

Undergraduate Research Handbook (Nunez Lab)

This handbook provides important information about the dynamics and expectations for undergraduate research at the Population Genetics Group at UVM (hereafter “The Nunez Lab”). **Please make sure that you read this document in its entirety** as it covers the expectations for students conducting research through BIOL 1994/2995/3995/4996.

Scope of undergraduate research in the Nunez Lab

Biological Science (B.S.) majors can apply up to 6 credits of biologically related research to their advanced life science elective requirement. Biology B.A. students may do research at their discretion, but it won’t count toward their BIOL electives. In the Nunez lab students may pursue research for credit by participating in a project directly led by Dr. Nunez, a graduate student or post-doc, or by developing a research project of their own. In most cases, students begin their work by participating in an existing project and later developing an independent project.

Preemption & Due Diligence

This document lays out guidelines and expectations pertaining to undergraduate research conducted through BIOL 1994, 2995, 3995, and 4996 (CAS HCOL only). Should any policy hereby described generate a conflict, broadly defined, with another policy derived from the official syllabi from BIOL 1994, 2995, 3995, 4996, or any other guideline established by the relevant degree-granting college (e.g., CAS, CALS, RSENR, HCOL, The Libraries, etc.), or any academic unit within (e.g., the biology department), priority shall be given to the latter. It is the responsibility of each trainee to complete their “due diligence” and to become familiar with all guidelines that may apply to them.

The Onboarding Process

Upon accepting an offer to conduct undergraduate research at the Nunez Lab students should complete the process of onboarding as soon as possible. This process consists of the following steps:

1. **Download Slack:** <https://slack.com/>. Slack is a professional messaging platform that we use in the Nunez lab to communicate with each other. Dr. Nunez should have sent you an invitation to join our group (“The Nunez Lab”). Please reach out to him otherwise. Most communications should be sent via this app.
2. **Set up a logistics “follow-up” meeting.** After receiving your acceptance offer, you should set up a follow-up meeting with Dr. Nunez to solidify some important details about your research project. These include:
 - a. **Number of credit hours to add to your semester:** Students pursuing a Bachelor of Science in Biology can add up to 6 credits of research to their degree. You must agree with Dr. Nunez on how

many credits per semester you will add to your credit load. For example, depending on your research project you may choose to add 1 credit in your first junior semester, 2 credits in your second junior semester, and 2 credits throughout your senior year ($1+2+2+2 = 7$). In this case, only the first 6 credits will apply to your B.S. degree, yet all 7 credits will contribute to your GPA. Also, please be aware that the number of credits you enroll in has a bearing on the minimum number of hours you should devote to research (1 credit is equivalent to ~40 hours in the lab per semester). Once this determination is made, you will be enrolled in a research-for-credit class that will appear in your transcript. This class will be either BIOL 2995 (for first-time researchers), BIOL 3995 (for continuing researchers), or BIOL 4996 (for CAS/HCOL Honors Theses).

- b. **Agree on a training plan:** Dr. Nunez will discuss with you important first steps about getting your research project started. This may consist of research papers to read, preliminary experiments to run, or a combination of both. Part of this training plan will include scheduling times for you to be in the lab, as well as the necessary training on how to operate equipment, or on experimental protocols. This will also be the meeting where Dr. Nunez and you will agree on various aspects of the day-to-day dynamics for the BIOL 2995, BIOL 3995, or BIOL 4996 credit.
 - c. **Agree on a one-on-one weekly meeting time:** To make sure you are making good progress on your research you will meet with Dr. Nunez at least once a week. Unless otherwise agreed. Make sure you schedule a meeting a at time that is not going to conflict with other important university activities.
3. **Send Dr. Nunez a small blurb and a photo of you:** See examples of this here:
<https://www.jcbnunez.org/people>
 4. **Complete Laboratory Safety Training.** Safety is key for any research at UVM, including the biology department and the Nunez Lab. Upon onboarding into the lab, you must complete UVM's mandated safety training at your earliest convenience and within the required time window as mandated by the university.
 - a. To complete all training go to: <https://riskmgmt.w3.uvm.edu/courses/>
 - b. To view your completed training go to: <https://riskmgmt.w3.uvm.edu/transcripts/UserLookup.php>
 - c. The core training to complete usually includes the following courses:
 - i. *Laboratory Safety Roles and Responsibilities*
 - ii. *Chemical Safety in the Laboratory*
 - iii. *Laboratory Chemical Waste Disposal*
 - iv. *Laboratory Ventilation and Chemical Fume Hoods*

