Anschutz, CU Denver, CU Boulder, etc that serve their dissertation or their skill/proficiency goals. This includes electives across multiple specializations. Talk to the PDs about what fits. See **Appendix 3** for the full list. Taking electives that put the total credits beyond 30 requires Program Directors and mentor approval.

Y2 SUMMER

Course	Registration	Credits
Doctoral Thesis	CPBS 8990	1

Comprehensive Exam preparation typically begins in Year 2 Summer. See the Examinations section.

Year 3 and Beyond

Minimum registration: 5 credits each Fall and Spring semester. Credits above 5 require faculty mentor approval. Students defending in the current semester must register for 5 credits of CPBS 8990. If a student

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is depending between semester dates, they must register for 5 credits of CPBS 8990 in the following semester.

Y3 FALL SEMESTER

Course	Registration	Credits
Elective of choice	See Appendix 3	~3
Doctoral Thesis	CPBS 8990	1–5 (variable)
Program Seminar	Attendance required	0
Comprehensive Exam (administered in Year 3 Fall, see Examinations section)	—	—

Ethics refresher. An eight-hour refresher course is required for all students every four years. Fifth-year students will take BMSC 7811 to fulfill this requirement. Contact the Program Administrator for enrollment information.

Y3+ SPRING SEMESTER

Course	Registration	Credits
Doctoral Thesis	CPBS 8990	1–5 (variable)
Electives (if applicable)	Mentor approval required	variable
Program Seminar	Attendance required	0

Thesis Advisory Committee (TAC) meetings are required **annually**; twice per year is strongly encouraged. Research Studio participation continues. Update talks are required annually.

Y3+ SUMMER

Course	Registration	Credits
Doctoral Thesis	CPBS 8990	1

Research Studios

Research Studios are team-based projects on real, faculty-designed research problems that run throughout Year 2 and beyond. A Studio requires students to work through the full computational science lifecycle on a difficult problem (from question formulation and data analysis through interpretation and communication) producing real research outputs: reproducible code, a preprint, a benchmark dataset, or a grant-style proposal.

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Studios run at an annual cadence beginning in Year 2, with a semesterly cadence planned as the program grows. Participation is required for all students in Year 2 and beyond.

Full details on Studio structure, team composition, problem selection, and output expectations will be communicated at the start of Year 2. Students entering in Fall 2026 will participate in their first Studio beginning in Fall 2027.

Doctoral Pathways

The program formally recognizes five pathways to doctoral completion. Doctoral work does not all look the same, and these pathways reflect that. All five require the same intellectual depth, rigor, and command of the work; what differs is the form of evidence that demonstrates it.

The five pathways are:

1. **Scientific Discovery:** New biomedical knowledge via sophisticated use of existing methods, with deep domain expertise informing problem formulation, research design, and interpretation. Evidence: publications and their contributions.
2. **Computational & Methodological Innovation:** New computational, statistical, or ML/AI methods to solve biological or clinical problems, benchmarked against existing approaches. Evidence: a novel method or validated model, with benchmarking.
3. **Clinical Translation:** A deployed clinical AI system or decision-support tool, built on the clinical infrastructure available on campus. Evidence: deployment and outcome evidence for a working prototype in a real clinical setting.
4. **Entrepreneurship & Innovation:** A startup, licensed technology, or commercialized IP, validated through structured venture training. Evidence: venture-validation evidence, substantially from the I-Corps process.
5. **Open Science & Infrastructure:** Widely adopted datasets, software platforms, or community resources. Evidence: adoption and usage evidence for what was built.

Declaration. Students declare a primary pathway, and optionally a secondary pathway, as part of the Comprehensive Exam proposal in Year 3 Fall. By that point, students have completed their specialization elective(s) and have enough dissertation traction to know which evidence standard fits their work. Nothing prevents informal exploration earlier and the rotations and Studio work are designed to help figure this out. Finally, declaration of a pathway (or two) is not meant to artificially constrain what direction a project goes instead of following the science or field (because of a declaration made before a shift in the field or something else getting published). It is instead a way for the student to clearly communicate with their thesis committee what their PhD goals are at the time of the Comprehensive Exam and how they are changing during the rest of their PhD. In turn, the thesis committee can use that information to evaluate if the student has completed the program intellectual output requirement.

Co-advisor. All students identify a primary advisor through rotations. As the dissertation project takes shape and pathway interest crystallizes, a co-advisor may be added, ideally in place before the Comprehensive Exam. Co-advisors are required for the Clinical Translation pathway (a clinical co-advisor, typically from UCHHealth or a clinical department) and the Entrepreneurship & Innovation pathway (an industry or venture co-advisor, typically from CU Innovations). For the other three pathways, co-mentorship is not required but may be appropriate depending on the committee's composition and expertise.

Dissertation defense. Every pathway is evaluated against a shared core standard (see Thesis Defense section) plus a pathway-specific evidence portfolio. Full rubrics for each pathway will be developed and communicated to all students before the first Comprehensive Exams under this framework. The program's Program Advisory Board, which includes faculty from across campus, industry, and clinical practice, advises on keeping pathway standards current.

Research Internship

Every student is required to complete a research internship, positioned in Summer of Year 4 into Year 5.

Why is this a program requirement? The internship exists to give every student protected time, near the end of their PhD, to do something directly in service of their career development. Students are required to discuss this opportunity with their advisor at least 9 months before the internship date to ensure that a good mutually agreed plan is in place for addressing research gaps and funding.

Scope. The internship may be in an academic, translational, or industry setting, whichever fits where a student is headed. A placement with a lab, hospital, company, or organization in the Denver area counts in full. Students headed for a faculty career might spend a summer in another lab building a collaboration or technique; students headed for industry might join a company research group; students drawn to translation might work inside a hospital system or non-profit. Students on the Entrepreneurship & Innovation pathway may satisfy the requirement through their own venture-building work.

Program support. Students do not arrange internships on their own. The program will build relationships with partner organizations across academia, health systems, industry, and the non-profit sector in the next two years, and students will be able to leverage these options. The program will work with each student individually to identify the right setting and timing.

Flexibility. The program recognizes that life circumstances (health, family, financial constraints) and professional circumstances (prior industry experience, prior networking) vary. Students who have already secured a strong opportunity through their own networks, or who have exceptional circumstances that make the standard timing or format difficult, may request a waiver from the Program Directors. The requirement is never enforced in a way that compromises a student's wellbeing or forces a choice between career development and degree completion.

First cohort. The first required internships for Cohort 2026 are in Summer 2030. Earlier cohorts will be offered the internship opportunity but are not required to complete it.

Credit Requirements Before the Comprehensive Exam

Students must complete all required core courses (Core 1–6), the rotation sequence, and a specialization elective before taking the Comprehensive Exam. All required courses must be completed with a grade of B or above. A grade of B– or below in any required course is considered unsatisfactory academic progress. See the Graduate School Standards section for policies on academic probation and remediation.

