

HENDRIX COLLEGE
BCMB PROGRAM RESEARCH GUIDELINES
(Approved in September 2009 – updated September 2019)

All students working towards a Biochemistry and Molecular Biology (BCMB) major are required to participate in a comprehensive laboratory research experience. This document contains information describing the:

1. Types of research experiences that can satisfy the BCMB research requirement;
2. Application process for ensuring that a specific research experience will satisfy the BCMB research requirement;
3. Components required for successful completion of a BCMB research experience;
4. Standard options available for students for documenting their research experience.
5. “Unusual circumstances” routes for satisfying the BCMB research requirements.

1. Types of research experiences that can satisfy the BCMB research requirement.

The BCMB research requirement can be satisfied in one of the following ways:

- On-campus research: Scientific projects supervised by a Hendrix College faculty member, carried out on the Hendrix campus, and approved by the BCMB faculty can take place either during a summer or an academic year as follows:
 - *Summer research*: students are expected to work on a full-time basis (40 hrs/week) for a minimum of eight weeks during the summer months on their projects;
 - *Academic year research*: students are expected to work at least two full academic year semesters on their projects. During this time, students can generally anticipate working in the laboratory for ~10hrs/week.
- Off-campus research: Many research projects carried out during a summer at a research institution other than Hendrix College can qualify for BCMB credit. Students are expected to work on a full-time basis (40 hrs/week) for a minimum of eight weeks during the summer months on their projects. Students choosing this option are required to obtain approval by the BCMB faculty (see “Off-campus research” application instructions below) prior to engaging in the research to ensure that the experience will qualify for BCMB research credit. In addition, these students are required to identify a Hendrix Research mentor who will be able to assist them as they complete their research requirements after the research project is concluded.

2. Application process for ensuring that a specific research experience will satisfy the BCMB research requirement.

Before starting a research project intended to satisfy the BCMB research requirement, students are required to submit a complete application form to the chair of the BCMB Program. The application will then be reviewed by members of the BCMB faculty in order to establish if the projected experience is appropriate for satisfying the BCMB research requirement. The following documents should be included in the application:

- For on-campus research projects: Students are required to submit the following document (both as a hard-copy and an electronic copy) to the BCMB Program chair

before the research project is scheduled to begin:

- A completed “Application Form for Satisfying the BCMB Research Requirement through On-Campus Research” attached to this document.
- **For off-campus research projects:** Students are required to submit the following documents (both as hard-copies and electronic copies) to the BCMB Program chair before the research project is scheduled to begin:
 - A completed “Application Form for Satisfying the BCMB Research Requirement through Off-Campus Research” attached to this document. Note that for off-campus research, students will need to arrange to have a member of the BCMB faculty serve as the Hendrix Mentor for the project.
 - A short proposal describing the research project they anticipate being involved in as well as the role of the student in the project.

3. Components required for successful completion of a BCMB research experience.

In addition to carrying out the actual laboratory research, all students intending to satisfy the BCMB research requirement are also expected to:

- **Turn in a completed application form** to the BCMB Program Chair before the start of the research project (see above: 2. Application process for ensuring that a specific research experience will satisfy the BCMB research requirement).
- **Write a formal research report** at the end of the research experience. This report must be typed and organized in appropriate scientific format. Such format usually includes a title page, abstract, introduction, materials and methods, results, discussion, and a bibliography. In most cases, one or more revisions of this report will be required. This report will be read and graded by the Hendrix Mentor associated with the research project. This grade will also be one of several factors that will be included in the BCMB Senior Capstone Experience grade (see BCMB Senior Capstone Experience document for more information).
- **Maintain a day-to-day laboratory notebook** documenting the day-by-day research activities, including a summary of any seminars attended or other scholarly activities related to the research project. This notebook will then be submitted to the Hendrix Mentor associated with the project at the end of the research experience. For projects carried out off-campus, a photocopy of the laboratory notebook is acceptable since the on-site research mentor will probably need to keep the original.
- **Present the results from their research either:**
 - during their senior year as part of the BCMB Senior Seminar (BCMB 497). Students choosing this option are strongly encouraged to also attend, and if possible present the results from their research, at a regional, national or international scientific conference sometime during their college career;
 - or
 - at a regional, national or international scientific conference approved by their Hendrix Mentor. Students choosing this option will still need to present their research at the BCMB Senior Seminar (BCMB 497) in order to complete their Senior Capstone Experience (see BCMB Program Senior Research Capstone Experience document for more details).

4. *Standard options available for students for documenting their research experience.*

All students involved in an approved BCMB research experience will need to officially document the completion of this requirement. Most students will do so by signing up for either BCMB X99 (which carries course credit) or BCMB 498 (a non-credit course). Which one is chosen will depend on specific circumstances. Below is a guide to help determine which of the two choices is appropriate for each specific case:

