

# Department of Molecular Biology Advising Handbook

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## Description of the Molecular Biology Major

### Requirements:

- I. No single one-block course can satisfy more than one requirement.
- II. 1 unit of organismal biology (BE105 Biology of Plants, BE106 Biology of Animals, BE107 Biology of Microbes, or HK204 Intro to Human Anatomy).
  - AP Biology 5 or IB HL 5 satisfies this requirement. See pg. 6 for details.
  - IB Biology of 6 satisfies this requirement **OR** satisfies the MB131 requirement.
- III. 1 unit of MB131 Introduction to Molecular and Cellular Biology or MB111 FYE Introduction to Molecular and Cellular Biology.
  - IB HL of 6 or 7 satisfies this requirement. See pg. 6 for details.
- IV. 1 unit of MB201 Laboratory in Molecular and Cellular Biology and Genetics.
- V. 1 unit of MB231 Genetics.
  - Pre-requisite: MB201.
- VI. 1 unit of 300-level lecture/discussion-based MB elective.
  - These are intended for sophomores and juniors.
- VII. 1 unit of 400-level lecture/discussion-based MB elective.
  - These are intended for juniors and seniors.
- VIII. 2 units of 300- or 400-level laboratory-rich electives.
  - Can be satisfied through mentored research with an MB professor.
  - Selected non-MB courses can meet one of these two units (see list), 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; HK321 Human Physiology; MA256 Mathematical Models in Biology; PY297 Neuroscience 1; BE365 Plant Physiology; BE280 Population Genetics; BE465 Techniques in Molecular Ecology and Systematics.
- IX. 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). MB112 (FYE Microbiology & Biophysics) satisfies this requirement.
  - List: any MB course other than MB100, MB111, MB131, MB201, MB231; any BE course other than BE100; CH382 Biochemistry I; HK204 Introduction to Human Anatomy; HK304 Advanced Human Anatomy; HK321 Human Physiology; MA256 Mathematical Models in Biology; PY297 Neuroscience I; AN230/MB230 Human Evolution; AN202 Human Biological Variation.
  - Courses that satisfy this requirement **cannot** also count to fulfill a different requirement.
- X. 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).
- XI. A maximum of 2 units of mentored research such as MB209, 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.
- XII. 4 units of Chemistry (CH107 General Chemistry I, CH108 General Chemistry II, CH250 Structures of Organic Molecules, and CH251 Reactions of Organic Molecules).

- XIII. 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 & II Accelerated; MA129 Calculus II; MA117 Probability and Statistics; MA217 Probability and Statistical Modeling; CP115 Computational Thinking; CP122 Computer Science I; CP222 Computer Science II; PC241 Physics for the Physical Sciences I; PC242 Physics for the Physical Sciences II). May be satisfied by AP or IB credit recognized by the registrar.
- XIV. Must attend Molecular Biology Day as a senior.
- XV. Must participate in Departmental assessment activities such as the senior exit survey and examination.
- XVI. Must complete the senior seminar requirement (see pg. 10 for details).

# 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.*

**Graduation With Distinction in Biology:** *In order to be eligible, you must have a high GPA, complete a research project, and write and defend a thesis; see pg. 7 for details.*

**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>

## 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.*

**Graduation With Distinction in Biology:** *In order to be eligible, you must have a high GPA, complete a research project, and write and defend a thesis; see pg. 7 for details.*

**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>*

## All-College Requirements

- FYE (2 units)
- West in Time (2 units)
- Scientific Inquiry (2 units, one with lab/field; satisfied by the MB major)
- Social Inequality (1 unit)
- Global Cultures (1 unit)
- Quantitative reasoning (1 unit; satisfied by the MB major)
- Foreign language (2 units)
  - Note that Phi Beta Kappa honor society requires completion of the intermediate college level in a second language (typically 202 or higher; may be an adjunct course)
- Writing requirement
  - Passed first year portfolio OR
  - Passed Writing Intensive class OR
  - Passed Writing in the Disciplines class with writing adjunct

## Senior Capstone Experience

1. Seniors must participate in departmental seminars, as announced at the Fall Majors' Meeting and/or by email. Stay tuned! For more details about seminar requirements, see pg. 10.
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.

## AP/IB Biology Credit in Biology

1. Students with a score of 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 their Chair.
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 CH 107 pre-requisite. Note that this credit may not count as any specific Organismal Biology and Ecology course; check with the OBE Chair.
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 their Chair.
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 Molecular Biology Chair, Staff assistant (Kelley.Mathers@ColoradoCollege.edu), and your molecular biology advisor. See Appendix 1, pg. 12.