5. **Complete all departmental forms:** Once you have enrolled in BIOL 2995/3995/4996, make sure to review and complete the **departmental** forms or **Honors College** forms. These forms are usually found in Brightspace and often consist of a) "enrolment form", b) "learning goals", and c) "general expectations." Note that these forms are submitted to the biology office so that the research credit will show up in your transcript (i.e., *these forms are important!*). If you are in the Honors College but are not aware of any forms, please contact your HCOL advisor and they will provide you with the appropriate forms.
6. **Complete an IDP:** Individual development plans (IDP) are an important way to create a professional vision for your career. Dr. Nunez's ability to mentor you will depend on him knowing your goals and aspirations so he may provide adequate advice. Dr. Nunez will send you a copy of an IDP via Slack.
7. Print and sign two copies of your onboarding letter and return one copy to P.I. Nunez.

General Requirements (BIOL 1994/2995/3995/4996)

Code of conduct and shared values

All folks associated with the Nunez lab shall adhere to the UVM code of conduct as well as the values of the Nunez lab:

(1) The Nunez lab shall be a space where all folks are treated with dignity and respect regardless of their identity. This includes factors such as age, disability, ethnicity, family structure, gender, gender expression, gender identity, marital status, nationality, neurodivergence, pregnancy, race, religion, sex, sexual orientation, and socio-economic background, in addition to other protected categories recognized by UVM, the state of Vermont, and by United States Law.

(2) Our lab will strive to be respectful and supportive of individual training needs. Furthermore, the lab will help each member identify any tools and resources that are needed to ensure the success of all members in their research and scholarship.

(3) Create a learning environment where we help each other grow both as scholars as well as human beings. Please learn more about UVM's policies and directives related to the advancement of diversity, equity, inclusion, and justice at our institution: https://www.uvm.edu/about_uvm/diversity

Should you believe that aspects of our shared values or the code of conduct are not being followed by peers, the PI (i.e., Dr. Nunez himself), other faculty, administrators, etc., please reach out to Dr. Nunez immediately to find a solution.

Lab meetings and mentoring meetings

Members of the Nunez lab are expected to attend a weekly **1-on-1 "mentoring" meeting** with Dr. Nunez. These meetings usually last 30 minutes and occur on a mutually agreed day. Attendance is mandatory for all students enrolled in BIOL 1994/2995/3995/4996. In these meetings, students are expected to share updates on all progress accomplished during the prior week. Students should expect to commit 7.5 semester hours to mentoring meetings.

Students enrolled in BIOL 2995/3995/4996 (but not 1994) are required to attend a **weekly lab meeting** in addition to the mentoring meeting. BIOL1994 students are welcome to attend lab meetings but should not see this as part of the total time commitment. Weekly lab meetings will last 1 and ½ hours and will take place on a day selected by the PI based on the availability of lab members (we recommend blocking a bit of extra time since some lab meetings may go over). These lab meetings are pivotal for the functioning of the lab and attendance is mandatory unless otherwise agreed with the PI.

In total, BIOL 2995/3995/4996 students are expected to commit 2.0 hours a week (lab + mentoring) to meetings, for a total of 30 semester hours. These meetings are considered part of professional development and are part of the research credit experience, yet they are considered "out-of-classroom" or "out-of-lab" hours and do not count towards the 40-hour "direct" effort credit commitment. Please block the appropriate number of hours in your calendar and refer to the specific sections of BIOL 2995/3995/4996 for additional details of the expected semester hours committed to research (i.e., total vs credit time commitment). *Students who cannot attend lab meetings due to class scheduling conflicts must discuss contingency plans with Dr. Nunez.*

Communication best practices

You must approach your research for credit experience with the highest level of professionalism. A key part of this is to be mindful of communication (via Slack and email). As a general rule, we try to limit our communications to business hours except in cases of emergencies or looming deadlines! Please be mindful that Dr. Nunez works with colleagues across multiple time zones. As a result of this, he may send you messages at nonstandard times. Please do not feel beholden to reply after business hours. You may choose to wait until the next business day to reply. Also, Dr. Nunez asks all his trainees to **check Slack daily** and to **reply to messages within a business day**. Dr. Nunez has an extremely busy schedule and assumes that you will be always informed of the comings and goings of the lab. Failure to do so may result in disruptions to research activities.