Following the completion of required coursework and the Comprehensive Exam, along with the electives required to reach 30 didactic credits, students should register for 30 credits of CPBS 8990 (Doctoral Thesis) before defending. At least 5 credits of CPBS 8990 must be registered in the semester of the defense.

See the Graduate School Policies and Procedures for the complete policy on academic credit requirements: [Graduate School - Resources & Forms - CU Anschutz](#)

Examinations and Evaluations

Preliminary Exam

Every first-year student takes the Preliminary Qualifying Exam at the end of Year 1. The exam is administered in June (exact date determined annually). Students join their dissertation lab on July 1.

The preliminary exam tests whether a student has built the foundational reasoning this program requires. It covers material from Core 1 through Core 4 (mathematical literacy, biomedical and clinical grounding, AI systems and their verification, and computational practice). The exam does not test recall of course content. It tests whether a student can integrate that foundation to reason through a genuine scientific problem they have not seen before.

Format. The exam is a Scientific Reasoning Examination, administered over several days. Students receive a real de-identified biomedical dataset, a curated set of papers (some containing flaws or contradictions), outputs from multiple AI systems addressing the same broad scientific question, and the broad question itself. Students produce a written research strategy document that states what they believe and don't, the assumptions underlying their conclusions, what additional data they would seek, how they would validate their hypotheses, and where the AI outputs were helpful versus misleading and why. An oral defense follows, in which the committee probes the reasoning behind the student's choices, asks them to defend methodological decisions under cross-examination, and introduces new information to test how they respond.

Grading. The exam is graded Pass / Pass with Conditions / Fail by the preliminary exam committee, using a published rubric [rubric for current format will be published early Spring 2026]. A passing grade is

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required to continue in the program. The committee has discretion to require a retake on all or part of the exam if a student does not pass. In the event of a failing grade, the committee determines whether to permit a retake or to recommend termination of the student's enrollment.

BSP students joining CPBS will take the CPBS preliminary exam with the cohort.

MSTP students transferring into CPBS have their existing MSTP preliminary exams accepted as equivalent. Results must be reviewed with the Program Director and Program Administrator.

See **Appendix 2** for a full description of the exam format and what to expect.

Yearly Planning Meeting

At the beginning of each academic year, every student is required to hold a Yearly Planning Meeting with their PhD advisor(s) and report the outcomes to the Program Directors and Program Administrator by the end of September. Students email a completed, signed two-page worksheet to the Program Administrator by that deadline.

The Yearly Planning Meeting gives you and your advisor a regular, structured opportunity to step back from day-to-day work. The goals are to celebrate what you've accomplished, set short-term and long-term research and career goals, identify what's working and what's in the way, and clarify expectations in both directions. These meetings become more valuable as you progress. What you need from your advisor at Year 2 is different from what you need at Year 4, and these conversations are the mechanism for that calibration to happen.

Detailed instructions and the two-page worksheet are here [CPBS Yearly Planning Meeting](#). The worksheet provides enough structure to make the meeting productive.

This Yearly Planning Meeting replaces the prior requirement to use the myIDP online tool. The program's own worksheet is the required document.

Comprehensive Exam

Successful completion of the Comprehensive Exam admits students to candidacy for the PhD. The exam **must be completed by the end of the first semester of Year 3 (Fall)**. The expectation is that students organize and have a fixed date for their comprehensive exam by the end of their second year. Students who need an extension must obtain approval from the Program Directors and notify the Program Administrator. A student cannot take the Comprehensive Exam with a GPA below 3.0 or before the Graduate School application is submitted and approved.

Requirements. Students must have passed the Preliminary Exam and completed all program-required non-doctoral thesis coursework (including up to 10 credits of CPBS 8990) before taking the exam. A

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student must complete or be registered for in the semester of their Comprehensive Exam, 24 Didactic credit hours (and up to 10 credits of CPBS 8990) before taking the exam. The 24 credits come from the six 3-credit core courses, one 3-credit specialization elective, and one other approved 3-credit elective of choice. Any student passing 24 credits of coursework that has not taken their Comprehensive Exam and has met the maximum of 10 credits of CPBS 8990 must continue to register for CPBS 7650-0V3 until the exam is taken; or the students are required for approval from Program Directors if they are not able to complete their comprehensive exam by the Y3 Fall.

After the required minimum of 24 semester hours of coursework and rotations, that leaves a minimum of six remaining course credits (usually two courses) for electives during the third year. There are a wide variety of informatics and bioscience courses and programs at the University of Colorado campuses and our students have been very creative at taking advantage of them to pursue specific biomedical and informatics interests. See **Appendix 3** of the Handbook for more details on electives. MSTP students have typically met the elective requirement upon entering the program, which should be verified with the Program Director.

Committee formation. Shortly after selecting a thesis mentor, students and their mentor recommend a Comprehensive Exam Committee (CEC), subject to Program Director approval. The CEC must have five members; a majority must be CPBS faculty. At least one member must be external to the program (not a core CPBS faculty member). The student's faculty mentor may be a member but cannot chair the committee. Larger committees require PD approval but must always have an odd number of members. All committee members must have a faculty appointment listed in the [Graduate Faculty Directory](#).

A **pathway-relevant member** is required on every CEC. For Clinical Translation and Entrepreneurship & Innovation students, the required co-advisor satisfies this directly. For other pathways, the normal committee composition should include someone with relevant expertise.

Students must disclose any potential conflicts of interest among committee members in writing. Examples include financial relationships (a committee member employed in the advisor's lab, or a current or former employer) and familial relationships.

The proposed committee is due to the Program Directors and Program Administrator by November 1 of Year 2, and must be approved before proceeding.

Students must meet with their CEC at least once before the exam. This introductory meeting, no later than April 1 of Year 2, should be brief: students may share up to a few slides introducing themselves and their project at a high level. The goal is to give committee members context and allow them to set expectations for the exam.

Required forms. All forms are on the Graduate School website: [Graduate School - Resources & Forms - CU Anschutz](#)

- Application for Candidacy and Exam Request Form
- Transfer of credit form (if applicable)

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Submit all forms to the Program Administrator **at least one month before the exam date**. Form processing can take time, and a late submission may require rescheduling the exam.

Format. Students prepare a doctoral thesis proposal in an NIH F31-style format (one-page Specific Aims and six-page Research Strategy; references additional). Strictly follow NIH formatting guidelines. The proposal must be submitted to the committee at least two weeks before the exam date.

The exam must be scheduled for three hours:

- A 45-minute public presentation of the proposal + a 15-minute Q&A (non-committee)
- A closed-door oral exam (1 hour 45 min) with the CEC + 15 min for CEC deliberation

The oral exam tests a broad field of knowledge, not only the content of the proposal. Committee members will probe whether the student can reason beyond what's written: explain the problem simply, defend why the approach is likely to work, account for what could go wrong, and revise a position under a real challenge. The exam is designed to find if a student can answer fluently, extend their answers under follow-up, and update their reasoning in real time.