- *Students doing on-campus summer research can choose one of the two options below:*
 - **If a student wants to continue the research as part of a course, he/she can sign up for BCMB X99** in one of the two semesters following the summer in which the research was done. Such students would sign-up for BCMB X99 as one of their four courses they are taking during either the Fall or Spring semester. This course will therefore count towards the 32 required courses for graduation but will not count as an elective for the BCMB major requirement. Note: if you choose this option you will be expected to work in the lab at least 10 hours a week during the semester that you are signed up for BCMB X99. Your Hendrix mentor will assign a letter grade for this course at the end of the semester for which you are signed up based on:
 - Quality of work done by the student in the lab
 - Quality of the lab notebook
 - Quality of a research presentation on the research the student did - this can be from the BCMB senior seminar or a presentation (poster or oral) at a scientific meeting.
 - **If a student does *not* want continue the research as part of a course, he/she can sign up for BCMB 498** as a non-credit course during the Spring semester of their senior year. Such students would add BCMB 498 as a fifth course during the Spring semester of the senior year (regardless of when the research has been done), but it will not count as credit towards graduation. Your Hendrix mentor will assign a CR (or no CR) grade for this course at the end of the semester based on:
 - Quality of work done by the student in the lab
 - Quality of the lab notebook
 - Quality of a research presentation on the research the student did - this can be from the BCMB senior seminar or a presentation (poster or oral) at a scientific meeting.
- *Students doing on-campus research during the academic year:*
 - **Students can sign up for BCMB X99** as one of the four courses they are taking during one of the two semesters in which they are doing the research. This course will therefore count towards the 32 required courses for graduation but will not count as an elective for the BCMB major. As indicated earlier, students are expected to work in the lab at least 10hrs/week during *both* semesters. Your Hendrix mentor will assign a letter grade for this course at the end of the semester for which you are signed up based on:

- Quality of work done by the student in the lab
 - Quality of the lab notebook
 - Quality of a research presentation on the research the student did - this can be from the BCMB senior seminar or a presentation (poster or oral) at a scientific meeting.
- **Students can sign-up for BCMB 498** as a non-credit course during the Spring semester of their senior year (regardless of when the research is carried out). Your Hendrix mentor will assign a CR (or no CR) grade for this course at the end of the semester based on:
 - Quality of work done by the student in the lab (based on the feedback from the PI with whom the student did the research)
 - Quality of the lab notebook
 - Quality of a research presentation on the research the student did - this will in most cases be from the BCMB senior seminar.
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 - *Students doing off-campus summer research:*
 - **Students can sign-up for BCMB 498** as a non-credit course during the Spring semester of their senior year (regardless of when the research is carried out). As indicated earlier, students are expected to work in the lab at least 10hrs/week during *both* semesters. Your Hendrix mentor will assign a CR (or no CR) grade for this course at the end of the semester based on:
 - Quality of work done by the student in the lab
 - Quality of the lab notebook
 - Quality of a research presentation on the research the student did - this can be from the BCMB senior seminar or a presentation (poster or oral) at a scientific meeting.
 - *BCMB X99, BCMB 498 normal registration process:*
 - To sign up for BCMB X99 or BCMB 498, students should complete an “Independent Study Request Form” and an “Add/Drop Form” which are available in the “Forms for Students” section of the Registrar’s webpage. The two forms should then be submitted to the registrar.

5. **“Unusual circumstances” routes for satisfying the BCMB research requirements.**

In some unusual cases, students may be able to satisfy their BCMB research requirements through routes that differ from those indicated in the sections above. All such unusual circumstances need to be (i) brought to the attention of the BCMB chair and faculty as soon as possible and (ii) evaluated by the BCMB chair and faculty on a case-by-case basis to determine if they can indeed qualify for BCMB research credit and, if so, if additional work is required by the student before official approval can be granted. In general, research done in a Hendrix laboratory done in the context of courses other than BCMB X99 or BCMB 498 (such as BIOL 499 and CHEM 450) may be considered for BCMB credit. However, in most cases, a student who has completed a research project off-campus but who has not undergone the application and approval process described above will not be able to obtain BCMB research credit for that experience.

Note 1: The Formal Research Report will not be factored into the BCMB X99 or BCMB498 grade, but will be part of the senior capstone grade.

Note 2: BCMB 498 and BCMB X99 are pre-coded for Undergraduate Research (UR) Odyssey credit. In order to officially obtain a UR Odyssey credit, students will need to (1) enroll in the class through the normal registration process (No statement of intent form is required) and (2) earn a “C” or “CR” for the course. No completion form is required. The standard wording that will appear on your Odyssey Transcript for these courses is: *This course provides a research experience through which the students are exposed to the state-of-the art techniques used by researchers in this field. A presentation of the research is evaluated by the faculty.* This wording can be tailored more specifically to your project by your Hendrix mentor if so desired.

Application Form for Satisfying the BCMB Research Requirement through On-Campus Research

(Please submit this form both as a hard copy and in electronic format to the BCMB Program Chair)

Name:

Date Submitted:

Academic Standing at time of proposed research:

Hendrix College Research Mentor:

Proposed Dates of Project:

Title of Project:

Sign and Date:

Student:

Hendrix Research Mentor

Approved by
BCMB Program Chair

Application Form for Satisfying the BCMB Research Requirement through Off-Campus Research

(Please submit this form and the 2-page document both as a hard copy and in electronic format to the BCMB Program Chair)

Name:

Date Submitted:

Academic Standing at time of proposed research:

Hendrix College Research Mentor:

Proposed Dates of Project:

Site of Project:

Off-Campus Mentor Information:

Name:

Title:

Mailing Address

Phone & email

Have you received an undergraduate fellowship, scholarship, grant or other funding for your research project or will the research be done on a volunteer basis?

Please prepare a document (approximately 2 pages) that justifies why you should receive a course credit for this project. Provide a brief summary of the research project, including a survey of prior research and an overview of the direction of your project. Be sure to describe your role in the design, implementation and interpretation of the research.

Sign and Date:

Student: _____

Hendrix Research Mentor: _____

BCMB Program Chair: _____