This document should be read by CMB Faculty and Students in conjunction with the current Graduate and Professional Bulletin of Colorado State University and the Code of the Cell and Molecular Biology Graduate Program. It has been written to emphasize certain policies contained in the Bulletin and to outline Policies and Procedures specific for the CMB Graduate Program.
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ADMISSION
The admission requirements of the Cell and Molecular Biology Graduate Degree Program (CMB Program) include a bachelor's degree in any of the biological, biochemical, or physical sciences. The university requirements for admission to graduate school apply with the following additions: a minimum of one year each of organic chemistry, physics, and biology; mathematics through differential and integral calculus. A course in biochemistry is highly recommended. Additional science courses such as cell biology, microbiology, developmental biology, immunology, genetics, physical chemistry, analytical chemistry, biophysics, physiology, and anatomy are considered in evaluation for admission. Promising students with deficiencies in entrance requirements may be accepted into the program provided all deficiencies are corrected during the first year. This may be accomplished by passing a background examination in the subject, by taking appropriate undergraduate courses, or by successfully completing graduate level courses that require the undergraduate courses as prerequisites. Graduate Record Examination (GRE) scores for the general examination are required and one advanced examination in an area of science is strongly recommended for consideration of financial aid. Applications are evaluated by the Admissions Committee and recommendations for admission are forwarded to the Graduate School. Final admission decisions are made by the Graduate School.

Students are admitted as graduate teaching assistants (GTA), as graduate research assistants (GRA) or, if they have governmental or other form of fellowship support, as pre-doctoral fellows.

INTERNATIONAL STUDENT APPLICATIONS
The CMB Program is also committed to educate students from foreign countries, particularly those from developing countries. Foreign student applicants must meet the same admission requirements as United States applicants (including GRE requirements). In addition, they must show evidence of competence in the written and spoken English language as evidenced by a TOEFL score of 80 (internet-based), 550 (paper-based) or higher. An IELTS score of 6.5 or above, or a PTE Academic Score of 58 or above are also acceptable.

TRANSFER FROM MS TO PHD PROGRAM
Students who have been admitted to the MS Program may apply to enter the PhD program with or without first completing their MS degree. To be considered, students should provide the Program Director with the following:

- Two letters of recommendation from CSU Faculty Members (one can be from the advisor)
- A personal statement describing how a PhD fits into their career goals and what qualities they possess that will allow them to be successful in a PhD program
- CSU Unofficial Transcript
- A statement from the PhD advisor describing how the student’s stipend and research project will be supported

These documents along with the student’s original application to the program will be forwarded to the Admissions Committee for evaluation. The committee may also interview the student in person. If the application is deemed acceptable, the student, Department Head, CMB Director and advisor must sign a letter describing the new commitment that the advisor and department are making to the student, prior to submission of the GS7 form that completes the transfer into the PhD program.

TRANSFER TO CMB FROM OTHER GRADUATE PROGRAMS AT CSU
Students from other programs (such as Molecular, Cellular & Integrative Neurosciences, or the DVM Pathology PhD program) may transfer into the CMB program after the first year of their graduate studies. On rare occasions, transfers may also be considered at a later point in the degree. In most cases these students will be directly admitted into a laboratory as a GRA. Students wishing to transfer into CMB must provide the following:

- Two letters of recommendation from CSU Faculty Members (one can be from the advisor)
- A personal statement describing how a PhD or MS in Cell & Molecular Biology fits into their career goals and what...
qualities they possess that will allow them to be successful

- CSU Unofficial Transcript
- A statement from the advisor describing how the student’s stipend and research project will be supported

These documents along with the student’s original application to the University (which includes UG transcripts and GRE scores) will be forwarded to the Admissions Committee for evaluation. The committee may also interview the student in person. If the application is deemed acceptable, the student, Department Head, CMB Director and advisor must sign a letter describing the commitment that the advisor and department are making to the student, prior to completion of the GS7 form that completes the transfer into the CMB program.

TRANSFER OF CREDIT

Students completing an MS degree at another institution prior to entering the PhD program may transfer up to 30 credits as specified in the Graduate Bulletin. Students completing an MS degree at CSU and then immediately entering the PhD program may potentially transfer a higher number of credits with the approval of their GAC. In each case, all transferred credits must be approved by their GAC. In addition, students must continue to participate in CM792 and CM793 once per year until they graduate.

SELECTION OF ADVISOR AND GRADUATE COMMITTEE

The Program Director with input from the Academic Committee will advise students concerning course work during the first year. If a student is admitted as a GRA with direct support from a faculty member, the faculty member will serve as the advisor and co-advice on course selection. After registering, a graduate student must obtain approval from the Academic Committee or his/her advisor before adding or dropping a course. Students receiving support from the CMB Program or from fellowships generally rotate through three laboratories of their choice during their first two semesters in residence. This experience will allow them to become familiar with potential thesis projects and with several faculty members in their area of interest.

Final selection of an advisor should be made by the end of the second semester following enrollment, but must be made by the end of the first calendar year. The Advisor, their Department Head, the student and the CMB Program Director will sign a letter describing the commitment that the Department and Advisor are making to the student prior to the student joining a lab.

The advisor and student shall select a Graduate Advisory Committee (GAC) that has expertise relevant to the major areas of the student’s graduate study. A minimum of 3 members is required for M.S. degree candidates and 4 committee members for Ph.D. degree candidates, at least two (M.S.) and three (Ph.D.) of the committee members must be members of the CMB faculty. In addition, the Graduate School requires the appointment of an outside member. This member must be a faculty member whose primary appointment is outside the home department of the student’s advisor. Faculty from outside of the University may also be appointed to committees (see the CMB Program Code for details). The CMB Program Director and/or Academic Committee may require changes to the committee structure or request justification prior to approving the GS6. This may be necessary to address, for example, conflicts of interest (e.g. committee members have a marital or mentor/mentee relationship) or perceived lack of relevant scientific expertise. The development of a formal plan of course work and research activities is the responsibility of the GAC.

The GAC should be selected and meet within three months of selecting an advisor to prepare the formal plan of study (Form GS 6, Program of Study). Subsequently, this committee should meet annually, or more frequently if necessary, to advise a student and to submit an evaluation of the student’s progress in completing his/her academic requirements and thesis research.

The procedures required for graduation are detailed by the Graduate School in the Graduate and Professional Bulletin.
ANNUAL MEETING WITH GRADUATE ADVISORY COMMITTEE (GAC)

Annual Performance Evaluation by Graduate Advisory Committee

To assist in the evaluation of a student’s progress in research, each student must meet annually with his/her Graduate Advisory Committee (GAC). This annual evaluation will consist of the following:

1. **Completion of the progress report form.** This form can be found on the CMB website and should be initiated at the time of the first GAC meeting and updated annually. Part 1 comprises sections describing progress in courses, professional development, teaching, mentoring, presentation skills and outreach. In Parts 2 and 3, the student and advisor are each asked to assess the student’s development and progress. In part 4 the student should summarize their research progress. The first research summary should be prepared at the time of the first GAC meeting and should describe the student’s future research goals. Subsequent research reports should briefly summarize the goals of the research and the progress made since the previous meeting with the Graduate Advisory Committee. The progress report must be distributed to the members of the Advisory committee at least one week before the scheduled meeting of the committee. The GAC are asked to sign the progress report and a copy should be provided to the CMB coordinator within one week of its completion. Students beyond their first year who fail to submit an annual progress report to the CMB program coordinator by February 1st each year will have a hold placed on their registration for the fall semester and will be required to petition the CMB Academic Committee to get the hold removed.

