**Department of Molecular Biology Advising Handbook**

*Last Updated February 1, 2022*

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# A. Description of the Molecular Biology Major

Requirements:

   No single one-block course can satisfy more than one requirement.

* 1 unit of organismal biology (BE105 Biology of Plants, BE106 Biology of Animals, BE107 Biology of Microbes, or HK204 Introduction to Human Anatomy)
  + AP Biology 4 or 5, or IB HL 5 satisfies this requirement
  + IB Biology of 6 satisfies this requirement **OR**satisfies the MB131 requirement
* 1 unit of MB131 Introduction to Molecular and Cellular Biology
  + IB HL of 6 or 7 satisfies this requirement
* 1 unit of MB201 Laboratory in Molecular and Cellular Biology and Genetics
* 1 unit of MB231 Genetics
* 1 unit of MB300-level lecture/discussion-based MB elective
  + These are intended for sophomores and juniors
* 1 unit of MB400-level lecture/discussion-based MB elective
  + These are intended for juniors and seniors
* 2 units of 300- or 400-level laboratory-rich electives
  + One or both units can be satisfied through mentored research with an MB professor (MB399, MB498, MB499, or MB397). Note: MB397 Mentored Research in Molecular Biology Alternative Format is a 0.5 unit course in an extended format over 4 blocks or half block; MB397 may be taken twice to count as 1 unit, or 4 times to count as 2 units.
  + Selected non-MB courses can meet one of these two units, but one of these units must be satisfied by an MB course offering. List of courses outside MB that can satisfy one (but not two) of these units: CH382 Biochemistry I; HK304 Advanced Human Anatomy; HK306 Advanced Joint Anatomy; HK321 Human Physiology; HK354 Advanced Head and Neck Anatomy; MA256 Mathematical Models in Biology; PY296 Functional Neuroscience; PY297 Neuroscience 1; PY299 Neuroscience (counts as 1 unit); BE365 Plant Physiology; BE280 Population Genetics; BE465 Techniques in Molecular Ecology and Systematics.
* 1 unit of elective in the biological sciences.
  + Can be satisfied by any MB course for majors, or BE course for majors, or by selected courses in Biochemistry, Mathematics, Neuroscience, Anthropology, or Human Biology and Kinesiology (see list).
  + List: any MB course other than MB100, MB131, MB201, MB231; any BE course other than BE100; CH382 Biochemistry I; CH383 Biochemistry II; HK204 Introduction to Human Anatomy; HK304 Advanced Human Anatomy; HK306 Advanced Joint Anatomy; HK321 Human Physiology;  HK354 Advanced Head and Neck Anatomy; MA256 Mathematical Models in Biology; PY296 Functional Neuroscience; PY297 Neuroscience I; PY299 Neuroscience (counts as 1 unit); AN230/MB230 Human Evolution; AN202 Human Biological Variation; MA130 Viruses: The Biology and Mathematical Modeling of Epidemics.
* 1 unit of Senior Capstone in Molecular Biology, MB497, which will be offered twice each year, once in the fall (Block 4) and once in the spring (Block 6).  A third block of MB497 may be offered some years depending on the number of senior MB majors.
* A maximum of 2 units of mentored research such as MB209, MB397, MB399, MB498, MB499, CH401, and CH403 can be counted toward the Molecular Biology major. All of these mentored research blocks require consent of instructor and agreement from the supervising professor at least one block in advance.
* 4 units of Chemistry (CH107 General Chemistry I, CH108 General Chemistry II, CH250 Structures of Organic Molecules, and CH251 Reactions of Organic Molecules).
* 2 units from selected courses in Mathematics, Computer Science, or Physics (MA125 Pre-Calculus and Calculus (counts as two units toward the requirement);  MA126 Calculus I; MA127 Calculus I and II Accelerated; MA129 Calculus II; MA117 Probability & Statistics; MA217 Probability and Statistical Modeling; CP115 Computational Thinking; CP122 Computer Science I; CP222 Computer Science II; PC141 Physics for the Life Sciences I; PC241 Physics for the Physical Sciences I). May be satisfied by AP or IB credit recognized by the registrar.
* Must attend Molecular Biology Day as a senior
* Must participate in departmental assessment activities such as the senior exit survey and examination
* Must complete the senior seminar requirement (See section F for details).