Pathway declaration. As part of the Comprehensive Exam process, students formally declare their primary doctoral pathway, and optionally a secondary pathway. The declaration is submitted as part of the exam proposal or in a brief accompanying document. See the Doctoral Pathways section.

Grading. The exam is graded Pass / Pass with Conditions / Fail, scored against a published Comprehensive Exam Rubric. [Comprehensive Exam Rubric](#) Pass with Conditions requires the student to meet specified remedial conditions within the timeline the committee sets (typically within 30 days; see Graduate School policy). Failure to meet conditions results in failure of the exam.

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

See **Appendix 4** for additional details on the Comprehensive Exam format and committee expectations.

Thesis Committee Meetings

By February 1 of Year 3, students must establish a Thesis Advisory Committee (TAC) and communicate the committee membership to the Program Administrator and Program Directors. The TAC is most commonly identical or similar to the CEC, but changes are permitted with the approval of the committee chair and Program Director.

The TAC must have five members: a majority must be CPBS faculty members; at least one member must be external to the program; the chair must be a senior CPBS faculty member (not the thesis mentor); the thesis mentor may be a member but cannot chair the committee; a pathway-relevant member is required

(see Doctoral Pathways section; the required co-advisor satisfies this for Clinical Translation and Entrepreneurship & Innovation pathways)

Thesis committees should have independent voices who can serve as advocates for the student distinct from the thesis advisor. Students should strive for a committee with diverse expertise rather than populating it with close colleagues of their mentor. Disclose any potential conflicts of interest in writing.

See **Appendix 5** for additional details on the Thesis Committee Form.

Thesis Defense

TIMING AND REQUIREMENTS

- Students must have **submitted a first-author research article to a peer-reviewed journal or conference, with the article under review at the time of defense. This article must represent a critical portion of the research scope approved by the thesis committee.** For students on the Clinical Translation or Entrepreneurship & Innovation pathways, the requirement may be satisfied by a submitted and under review article, or by a preprint accompanied by documented deployment or validation evidence consistent with the pathway's evidence standard.
- Students must have taken or be registered for at least 30 credits of CPBS 8990 at the time of defense.
- Students defending after the semester ends must register for 5 credits of CPBS 8990 in the following semester.
- Schedule a defense date at least six weeks in advance.
- Submit the final thesis document to the committee at least two weeks before the defense date.
- Receive approval from the thesis committee to proceed to schedule a defense date.

PRE-COMPREHENSIVE EXAM PUBLICATIONS

All papers relevant to a student's PhD research count toward their thesis regardless of whether they were submitted or published before or after their comprehensive exam. Two points of context are worth keeping in mind as the student and their committee think about the thesis as a whole. First, the program does apply some judgment when a publication arises very early in a student's graduate career. This is typically relevant in cases where a student was working in their PhD mentor's lab in a prior capacity (e.g., as a post-bac researcher) and then continues, completes, or publishes that work after matriculating as a graduate student. In those situations, the program would generally not count that publication as a thesis chapter. Second, while a peer-reviewed research publication or manuscript under review is a necessary component of the thesis, it is not sufficient on its own. The student's committee (and the program) will be looking for a coherent, significant body of work that reflects the full scope of the PhD research as defined by the student, their mentor, and their committee during their comprehensive exam. A single strong paper is an important building block, but the thesis as a whole should tell a unified scientific story.

THESIS DEFENSE FORMAT

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The defense consists of a public oral presentation (~45 minutes presentation; ~15 minutes Q&A) followed by a 2 hour closed-door meeting with the TAC.

All students are evaluated against a shared core standard: command of the work and the ability to defend and extend reasoning under live questioning. A student who presents strong evidence but cannot reason beyond it under a question they did not anticipate has not met the standard, regardless of how strong the artifact itself looks.

In addition, each pathway carries a pathway-specific evidence portfolio:

- Scientific Discovery: publications and their contributions
- Computational & Methodological Innovation: a novel method or validated model, benchmarked
- Clinical Translation: deployment and outcome evidence for a working prototype
- Entrepreneurship & Innovation: venture-validation evidence (substantially from I-Corps)
- Open Science & Infrastructure: adoption and usage evidence for what was built

Full rubrics for each pathway evidence portfolio will be developed and published before the first defenses under this framework. The program will communicate these to students well in advance.

REQUIRED FORMS

Submit all forms to the Program Administrator at least four weeks before the exam. The forms can be found at [Graduate School - Resources & Forms - CU Anschutz](#):

- Biosketch Form (Graduate School form, not the NIH form)
- Exam Request Form
- Thesis Approval Form — initiate before the exam and complete by Graduate School deadlines

See **Appendix 7** for program-specific thesis defense guidelines.

See **Appendix 6** for AI Use Policy guidelines for the dissertation.

GRADUATE SCHOOL POLICIES FOR THESIS EXAM RESULTS

- **Pass.** An affirmative vote from a majority of committee members is required.
- **Pass with Conditions.** The committee may pass the exam while requiring additional work (revised writing, additional experiments, etc.) within 60 days. The student is considered to have passed once conditions are met. Failure to meet conditions within the timeline results in failure of the exam.
- **Fail.** A student who fails the exam may not continue in the program unless the program supports a retake in writing.

THESIS DEFENSE RESOURCES AND DISSERTATION GUIDELINES

You can find the following information at [SCHEDULE OF DEADLINES FOR DOCTORAL CANDIDATES](#)

- Thesis & Dissertation/ProQuest Format & Guidelines
- Graduate School Deadlines, Forms, Policies
- Watch: How to prepare the correct forms and upload your dissertation
- See **Appendix 7** for program-specific guidelines

Policies and Procedures

CPBS Program Specific Obligations and Expectations

Program Transfer. Students matriculate into CPBS by application and are expected to remain in the program. Transferring from a program at any point is actively discouraged. If there are concerns about a mentor or a perceived lack of research options, the expectation is that solutions are explored within the program first. Program transfer is approved only under exceptional circumstances, and only after successful completion of the preliminary exam.

Attendance. All graduate students are required to attend post-rotation seminars, thesis defense seminars of other students in the program, the CPBS Seminar series, and the annual retreat.

Education Assistant and Teaching Assistant Experience. All students are expected to complete **one Education Assistant (EA) experience** during Year 2, serving as an EA for one of the Year 1 core courses. This is a required training experience, designed to develop teaching, organizational, and leadership skills, solidify foundational knowledge, and build community by providing service to the program. Specific EA assignments will be coordinated through the Program Director and Program Administrator.

Beginning in Year 3, paid Teaching Assistant (TA) positions are available for upper-level core courses and specialization electives on a competitive basis. Students interested in a TAsip should express interest to the Program Director. TAsips are optional and are not a substitute for dissertation progress.

Student File. The Program Administrator maintains a file for each student. All relevant records (published abstracts and papers, awards, honors, copies of forms filed with the Graduate School) should be sent to the Program Administrator. Students may review their files at any time.