2. **A research seminar in CM 793.** Students are required to enroll once per year in CM 793 starting in their first year, and present a seminar in this course describing their progress in research starting their second year. Students should inform their committee well in advance of the date of their scheduled seminar and strongly encourage members of their GAC to attend. Optimally, students should give their written progress report to their committee a week prior to their research seminar and a meeting should be scheduled within two weeks after the seminar to clarify questions raised by the progress report and the seminar, and to solicit guidance and suggestions from the GAC concerning goals, methods, and evaluation of the research. The GAC members may evaluate the presentation as part of the progress report.

LABORATORY ROTATIONS FOR FIRST YEAR STUDENTS

The advisor-student relationship is unique and it is the mutual strength, respect, and stimulus of this relationship that promotes scientific achievement. First-year Ph.D. students who receive support from the CMB Program generally complete three laboratory rotations during the first two semesters in residence. The aim of this program is to introduce students to a variety of research approaches, techniques and projects, and to aid students in choosing an advisor for their dissertation research. The goal of each rotation is to allow the student to accomplish some research and to experience the culture of the laboratory. Students are expected to attend group meetings of the laboratories through which they rotate and complete some original research while learning the techniques and approaches of different disciplines. At the end of each rotation the student should meet with the advisor to discuss their performance and the advisor will complete a Rotation Report that will be shared with the student and the CMB Program Coordinator and will be used to determine satisfactory performance for grading of Independent Study (CM595/795) credits. The Rotation Report form can be found on the CMB website and must be submitted to the Director within one week of completing a rotation.

Entering students will participate in an orientation program (CMS10) that will begin during the week prior to the first day of classes and also in training in experimental design (MIP611: Advanced Microbiological Research Methods). The orientation will provide students with information on the breadth of research conducted by faculty in the program, the available research resources on campus, and faculty who are willing to provide laboratory rotations. It will also prepare students for graduate school and their future career. Students will submit a list of their preferred rotations. Matches will be made in consultation with the Academic Committee and/or Program Director. Students will begin the first rotation in August and the second rotation in October. The third rotation begins in early January. The selection of an advisor should occur shortly after Spring break. This allows the student maximum flexibility in making their final choice of advisor. In the unlikely event that a student has not found a good match they may complete a fourth rotation before the end of the Spring semester.
After this time students who have not found a lab may approach additional faculty for further rotations but cannot rely on the CMB Program for stipend support. A student who has not found an advisor by the start of the Fall semester following admission risks dismissal from the CMB program due to inability to make progress on the research portion of their studies.

In consultation with the Director or Academic Committee, Ph.D. students should register for a variable number of CM795 credits (Independent Study) for these lab rotations.

**DIRECT RECRUITMENT INTO LABORATORIES**

Faculty will be allowed to recruit incoming students directly to their laboratories to immediately begin work on a thesis or dissertation project. Such students must be approved for admission into the CMB program by the Admissions Committee and the Graduate School and must be supported by funds other than those of the CMB Program, generally in the form of a teaching or research assistantship or fellowship. The Admissions Committee must approve the advisor’s plan to support the student’s stipend and research project prior to admission of the student. Such students will not participate in rotations.

To protect the interests of the student in the unlikely event that the student and faculty member are incompatible, students who are recruited by a faculty member have the opportunity to change laboratories at the end of the spring semester, if they so desire. The laboratory that supported the student through the first year would have no hold on the student and would not be reimbursed for their support during the first year. Of course, the faculty member would have no further obligation regarding funding of students who left his/her laboratory.

**STANDARDS OF PERFORMANCE**

The academic and research performance of each student is evaluated annually by the student’s Graduate Advisory Committee (GAC) and the advisor and the signed progress report must be submitted to the CMB Program to be put in the student’s file. Unsatisfactory performance in course work, laboratory rotations, or research is grounds for probation or dismissal from the CMB program following Graduate School guidelines. In course work, an unsatisfactory performance is based upon grade point average. For laboratory rotation and research, unsatisfactory grades are assigned based upon a comparison with the performance of successful students in similar disciplines. This requirement is to assure that students are making adequate progress and that failure to progress satisfactorily is addressed expeditiously. Following a committee meeting the GAC may recommend that the advisor enter a grade of U for research credits, or the committee may provide a letter describing unsatisfactory progress which can be shared with the CMB Academic Committee and the Dean of the Graduate School. A student in this position will be required to hold another committee meeting after four months which will be attended by a member of the Academic Committee. If there is no improvement the GAC may recommend to the Graduate School that the student be dismissed from the program. Each student must maintain a cumulative Grade Point Average (GPA) of at least 3.00 in all didactic course work taken during his/her graduate program at Colorado State University, achieve a B or higher in all core courses and receive satisfactory grades in Independent Study and Thesis Research courses. After a second semester in which a student fails to attain a cumulative average of 3.00 or receives unsatisfactory grades in research/independent study, he/she will be dismissed in accordance with Graduate School procedures. Any exception must be initiated by the student in the form of a petition to the student’s GAC, or the CMB Director, if no GAC has been established. The advisor or the director may then appeal to the Dean of the Graduate School for reinstatement.

After completing 3 years in the MS program or 6 years in the PhD program, students must formulate a written plan for completion including a timeline that should be reviewed by the Program and their GAC. At any time after this point the CMB Director may call a meeting of the GAC to review the student’s progress and performance. This meeting and any subsequent meetings may be attended by the CMB Director or a member of the CMB Executive or Academic Committee.

Any time that a student experiences an event or issue that impacts their ability to make progress on their degree for more than 3 months, they should notify the CMB Program Coordinator or Director as well as their advisor. The information will be kept confidential but will allow the Program to intervene and provide support and guidance.
GRADUATE ASSISTANTSHIPS
Graduate Assistantships may be awarded to students who enter with a GPA of 3.00 or above. These are awarded on a competitive basis and most start at the beginning of the fall semester. A student entering with less than a 3.00 GPA is usually eligible only after he/she has completed one semester with a cumulative GPA of 3.0 or better. Any student holding a Graduate Assistantship and failing to maintain a cumulative GPA of 3.00 will lose such support immediately and will be eligible again only after raising his/her cumulative GPA to 3.00 or above.