# B. Suggestions for completing the 16 units for the major in four years

## For students who took calculus in high school

First Year

* Take the mathematics placement exam (See Quantitative Reasoning Center);
* CH107; and
* MB131; and
* MB201; and
* CH108.
* *Note: students who did not take calculus in high school are advised to take calculus or statistics before taking any chemistry or molecular biology courses. See p. 4.*

Sophomore Year

* One unit of organismal biology; and
* MB231; and
* CH250; and
* CH251; and
* Find a Molecular Biology advisor and declare the Molecular Biology major through the registrar’s office.

Junior Year

* One 300-level MB discussion course; and
* One 300-level MB laboratory intensive course; and
* Two units of math/computer science/physics.

Senior Year:

* One 400-level MB discussion course; and
* One 300- or 400-level MB laboratory intensive course; and
* One elective unit in the biological sciences; and
* MB497 (the senior capstone course); and
* Required seminar participation; and
* Required assessment activities.

***Research****: It is advisable to complete a research opportunity during at least one of your last two summers in college. Discuss this possibility with your Molecular Biology advisor and see* [*www.nsf.gov/crssprgm/reu/*](http://www.nsf.gov/crssprgm/reu/)*. Positions are highly competitive, so apply broadly.*

***Study abroad:*** *One semester in the sophomore or junior year recommended. Contact Heather Browne to find a study abroad program that is compatible with a major in Molecular Biology. Heather can also explain how financial aid applies to various study abroad opportunities.*

***Phi Beta Kappa:*** *In order to be eligible, you must have a high GPA and complete the intermediate college level in a second language (typically 202 or higher; may be an adjunct course) and satisfy certain distribution requirements; see* [*https://www.coloradocollege.edu/other/pbk/membership-requirements.html*](https://www.coloradocollege.edu/other/pbk/membership-requirements.html)

## For students who did not take calculus in high school

First Year

* Take the mathematics placement exam (See Quantitative Reasoning Center)
* One unit of math/computer science (preferably Pre-calculus - Calculus or MA 117 Statistics); and
* CH107; and
* MB131; and
* CH108 or MB201.

Sophomore Year

* One unit of organismal biology; and
* MB 201 or CH108; and
* CH250; and
* CH251; and
* Find a Molecular Biology advisor and declare the Molecular Biology major through the registrar’s office.

Junior Year

* MB231; and
* One 300-level MB discussion course; and
* One 300-level MB laboratory intensive course; and
* One unit of math/computer science/physics.

Senior Year:

* One 400-level MB discussion course; and
* One 300- or 400-level MB laboratory intensive course; and
* One elective unit in the biological sciences; and
* MB497 (the senior capstone course); and
* Required seminar participation; and
* Required assessment activities.

***Research****: It is advisable to complete a research opportunity during at least one of your last two summers in college. Discuss this possibility with your Molecular Biology advisor and see* [*www.nsf.gov/crssprgm/reu/*](http://www.nsf.gov/crssprgm/reu/)*. Positions are highly competitive, so apply broadly.*

***Study abroad:*** *One semester in the sophomore or junior year recommended. Contact Heather Browne to find a study abroad program that is compatible with a major in Molecular Biology. Heather can also explain how financial aid applies to various study abroad opportunities.*

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## All-College Requirements

The All-College Requirements are different depending on student enrollment date.

* Students who enrolled at CC prior to the fall of 2020 must complete the old All-College Requirements (FYE, Critical Perspectives, etc.).
* Students who enrolled at CC in the fall of 2020 or later must complete the new General Education Program (CC100, CC120, Learning Across the Liberal Arts, etc.).
* Both the new and old All-College Requirements are posted here: <https://www.coloradocollege.edu/basics/welcome/leadership/policies/all-college-degree-requirements-policy>

# C. Senior Capstone Experience\*

1. Seniors must participate in departmental seminars, as posted on [www.coloradocollege.edu/academics/dept/molecularbiology/seminars/](http://www.coloradocollege.edu/academics/dept/molecularbiology/seminars/) For more details about seminar requirements, see section F.
2. Seniors must participate in (attend or present at) Molecular Biology Day.
3. Seniors must pass MB497.
4. Seniors must participate in assessment activities, as announced at the Fall Majors’ meeting.

