Outline of Biology requirements for Honors Track 1, 2 and 3 Biology and Biotech majors

1. Track 1 and 2 students take BIO 491H (for 2 CH of Honors electives) in fall of sophomore year. This is required for Bio majors and recommended for Biotech majors.

2. Track 1 and 2 students search for a research advisor in their area of interest in sophomore year.

3. Track 1 and 2 students take a BIO 495H or 496H (for 1 CH of Honors electives) with that advisor in spring of sophomore year or fall of junior year. This is required for Bio majors and recommended for Biotech majors.

4. Track 1-3 students take BIO 499A with their advisor in spring of junior year, and BIO 499B and 499C in fall and spring of senior year.

5. BIO 499A requires the student and advisor to assemble a committee that collectively develops the research project. The student is then required to produce and submit a committee-approved thesis proposal by the end of term (deadline has been extended for spring 2020 due to covid).

6. BIO 499C requires the student to produce and submit a committee-approved thesis and give a public presentation by the end of term (deadline has been extended for spring 2020 due to covid).

7. BIO 499A-C all require the student to commit a minimum of 8 hours per week; the student, advisor and committee members are required to meet twice per term to discuss research activity; and the advisor and committee members are required to set deadlines and give regular advice and feedback to ensure that adequate research progress is being made.

8. Track 2 and 3 students are required to have a GPA of 3.5 to enter the Honors College and all students are required to keep a GPA of 3.25 to continue in the Honors College. Advisors and students must ensure that these requirements are met when they complete the pre-registration forms for BIO 499A-C.

This outline is presented for quick reference only. Students and advisors are asked to read the remainder of this document to familiarize themselves with advice, rationales, details, restrictions, flexibility and exceptions that apply to particular steps, and with recommendations for problem and conflict resolution. Deadline dates set by the Honors College are not reported on this document, and students and faculty are asked to consult the Honors deadline webpage directly.

If you have questions, contact me, Chris Rose, Biology Honors Liaison, at rosec@jmu.edu.
General description of Honors Track 1-3 requirements:

Biology and biotechnology have emerged as the pre-eminent sciences of our times, impacting society on issues as diverse as environmental deterioration, global warming, energy production, human reproduction, science education and the battles against cancer, pathogens and age-related and genetic diseases. Having a detailed understanding of how biological research is done is becoming increasingly important for making informed decisions about social and political policies as well as for entering into the many biology-related career paths now available. Biology and Biotechnology Honors thesis projects (BIO 499, also called senior research or capstone projects) are intended to give high-caliber students first-hand experience in designing and carrying out biological research on a subject of interest to them. By working in close relation with one or more experienced faculty members, students are also exposed to the collaborative nature of research activity, which is vital to doing innovative and productive science. BIO 499 projects can also be “hands-off” scholarship projects, meaning strictly library/internet research and writing projects on research or the history of research in Biology or Biotechnology, or related fields.

Track 1 and 2 Honors students in Biology are required to take a 3-credit hour course package of BIO 491H (2 credit hour) and BIO 495/6H (1 credit hour) courses during their sophomore and junior years and before starting BIO 499A. This package is to ensure that students establish a working relationship with a future advisor and have acquired some writing training and research experience before starting thesis work. Track 1 and 2 students are recommended to take BIO 491H Scientific Writing, Presentation and Critical Thinking in Fall term of their sophomore year. They also have to take either BIO 495H Biotechniques or BIO 496H Research Literature (BIO 497 A/B is not an option for Honors credit because the system will not process BIO 497AH or 497BH). The three credit hours earned in these courses count towards the 6 credit hours of Honors elective classes required of Track I and II students by the Honors program. Faculty are encouraged to have their non-Honors research students take BIO 491H (as BIO 491), and this requires permission of the instructor. Track 1 and 2 Honors students in Biotechnology are recommended but not required to take BIO 491H. The advisor and student must submit a pre-registration form to the Biology main office to be able to register for BIO 495/6H in MyMadison. Non-Honors research students must do the same to register in BIO 491.