Funding Proposals. Students who have passed their Comprehensive Exam must submit at least one external funding proposal during their PhD (e.g., NIH F31, NSF GRFP). Students are also strongly encouraged to also apply for computer resources awards (e.g., NAIRR, NSF ACCESS). Discuss with your thesis mentor which opportunity best fits your work. Note that the Scientific Communication & Fellowship Writing Workshop in Year 1 Fall is designed specifically to give students an early start on this.

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Publications. See the Thesis Defense section for the publication requirement at defense. The program strongly encourages students to submit research articles throughout their doctoral training, not only near the end.

Participation in Recruitment. Each year, prospective student applicants visit for interviews (typically January through March). Current students play an important role in helping candidates understand the program and the community. When asked, please spend time with prospective students at dinners and program events. All student and faculty interviewers are asked to follow the [Rubric Breakdown and Guidelines](#) when meeting with candidates. The rubric helps provide useful, consistent information to the Admissions Committee and gives every candidate a fair experience. Finally, all third and fourth year students are required to present posters at the recruitment event.

Vacation and Holidays. Graduate students receive all University holidays and no more than **14 calendar days** (counting all days Monday through Sunday) of vacation per year, with no year-to-year accrual. Stipends continue during vacation and holidays. The times between academic terms and summers are active parts of the training period. Students taking courses are expected to attend all classes and take all exams as scheduled. Advanced students should arrange vacation with their thesis mentor in advance.

Sick Leave and Other Leave. Graduate students may continue to receive stipends for up to **15 calendar days** (all days Monday through Sunday) of sick leave per year, with no year-to-year accrual. Sick leave may be used for medical conditions related to pregnancy and childbirth. Under exceptional circumstances, additional sick days may be granted through a written request to and approval by the Program Director. The Leave Policy can be found here: [Graduate School - Resources & Forms - CU Anschutz](#).

Parental Leave. Students may continue to receive stipends for up to **60 calendar days** of parental leave per year for the birth or adoption of a child. Either parent is eligible. Parental leave requires approval from the Program Director. Extended leave beyond these limits requires approval from the awarding component and documentation of an unpaid leave of absence; contact the Program Administrator for guidance.

Procedure for Leave Reporting. Students are required to keep a record of their leave through their home division or department, using the Graduate School time and leave reporting system at Vacation and Leave Policy for PhD students on the [Graduate School - Resources & Forms - CU Anschutz](#). Submit leave requests through the system, where they will be routed to the mentor for approval.

AI Use. See **Appendix 6**.

Communication. All PhD students are required to read emails from CPBS leadership and respond by the stated deadlines (or within two business days). Your cuanschutz.edu email address is the primary means of written communication within the program and the University. This calendar associated with this email is the primary means for notifying and tracking activities and events within the program and the University.

Graduate School Standards

Graduate School Policies and Procedures are listed on the Graduate School Resource page:

- [Student Code of Conduct and Grievance Processes](#) Summary, procedures, and forms for reporting grievances, violence, discrimination, harassment, misconduct, and violations of academic integrity or the Honor Code.
- Graduate School Policies and Procedures [gs-policies-and-procedures.pdf](#)

Credits. The Graduate School requires at least 30 semester hours of didactic coursework (core courses, lab rotations, and program electives) and 30 semester hours of thesis research (CPBS 8990).

GPA. Students must maintain a 3.0 GPA. Students must earn a B or above in all required courses. A B– or below in any required course is considered unsatisfactory academic progress.

Academic Honor Code. Education at CU Denver | Anschutz is conducted under the honor system. All students are expected to uphold principles of honesty, integrity, and appropriate professional conduct. Expectations, definitions, and procedures are outlined in the Academic Honor Code [ore-honor-code-and-committee-procedures--3-26-25.pdf](#) and Student Code of Conduct [Student Code of Conduct and Grievance Processes](#)

Student Email Policy. Email is considered an official means for communication within UCD Graduate School. See this [document](#).

Remedial and Disciplinary Actions. The CPBS program endorses and enforces the University's Academic Honor Code. Students whose cumulative GPA falls below 3.0 are placed on Academic Probation by the Graduate School. Students have two semesters in which to raise their GPA to 3.0; failing to do so results in dismissal. A B– or below in any required course may require retaking that course, at the recommendation of the Program Director and GAC. More than one unsatisfactory grade in a required course is grounds for dismissal.

If the Program Director and/or GAC determine that a student is not making satisfactory progress, the student, thesis mentor, and committee chair will meet with the Program Director to assess the situation. Possible outcomes include continued support with a probationary period, or a recommendation for dismissal. All meetings are documented by the Program Administrator.

Change in Thesis Lab. A student who leaves a thesis lab (while remaining in good academic standing) has the current semester or 90 days, whichever comes first, to identify a new thesis mentor. Failure to identify a new lab within that period results in dismissal from the program.

Time Limit. Students have eight years from enrollment to complete all requirements for the degree. **Continuation after six years requires approval** from the thesis committee and the Program Director.

Appeals. A student may appeal any decision by the Program Directors that affects their standing in the program. Appeals must be made in writing and emailed to the Program Directors within seven days of the decision. The Program Directors will respond within seven days of receipt and will offer the student an opportunity to meet in person if desired. Unchallenged decisions, or decisions after appeal to the Program Directors, are final with respect to academic deficiency corrections. Dismissal recommendations may be appealed to the Dean of Graduate Studies.

Disclaimer. This handbook does not constitute a contract with the University of Colorado Denver Graduate School, the Office of Research Education, or the CPBS Program, expressed or implied. The Graduate School, Office of Research Education, and CPBS Program reserve the right to change, delete, or add to any provisions at their sole discretion. Provisions in this document are designed as firm guidelines; exceptions may be made based on extenuating circumstances.

Office of Research Education

- [Office of Research Education -- Forms and Resources](#)
- [ore-policy-on-conflict-of-interest-and-undue-influence-6-1-24.pdf](#)
- [ore-honor-code-and-committee-procedures--3-26-25.pdf](#)
- Student Badge Requirement: All students must carry a CU Anschutz badge at all times. Lost or stolen badges should be immediately reported to the Badging Security Office or University Police (after hours).
- [Financial Aid](#)
- Residency: Students are required to begin establishing Colorado residency as soon as they accept their offer. Complete this promptly to meet year-end deadlines. See: Students who do not obtain Colorado resident status by Year 2 (with the exception of international students) are responsible for the difference between in-state and out-of-state tuition.

Tuition, fees, and stipend. All incoming students are offered a financial aid package that includes an annual stipend of \$43,000 (approved for 2026–2027), tuition costs, and payment of individual student health insurance and activity fees. The stipend is evaluated annually for cost of living. Support covers July 1, 2026 through June 30, 2027 for continuing students, and August 15, 2026 through June 30, 2027 for first-year students. Continuation of support depends on satisfactory academic progress as defined by the Graduate School and program policies.