\*Note: Since we define "senior" as a student within their last 8 blocks at CC, students who anticipate mid-year graduation must complete their seminar attendance requirement and complete MB497 within their last 8 blocks, and must attend MB Day in the spring prior to graduation.

# D. AP/IB Biology Credit in Biology

1. Students with a score of 4 or 5 on AP Biology may count that as one unit of organismal biology. Note that this credit may not count as any specific Organismal Biology and Ecology course; check with the Chair of OBE.
2. Students with a score of 5 on Higher Level IB Biology may count that as one unit of organismal biology for purposes of the Molecular Biology major. They should enroll in MB131 after completing the CH107 pre-requisite. Note that this credit may not count as any specific Organismal Biology and Ecology course; check with the Chair of OBE.
3. Students with a score of 6 on IB Higher Level Biology may count that as one unit of MB131 **or** as one unit of organismal biology; they should consult with a Molecular Biology professor to decide on the best option
4. Students with a score of 7 on IB Higher Level Biology may count that as one unit of organismal biology **and** as one unit of MB131. They should enroll in MB201 after completing the CH107 pre-requisite. Note that this credit may not count as any specific Organismal Biology and Ecology course; check with the Chair of OBE.
5. To formalize your AP or IB credit counting toward the Molecular Biology degree, you must send your answers to the AP/IB questionnaire in an email to the Chair of Molecular Biology, administrative assistant (Kelley.Mathers@ColoradoCollege.edu), and your Molecular Biology advisor. See Appendix 1.

# E. Senior Thesis in Molecular Biology

**Eligibility & Expectations**

* The thesis is intended for students who have time to spend immersing themselves in the discipline of Molecular Biology for the majority of their senior year, and who have demonstrated an avid interest in molecular biology during their undergraduate careers.
* The thesis is a significant time commitment; we expect that the thesis will take between 10-12 hours of work per week, in addition to a dedicated thesis block.
  + Students should consider their other commitments carefully to ensure they have time to complete the thesis and must consult their MB advisor.
  + Students should plan to work closely with their thesis readers during Blocks 5 & 6, as multiple revisions are usually necessary­. Faculty teaching during these blocks may require strict deadlines for submissions of revisions.
* Students interested in doing a thesis must have finished their research before the beginning of Block 2 of their senior year. Typically, a thesis is based on work done over several blocks or during a 10-week summer research program, or both. To determine if your research is eligible:
  + If you have done research on campus, consult your research mentor.
  + If you have done research off campus, see the “Eligibility Off-Campus Research” section below and consult your MB advisor.
* Failure to meet any of the deadlines or requirements below will disqualify a student from completing a thesis. The primary reader will determine the thesis grade for MB499, with the possibility of a NC grade.

**Thesis Timeline**

* Your primary reader may set additional intermediate deadlines in addition to those listed below, or may set deadlines earlier than those set below.
* You may still complete a thesis if you plan to graduate a semester early, however, you must plan to (1) complete your written thesis and (2) present your thesis during your last semester.

**Junior Year**

* During the Year: Plan for a research experience that includes a couple blocks of research during the junior year and/or a 10-week summer research experience on campus at CC or elsewhere such as through the NSF REU program (<https://www.nsf.gov/crssprgm/reu/>). CC summer lab positions often fill in the late fall or early spring semester; NSF REU applications are often due in the early spring semester but check the NSF REU website for specific due dates.
* Block 7: Register for MB499 – Senior Thesis with your research mentor / primary reader.
  + **You must register for – and complete – a thesis block during Blocks 1-4.**
  + Your senior thesis block should be named beginning with the prefix “MB499:”. For example, “MB499: RNA-binding proteins and dendrite formation.”
  + If you are still waiting on summer research plans during pre-registration, contact your MB advisor to discuss your plans for a thesis.