General description of the senior research (or Honors thesis) project:

All Honors students are required to do an Honors thesis project. Non-Honors students, including transfer students, who wish to do an honors thesis project must first meet the requirements for entry into the Honors program, which are a cumulative GPA of 3.5 and sufficient evidence of initiative, originality and intellectual maturity to warrant registration in an Honors thesis project. Biology and Biotechnology Majors generally do projects with faculty members in the department of their respective Majors. Biology and Biotechnology Honors projects are currently done through the same set of BIO 499 courses (though separate courses for each Major might be established in the future). Biology and Biotechnology Majors are free to work with faculty outside Biology and Biotechnology and to earn credits toward the 40 credit hour Biology Majors requirement as long as they register in BIO 499, select subject matter that is related to Biology or Biotechnology and have a co-advisor within their respective Major (Biology or Biotechnology) who assumes the responsibility of ensuring that the student fulfills the requirements for
completing an Honors project in Biology/Biotechnology. Such students must get signatures on all Honors documents from their advisor and Biology/Biotechnology co-advisor plus the AUH of Biology/Biotechnology and the dean of CSM. Biology and Biotechnology Majors must also have completed all four Biology core courses (BIO 140, 150, 240, 250) prior to starting a Bio 499 Honors project.

Biology and Biotechnology Majors who work with faculty outside Biology and Biotechnology can choose to earn honors thesis credits in other departments or colleges (e.g. CHEM 499, HONORS 499) that do not count toward the 40 credit hour Biology Majors requirement. This alternative includes a cross-disciplinary writing project that is done as HONORS 499 and can be supervised by a committee of faculty from any part of the university. Students who are not Biology or Biotechnology Majors and who wish to do a project with Biology or Biotechnology faculty can do so for BIO 499 credit, and are subject to the requirements and credit system of Biology/Biotechnology honors projects. Biology and Biotechnology give credit for research projects but not creative projects.

Students might also arrange with their advisor to do thesis research as a collaborative project involving one or more other students. This arrangement must follow the guidelines for Collaborative Projects at the Honors College website (go to the Handbook page and then Honors Project Info – Project Types) and permission must be sought from the Honors Program Office during the planning phase of the project in Bio 499A (see page 6).

Honors thesis projects in Biology or Biotechnology are usually done in three consecutive semesters and require registration in three 2-credit hour BIO 499 courses (BIO 499A, 499B, and 499C). These courses are usually taken in spring semester of junior year, and fall and spring semesters of senior year. However, students, with the permission of their faculty advisor (see below), can start the program earlier, in the fall semester of junior year, or later, in the summer session between junior and senior years. Students who start an Honors thesis project in their junior year can but are not required to do research during the summer between their junior and senior years. How they register to do summer research (i.e., in a BIO 499, BIO 497 or another course), what credit hours they receive, and if and how they are paid must be determined by arrangement with the faculty advisor. One BIO 499 course (499A or 499B) can be taken in summer school, but the other two BIO 499 courses must be taken during fall and spring semesters. Students are discouraged from taking BIO 499 courses as eight-week block courses since it requires double the weekly time commitment (see page 8 for the one exception).
Steps for arranging a thesis project:

1. At the beginning of their junior year or earlier, **students must go to the Handbook page of the Honors College website**, read through the Honors Project Info section and obtain an application form from the Honors Project Forms section.

2. **Students must identify a faculty adviser** before or at the beginning of their junior year. The best way to do this is to review the webpage listings of Biology and Biotechnology professors and their research projects, find several doing interesting research, and contact them by email to see if they have space in their labs and are willing to support a thesis student. Most students who do an Honors thesis project in Biology/Biotechnology find an advisor and start doing research before their junior year. Track 1 and 2 Biology majors are required to do a BIO 495/6H so the professor and student are already familiar with each other at the start of BIO 499A, the professor can be more confident that the student has the ability and drive required to do an Honors project, and the student is aware in advance of the professor’s expectations for an Honors project. Also, students who wait until the middle of their junior year to find a faculty advisor might have difficulty finding one whose research interests them and who is willing to take on an unfamiliar student at that time. Thus, it is important that the student act sooner, rather than later, to contact a professor and initiate research, as the longer one waits, the more difficult it can become. Students wishing to start the Honors project earlier or later than spring semester of their junior year must arrange this in advance with their faculty advisor. Once a student has found a faculty advisor, the faculty and student must agree upon and invite two faculty members to serve as committee members. The committee can be formed before starting a BIO 499A, but it should be formed at the very latest within the first month of BIO 499A. The faculty advisor and two committee members **must have a PhD or Masters** and be permanent faculty members at JMU, though others including term faculty and faculty at other institutions can serve as additional committee members.