Students entering with support as a Graduate Teaching Assistant from the CMB Program receive a monthly stipend at least equivalent to either that recommended by the National Institutes of Health ($2050 per month in 2018) or the minimum stipend set by the Graduate School, whichever is higher. Stipend is base-funded and tuition is provided by the GTA/GSA Base Tuition Program. Alternative and subsequent support for graduate students are provided through diverse sources, including fellowships, research grants awarded to faculty members, and GTAships from various departments that utilize different guidelines. However, the goal of the CMB Program is that all students should receive a stipend of at least that recommended by the NIH, or the level set by the departmental program of their advisor if it is greater than the NIH stipend.

The Graduate School provides a health insurance contribution to help offset the cost of health insurance to graduate assistants who meet all of the following criteria each fall and/or spring semester:

- appointed to a 25% (10 hours per week) or more assistantship (GTA, GRA, GSA) by the end of the regular add/drop period in either fall or spring semester or both,
- enrolled in CSU health insurance, and
- enrolled in 5 or more resident-instruction credits (Audits, Continuous Registration, and CSU Online credits do not meet the Resident Instruction enrollment criteria for this policy).

Students who have been advanced to candidacy and are appointed to a graduate research assistantship are expected to devote a full-time effort to their research. It is the responsibility of the advisor to designate the work load. Graduate Assistants are considered temporary employees by the University and, as such, do not earn vacation time. The general CMB Program leave policy is two weeks per year for all Graduate Assistants, subject to approval of their advisor.

GRADUATION REQUIREMENTS
The graduation requirements will in general follow those outlined in the current Graduate and Professional Bulletin. During the first two semesters, M.S. and Ph.D. candidates are expected to complete graduate courses in Molecular Regulation of Cell Function (BC565) and Molecular Genetics (BC 563) as well as CM510 (Introduction to CMB) and MIP611 (Advanced Microbiological Research Methods). All students must enroll in graduate seminar (CM 793), in which each student presents his/her thesis research, and CMB Seminar (CM792) in which invited speakers present their research. These two seminar courses aim to create community within the program and allow the program to evaluate student progress. Every CMB student must enroll in these courses once each year in either the spring or fall. GRAD550 (STEM Communication) is required and can be completed in the first or second year. Appropriate courses to complete the elective requirements for Ethics, Statistics and Writing, along with additional courses appropriate for the planned thesis research, may be established by the Graduate Advisory Committee.

To advance to candidacy for the Ph.D. degree, students are required to pass a preliminary examination administered by the student’s Graduate Advisory Committee according to the procedures described in the Preliminary Examination section of this booklet and in the Graduate and Professional Bulletin. The plan A M.S. degree in Cell and Molecular Biology is a research-oriented degree, so the Plan A Master’s thesis must be based upon laboratory research. The M.S. degree is not a prerequisite for the Ph.D. degree.

The completion of a thesis is necessary for both the M.S. (Plan A) and Ph.D. degrees. Each candidate is required to present a formal seminar summarizing his/her research and to pass a formal thesis defense administered by the Graduate Advisory Committee. In special cases a Plan B M.S. degree may be awarded. The Plan B M.S. degree does not require a thesis, but
does require a written report on a topic approved by the GAC and an oral exam. The final corrected and approved thesis must be submitted to the Graduate School within 1 semester of the thesis defense. Any exception must be initiated by the student in the form of a petition to the student’s Graduate Advisory Committee. If the thesis is not submitted in this time frame, the student will be considered to be making unsatisfactory progress towards the degree. After two semesters, the GAC may recommend to the Graduate School that the student be dismissed from the program with no degree.

CONTINUOUS REGISTRATION

During periods where a student is not utilizing University Resources (other than library and computing resources) they may enroll in Continuous Registration (CR). Examples of appropriate use of CR include medical or family leave, internships, and reaching the point of writing the dissertation full time. In each of these cases, CR must be approved by the advisor and the GAC and the request must be accompanied by a plan for completion of the degree. The form for CR approval will be provided by the CMB Program Coordinator upon request and is specific to CMB. It must be completed for the 1\textsuperscript{st}, 4\textsuperscript{th}, and 8\textsuperscript{th} semester of CR and signed by the student’s entire GAC. In general, students should require a maximum of 2 consecutive semesters of CR. CR may be used for the summer semester without approval when the student is planning to graduate during the summer. At all other times students should register for Independent Study or Dissertation Credits that reflect the time being spent in the laboratory (3hr per credit per week). Further details on CR can be found in the [Graduate Bulletin](#).

DIVERSITY AND INCLUSION

The CMB Program recognizes that each student has a unique set of merits, experiences and challenges and we value this diversity. The Program is committed to giving every student the best possible chance for success. With this in mind, members of the Academic and/or Executive Committee will work with individual students and their advisors to map out alternative paths to graduation if they find they cannot easily fit into the traditional path.

COURSES REQUIRED FOR THE M.S. DEGREE

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 565</td>
<td>Molecular Regulation of Cell Function</td>
<td>4</td>
</tr>
<tr>
<td>BC 563</td>
<td>Molecular Genetics</td>
<td>4</td>
</tr>
<tr>
<td>GRAD 550</td>
<td>STEM Communication</td>
<td>1</td>
</tr>
<tr>
<td>MIP 611</td>
<td>Advanced Microbiological Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>CM 510</td>
<td>Introduction to Cell &amp; Molecular Biology</td>
<td>1</td>
</tr>
<tr>
<td>CM 792†</td>
<td>Cell and Molecular Biology Seminar</td>
<td>1</td>
</tr>
<tr>
<td>CM 793†</td>
<td>Graduate Seminar</td>
<td>1</td>
</tr>
<tr>
<td>CM 595</td>
<td>Independent Study</td>
<td>1-3</td>
</tr>
<tr>
<td>CM 699</td>
<td>Thesis (for Plan A)</td>
<td>1-4</td>
</tr>
<tr>
<td>Ethics Elective*</td>
<td>At least 1 credit in Ethical Conduct of Science</td>
<td>1-3</td>
</tr>
<tr>
<td>Electives **</td>
<td>At least 4 credits in regular graduate level courses</td>
<td>4-8</td>
</tr>
</tbody>
</table>

The M.S. degree requires 12 credits of upper level (500 or above) didactic course work. A total of 30CR are required.
### COURSES REQUIRED FOR THE Ph.D. DEGREE