**Senior Year**

* First Friday of Block 2: Deadline to submit Senior Thesis Registration Questionnaire.
  + See Appendix 2.
* Last Day of Block 4: Complete draft of thesis due to primary reader.
  + See “Complete First Draft Requirements” below.
* First Tuesday of Block 5: Corrections to first draft returned to student by primary reader.
* Last Friday of Block 5: Student revisions returned to the primary and secondary readers.
  + See “Revised Draft Requirements for the Second Reader” below.
* Last Friday of Block 6: Final reviews of thesis by both readers completed; thesis completed and signed first/title page turned into the MB administrative assistant.
  + See “Final Thesis Requirements” and “Final Thesis Submission” below.
* First Monday of Block 7: Final copy of thesis uploaded to library.
  + See “Final Thesis Submission” below.

**Thesis Requirements**

**Complete First Draft Requirements**

1. Due to the primary reader **before the last day of Block 4**.
2. The paper consists of the following sections:
   1. A title.
   2. An abstract of 300-500 words.
      1. Your audience for this abstract is a fellow MB senior.
   3. An introduction of 1,250-1,750 words.
      1. This introduction must include a review of primary literature in molecular & cellular biology related to the topic of your research.
   4. A methods section.
   5. A results section with at minimum two figures or tables of data.
      1. It is not acceptable to use the same data in two different formats.
      2. Figures and tables must be formatted according to typical professional publications in molecular biology.
   6. A discussion of 1,250-1,750 words.
   7. A works cited section (references)
      1. Format according to directions from the primary reader.
      2. Minimum 6 primary publications cited; published in the previous 10 years.
      3. Minimum 2 reviews cited; published in the previous 10 years.
      4. Check with your primary reader for the names of appropriate journals.
   8. In-text citations formatted according to directions from the primary reader.

**Revised Draft Requirements for the Second Reader**

1. Due to the primary and secondary readers **on or before the last Friday of Block 5**.
2. Must address all of the primary reader’s concerns prior to submission; this may require multiple drafts during the block.
3. Must include all sections as described in “Complete First Draft Requirements” above.

**Final Thesis Requirements**

1. Due to the primary and secondary readers **on or before the last Friday of Block 6**.
2. Must address all of the primary and secondary reader’s concerns prior to submission; this may require multiple drafts during the block.
3. Must include all sections as described in “Complete First Draft Requirements” above.
4. Should also include a final section, “Acknowledgements”.

**Final Thesis Submission**

Following final approval from your primary thesis advisor, the full thesis must be submitted to the library **before the first Monday of Block 7**.

* 1. Submit at the following website: <http://tiny.cc/thesissubmission>
  2. For more information, see <https://coloradocollege.libguides.com/DigitalArchivesSubmission>

**Presentation at Molecular Biology Day**

1. Plan a 10-15-minute presentation of your thesis and be prepared to answer questions by students and professors about your research.
2. Thesis students attempting to graduate in December must talk to their advisor and the department chair to arrange an alternative way to fulfill this requirement four blocks in advance of graduation.

**Eligibility of Off-Campus Research**

* Research done under the supervision of someone off-campus, must first be approved as qualifying by the department.
  + You must contact your primary reader during the off-campus research experience to discuss the project before the research concludes to determine if it qualifies as a thesis-eligible project.
  + It is up to you to communicate with your primary reader; if you do not do communicate with your primary reader, you may not do a thesis.
* At minimum, the research must involve:
  + Testing a hypothesis, generating an experimental system to test a hypothesis, or generating data for hypothesis formation. Ultimately, this is at the discretion of the primary reader.
  + Doing a project that includes substantive laboratory or computational experiences typical of the disciplines of molecular biology, genetics, genomics, developmental biology, cell biology, immunology, bioinformatics, molecular evolution, biochemistry, virology, molecular neuroscience, microbiology, and closely related disciplines.
    - Projects in other fields such as public health or ecology may not qualify if they do not involve molecular biology.