3. **The faculty advisor must ensure that** any non Honors student who requests to do a Honors thesis project has a cumulative **GPA of 3.5 or higher** in the semester before registering for BIO 499A, has or will have completed the Biology core courses (Biology and Biotechnology Majors only), and exhibits sufficient initiative, originality, and intellectual maturity as well as available time to warrant registration in a Honors thesis project. Faculty advisors are advised to request copies of student degree progress reports for verifying the GPA and core course requirements and to ask about student extracurricular activity and work schedules **before** taking on a student. Faculty advisors must also decide if and when a student must complete other cognate and biology course requirements to do their particular honors projects.
4. General requirements for BIO 499A, B and C:

4.1 **Students are required to commit a minimum of 8 hours per week** to each BIO 499 course (or the equivalent if taken as an 8 week block or summer course). This includes time spent in lab and group meetings. Although faculty advisors recognize the need for flexibility in research schedules, missed BIO 499 time must be made up in subsequent weeks.

4.2 **The faculty advisor, committee members and student are required to hold two meetings in each BIO 499 course**, at approximately the end of the first and third quarters of each semester. One purpose of these meetings is to oversee the project, i.e., develop the project, define a timeline of activities and a set of expectations for research activity and literature review, set deadlines, and discuss problems and trouble shooting. A second important purpose of each meeting after the first is for the advisor and committee members to decide whether the student is making sufficient progress to allow their continuation in an Honors project. If the decision is no, they must also decide whether the student is to be transferred to a BIO 497 or BIO 495 or prevented from continuing in research altogether. The criteria for their decision are the level of student performance, the reason for any underperformance and the student’s demonstrated levels of motivation and ability. Faculty advisors assign grades for BIO 499A, B and C. An incomplete grade should not be given for BIO 499A and B, though it can be given for BIO 499C.

4.3 **Students are required to have a GPA of 3.5 to enter the Honors College and to maintain a GPA of 3.25 to continue in the Honors College.** Students whose GPA drops below 3.25 after completing BIO 499A or BIO 499B can continue in the Honors project only at the discretion of the faculty advisor and committee members, who will base their judgment on the student’s ability to recover a GPA of 3.25 by the end of the next BIO 499 course. If that student’s GPA fails to recover to 3.25 by the end of the next BIO 499 course, the faculty advisor and committee members must either transfer the student to a BIO 497 or BIO 495 or discontinue their research altogether.

4.4 **The advisor and student must submit a pre-registration form to the Biology main office for the student to be able to register for BIO 499A-C in MyMadison.**
5. Specific requirements for BIO 499A:

The faculty advisor and student must first decide upon the general nature of the project and select two committee members. Before and during the first committee meeting, the faculty advisor, committee members and student develop a research project that can be done within the scope of three two-credit courses and work out a mutually acceptable timeline for carrying out the research training, library research, proposal writing, and research activity required to complete the project. Given the time-sensitive nature of much biology research, the scheduling of research training and activity over the course of BIO 499A, 499B and 499C is flexible. Students who start research with their faculty advisor earlier than the start of BIO 499A might be required by their advisor to complete the library research and proposal requirements for an Honors project in a BIO 496 Research Literature course in the semester prior to BIO 499A. This would allow the student to participate more fully in research activity in BIO 499A. However, a proposal produced in a BIO 496 course still requires the approval of the committee members who, if selected after the completion of the BIO 496, might ask the proposal to be revised to meet their requirements.

The faculty advisor and student must also decide whether the project will be done collaboratively, and, if so, follow the guidelines at the Honors Honors College website (go to the Handbook page and then Honors Project Info – Project Types) for seeking permission from the Honors College and meeting other requirements.

Students are required to complete and submit a thesis proposal with the following sections: Introduction, Methods, Timeline, and References. The introduction must place the proposed research in a broader theoretical or conceptual context and explain why the research is important in terms of theory, application and/or generation of new knowledge. It must also describe what is currently well established in the broader area, identify unanswered questions that relate to the proposed research, and indicate how the proposed research will answer those questions or fill in a gap in our knowledge. The introduction should finish by explicitly stating the hypothesis or question being addressed (or the objectives of the research), and if appropriate, providing predictions of objectives or tests. The methods section should describe the methods in sufficient detail for committee members to evaluate their adequacy, feasibility and appropriateness for the tasks in question. This section should also provide details on data analysis, including statistical tests. The timeline should outline when major aspects of the research will be accomplished and when writing will commence. Biology and Biotechnology thesis proposals are generally at least 1250 words long, and have a minimum of 7 references to scientific journal articles, review articles, and scientific texts, which must be properly cited and referenced. The writing style must be polished and free of typos.

For hands-off” scholarship projects, meaning library/internet research and writing projects on research or the history of research in Biology or Biotechnology, the proposal would follow the same general outline and requirements, the introduction would indicate one or more questions to be asked and the methods would indicate a strategy for how information or data will be collected and analyzed to answer the question(s). These requirements are in keeping with the general intention of thesis experiences to be guided inquiry and discovery, as opposed to merely description.
The faculty advisor and committee members are required to return comments on drafts of a proposal to the student on a timely basis and to ensure that the proposal complies with their expectations for scholarship before they approve it.