## Graduation with Distinction

To graduate with distinction, a student must:

1. Find a molecular biology research mentor to supervise independent research, or to supervise the writing of a thesis using off-campus research in molecular biology (such as that in an REU program); and
2. Enroll in one block of MB499 with that research mentor during blocks 1-4 of the senior year; and
3. Register for the senior thesis with the department no later than the first Friday of Block 2 of the senior year (see Appendix 2, pg. 13); and
4. Complete a Molecular Biology senior thesis MB 499 with a grade of A- or above (see Senior Thesis in Molecular Biology, pg. 7-9); and
5. Present the thesis in a seminar at Molecular Biology Day (see Senior Thesis in Molecular Biology, pg. 7-9); and
6. Provide a final digital copy of the thesis to Tutt Library by the first Monday of Block 7; and
7. Achieve a GPA of at least 3.7 in 12 of the 16 courses taken to fulfill the major. The calculation must include 12 grade track courses.
8. If a student does not have twelve or more grade track courses because they are a transfer student, a faculty member may nominate the student for consideration for distinction by a departmental vote.

## 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 a summer, 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.

### **Junior Year**

- 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.
  - Appendix 2, pg. 13.
- 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 staff 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:
  - a. A title.
  - b. An abstract of 300-500 words.
    - i. Your audience for this abstract is a fellow MB senior.
  - c. An introduction of 1,250-1,750 words.
    - i. This introduction must include a review of primary literature in molecular & cellular biology related to the topic of your research.
  - d. A methods section.
  - e. A results section with at minimum two figures or tables of data.
    - i. It is not acceptable to use the same data in two different formats.
    - ii. Figures and tables must be formatted according to typical professional publications in molecular biology.
  - f. A discussion of 1,250-1,750 words.
  - g. A works cited section (references)
    - i. Format according to directions from the primary reader.
    - ii. Minimum 6 primary publications cited; published in the previous 10 years.
    - iii. Minimum 2 reviews cited; published in the previous 10 years.
    - iv. Check with your primary reader for the names of appropriate journals.
  - h. 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**

1. The first/title page of the thesis must be printed, signed by all thesis readers, and turned into the Molecular Biology staff assistant **by the last day of Block 6**.
2. The full thesis is due to the library **before the first Monday of Block 7**.
  - a. Submit at the following website: <http://discovery.coloradocollege.edu/etd/>
  - b. For more information, see <http://www.coloradocollege.edu/library/help/how-to-submit-a-thesis.dot>

### **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. Students attempting to graduate with distinction in December must 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.

## 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. These will be announced by email to declared Molecular Biology majors and using flyers in the Molecular Biology Department.
  - a. 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.
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 staff assistant [Kelley.Mathers@coloradocollege.edu](mailto:Kelley.Mathers@coloradocollege.edu) in the text of an email **PRIOR TO the seminar**.
  - a. We encourage you to meet with each other to discuss the publication.
  - b. 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.*

## The Departmental Minor in Molecular Biology

- 1 unit of MB131 or MB111 (Introduction to Molecular & Cellular Biology)
- 1 unit of MB201, Laboratory in Molecular & Cellular Biology & Genetics
- 1 unit of MB231, Genetics
- 3 units that have MB231 as a pre-requisite
  - List of courses outside MB that can satisfy only one (but not two or three) of these units: CH382 Biochemistry I; HK304 Advanced Human Anatomy; HK321 Human Physiology; MA256 Mathematical Models in Biology; PY297 Neuroscience 1; 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, Molecular Biology Chair Darrell.Killian@ColoradoCollege.edu, the Molecular Biology staff assistant, Kelley.Mathers@ColoradoCollege.edu, and yourself. This e-mail will become part of your departmental file, maintained by the staff 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.
  - a. I have a score of 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.
  - b. 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.
  - c. I have a score of 6 on the IB Higher Level Biology exam and I plan to count this as...
    - i. one unit of MB131. I understand that I can enroll in MB201 after completing CH107; **OR**
    - ii. one unit of organismal biology (choose one option)
  - d. 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.
  - a. The registrar has not awarded me any AP/IB credits in mathematics.
  - b. The registrar has awarded me one unit of AP/IB credit in statistics.
  - c. The registrar has awarded me one unit of AP/IB credit in calculus.
  - d. The registrar has awarded me two or more other AP/IB units in mathematics (please describe....)
  - e. The registrar and the Chemistry department have awarded me one or more units in Chemistry (please describe....)