# F. Senior Seminar Requirements

During the last two semesters, to fulfill the requirements for the major (and to graduate), seniors must fulfill the seminar participation required by the Senior Capstone Experience. To fulfill this requirement, seniors must:

1. Make certain that you are a declared Molecular Biology major.
2. Attend **FOUR** research seminars during your last two semesters. These will be announced by email to declared Molecular Biology majors and using flyers in the Department of Molecular Biology.
   1. Note that **many of these will be in the fall** semester – don’t put this off.
3. Prior to each research seminar, read a publication by the seminar speaker, or a related publication, which will be distributed one week prior to the seminar by email.
4. Write a question to ask the author about the work in the publication. Submit this question to both A) your advisor AND to B) the administrative assistant [Kelley.Mathers@coloradocollege.edu](mailto:Kelley.Mathers@coloradocollege.edu) in the text of an email **PRIOR TO the seminar**.
   1. We encourage you to meet with each other to discuss the publication.
   2. We encourage you to bring a copy of your question to the seminar, so that you may ask the speaker your question.
5. At each seminar, sign in.
6. If the seminar speaker is invited to have lunch or another gathering with students, it is in your best professional interests to attend such gatherings.
7. The paraprofessional will reconcile the sign-in sheet with the questions submitted on time to Kelley, to keep track of student progress fulfilling this requirement.
8. This requirement cannot be met without fulfilling BOTH of the components: question submission ahead of time and attending the seminars.
9. *Ultimately, it is up to each senior to ensure that they fulfill this requirement in order to complete their major and graduate.*

# G. The Departmental Minor in Molecular Biology

* 1 unit of MB131 Introduction to Molecular and Cellular Biology
* 1 unit of MB201 Laboratory in Molecular and Cellular Biology and Genetics
* 1 unit of MB231 Genetics
* 2 units of 300- or 400-level MB courses
* 1 unit that is either (a) a 300- or 400-level MB course, or (b) from the list below:
  + List of courses outside MB that can satisfy this unit: CH382 Biochemistry I; HK304 Advanced Human Anatomy; HK306 Advanced Joint Anatomy; HK321 Human Physiology; HK354 Advanced Head and Neck Anatomy; MA256 Mathematical Models in Biology; PY296 Functional Neuroscience; PY297 Neuroscience 1; PY299 Neuroscience (counts as 1 unit); BE365 Plant Physiology; BE280 Population Genetics; BE465 Techniques in Molecular Ecology and Systematics.

# Appendix 1. Use of AP or IB credit in Biology, Mathematics, or Chemistry

Type the following questions and your answers to them in the body of an e-mail sent simultaneously to your Molecular Biology advisor, Chair of Molecular Biology (see the MB website), the Molecular Biology administrative assistant, Kelley.Mathers@ColoradoCollege.edu, and yourself. This e-mail will become part of your departmental file, maintained by the administrative assistant.

**Make sure the subject line of the email is “AP/IB credit”**

1. Do you have AP or IB credit in Biology? Write out one of the following options in the email.
   1. I have a score of 4 or 5 on the AP Biology test and I plan to count this as one unit of organismal biology. I understand that I still have to take MB131 after I have completed its CH107 pre-requisite.
   2. I have a score of 5 on the IB Higher Level Biology exam and I plan to count this as one unit of organismal biology. I understand that I still have to take MB131 after I have completed its CH107 pre-requisite.
   3. I have a score of 6 on the IB Higher Level Biology exam and I plan to count this as…
      1. one unit of MB131. I understand that I can enroll in MB201 after completing CH107; **OR**
      2. one unit of organismal biology (choose one option)
   4. I have a score of 7 on the IB Higher Level Biology exam and I plan to count this as one unit of organismal biology **and** as one unit of MB131. I can enroll in MB201 after completing CH107.
2. Do you have AP or IB credit in mathematics or chemistry? Write out one of the following options in the email.
   1. The registrar has not awarded me any AP/IB credits in mathematics.
   2. The registrar has awarded me one unit of AP/IB credit in statistics.
   3. The registrar has awarded me one unit of AP/IB credit in calculus.
   4. The registrar has awarded me two or more other AP/IB units in mathematics (please describe….)
   5. The registrar and the Chemistry department have awarded me one or more units in Chemistry (please describe….)