Program Events and Activities

Attendance is required at all events listed in this section.

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PROGRAM SEMINAR

The CPBS Program Seminar runs Wednesdays from 1:00–2:00 PM. This time is used for CPBS student research update talks, prospective faculty candidate talks, and NLM T15 postdoctoral fellow presentations. All students are expected to attend in-person and sign in before the start of each seminar. Contact Program Leadership and the Program Administrator if you need to miss a session or attend virtually.

Update Talks. Students give an annual research update talk in the seminar series. Second-year students present a 30-minute seminar (25 min talk + 5 min Q&A). Third-year and above students give a 45 minute talk with 15 minutes for questions. After completing the Comprehensive Exam, thesis update talks are required annually. The Committee Chair posts a brief critique of each annual seminar on [Predoc Progress Assessment web site](#). All members of the audience can use the [CPBS Student Talk Evaluation](#) form to provide feedback. Students actively writing their thesis may be exempt at the discretion of the Program Directors.

ANNUAL RETREAT

The annual program retreat is held each Spring and includes participation from all students in a one-day event. It is organized by a student committee in collaboration with faculty and program leadership. The retreat is designed to engage and educate PhD students on CPBS-related topics, provide an informal venue for presenting research to peers and faculty, and build community. All students in Year 3 or above are required to present their work (poster or short talk).

STUDENT ACTIVITIES

Student lunches are held six times per year (Fall, Spring, and Summer terms) to discuss program updates, student concerns, and new initiatives. These meetings include all students, the Program Directors, CPBS faculty, and the Program Administrator. Attendance is required.

RECRUITMENT

Each year during January through March, prospective student applicants visit for interviews. We need the help of current students and faculty to show candidates what the program has to offer. When asked, please spend time with prospective students at dinners and program functions. Year 3 and Year 4 students are required to present posters at the first recruitment event.

All interviewers (students and faculty) are asked to follow the [Rubric Breakdown and Guidelines](#) CPBS Interview Instructions and Rubric when meeting with candidates. The rubric ensures that the information gathered is useful to the Admissions Committee and that all candidates have a consistent, equitable interview experience. This is a program document; please read it before interview season each year.

Resources and Support

Students can access campus services through the links provided below. For detailed information or to schedule an appointment, visit the Office of Student Affairs webpages or contact 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](#)

Training Grants

Once accepted into a thesis laboratory, your tuition, stipend, and benefits are funded by your mentor. Completing the required rotations during Year 1 is essential for maintaining funding continuity.

From Year 2, students may apply for the NLM T15 Training Grant Fellowship, a competitive, reviewed process. In addition to tuition, health and dental insurance, and a stipend, the training grant may cover conference travel and research computing costs. Stipends are paid monthly via direct deposit on the last working day of each month; taxes are not withheld for training grant appointees.

T15 applications are open during the Spring semester and requirements may vary each year. Contact the T15 PIs, Program Administrator, and Program Director for more information.

Appendices

LIST OF APPENDICES

Appendix 1: Medical Scientist Training Program & Biomedical Sciences PhD Program Handbook

Appendix 2: Preliminary Exam

Appendix 3: Specialization Tracks and Electives

Appendix 4: Comprehensive Exam

Appendix 5: Comprehensive/Thesis Committee Form

Appendix 6: AI Use Policy

Appendix 7: Program-Specific Thesis Defense Guidelines

Appendix 8: Faculty Information/Resources

Appendix 9: Useful Information for First-Year Rotations

Appendix 10: ORE policy on External Employment for Graduate Students

Appendix 11: Mentor-Mentee Mutual Expectations

Appendix 1: Medical Scientist Training Program & Biomedical Sciences PhD Program

[Medical Scientist Training Program](#) & [HANDBOOK](#)
[Biomedical Sciences PhD Program](#) & [HANDBOOK](#)

Appendix 2: Preliminary Exam

Overview. The preliminary exam is a Scientific Reasoning Examination administered over several days at the end of Year 1 (by the end of June). It covers the Core 1 through Core 4 foundation: mathematical literacy and reasoning, biomedical and clinical grounding, AI systems and their limits, and computational practice. The exam does not test recall of course content. It tests whether a student can apply that foundation to reason through a genuine, novel scientific problem.

Materials provided. Each student receives:

- A real de-identified biomedical dataset

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- A curated set of papers, some of which contain methodological flaws or contradict one another
- Outputs from multiple AI systems on the same broad scientific question
- The broad scientific question itself

Written component. Students produce a research strategy document that addresses:

- What they believe the evidence supports, and what remains uncertain
- The assumptions underlying their conclusions
- What additional data or experiments they would seek and why
- How they would validate their hypotheses
- Where the AI outputs were helpful, where they were misleading, and why

The document is the student's own work. See Appendix 6 for AI use guidelines specific to this milestone.

Oral defense. The committee probes the reasoning behind the written document, i.e., not just what the student concluded, but how they got there. Students should expect to defend their methodological choices under cross-examination and to respond to new information or counter-evidence introduced live by the committee.

Grading. Pass / Pass with Conditions / Fail, evaluated by the preliminary exam committee using the published rubric [to be published Fall 2026]. A passing grade is required to continue in the program. In the event of a failing grade, the committee determines whether to permit a retake.

After the exam. Students who pass join their dissertation lab on July 1.

Format note for Cohort 2026. This is the first year of the new exam format. The exam committee will communicate detailed logistics, including timing, submission format for the written component, and scheduling for oral defenses, in Spring 2027.

Appendix 3: Specialization Tracks and Electives

REQUIRED SPECIALIZATION ELECTIVES (YEAR 2 SPRING)

Students select one specialization track and take its elective. Selection is made in Year 2 Spring. Taking electives from more than one specialization is possible.

- **Track A: Bioinformatics & Computational Biology**
 - Omics Analysis, Integration & Prediction: WGS/WES, GWAS, epigenomics, xQTL mapping, single-cell and spatial genomics, molecular networks, multi-omics integration.
- **Track B: Computational Neuroscience**
 - Computational & Theoretical Neuroscience: neural coding and information theory, dynamical-systems models of circuits, computational models of cognition, plus a neural data science lab component.

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- **Track C: Imaging Informatics**
 - Medical Image Analysis & Computer Vision: segmentation, registration, radiomics, CNNs and vision transformers, clinical workflow integration, regulatory pathways.
- **Track D: Clinical Informatics**
 - Clinical Decision Support & Predictive Modeling: EHR- and clinical-data-based prediction, mechanistic and physiological modeling (ODE-based and hybrid mechanistic-statistical models, personalized dynamical models, parameter estimation from sparse clinical time series), clinical NLP, deployment and monitoring of decision-support tools.

Registration details (course numbers and scheduling) for specialization electives will be communicated by the Program Administrator.