Students are required to have their proposal completed and approved by the faculty advisor and committee members at least one week before the Honors College deadline at the end of the 499A semester, which is usually in late November or mid April, or the end of summer for students who do BIO 499A in summer session but check the Honors College website (go to the Handbook page and then Honors Project Info – Deadlines) for the exact dates.

Students are also required to complete and submit a Senior Honors Project application by the same deadline.

To expedite the proposal approval and submission process, students and advisors are required to follow these steps:

1. The student emails an electronic copy of the completed thesis proposal (entitled Student's last name_BIO499A.docx) to the Honors Liaison (Chris Rose) at least one week before the due date at the Honors office. This one week period is to ensure four things: that the liaison has adequate time, especially during Biosymposium week, to review all proposals for compliance with the biology thesis policy requirements, that students have sufficient time to satisfy any requests for revision, that the department head and dean have time to sign the application form, and that campus mail has adequate time to deliver the documents to the Honors office.

2. The student will complete any revisions requested by the liaison and email it back to the liaison for review as Student's last name_BIO499A_V2 (or higher if necessary).docx.

(steps 3-5 are currently in revision to become entirely electronic due to covid)

3. The student will collect signatures from their committee and submit the application form to the main office where it will sit until the proposal has been pre-approved by the Honors Liaison.

4. Once the proposal has been pre-approved, the liaison will ask the department head to sign the application form, and email the student to have them bring a fully revised hardcopy of the thesis proposal to the main office, where they pick up the application form and take both the application form and hardcopy to the dean’s office for signature. Once the dean has signed the application form, the dean’s office will send both the application form and hardcopy through campus mail to the Honors office.

5. The liaison will send an electronic copy of the final thesis proposal to the dept office for archiving.

The faculty adviser is also required to assign a grade for BIO 499A based on their own rubric for assessing progress made in library research, proposal writing, and if applicable research activity, as well as the ability to meet deadlines and respond to requested revisions. A grade of Incomplete is not acceptable for BIO 499A. If the proposal is not approved and submitted on
time, the faculty advisor cannot allow the student to register in BIO 499B.

**Acceptance into the Honors College** is determined solely by the Honors College Director. Acceptance letters are sent to the student, adviser, department head/school director and college dean. Once accepted, students are accorded all privileges of being an Honors student.

**6. Specific requirements for BIO 499B and BIO 499C:**

BIO 499B usually involves research activity, and BIO 499C usually involves completing the planned research activity, writing the thesis, responding to revisions requested by the faculty adviser and committee members, and preparing the final document for submission to the Honors College. In addition to the two required committee meetings per semester, committees can choose to schedule additional meetings to review progress in research activity and early drafts of the thesis.

The student is required to comply with the committee’s instructions according to the timeline, respond to all requests for thesis revisions, and otherwise fulfill the committee’s expectations for research and scholarship activity.

In the event that a student who has already started or committed to starting a BIO 499A with an advisor finds that they need to graduate a semester early, they are advised to register for BIO 499B and BIO 499C as separate blocks in the second semester. This option must be agreed upon by the advisor who must ensure that the project meets the same expectations in scope and depth as a three-semester honors project. This is the only option available for completing a BIO 499 in two semesters and there is no option available for completing a BIO 499 in one semester.

Unless they petition to submit their thesis in journal format (see below), the student is also required to produce a final thesis with the following: an introduction with literature review and statement of the problem, methods, results and discussion sections, and a bibliography with references that are properly formatted. The length of the thesis and the number of references cited must be sufficient to meet the committee’s expectations for Honors scholarship activity. All parties are reminded that the Honors College requires that Honors theses resemble Masters theses in terms of scholarship, i.e. with strong emphasis on literature review and explaining how the science is done and why. Although the organization of the material is flexible, the thesis must conform to all format requirements specified in the Formatting Requirements link at the Honors College website (go to the Handbook page and then Project Submission). The writing style must be polished and free of typos.

The student is required to submit a pre-submission form early in the 499C semester (go to the Handbook page and Honors Project Info – Deadlines for the exact deadline, and Project Submission to download the form). Faculty signatures are required to confirm that the student is making satisfactory progress towards completion of their project.

The student and faculty advisor can agree to have the thesis submitted in the format of a specific journal. The final thesis must still contain a title page, table of contents, list of figures, acknowledgements and bibliography, and have consistent formatting throughout the text.
Students are required to notify the Honors office of their decision to use a journal format on the pre-submission form.