# Appendix 2. Senior Thesis Registration Questionnaire

Students planning to do a Senior Thesis must register their thesis with the department by the **first Friday of Block 2.**

To register, sign up for the **Opportunities in Molecular Biology Research** Canvas site at: [**https://canvas.coloradocollege.edu/enroll/CNYRME**](https://canvas.coloradocollege.edu/enroll/CNYRME)

Then navigate to the MB Senior Thesis Questionnaire at: [**https://canvas.coloradocollege.edu/courses/29349/quizzes/4352**](https://canvas.coloradocollege.edu/courses/29349/quizzes/4352)

Here are the questions that you will need to answer to complete the Questionnaire

1. What is your name?
2. Did the research you performed and will write about in your thesis occur at CC or at another institution?
3. Who is your research mentor/senior thesis supervisor?
4. Who is your senior thesis second reader?
5. When have you enrolled in MB499?
6. Summarize your thesis research question in 2-4 sentences.
7. What is the date for Molecular Biology Day?
8. Is there any reason that you cannot be there on Molecular Biology Day, such as graduating a semester early?

# Appendix 3. Department of Molecular Biology courses

|  |  |
| --- | --- |
| **Course number** | **Course name** |
| MB100 | Studies in Molecular Biology |
| MB101 | The Science and Ethics of Genetics |
| MB112 | Investigations in Molecular Biology |
| MB131 | Introduction to Molecular and Cellular Biology |
| MB199 | Research Ethics in the Sciences |
| MB201 | Laboratory in Molecular and Cellular Biology and Genetics |
| MB209 | Introduction to Mentored Research in Molecular Biology |
| MB210 | Introductory Special Topics in Molecular Biology |
| MB230 | Human Evolution |
| MB231 | Genetics |
| MB244 | Scanning Electron Microscopy |
| MB256 | Mathematical Models in Biology |
| MB301 | Special Topics in Molecular Biology |
| MB302 | Independent Study in Molecular Biology |
| MB307 | The Molecular and Cellular Regulation of Gene Expression |
| MB310 | Advanced Cell Biology |
| MB315 | Genomics |
| MB321 | Microbiology: Cells, Molecules, and Infection |
| MB325 | Molecular and Cellular Immunology |
| MB345 | Transmission Electron Microscopy |
| MB350 | Special Topics in Laboratory Research in Molecular Biology |
| MB355 | Laboratory in Advanced Genetics |
| MB357 | Laboratory in Yeast Genetics |
| MB360 | Laboratory in Molecular Microbiology |
| MB365 | Laboratory in Genomics |
| MB375 | Laboratory in Advanced Cell Biology |
| MB397 | Mentored Research in Molecular Biology Alternative Format |
| MB399 | Mentored Research in Molecular Biology |
| MB401 | Advanced Special Topics in Molecular Biology |
| MB405 | Stem Cell Biology |
| MB410 | Molecular and Cellular Virology |
| MB415 | Developmental Neurobiology |
| MB425 | Molecular and Cellular Biology of Cancer |
| MB450 | Advanced Special Topics in Laboratory Research in Molecular Biology |
| MB455 | Laboratory in Advanced Cell Biology |
| MB497 | Senior Capstone in Molecular Biology |
| MB498 | Advanced Mentored Research in Molecular Biology |
| MB499 | Senior Thesis in Molecular Biology |