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC 565</td>
<td>Molecular Regulation of Cell Function</td>
<td>4</td>
</tr>
<tr>
<td>BC 563</td>
<td>Molecular Genetics</td>
<td>4</td>
</tr>
<tr>
<td>CM 510</td>
<td>Introduction to Cell &amp; Molecular Biology</td>
<td>1</td>
</tr>
<tr>
<td>MIP611</td>
<td>Advanced Microbiological Research Methods</td>
<td>4</td>
</tr>
<tr>
<td>GRAD550</td>
<td>STEM Communication</td>
<td>1</td>
</tr>
<tr>
<td>CM 792†</td>
<td>Cell and Molecular Biology Seminar</td>
<td>4 or more</td>
</tr>
<tr>
<td>CM 793†</td>
<td>Graduate Seminar</td>
<td>4 or more</td>
</tr>
<tr>
<td>CM 795</td>
<td>Independent Study</td>
<td>≥1</td>
</tr>
<tr>
<td>CM 799</td>
<td>Dissertation</td>
<td>≥1</td>
</tr>
<tr>
<td>Ethics Elective*</td>
<td>At least 1 credit in Ethical Conduct of Science</td>
<td>1-3</td>
</tr>
<tr>
<td>Topics Elective*</td>
<td>At least 2 credits in Topics/Literature Review</td>
<td>2</td>
</tr>
<tr>
<td>Statistics Elective*</td>
<td>At least 3 credits in graduate level Statistics</td>
<td>3-4</td>
</tr>
<tr>
<td>Writing Elective*</td>
<td>At least 1 credit in a graduate level Writing</td>
<td>1-3</td>
</tr>
<tr>
<td>Other Electives **</td>
<td>At least 6 credits in regular graduate courses</td>
<td>variable</td>
</tr>
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### COURSES REQUIRED FOR THE CANCER BIOLOGY SPECIALIZATION

CMB students may elect to specialize in Cancer Biology which leads to a Specialization noted on their transcript. At least five credits must be selected from courses below:

<table>
<thead>
<tr>
<th>Course No.</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ERHS 611</td>
<td>Cancer Genetics</td>
<td>2</td>
</tr>
<tr>
<td>ERHS 510</td>
<td>Cancer Biology</td>
<td>3</td>
</tr>
<tr>
<td>VS 718</td>
<td>Cancer Biology Clinical Practicum</td>
<td>2</td>
</tr>
<tr>
<td>EHRS 733</td>
<td>Environmental Carcinogenesis</td>
<td>3</td>
</tr>
</tbody>
</table>

In addition, students specializing in Cancer Biology may satisfy the CM792 seminar requirement by attending Clinical Oncology Seminar/Journal Club.

Any variation from the required courses must be approved by the Academic Committee and the student’s Graduate Advisory Committee. Requests for course substitutions or omissions must be submitted to the Academic Committee by the student in writing. Each graduate student must present a seminar of his/her work before graduating.

It is the responsibility of each graduate student to know and meet all requirements of the Graduate School. These are listed in the Colorado State University *Graduate and Professional Bulletin*, Handbook on Graduate Study, and Guidelines for Graduate Advising and Committee Service. The latter two publications will be sent to students during the first term they are registered.

† Students are required to take CM792 and CM793 once each year starting in the first year. Thus, if a student takes 2 years to complete the MS degree they will complete 2CR each of these courses. Similarly, if a student takes 5 years to complete the PhD, they will take each course 5 times for a total of 5CR each. These courses will only be taken once per year.

* Ethics, Statistics and Topics Electives: Acceptable courses are listed below. Others may be substituted with approval of the Graduate Advisory Committee and Program Director.

** Electives: Cell and Molecular Biology courses listed below, possible elective courses offered by other departments listed below, and on the CMB website, but these lists are not exhaustive. Other courses may be required by the Graduate Advisory Committee.
ETHICS, TOPICS, STATISTICS & WRITING ELECTIVES

**Ethics Electives:**
All CMB Students must take at least 1 credit covering Ethical Conduct of Science.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM666</td>
<td>Science &amp; Ethics</td>
<td>Spring</td>
</tr>
<tr>
<td>CM/BC601</td>
<td>Responsible Conduct in Biochemistry</td>
<td>Spring</td>
</tr>
<tr>
<td>MIP654</td>
<td>Research Policies &amp; Regulations</td>
<td>Fall</td>
</tr>
<tr>
<td>GRAD544(1cr)</td>
<td>Ethical Conduct of Research</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>NSCI575(1cr)</td>
<td>Ethical Issues in Big Data Research</td>
<td>Fall</td>
</tr>
</tbody>
</table>

**Topics Electives:**
CMB Ph.D. Students must take at least 2 credits of graduate level Topics/Literature Analysis classes. CM700 is preferred but other courses may be substituted.

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM700</td>
<td>Critical Analysis of the Literature</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>MIP700</td>
<td>Topics in Microbiology, Immunology &amp; Pathology</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>BC692CV</td>
<td>Topics in Animal Development</td>
<td>Spring</td>
</tr>
<tr>
<td>HES796(1cr)</td>
<td>Group Study</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>BMS796a/NB796c(1cr)</td>
<td>Topics in Neuroscience</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>BC711</td>
<td>Adv. Topics in Structural Biology</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>BC763</td>
<td>Adv. Molecular Genetics Topics</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>BMS502</td>
<td>Topics in Plant Pathology</td>
<td>Fall</td>
</tr>
<tr>
<td>CBE707</td>
<td>Adv. Topics in Biochemical Engineering</td>
<td>Fall</td>
</tr>
<tr>
<td>CHEM651(var)</td>
<td>Special Topics in Chemistry</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>FSHN650</td>
<td>Recent Developments in Human Nutrition</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>SOCR730(1cr)</td>
<td>Topics in Plant Breeding &amp; Genetics</td>
<td>Fall</td>
</tr>
<tr>
<td>HORT601(2cr)</td>
<td>Current Topics in Root &amp; Rhizosphere Biology</td>
<td>Spring</td>
</tr>
</tbody>
</table>

**Statistics Electives:**
CMB Ph.D. students must take at least 3 credits of graduate level Statistics.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAT511(4cr)</td>
<td>Design &amp; Data Analysis for Researchers I</td>
<td>Fall</td>
</tr>
<tr>
<td>STAT512</td>
<td>Design &amp; Data Analysis for Researchers II</td>
<td>Spring</td>
</tr>
<tr>
<td>STAT540</td>
<td>Data Analysis &amp; Regression</td>
<td>Fall</td>
</tr>
<tr>
<td>ERH542</td>
<td>Biostatistical Methods for Qualitative Data</td>
<td>Fall</td>
</tr>
<tr>
<td>ERH544/STAT544(3cr)</td>
<td>Biostatistical Methods for Quantitative Data</td>
<td>Spring</td>
</tr>
<tr>
<td>V5562</td>
<td>Applied Data Analysis</td>
<td>Spring</td>
</tr>
<tr>
<td>V5733(4cr)</td>
<td>Advanced Veterinary Epidemiology</td>
<td>Spring</td>
</tr>
</tbody>
</table>

Courses listed under the STAA prefix may also be considered and can be taken online or on campus
http://www.stat.colostate.edu/statprostudents/statdistance/statcourses/statcoursedescriptionsstaa.html