If none of these specializations represent the student's thesis work, there are a wide variety of informatics and bioscience courses and programs at the University of Colorado campuses and our students have been very creative at taking advantage of them to pursue specific biomedical and informatics interests. Requires approval from the Program Directors and Mentor.

- **Biomedical Science Foundation Courses.** Students who want to fill fundamental biology gaps may take courses from the BMSC graduate core sequence (e.g., BMSC 7806, BMSC 7833-7838). These are graduate-level and appropriate for that purpose, with the understanding that they add to the total course load.
- **Computational Topic Electives.** Students who want additional depth in computational methods beyond what the core curriculum provides may take courses in machine learning, deep learning, causal inference, data visualization, NLP, network analysis, or other relevant areas. Courses offered at the Anschutz campus, CU Denver Downtown campus (DDC), and CU Boulder (CUB) are all eligible with approval. Examples include:
 - Machine Learning & Deep Learning: BIOE 5020/5021, BIOS 7747, BIOS 7748, DDC CSCI 5930 & 5931, CUB CSCI 5622 & 6622
 - Longitudinal Data: BIOS 6629
 - Causal Analysis: BIOS 6641
 - Data Visualization: BIOS 7719
 - NLP: CSCI 5832 (CUB)
 - Multi-agent Systems: CSCI 5423, 7000 (CUB)
 - Machine Intelligence: CSCI 5822 (CUB)
 - Network Analysis: CSCI 5352 (CUB)
- **Domain Electives.** Students interested in additional domain depth beyond their primary specialization track may take courses in any of the four specialization areas or in adjacent biomedical fields. See the examples in each track above. Students with research directions that span or fall outside the four tracks may design a custom elective plan with PD and advisor approval.

- **Cross-Campus Enrollment.** Students taking courses at CU Boulder or CU Denver must: (1) email the course instructor to request approval; (2) complete the Inter-campus Enrollment Form on the CU Anschutz Registrar's website; (3) submit the form and the instructor's approval email to the Program Administrator.

Appendix 4: Comprehensive Exam

Overview. The Comprehensive Exam is an orally defended doctoral thesis proposal, taken by the end of Year 3 Fall. See the Comprehensive Exam section in the main handbook for requirements, committee formation, timeline, and grading.

Proposal format. The proposal follows an NIH F31-style format:

- 1-page Specific Aims
- 6-page Research Strategy (Significance, Innovation, Approach)
- References (additional, not counting against page limits)

The proposal should:

- Clearly state the problem and its significance
- Address 2–3 specific aims
- Explain the proposed approach and its rationale
- Acknowledge likely pitfalls and alternative approaches

Submit the proposal to the committee at least two weeks before the exam date.

Oral exam. The 45 minute public presentation + 15 minute Q&A (non-committee audience members) is followed by a 2 hour closed-door oral exam. The oral exam covers the full breadth of the student's field, not only the proposal content. Expect questions on: what the problem is (stated simply enough to name the input and the output); why current approaches fall short; why the proposed approach is likely to succeed; what the actual workflow and datasets look like; how results will be evaluated for both method performance and biological/clinical significance; what challenges could arise; and what comes next if the approach works.

Rubric. The exam is evaluated using the CPBS [Comprehensive Exam Rubric](#)

Pathway declaration. Students formally declare their primary (and optionally secondary) doctoral pathway as part of the Comprehensive Exam process.

Required forms. Submit to the Program Administrator at least one month before the exam: Forms can be found at [Graduate School - Resources & Forms - CU Anschutz](#)

- Application for Candidacy and Exam Request Form

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- Transfer of credit form (if applicable)

All forms via DocuSign at [Graduate School - Resources & Forms - CU Anschutz](#) Do not wait — form issues can require rescheduling.

AI use. See Appendix 6.

Appendix 5: Comprehensive/Thesis Committee Form

One week prior to each committee meeting, students are required to fill out and distribute to their committee members and Program Administrator:

1. The Thesis Committee Form (found on the ORE website: [Office of Research Education -- Forms and Resources](#))
2. Student accomplishments
3. Yearly Planning Meeting document (should be completed each year by end of September)

These forms will serve as a record of your accomplishments and your progress toward completion of your thesis research.

Appendix 6: AI Use Policy

Scope: These guidelines apply to generative AI (GenAI) tools (ChatGPT, Claude, Copilot, Gemini, Perplexity, etc.) that generate text, code, or other content from prompts. This does not include spell-checkers, grammar tools without generative features, citation managers, or established bioinformatics and statistical software.

These guidelines cover two domains: CPBS courses and PhD milestone documents (preliminary exam proposal, comprehensive exam proposal and dissertation). AI use in day-to-day research (e.g., in the lab, in data analysis, in manuscript preparation) is governed by your mentor's lab-specific policies, which may be stricter than what is stated here, and by the University of Colorado Anschutz Medical Campus policies. When in doubt, ask your mentor.

Important note: These guidelines establish a *floor*, not a ceiling. Course directors, mentors, and thesis committees may set stricter expectations, which take precedence. CPBS Program Directors are available for questions about implementation. These guidelines will be reviewed and updated annually. AI tools and the evidence base around their use in training are both evolving rapidly, and this document will evolve with them.

Foundational principle: The primary purpose of PhD training is not task completion but the development of students into an independent scientist. GenAI tools can support that development, but they can also shortcut it. Using AI to bypass intellectual struggle may produce polished output, but it deprives you of the cognitive work through which genuine expertise is built.

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A key asymmetry to consider is that the same AI tool that augments the work of an expert researcher can undermine the development of a trainee still building foundational skills. This is not a reason to avoid AI altogether but surely is a reason to be deliberate about when and how you use it.

The guiding principle throughout is: build foundational expertise first, then use AI to augment it. The threshold is functional, i.e., can you complete the task independently, explain your reasoning, and catch your own errors without AI assistance? Until that bar is reached in a given domain, AI use in that domain risks bypassing development rather than supporting it.

Data privacy and policy compliance: Before any other consideration, you must protect sensitive information and comply with applicable policies.

- Never enter identifiable patient data, controlled-access research data, unpublished results, novel hypotheses, or confidential collaborator information into public GenAI systems. Public AI tools store and may use whatever you submit.
- Change GenAI tool settings to prevent your inputs from being used for model training, where that option is available.
- Follow all rules about AI use specified by journals (for publications), funding agencies (for grants), data use agreements (for controlled-access datasets), and course directors (for coursework). These take precedence over these program guidelines.
- If you need to use AI tools with sensitive information, speak with your mentor first to identify approved local or institutional solutions.