# Appendix 4. Study Abroad Guidelines

**General Information About Study Abroad:**

* For more information about general CC International Studies and approved Off-Campus Programs, please visit the [Center for Global Education and Field Study](https://www.coloradocollege.edu/international/) website.
* You will be asked to document the course content through the syllabi, copies of exams, textbooks and through discussion and/or a department member who teach the course for which you want to substitute elsewhere.
* The best time to study abroad is generally in your junior year, after you have taken the basic coursework in the MB major (CH107, MB131 or MB111, MB201, MB231).
* Course approvals can be requested through the required CC Internal Application for Off-Campus Study, via SUMMIT (see the [How to Apply](https://www.coloradocollege.edu/offices/globalandfieldstudy/global-education/semesters-off-campus/application-process.html) portion of the Center for Global Education and Field Study website). The system will contact your advisor, the Registrar, and the departmental study abroad advisor for electronic approval of your proposed coursework.
* You must be a declared Molecular Biology (MB) major with a MB faculty member advisor ***before*** you may study abroad and have study abroad credits satisfy requirements for the MB major.
* This guide pertains only to courses that will count towards the Molecular Biology (MB) major.
  + Substituting required courses for the major that are taught by other departments at CC, such as Chemistry, requires ***written approval*** by that Department ***and*** approval by your academic advisor in MB.
  + The [Credit Transfer](https://www.coloradocollege.edu/offices/globalandfieldstudy/global-education/semesters-off-campus/credit-transfer/) portion of the Center for Global Education and Field Study website describes policies for courses that may provide credit towards All-College Requirements.

**Study Abroad Credits That Satisfy Requirements for the Molecular Biology (MB) Major**

* Students can receive a ***maximum*** 2 units towards the Molecular Biology major for courses that begin with an MB designation.
* A course qualifies for a unit that satisfies a Molecular Biology major requirement if:
  + The course counts for ≥ 4 semester hours (4 semester credit hours = 1 CC unit)
    - Courses of only 3 semester hours only count as 0.75 units of CC credit and will not fulfill any MB requirement
    - Courses that count for less than one unit can be added together to get a maximum of 2 units. For example, 0.75 units + 0.75 units + 0.5 units = 2 units of CC credit.
  + The course prerequisites are equivalent to MB231 – Genetics.
    - *If you are unsure if a course meets this requirement, please consult a faculty member in MB.*
  + The course is unique in your academic trajectory – that is, credit will *not* be awarded for courses that are very similar to, or largely duplicate, courses you’ve already taken at CC. After returning to CC, you cannot take an equivalent course for credit. For example, if you take a course on Virology during study abroad, you cannot subsequently take Virology at CC also for credit.
  + You receive a grade of at least a C- in the course.
* These 2 study abroad units can satisfy any of the following Molecular Biology major requirements:
  + 1 unit of 300-level lecture/discussion-based MB elective
  + 1 unit of 400-level lecture/discussion-based MB elective
  + 2 units of 300- or 400-level laboratory rich electives
    - ***Note:*** These may be few and far between, as most traditional courses are a mix of lecture and lab, with a far smaller lab component. *Please consult a faculty member in the MB department if you are unsure if a course meets this requirement.*
    - Since a maximum of 2 units of mentored research can count towards the MB major, a mentored research project (the equivalent of 4 semester hours, or 10 hours/week, per 1 CC credit) can count towards the MB major here.
  + 1 unit of elective in the biological sciences
    - Since a maximum of 2 units of mentored research can count towards the MB major, a mentored research project (the equivalent of 4 semester hours per 1 CC credit) can also count towards the MB major here if the research is sufficiently related to molecular biology. *Please consult a faculty member in the MB department if you are unsure if a mentored research projects meets these guidelines.*
  + ***Note:*** A course with a combination of lecture and lab may only count towards either a 300/400 lecture/discussion-based elective OR a 300/400 laboratory-rich elective and not both
    - From MB student handbook: No single one-block (in this case, ≥4 semester hour) course can satisfy more than one requirement.
* These 2 study abroad units can ***never*** satisfy any of the following Molecular Biology major requirements:
  + 1 unit of MB131-Introduction to Molecular and Cellular Biology *or* MB111-FYE Introduction to Molecular and Cellular Biology
    - ***Note****:* One exception is that the Boston University Science Semester in Madrid offers a course similar to MB131 called **CAS BI 203: Cell Biology**, whichmay be used to satisfy the MB131 requirement. However, this program has been inconsistent in their prerequisite requirements for CAS BI 203 and some students have been told they need to take MB131 first. The Department of Molecular Biology has determined that you will NOT receive credit for the MB major if you take CAS BI 203 after already taking MB131. Also, despite this course having some lab, it does NOT fulfill the requirement for MB201.
  + 1 unit of MB201-Laboratory in Molecular and Cellular Biology and Genetics
  + 1 unit of MB231-Genetics
  + 1 of the 4 units of Chemistry (CH107)
    - As CH107 is required for MB131, you may *not* count study abroad credit towards the MB major for CH107
  + 1 unit of MB497-Senior Capstone in Molecular Biology
  + Senior requirements, including the following:
    - Must attend Molecular Biology Day as a senior
    - Must participate in Departmental assessment activities such as the senior exit survey and examination
    - Must complete the senior seminar requirement.