**Writing Electives:**
CMB Ph.D. students must take at least 1 credit of courses covering Scientific Writing. These may focus on grant writing and/or manuscript writing. The writing elective should be completed prior to taking the preliminary exam.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM640</td>
<td>Creative Science Writing</td>
<td>Spring</td>
</tr>
<tr>
<td>CM7011(2cr)</td>
<td>Planning Research &amp; Grant Proposals</td>
<td>Fall/Spring</td>
</tr>
<tr>
<td>MIP666</td>
<td>Writing Scientific Manuscripts</td>
<td>Fall</td>
</tr>
<tr>
<td>MIP680(1cr)</td>
<td>Grant Writing</td>
<td>Spring</td>
</tr>
<tr>
<td>BC701(1cr)</td>
<td>Grant Proposal Writing &amp; Reviewing</td>
<td>Fall</td>
</tr>
<tr>
<td>BIOM750/NB771(1cr)</td>
<td>Writing, Submitting &amp; Reviewing Grants</td>
<td>Fall</td>
</tr>
<tr>
<td>BSPM530/SOCR530(1cr)</td>
<td>Scientific Writing</td>
<td>Spring</td>
</tr>
<tr>
<td>BZ544(2cr)</td>
<td>Presenting Research in Biology</td>
<td>Fall</td>
</tr>
<tr>
<td>HES700(3cr)</td>
<td>Professional Skills in Bioenergetics</td>
<td>Fall</td>
</tr>
</tbody>
</table>
## CMB PREFIX COURSES

### FALL
- **CM502 (2cr)**: Techniques in Cell and Molecular Biology
- **CM505 (1cr)**: Nucleic Acids for Non-Life Scientists
- **CM506 (1CR)**: Protein Basics for Non-Biologists
- **CM510 (1cr)**: Introduction to Cell & Molecular Biology
- **CM595 (var)**: Independent Study
- **CM699 (var)**: Thesis
- **CM700 (1cr)**: Critical Analysis of the Literature
- **CM702B (1cr)**: Methods in Cell & Molecular Biology: Mammalian Tissue Culture
- **CM702D (1cr)**: Methods in Cell & Molecular Biology: Radiation Cytogenetics
- **CM792 (1cr)**: Cell & Molecular Biology Seminar
- **CM793 (1cr)**: Graduate Seminar
- **CM784 (var)**: Supervised College Teaching
- **CM795 (var)**: Independent Study
- **CM799 (var)**: Dissertation

### SPRING
- **CM595 (var)**: Independent Study
- **CM640 (3cr)**: Creative Science Writing
- **CM/PL666 (3cr)**: Science and Ethics
- **CM699 (var)**: Thesis
- **CM700 (1cr)**: Critical Analysis of the Literature
- **CM792 (1cr)**: Cell & Molecular Biology Seminar
- **CM793 (1cr)**: Graduate Seminar
- **CM784 (var)**: Supervised College Teaching
- **CM795 (var)**: Independent Study
- **CM799 (var)**: Dissertation
OTHER ELECTIVES
CMB faculty have interests aligned with several different research fields. Students wishing to gain additional training in one of these areas may find the lists of electives below helpful. This list is not exhaustive and other courses may be applied towards the degree if the Program Director and/or the student’s advisory committee approves.

Regulation of Gene Expression
Many of the courses offered through the BMB Department (BC prefix) are pertinent to this research focus.
- BC511 Structural Biology I
- BC611 Structural Biology II
- BC663 Gene Expression
- BC 665 Advanced Cell Biology
- BC512 Principles of Macromolecular Structure
- BC665A Advanced Topics Cell Reg. Microscopic Methods
- MIP543 RNA Biology
- MIP570 Functional Genomics
- CS580 Programming for the Life Sciences
- CS548 Bioinformatics Algorithms
- BSPM540 Understanding Genomes
- BZ576 Genetics of Model Organisms (fall, even yrs)
- CBES70 Biomolecular Engineering/Synthetic Biology (Spring)

Infectious Disease
Many of the courses offered through the MIP Department are pertinent to this research focus.
- MIP540 Biosafety in Research Laboratories
- MIP530 Advanced Molecular Virology
- MIP636 Mechanisms of Viral Infection and Diseases
- MIP533 Epidemiology of Infectious Disease
- MIP555 Principles and Mechanisms of Disease
- MIP628 Immunity to Infection

Cancer Biology
Many of the courses offered through the EHRS Department are pertinent to this research focus.
- ERHS 530 Radiological Physics and Dosimetry I.
- ERHS 532 Epidemiologic Methods.
- ERHS 542 Biostatistical Methods for Qualitative Data.
- ERHS 544/STAT 544 Biostatistical Methods for Quantitative Data.
- ERHS 550 Principles of Radiation Biology.
- ERHS 630 Radiological Physics and Dosimetry II.
- ERHS 640 Advanced Epidemiology.
- ERHS 701 Advanced Diagnostic Imaging Modalities.
- ERHS 714 Radiation Therapy Physics.
- ERHS 721 Radiation Oncology.
- ERHS 751 Advanced Radiation Biology I.
- ERHS 753 Advanced Radiation Biology II.
- ERHS 770 Radiation Biology Basic to Tumor Therapy.
- MIP 651 Immunobiology.
- V5 750 Clinical and Applied Pharmacology.

Plant Biology
Many of the courses offered through BSPM, Horticulture, Biology, and Soil & Crop Sciences are pertinent to this research focus.
- BSPM 510 Insect Plant Disease Relationships
- BSPM 526 Evolutionary Ecology
- BSPM 540 Understanding Genomes
- BSPM 550 Advanced Molecular - Plant Microbe Interactions
BZ555 Reproduction in Higher Plants (Spring, even yrs)
BZ 570 Molecular Aspects of Plant Development
BZ 572 Phytoremediation
BZ 642 Plant Metabolism
FSHN 508 International Nutrition and World Hunger
FTEC 578 Phytochemicals and Probiotics for Health
HORT 571 Soil-Plant-Water Relations/ Water Stress
HORT 575 Plant Germplasm Conservation
HORT 675 Plant Stress Physiology
HORT 580 Phytochemicals to Improve Human Health, multiple campuses
SOCR 535 Origin and Evolution of Cultivated Plants
SOCR 540 Soil-Plant Nutrient Relationships
SOCR 720 Advanced Plant Breeding
SOCR 725 Quantitative Inheritance in Plant Breeding
SOCR 730 Topics in Plant Breeding and Genetics
SOCR 731 Plant Breeding Data Management
BSPM/SOCR 740 Plant Molecular Genetics

Metabolic Regulation
Many of the courses offered through the FSHN and HES Departments are pertinent to this research focus.