PART 1: COURSES

What is acceptable

- Writing and grammar review. You may use GenAI to review drafts you have written for grammar, flow, and clarity — except during course exams (see below). AI review of your own text is acceptable, but AI generation of text is not. Here's a way to make the distinction: if you wrote a draft and AI responded to it, that is review. If AI wrote it and you responded to it, that is generation, regardless of how much you edited the result.
- Coding assistance. You may use GenAI as a coding tutor: to learn new syntax, understand code structures and principles, and debug errors you have attempted to resolve yourself. Designing your own learning-driven queries (asking AI to explain why something works, not just to produce working code) is the appropriate mode. AI may not be used to generate analysis code for assignments you have not independently mastered.
- Conceptual learning. You may use GenAI to help understand concepts covered in coursework, e.g., to break down a difficult paper, clarify a technique, or explain a statistical concept in plain terms. This is acceptable as a supplement to, not a substitute for, engaging with assigned materials and working through problem sets yourself.

What is not acceptable

- Exams. GenAI tools may not be used at all during course exams. This includes grammar review. Exams assess your independent thinking; AI use of any kind during an exam is a violation of academic integrity.

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- Homework and written assignments. GenAI may not be used to generate content for homework or writing assignments. This includes text produced from bullet points or outlines you provided, as well as lightly edited AI output. All substantive intellectual work (reasoning, argument, analysis, interpretation, etc.) must be your own. Grammar and flow review of your own completed draft is acceptable.
- Proposals (in courses). AI may not be used to identify research questions, frame specific aims, choose experimental approaches, select analytical methods, or generate any substantive text. Grammar and flow review of your own completed draft is acceptable. You should be able to defend every sentence and every methodological choice with knowledgeable scientific reasoning.
- Peer review summaries. You may not use GenAI to generate summaries or reviews of classmates' work. Peer review develops critical thinking and scientific communication skills that cannot be outsourced. There is an additional reason: uploading another person's proposal to a public AI system raises serious confidentiality concerns, since that content may be stored or used by the tool without your classmate's consent. NIH has adopted a policy prohibiting GenAI use in peer review for precisely this reason.

Citation requirement for courses: When you use GenAI tools for any permissible purpose, include a citation in the bibliography of the relevant assignment. At minimum, include: tool name and version, date of use, and a brief description of how it was used.

Example: *Anthropic Claude (claude-sonnet-4-6; accessed March 2026) was used to review a completed draft of this proposal for grammar and flow. Suggestions were evaluated and selectively incorporated by the author.*

PART 1: PHD MILESTONES AND DOCUMENTS

PhD milestone documents, which includes the preliminary exam proposal, comprehensive exam proposal, and dissertation, require formal AI use disclosure. This reflects a simple principle: AI use in research is a scientific act, and transparency about it is an extension of the same integrity that governs methods reporting and authorship.

Permitted scope and disclosure requirements differ across the three milestones, reflecting where students stand in their training at each point. The preliminary exam sits at the end of the foundational year, before independent expertise is established, and AI use during it is the most restricted. The comprehensive exam marks the transition to independent research; augmentative uses are permissible within limits set by the program and advisor. The dissertation stage assumes demonstrated foundational expertise, and augmentative use is generally appropriate. Disclosure does not make a prohibited use acceptable. Committees and advisors should read disclosures with the student's developmental stage in mind.

Full requirements (including what must be disclosed and what does not require disclosure, the two-part format [Methods paragraph and full attachment], a taxonomy of disclosable uses, and worked examples for each milestone) are in the [CPBS AI Use Disclosure Policy](#)

Guidance for all contexts: Regardless of whether you are working on a course assignment, a milestone document, or day-to-day research, the following apply:

- Critically evaluate all AI output. AI tools produce incorrect-yet-confident-sounding text with some regularity. Confabulated citations, inappropriate statistical choices, and logical errors in code are common failure modes. You cannot catch errors you do not have the expertise to recognize, which is itself a reason to build that expertise before relying heavily on AI.
- Document your AI use in your research notes as you go. Tracking tool, version, date, prompt, output, and what you verified or corrected is far easier in the moment than reconstructing it at submission.
- Be transparent with collaborators. Anyone contributing to work you are using AI to assist has a right to know.
- Approach these tools with intellectual integrity. The goal of your training is to develop capabilities that are distinctively *yours*. This includes depth of thinking, originality of approach, and robustness of foundational skills. AI produces outputs based on patterns in existing data. Your goal is not to replicate those patterns but to develop a scientific identity that goes beyond them.

Questions about these guidelines should be directed to the CPBS Program Directors. Questions about the Graduate School AI Use Disclosure requirements should be directed to the Graduate School Office of Research Education.

Appendix 7: Program-Specific Thesis Defense Guidelines

Doctoral Thesis Update Seminars. After completing the Comprehensive Exam, students are required to give a thesis update seminar annually. TAC meetings are also required annually. Update seminars give the TAC an opportunity to assess progress and invite input from the faculty as a whole, and give students regular opportunities to develop their presentation skills. Therefore, students must invite their TAC, their advisor(s), and all their lab members to their update seminars. A student, in consultation with their mentor and with Program Directors' approval, should have an outside committee member identified by the time of their first thesis update (approximately one year into the thesis lab).

Following each committee meeting, whether or not accompanied by a public presentation, the student and TAC chair complete an assessment summarizing what was discussed. The assessment form is found on the [Office of Research Education](#)

Thesis Advisory Committee. The TAC advises you until your thesis defense. The TAC is often the same as the CEC but may change (with approval from the committee chair and Program Directors). The TAC must have five members: a majority CPBS faculty; at least one external member; the chair must be a regular CPBS faculty member (not the thesis mentor). The thesis mentor may be a member but cannot chair. A pathway-relevant member is required (the co-advisor satisfies this for Clinical Translation and Entrepreneurship & Innovation pathways).

Students must disclose any potential conflicts of interest among committee members in writing. You are required to meet with your TAC at least once per year (twice per year is strongly encouraged). The student takes the initiative in scheduling meetings. After each meeting, the student completes the Thesis Advisory

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Committee Meeting form no later than two weeks following the meeting. The form is at [Office of Research Education -- Forms and Resources](#) Add the Program Administrator to all TAC meeting calendar invites.

Thesis Defense. The student's TAC conducts the Defense of Dissertation after completion of independent research. Arrangements must be made with the Graduate School via the Program Administrator at least one month in advance. Students are required to hold a TAC meeting 3–6 months before their intended defense date and obtain a documented “go-ahead” from the committee to schedule the defense. Required forms: the Biosketch and Exam Request (DocuSign, not PDF; use the links in the [Graduate School - Home - CU Anschutz](#) to ensure you have the most current versions). Verify with the Program Administrator at least one month in advance that all committee members have current faculty appointments with the Graduate School.

The doctoral thesis document must be written, approved by the examining committee, and formatted per Graduate School guidelines. A near-final draft is submitted to the committee at least two weeks before the defense. The committee must formally approve the dissertation before the candidate submits the final version to the Graduate School. Students must be registered for and have completed 30 semester hours of CPBS 8990, and must be registered for 5 credits of CPBS 8990 in the semester of the defense

All code and results from rotational and thesis work are the property of the mentor; a copy must be left with the mentor at the completion of each rotation and at the end of the PhD.