## Appendix 2. Senior Thesis Registration Questionnaire

Type the following questions and your answers to them in the body of an e-mail sent simultaneously to your research mentor/senior thesis supervisor, your senior thesis second reader, the Molecular Biology Chair Darrell.Killian@ColoradoCollege.edu, the Molecular Biology staff assistant Kelley.Mathers@ColoradoCollege.edu, and yourself. **You must register by the first Friday of Block 2.** This e-mail will become part of your departmental file, maintained by the staff assistant.

**Make sure the subject line of the email is “Senior Thesis Registration Questionnaire”**

1. Who is your research mentor/senior thesis supervisor?
2. Who is your senior thesis second reader?
3. When have you enrolled in MB499?
4. Summarize your thesis research question in 2-4 sentences.
5. What is the date for Molecular Biology Day?
6. Is there any reason that you cannot be there on Molecular Biology Day, such as graduating a semester early?
7. Which twelve grade-track majors' courses will you use to calculate the GPA needed to graduate with distinction (which is 3.7)? You may still complete a senior thesis without meeting this requirement but you will not be eligible for distinction.

## Appendix 3. Department of Molecular Biology courses

	<b>Course number</b>	<b>Course name</b>
1	MB100	Studies in Molecular Biology
2	MB101	The Science and Ethics of Genetics
3	MB109	First Year Experience Microbiology and Cellular Biophysics
4	MB111	First Year Experience Introduction to Molecular and Cellular Biology
5	MB112	Investigations in Molecular Biology
6	MB131	Introduction to Molecular and Cellular Biology
7	MB199	Research Ethics in the Sciences
8	MB201	Laboratory in Molecular and Cellular Biology and Genetics
9	MB209	Introduction to Mentored Research in Molecular Biology
10	MB210	Introductory Special Topics in Molecular Biology
11	MB230	Human Evolution
12	MB231	Genetics
13	MB301	Special Topics in Molecular Biology
14	MB302	Independent Study in Molecular Biology
15	MB305	Advanced Genetic Analysis
16	MB310	Advanced Cell Biology
17	MB320	Microbiology and Molecular Genetics
18	MB350	Special Topics in Laboratory Research in Molecular Biology
19	MB355	Laboratory in Advanced Genetics
20	MB360	Laboratory in Molecular Microbiology
21	MB399	Mentored Research in Molecular Biology
22	MB401	Advanced Special Topics in Molecular Biology
23	MB405	Stem Cell Biology
24	MB410	Molecular and Cellular Virology
25	MB415	Developmental Neurobiology
26	MB450	Advanced Special Topics in Laboratory Research in Molecular Biology
27	MB455	Laboratory in Advanced Cell Biology
27	MB497	Senior Capstone in Molecular Biology
29	MB498	Advanced Mentored Research in Molecular Biology
30	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 [International Programs](#) 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](#) portion of the International Programs 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](#) portion of the International Programs 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  $\geq 4$  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 the MB department*
  - 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<sup>-</sup> 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,  $\geq 4$  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:** The Boston University programs in Grenoble, Dresden, and Madrid have a course similar to MB131 (CAS BI 203: Cell Biology). These programs will not allow students to take this course without MB131 as a prerequisite. The Molecular Biology Department has determined that there is too much overlap between this course and MB131, however, so **CAS BI 203: Cell Biology does not satisfy any MB major requirements.**
  - 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](#)
  - Direct enrollment in upper-level electives in [certain universities](#), such as the University of Botswana, VU Amsterdam. **Please get approval with an MB advisor before departure.**
- CC-Approved Third Party Programs
  - Boston University
    - France – [Grenoble Science Semester](#)
    - Germany – [Dresden Science Semester](#)
    - Spain – [Madrid Science Semester](#)
    - **Note:** The Boston University programs in Grenoble, Dresden, and Madrid have a course similar to MB131 (CAS BI 203: Cell Biology). These programs will not allow students to take this course without MB131 as a prerequisite. The Molecular Biology Department has determined that there is too much overlap between this course and MB131, however, so **CAS BI 203: Cell Biology does not satisfy any MB major requirements.**
  - Danish Institute for Study Abroad (DIS) Program
    - Copenhagen – [DIS Copenhagen](#)
    - Stockholm – [DIS 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](#)
  - Hebrew University of Jerusalem
    - Rothberg International School - [Quantitative Biology Program](#)
  - IFSA-Butler
    - Many locations; please see CC's [Semesters Off-Campus](#) website for more information