BMS 500 Mammalian Physiology I
BMS501 Mammalian Physiology II
BMS 631 Mechanisms of Hormone Action
BMS 632 Metabolic Endocrinology
BMS 640 Reproductive Physiology and Endocrinology
CHEM 541 Organic Spectroscopy
CHEM 566 Bioinorganic and Biomedical Chemistry
NB 501 Cellular and Molecular Neurophysiology
NB 750 Physiology of Ion Channels
VS 628 Physiology and Pathophysiology
VS 750 Clinical and Applied Pharmacology
ERHS 502 Fundamentals of Toxicology
ERHS 510 Cancer Biology
ERHS 602 Toxicologic Pathology
FSHN 675 Regulation of Energy Intake
FSHN 504 Micronutrients (online course)
FSHN 505 Nutrition and Physical Activity in Aging(online course).
FSHN 540 Nutrigenomics and Advanced Lipid Metabolism
FSHN 550 Advanced Nutritional Science I
FSHN 551 Advanced Nutritional Science II
FSHN/HES 630 Integrative Exercise and Nutrition Metabolism
FTEC 578 Phytochemicals and Probiotics for Health
HES 610 Exercise Bioenergetics
HES 704 Advanced Topics in Human Bioenergetics
HES 710 Exercise in Disease Prevention
HES 730 Cardiovascular Pathophysiology
HES 735 Human Cardiovascular Control
HES 793 Bioenergetics Seminar

Neuroscience and Molecular Physiology
Many of the courses offered through the Molecular and Cellular Integrative Neurosciences Program are pertinent to this research focus.

NB500 Readings in Cellular Neurobiology
BMS500 Cellular and Molecular Neurophysiology
Reproductive and Developmental Biology
Many of the courses offered through the BMS Department are pertinent to this research focus.

- BMS 500 Mammalian Physiology I
- BMS 501 Mammalian Physiology II
- BMS 631 Mechanisms of Hormone Action
- BMS 632 Metabolic Endocrinology
- BMS 640 Reproductive Physiology and Endocrinology

Quantitative Biology
This is a rapidly growing area at CSU and more courses are likely to be available soon.

- MIP570 Functional Genomics
- CS425 Introduction to Bioinformatics Algorithms
- CS580 Programming for the Life Sciences
- CS548 Bioinformatics Algorithms
- BSPM540 Understanding Genomes
- DSCI510 Linux as a Computational Platform
- DSCI511 Genomics Data Analysis in Python
- DSCI512 RNA-seq Data Analysis
- MIP/BZ565 Next Generation Sequencing Platforms & Libraries
- MATH532 Mathematical Modeling of Large Datasets
- MATH676 Topological Data Analysis
- GRAD510 Fundamentals of High Performance Computing
- GRAD511 High Performance Computing and Visualization
- STAT600 Statistical Computing
- BIOM400 Biomolecular Kinetics and Cell Dynamics
- BZ360 Bioinformatics and Genomics
- BZ 571, Molecular and Genome Evolution
- BZ 578 Genetics of Natural Populations
- MIP577 Computer Analysis in Population Genetics
- NSCI677 Microscopic Image Collection & Processing

Career Development

- Business & Management
  - MGT450/BIOM580 Biomedical Entrepreneurship
  - MGT 305 Fundamentals of Management
  - MGT 320 Contemporary Management Principles/Practices
  - MGT 325 Leadership Communication
  - BMS610A Managing a Career in Science

- Safety, Philosophy & Ethics
  - MIP540 Biosafety in Research Laboratories
  - PHIL564 Animal Ethics
  - HIST463 Science and Technology in Modern History
Scientific Journalism & Communication
JTC372 Web Design and Management
JTC 461 Writing about Science, Health & Environment
JTC 464 Technical Writing
JTC 465 Specialized and Technical Editing
JTC 501 Process and Effects of Technical Communication
JTC 660 Communication in Technology Transfer
JTC 662 Communicating Science and Technology
GRAD550 Science Communication
MIP666 Writing Scientific Manuscripts

The English Department offers a Portfolio Option in Non-Fiction which may be of interest to CMB students attracted to scientific writing as a career.

Teaching

CMB students are encouraged to work towards a Graduate Teaching Certificate through The Institute for Learning and Teaching (TILT).
### SAMPLE CURRICULUM – M.S.

This is based on a Plan A - M.S. degree requiring a thesis. It may be possible to compete the requirements in fewer than four semesters. A Plan A Masters degree requires 30 credits of which 12 credits are at the 500 level or above in regular course work.

#### First Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM510</td>
<td>Introduction to CMB</td>
<td>1cr</td>
</tr>
<tr>
<td>MIP611</td>
<td>Advanced Microbiological Research Methods</td>
<td>4cr</td>
</tr>
<tr>
<td>BC563</td>
<td>Molecular Genetics</td>
<td>4cr</td>
</tr>
<tr>
<td>CM595</td>
<td>Independent Study</td>
<td>Variable</td>
</tr>
</tbody>
</table>

#### Second Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>BC565</td>
<td>Molecular Regulation of Cell Function</td>
<td>4cr</td>
</tr>
<tr>
<td>CM792</td>
<td>Seminar</td>
<td>1cr</td>
</tr>
<tr>
<td>CM793</td>
<td>Student Seminar</td>
<td>1cr</td>
</tr>
<tr>
<td></td>
<td>Ethics Elective</td>
<td>1-3cr</td>
</tr>
<tr>
<td>CM595</td>
<td>Independent Study</td>
<td>Variable</td>
</tr>
</tbody>
</table>

#### Third Semester

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM792</td>
<td>Seminar</td>
<td>1cr</td>
</tr>
<tr>
<td>GRAD550</td>
<td>STEM Communication</td>
<td>1cr</td>
</tr>
<tr>
<td>CM699</td>
<td>Dissertation</td>
<td>Variable</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>Variable</td>
</tr>
</tbody>
</table>

#### Fourth Semester (if needed)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM699</td>
<td>Dissertation</td>
<td>Variable</td>
</tr>
<tr>
<td>CM793</td>
<td>Graduate Seminar</td>
<td>1cr</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>Variable</td>
</tr>
</tbody>
</table>
SAMPLE CURRICULUM – Ph.D.
A Ph.D. degree requires 72 credits of which 37 credits are at the 500 level or above in regular course work.

**First Semester**
- CM510  Introduction to CMB  1cr
- MIP11  Advanced Microbiological Research Techniques 4cr
- BC563  Molecular Genetics  4cr
- CM795  Independent Study  Variable

**Second Semester**
- BC565  Molecular Regulation of Cell Function  4cr
- CM792  Seminar  1cr
- CM793  Student Seminar  1cr
- Ethics Elective  1-3cr
- Statistics Elective  3-4cr
- CM795  Independent Study  Variable

**Third Semester**
- CM792  Graduate Seminar  1cr
- GRAD550  STEM Communication  1cr
- CM795  Independent Study  Variable
- Writing Elective  1-3cr
- CM700  Critical Analysis of the Literature  1cr
- Electives  Variable

**Fourth Semester**
- CM795  Independent Study  Variable
- Electives  Variable
- CM700  Critical Analysis of the Literature  1cr
- CM793  Graduate Seminar  1cr

**Beyond the 2nd year**
CM793 and CM792 should be taken once each year in either the fall or spring semester.
CM799 Dissertation should be used for the last semester, while writing the thesis.