The **499C student is required to give a public presentation (talk or poster) of their research** in the presence of their advisor and/or committee members at the Honors symposium, Biosymposium, a professional scientific conference such as NCUR or VAS or another scientific setting outside of the classroom. Students are required to indicate the date and venue of the public presentation on their pre-submission form and thesis title page.

The student is required to submit the final thesis online by the deadline at the end of the **499C semester, which is usually in late November or mid April, or the end of summer for students who do 499C in summer session but check the Honors College website (go to the Handbook page and then Honors Project Info – Deadlines) for the exact deadlines.**

A fully revised version in PDF format must be received and approved by the faculty advisor and committee members before submission. The student must also submit one hard copy of the title/signature page, with original signatures, to the Honors College Office by the same deadline. Signatures do not need to appear on the electronic version of this page. To be considered for nomination for Outstanding Thesis Awards in Biology and Biotechnology, an almost complete, revised version of the thesis must be received by the Biology and Biotechnology Awards Committee three days before the deadline set by the Honors College Outstanding Thesis Award Committee. Theses submitted to the Honors office after the November or April deadline are not eligible to receive a Phi Beta Kappa or Phi Beta Kappa award. Graduation dates might also be impacted by late submission, posing a real concern for students entering graduate schools or jobs. Upon receiving approval from a program director, the student must also submit the PDF file to the JMU library system.

The **faculty advisor and committee members are required** to provide students with unambiguous instructions and a clearly defined timeline for completing various drafts of the thesis, and to return comments on each draft on a timely basis.

The **faculty advisor and committee members are also required to** determine whether an honors project meets the Honors milestone and the student is entitled to graduate With Distinction (for Track III students) or as an Honors Scholar (Tracks I and II). If they decide that a senior thesis does not meet the high standards necessary to receive Honors credit, they can assign a grade lower than B for the completion of work in BIO 499C. A grade lower than B will indicate that the student is being denied the opportunity to graduate “With Distinction” or as an “Honors Scholar” through the Honors College.

The **faculty adviser is required to assign grades for BIO 499B and BIO 499C** based on their own rubric for assessing the progress made, the quality of the final product, and the ability of the student to meet deadlines and respond to requested revisions. A grade of Incomplete is acceptable for BIO 499B and BIO 499C given sufficient justification. Under no circumstances can a faculty advisor assign a grade other than Incomplete for BIO 499C until the thesis has been completed, the title page signed by the committee, and both thesis and title page submitted to the Honors office. If a student plans to submit the thesis after the Honors College deadline, the faculty advisor must inform the College Director directly of this intention and provide a reason...
and a projected submission date.

7. Problem and conflict resolution:

Students, faculty advisors and committee members who have any complaint or dispute regarding the performance or completion of anyone’s obligations for an Honors project are recommended to consult the Biology Department Honors Liaison person for advice on resolving the problem.

Students wishing to change advisors or committees for whatever reason are recommended to consult the Biology Department Honors Liaison person. The ability to change advisors or committees will be contingent on multiple factors, including but not limited to the timing of the request, the availability of suitable advisors and the reason for the request. Students wishing to discontinue their Honors project should address the issue with their faculty advisor.

Faculty advisors and committee members are responsible for adhering to this policy and for taking reasonable and timely measures to promote the success of the Honor project. This could include requiring students to attend seminars on how to prepare talks and posters, enroll in BIO 491 (Scientific writing, presentation and critical thinking) to hone their scientific writing skills, and seek help from the University Writing Center for more general guidance on writing style.

The decision to terminate an Honors project prior to its completion or to deny the student the opportunity to graduate “With Distinction” or as an “Honors Scholar” should be made by the committee in consultation with the Honors liaison and only after the committee has documented evidence of the basis for their decision. This could mean three things: (1) evidence of irresponsible, unethical or negligent behavior by the student, (2) evidence of when and how the committee conveyed their expectations to the student, and when and how the student failed to meet these expectations, and (3) measures that the committee has taken that were not successful in addressing student underperformance, such as referring a student to the JMU writing center following their own efforts to help the student improve their writing. The committee should also be prepared to present this evidence in a hearing with the Honors liaison and/or Honors College director if requested. The Honors liaison’s role in such hearings is as a nonpartisan mediator and not as an advocate or spokesperson for either party. Any decision to terminate an Honors project prior to its completion or to deny the student the opportunity to graduate “With Distinction” or as an “Honors Scholar” must be communicated to the Honors College office as soon as possible so they can update the registrar’s office well prior to graduation.