Appendix 8: Faculty Information/Resources

- [Quick Reference table for membership](#)
- [Computational Bioscience Faculty and Research | School of Medicine](#)

Appendix 9: Useful Information for First-Year Rotations

Mentor-Mentee Compact. At the start of each rotation, both the student and the rotation mentor must complete the CPBS Mentor-Mentee Compact [OneDrive](#) Submit the completed compact to the Program Directors and Administrator within the first week of the rotation.

CPBS Rotation Project Proposal Template. All rotation forms must be submitted within the first week of the rotation.

- Student Information Student ID | First Name | Last Name
- Rotation Information Rotation: | Year: | Program: Rotation Start Date: | Rotation End Date: Rotation Mentor: | Rotation Co-Mentor (if applicable):
- Program Questions Rotation Project Title: Background: Hypothesis to be tested:

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- **Specific Aims (2–3)** Submit 2–3 specific aims, each consisting of 2–3 sentence statements and/or bullet points describing the major goals and methods. Keep aims modest in scope so they can be meaningfully addressed during the rotation period.

Rotation Form Submission Process:

- You initiate the process by selecting the mentor with whom you wish to rotate.
- Use the Rotation Form at [Office of Research Education -- Forms and Resources](#)
- The form is automatically sent to your selected mentor for approval.
- The mentor reviews the proposal and responds.
- The form routes to the Program Directors for final approval.
- All parties are notified once approved.
- One week before the rotation ends, the mentor receives an evaluation rubric to assess your performance.
- The completed evaluation is sent to you, the Program Directors, GAC Chair, mentor, and Program Administrator.

Important: This system contains sensitive student data and must be accessed on campus or via VPN.

Rotation Assessment. Students are strongly encouraged to meet with each rotation mentor after their evaluation to discuss their performance. This is an excellent opportunity to get direct feedback (and, where appropriate, to provide feedback on the rotation experience itself) and openly discuss the interest in and opportunity for joining the lab.

Rotation Assessment Rubric. Please rate the student on the following:

- Intellectual engagement in the research area: A / B / C / D / F — Comments
- Effort on research, accounting for coursework: A / B / C / D / F — Comments
- Areas of strength:
- Areas for improvement:
- Overall suggested grade: A / A– / B+ / B / B– / C / I
- Mentor Name/Signature: | Rotation Completion Date:

Rotation Talk Evaluation. Rotation talks are scheduled the Wednesday following the end of each rotation (three talks per academic year). The talk is 10–15 minutes plus up to 3 minutes for questions. The purpose is to develop oral communication skills. Evaluators should provide constructive feedback on:

- **Content:** Does the introduction state the broad problem and provide appropriate background? Is the hypothesis clearly stated? Are experimental approaches clearly explained? Does the student explain data clearly, draw attention to what matters, and relate findings back to the big picture? Are future directions described?

- Slides: Are images, graphs, and text easy to read?
- Audience Interaction: Does the student engage with the audience? Do they handle questions effectively?
- What did you find particularly effective about this presentation?
- What would you suggest improving?

Appendix 10: ORE Policy on External Employment for Graduate Students

Background. Graduate students receive an annual stipend, health insurance, and full tuition, and are considered full-time students. Per NIH policy, students are expected to devote a minimum of 40 hours per week to their PhD training.

Students may wish to take on additional paid employment for financial reasons or professional development. This can be complementary and beneficial, but past instances of students becoming effectively full-time employees elsewhere while completing a PhD have been detrimental to academic progress and the mentor relationship.

Policy. Graduate students who are US Citizens or Permanent Residents and in good academic standing may, with appropriate advance written approval, work a maximum of 10 hours per week in external employment. [International students are required to strictly follow the rules associated with their student visa and strongly encouraged to stay in touch with ISSS to be aware of the latest rules.]

- First-year students: approval required from the Program Directors
- Students who have entered a thesis lab: approval required from the Program Directors and thesis mentor
- The ORE and thesis mentor/committee must be informed of any approved external employment
- External employment must not conflict with any required elements of PhD training, including classes, exams, seminars, lab meetings, rotations, retreats, and other required program or ORE activities.
- Students must remain in good academic standing to continue approved external employment. Approvals are reviewed and reported at every TAC meeting (every 6 months). Students attest that they have not exceeded approved hours.
- Students receiving extramural support from training grants or other sources are subject to the requirements of those funding entities and may not be eligible for external employment.
- Failure to disclose external employment, false reporting, or willfully exceeding approved hours is grounds for disciplinary action and possible dismissal.

Definitions. External employment is any paid (or in-kind compensated) work or work product outside of a student's PhD training program and the Office of Research Education. Good academic standing is defined as: maintaining a B or above in all classes, rotations, and thesis work; passing all preliminary and comprehensive exams; meeting other program requirements; and demonstrating satisfactory and timely progress toward the PhD as assessed by the thesis committee.

Appeals. Students may appeal a denial or rescission of approval for external employment on the basis that policies were not followed or applied fairly. Appeals are reviewed by the Associate Dean for Research Education, whose decision is final.

Appendix 11: CPBS Mentor and Mentee Mutual Expectations

What students can expect from their faculty mentor:

Scientific

- Provides advice on hypotheses, aims, experimental design, and computational approach
- Gives feedback on results and assists with interpretation and next steps
- Stays current with the literature and is willing to discuss presentations, meetings, and seminars
- Meets regularly with the student (at least weekly) and provides opportunities to present in lab meetings
- Actively looks for funding opportunities (T32, F31, and others) and helps with grant applications
- Provides timely evaluations and letters of recommendation
- Helps with selection of committee members
- Facilitates connections with collaborators and colleagues at other institutions

Leadership

- Delegates tasks appropriately
- Provides a neutral forum for discussing scientific and lab issues
- Shows discretion and professionalism at all time
- Addresses problems as they arise
- Is available for meetings and questions

What faculty look for and expect from lab members:

Scientific

- Genuine interest and engagement in the research area
- Careful planning, documentation, and organization of code, methods, and results
- Critical evaluation of methods and results: appropriate statistics, interpretation of findings, understanding of controls
- Logical extensions of prior work in subsequent approaches

Work habits

- Clear communication about hours, scheduling, and planned time away
- Efficient planning of work

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- Good use of waiting time during computations (reading, reviewing literature)
- Conscientious documentation practices

Literature engagement

- Regular search for and reading of relevant papers from the lab and related groups
- Engagement with papers provided for journal club or suggested by the mentor

Creativity and initiative

- Willingness to ask questions in lab meetings and seminars
- Suggestions for new approaches or lines of analysis
- Personal responsibility for meeting deadlines and interpreting results
- Constructive response to lab problems (propose solutions, not just identify them)

Communication

- Effective lab meeting presentations and rotation talks
- Constructive response to feedback from the mentor and lab members

Lab culture

- Careful note-taking when learning from others
- Keeping shared spaces clean and organized
- Collegial engagement with labmates