Note that the coursework described here may differ from the Approved CMB Curriculum due to the fact that approval of changes in the curriculum takes up to a year. The Approved CMB Curriculum takes precedence but the coursework described here is what is currently recommended, available and approved by the CMB Faculty.
EXAMINATIONS

See the current Graduate and Professional Bulletin for details concerning administration of examinations and requirements for submitting specific forms to the Graduate School Office including graduation requirements.

Final M.S. Examination - The final examination will be oral and is conducted by the student’s Graduate Advisory Committee that is chaired by his/her advisor. The examination for Plan "A" is primarily a defense of the student's thesis. The examination for Plan "B" is based upon the completed course work and the topic selected for the final report due under Plan "B". A copy of the thesis/report must be circulated to the student's Graduate Committee at least two weeks before the final examination. All CMB faculty and students are invited to attend. The graduate student has the responsibility to check with each committee member in order to schedule a suitable time and place for the oral examination, and to inform the CMB Administrative Assistant so that the CMB faculty can be notified at least two weeks in advance of the examination.

Preliminary Examination for Ph.D. Degree - After formal acceptance into a Ph.D. degree program and completion of major course requirements, a comprehensive preliminary examination is administered to determine if the student is qualified to continue toward the doctorate degree. This examination should ascertain the student's potential to become a research scientist capable of making significant contributions to his/her field of learning. Therefore, during the examination the student will be expected to demonstrate his/her ability to interrelate knowledge and concepts acquired in undergraduate and graduate courses, with emphasis on the specific courses listed under Minimum Graduation Requirements, and to be able to apply these concepts to a fundamental research investigation.

Students are expected to have knowledge beyond the scope of the research area with which they are affiliated. Students will be expected to demonstrate an understanding of material taught in the required core courses and the completed elective courses. These subject areas are considered to be the basic foundation for cell and molecular biologists and are covered on the oral preliminary examination.

Timing

The comprehensive preliminary exam is to be administered by the end of the 5th semester in the graduate program (Fall semester of 3rd year) by which time the student should have completed all of the required classes. For students transferring from MCIN, the preliminary exam should be completed by the end of the 5th semester after enrolling at CSU. For students transferring from other programs (e.g. Resident/PhD students) the timeframe for completing the preliminary exam should be defined through discussion with the GAC and the CMB Program Office notified of the expected date of completion. Failure to comply with these requirements will result in the CMB Graduate Education Office placing a hold on registration. Exceptions may be made in extraordinary circumstances but must be approved by the CMB Academic Committee and the CMB Program Director. The student is responsible for notifying the CMB Program Office of intent to hold the examination. In addition, the student will provide the CMB Program Office with documentation (copies of the GS16 form, the proposal and the examiners’ evaluation) upon completion of the exam, regardless of the outcome.

A summary of the examination process is provided below:

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early Fall Semester of 2nd year</td>
<td>All 2nd year students should attend a Preliminary Exam Information Meeting during which the format and timing of the CMB Preliminary Exam will be discussed.</td>
</tr>
<tr>
<td>Fall or Spring Semester of 2nd year</td>
<td>The student should prepare a research proposal on their own project, either as part of a grant writing class and/or in close collaboration with the primary advisor. This proposal should be shared with the examination committee at least one week ahead of a Pre-Exam Committee Meeting along with a copy of the “Guidelines for the Comprehensive Preliminary Exam” (this document).</td>
</tr>
<tr>
<td>Spring/Summer of</td>
<td>A Pre-Exam Committee Meeting should be held at which the first research proposal will</td>
</tr>
</tbody>
</table>
2nd year or Early Fall of 3rd year

be approved / discussed. In addition, the role of the advisor, chair of the committee and format and date of the exam will be finalized. This committee meeting may also double as the student’s annual committee meeting.

7 weeks prior to the exam (and before the last week in October)
The student should provide the examination committee with a one page document describing the Specific Aims of their independent proposal.

6 weeks prior to the exam
The committee should provide comments on the specific aims to the student (by email).

4 weeks prior to the exam
Any revisions to the Specific Aims should be approved by the examination committee (by email). The CMB Office should be notified of intent to take the examination and the date. The student should allow 2-3 weeks of full time effort to complete the proposal.

1 week prior to the exam
The final independent proposal should be handed to each committee member for evaluation, along with a copy of the preliminary examination evaluation form. The student will also provide the committee with a completed Assistance Form detailing the contributions of others to the proposal.

Day of the Exam (must be completed by end of Fall semester in the 3rd year)
Student and committee meet for the oral examination. Committee members provide their written evaluation forms to the chair after the exam.

Within 2 days after the exam
The original, signed GS16 form must be submitted to the Graduate School. Copies of GS16 and the proposal will be provided to the CMB Office. Copies may be electronic.

Within 1 week after the exam
The chair of the committee will provide the student, other committee members and the CMB office with a summary statement describing the student’s performance in the examination.

### Preliminary Exam Information Meeting
During the fall semester, all second year CMB students should attend an information meeting during which the format and timing of the CMB preliminary exam will be discussed.

### Preparation
In order to pass the preliminary exam the student must be able to independently formulate a hypothesis and design experiments to test this hypothesis. In addition, the student needs to be able to concisely and coherently convey their ideas to the examiners both orally and on paper. To develop these skills prior to the examination the student should prepare a research proposal (Thesis Proposal) on their own project in collaboration with the primary advisor and/or as part of a grant writing class. This proposal should be shared with the examination committee prior to the Pre-Exam Meeting to allow them to evaluate whether the student is adequately prepared for the examination and familiarize themselves with the student’s research area.
Pre-Examination Committee Meeting

Once the student has completed the Thesis Proposal on their own research and it has been approved by the primary advisor and/or received a passing grade in a grant writing class, they should arrange the Pre-Examination Committee Meeting. This committee meeting may also serve as the student’s annual committee meeting and all committee members should be present. In addition, the CMB Program Director (or Chair of the CMB Academic Committee) should attend this meeting in order to describe the CMB Preliminary Exam and the purpose of the meeting to the Committee. The purpose of the Pre-Exam Meeting is:

(i) **To Approve the Thesis Proposal.** The committee should determine whether the Thesis Proposal meets expectations and demonstrates that the student is ready for the Preliminary Examination. The student may present the proposal orally as part of CM793 or during the committee meeting, if desired. If the proposal does not meet expectations, the committee should provide detailed guidance as to what is needed to bring it up to standard.

(ii) **To Select a Chair of the Examination Committee.** The chair will communicate directly with the student during preparation of the independent proposal and provide a comprehensive written evaluation after the examination. The Chair of the Examination Committee may be the primary advisor if the rest of the committee agrees.

(iii) **To Define the Role of the Primary Advisor(s).** The Committee as a whole will determine whether the student’s major advisor(s) may be present for the oral examination, whether they may actively participate in the examination, and whether they may vote as to whether the student passes or fails the exam. If the committee decides to exclude the primary advisor(s) from the exam process then an alternate examiner should be identified from among the CMB Faculty. In this case, it may be necessary to file a GS9A form with the Graduate School in order to include the temporary member of the committee.