**Study Abroad Programs with *Potential* for Credits that Usually Satisfy Molecular Biology (MB) Major Requirements:**

* ACM Programs
  + [Oak Ridge Science Semester](http://www.acm.edu/programs/15/oakridge/index.html)
* CC-Approved Third Party Programs
  + Boston University
    - Spain – [Madrid Science Semester](http://www.bu.edu/abroad/programs/madrid-science-program/)
    - ***Note****:* See above for a description of how the Boston University **CAS BI 203: Cell Biology** course may be applied to the MB major.
  + Danish Institute for Study Abroad (DIS) Program
    - Copenhagen – [DIS Copenhagen](http://disabroad.org/copenhagen/)
    - Stockholm – [DIS Stockholm](http://disabroad.org/stockholm/)
    - ***Note:*** Many DIS courses are only 3 credit hours, so students will need more than one course to add up to 1 elective unit in MB. The remaining course hours will count towards a ½ unit towards graduation requirements.
  + EuroScholars
    - Many locations – visit [EuroScholars Website](http://euroscholars.eu/index.php/)
  + Hebrew University of Jerusalem
    - Rothberg International School - [Quantitative Biology Program](https://overseas.huji.ac.il/quantbio)
  + IFSA-Butler
    - Many locations; please see CC’s [Center for Global Education and Field Study](https://www.coloradocollege.edu/offices/globalandfieldstudy/global-education/index.html) website for more information

**Study Abroad or Summer Courses in Direct Enrollment Programs**

* All courses for the Molecular Biology major can be fulfilled by direct enrollment in other universities with the exception of MB497 – Senior Capstone.
* **You must get approval with an MB advisor before departure.** Please contact the Chair of Molecular Biology or your advisor as soon as possible with the courses you would like to petition via direct enrollment for counting toward the MB major.
  + To petition for a course in a direct enrollment program to count for the MB major, please provide the following information:
    - The University you will be direct enrolling in
    - Information about the course you wish to count towards the MB major:
      * The course number(s)
      * The number of credit hours for the course(s)
      * The official description of the course(s) from the University website
      * The pre-requisites for the course(s) and a description of those pre-requisites course(s) at that University
      * *If possible*: the textbook used or syllabus for the course(s)
      * What course(s) in the MB major you wish to satisfy with this direct enrollment course(s)
* Students can receive a ***maximum*** 2 units towards the Molecular Biology major for courses that begin with an MB designation.

# Appendix 5. Transfer Students

All transfer credits towards the Molecular Biology major must be approved by the department; please contact the Chair of Molecular Biology as soon as possible with the courses you would like to petition for counting toward the MB major.

In the situation where a student has a year of introductory biology at the college level, it is typical that course will cover the MB131 and Organismal Biology requirement. However, these still require approval by the department.

To petition for a transfer course to count, please provide the following information:

* Information about the course you wish to count towards the MB major:
  + The course number(s)
  + The number of credit hours for the course(s)
  + The official description of the course(s) from the University website
  + The pre-requisites for the course(s) and a description of those pre-requisites course(s) at that University
  + *If possible*: the textbook used or syllabus for the course(s)
  + What course(s) in the MB major you wish to satisfy with this direct enrollment course(s)