(iv) **To Establish Acceptable Practices during the Writing Process.** Although the primary advisor may NOT collaborate with the student on the independent proposal, the committee may specify whether the proposal can be discussed with peers, whether the student may obtain assistance with English language editing (this should generally only be considered for those students with English as a second language or a disability such as dyslexia), and may also provide a list of acceptable topics.

(v) **To Determine a Date and Time for the Examination.**

The decisions made at this meeting should be documented on the form provided (Pre-Examination Form, Page 4 of these guidelines) and the student should provide the CMB Office with a copy.

Format of the Proposals

Both the Thesis Proposal and the Independent Proposal should be in the format of an NIH R03/R21 application and use the template provided on the CMB Program Website. The entire document should not exceed 7 single-spaced pages including 1 single-spaced page allocated to the Specific Aims. Margins should be no less than 0.5” and the font should be no smaller than 11pt Arial. The main proposal should be divided into Significance, Innovation and Approach sections. Figures should be embedded in the text and have a font size of no smaller than 8 pt. Use of color figures is acceptable and encouraged. References are not included in the 7 page limit. If a grant writing course specifies a different format for the Thesis Research Proposal then that format is acceptable for that document, but the Independent Proposal should still follow the guidelines outlined above.

Preparation of the Independent Proposal

The independent proposal should be prepared by the student, without discussion of the approach or hypothesis with the advisor(s). The student should rely on the literature and their own background knowledge to develop a strong, original hypothesis and design an experimental approach to test it. Potential pitfalls and alternative approaches should be considered and the techniques proposed should be appropriate and state-of-the-art. The experimental approach should rely mainly on techniques other than those the student routinely uses in their own research. For example, if the
The student’s research project extensively utilizes ELISA assays and flow cytometry, these types of assay may not form the bulk of the experiments in the proposal, although they need not be completely avoided. Additional guidelines are provided on the CMB Program Website.

The proposal should be written in English. Students who feel they are deficient in their written language skills are encouraged to consult the CSU Writing Center for assistance. Students are also cautioned that the proposal should be an original, independently prepared document. Plagiarism of ideas or inappropriate use of passages from published documents will result in immediate dismissal from the PhD program.

At the time the proposal is submitted to the committee, the student should also submit the Assistance Form (Page 5) describing the contributions of other individuals (if any) during the preparation of the proposal.

Evaluation of the Specific Aims
The committee or advisor may provide the student with a list of four or five acceptable areas of study if they wish but experimental approaches and specific problems to be addressed should not be discussed. The committee is asked to evaluate the Specific Aims before the student prepares the main proposal. Comments and suggestions should be communicated to the student by email ~6 weeks prior to the oral examination. In particular the committee should:

(i) Evaluate whether the student is proposing research in a relevant area that is neither too close, nor too far from their own area of expertise. For example, a student working on replication of HIV-1 could propose to investigate replication of an alphavirus, or perhaps examine immunity to HIV-1, but it would be inappropriate to focus on the replication of a related retrovirus such as FIV. Equally, it would be unsuitable for this student to propose experiments on plant pollination as this topic has no obvious connection to the student’s chosen field of study. The committee is encouraged to use their discretion to determine whether aims are appropriate. Finally, the proposal should not overlap significantly with other projects in the laboratory supervised by their major advisor. In general, the subject matter of the proposal should be close enough to the student’s own area that the knowledge garnered will enhance the student’s understanding of their own research.

(ii) Give the student guidance regarding the scope of the specific aims and make suggestions that could help focus the proposal. For example, if the student proposes too broad a study the committee members could suggest which Aims should be discarded and which expanded.

The committee should not overtly suggest better experimental approaches or better hypotheses; although it is acceptable to ask that the student formulate another hypothesis and develop new specific aims if those submitted are considered unacceptable.

The Examination
At the start of the oral examination the student will give a ~20min presentation covering the material in the independent proposal. The committee will then question the student to determine how well they understand the literature in their chosen field of study as well as the background information relevant to the written proposal. The committee will also test the student’s ability to think creatively and communicate their ideas orally. In addition to the material presented in the proposal, the student can expect to be questioned on material taught in BC563 and/or BC565 or other graduate classes they have completed, as well as on material they presented in the Thesis Proposal. The CMB Program Director should be invited to attend the Preliminary Exam as an impartial observer and in an advisory capacity.

Overall Evaluation
An evaluation form is provided on the CMB Graduate Program Website. The independent proposal should not be evaluated as if it were being considered for funding. One goal of the preliminary exam is to ascertain whether the student understands their chosen field of study sufficiently that they can formulate an interesting and original hypothesis and develop a means to test it. The exam also tests the student’s ability to communicate their ideas effectively orally and on paper. The written proposal, the oral presentation and the student’s performance in the
questioning period will all be evaluated.

**Failing the Examination**
The student must pass both the written and oral parts of the examination in order to pass the preliminary exam. If performance in either portion is inadequate, the student fails the examination. In this case, if the committee agrees, the exam may be administered a second time no sooner than two months and no later than four months from the date of the original examination. The requirements to pass the second exam should be clearly defined by the committee and may include rewriting the proposal, taking additional classes and/or repeating the oral defense. If the student fails the second examination they will be immediately dismissed from the Ph.D. program.

**Final PhD Examination:** The final examination will be oral and is conducted by the student's Graduate Advisory Committee that is chaired by his/her advisor. The examination is primarily a defense of the student's thesis. A copy of the thesis must be circulated to the student's GAC at least two weeks before the final examination. All CMB faculty and students are invited to attend. The graduate student has the responsibility to check with each committee member in order to schedule a suitable time and place for the oral examination, and to inform the CMB Program Coordinator so that the CMB faculty can be notified at least two weeks in advance of the examination. All committee members must participate in the examination either in person or remotely. If a committee member is unable to participate, the exam should be postponed or the missing member can be replaced for the purposes of the exam. Approval can be obtained by contacting the Graduate School.

**PUBLICATIONS**
Presentation of research results is an important aspect of graduate education. Ph.D. candidates must prepare and submit a manuscript for publication in a peer-reviewed scientific journal with the student as first author. The CMB Program should be noted as the student's affiliation in all publications.

**STUDENT APPEALS OF GRADING DECISIONS**
Faculty members are responsible for stating clearly the instructional objectives of the course at the beginning of each term and for evaluating student achievement in a manner consistent with these objectives. Students are responsible for meeting standards of academic performance established for each course in which they are enrolled. Faculty members and instructors are responsible for determining and assigning final course grades. Graded examinations, papers and other materials used as a basis for evaluating a student’s achievement will be available to the student for inspection and discussion. Students may appeal faculty grading decisions through the mechanism described in the Code of the CMB Program, which is in line with procedures described in Section I.7 of the Faculty Manual.

*APPROVED BY VOTE OF THE CMB FACULTY OCTOBER 24, 2018*