BIOL 1994: Directed readings in Biology

Directed readings is a course designed for first and second-year students with no previous research experience who wish to explore the literature and discuss potential project ideas with Dr. Nunez without committing to a research project. This course is usually taken as a stepping stone to BIOL 2995. In the Nunez lab, BIOL 1994 is only offered as a 1 credit experience.

Effort expectations

Students are expected to invest *at least* 40 hours per semester in BIOL 1994 in “direct” activities. These “direct” activities hours are partitioned into 7.5 semester hours (30 minutes per week) for mentoring meetings and a minimum of 40 hours (2.6 hours per week) for reading papers or books assigned by Dr. Nunez. Each week, in the mentoring meeting, the student and Dr. Nunez will discuss the readings as well as potential projects for the future.

Deliverables

The only deliverable of BIOL 1994 (as described in the syllabus for the course in Brightspace) is a “final paper”, whose length, format, and topic will be agreed upon with Dr. Nunez during the semester. The time devoted to writing this paper is equivalent to “homework/class prep” and it’s outside of the 40 semester hours of direct credit effort. **The final paper is due the last Wednesday, before finals week, of any given semester.**

Assessment

Letter grade	Rubric
A+	The student completed all assigned readings and shows evidence of advanced understanding of the material. The final essay is clear, well written and well researched and shows knowledge of basic theory needed to undertake a research project. The student has prepared a research plan for BIOL2995. The student has attended optional lab meetings and has made meaningful contributions to the lab community and overall research enterprise. The student will be invited to join research (via BIOL2995) in the coming semester.
A	The student completed all assigned readings and shows evidence of advanced understanding of the material. The final essay is clear, well written and well researched and shows knowledge of basic theory needed to undertake a research project. The student will be invited to join research (via BIOL2995) in the coming semester.
B	The student completed all assigned readings and shows evidence of basic understanding of the material. The final essay is clear, well written and well researched yet shows gaps in their understanding of basic evolutionary theory. The student may be invited to join research (via BIOL2995) in the coming semester.
C	The student completed all assigned readings and shows evidence of cursory understanding of the material. The final essay is not clear and reveals major gaps in their understanding of basic theory. The student will NOT be invited to further research opportunities.
D	The student failed to complete all assigned readings and shows evidence of cursory understanding of the material. The final essay is not clear, reveals major gaps in their

	understanding of basic theory, or it was submitted in an incomplete form. The student will NOT be invited to further research opportunities.
F	The student did not complete the readings and did not submit the deliverable. The student will NOT be invited to further research opportunities.

BIOL 2995: Undergraduate Research I

BIOL 2995 is the core research credit taken by Biology undergraduates at UVM. Particularly by those who are doing research for the first time.

Effort expectations

Students are expected to invest 40 semester hours of “lab work” for every credit hour. These hours apply exclusively to those spent in the lab (molecular or computational). In addition to these 40 hours, students are expected to commit 30 hours to professional development activities sanctioned by the Nunez lab (lab and mentoring meetings). Students are also expected to spend additional “out-of-class” or “homework” hours preparing for meetings or reading papers to inform their projects. **Please consider the cumulative time commitment demands before agreeing to join research for credit experiences.**

In the Nunez lab, BIOL 2995 is commonly offered in the form of 1 or 2 credits, as follows:

Credit Load	1 cr. version	2 cr. version
Lab Meeting hours	22.5	22.5
Mentoring hours	7.5	7.5
Lab hours (credited)	40 (2.5 per week)	80 (5.3 per week)
Extra preparation hours	10-30 (flexible)	10-30 (flexible)
Total time commitment	80-100 per semester	120-140 per semester

In general, Dr. Nunez recommends the 1-credit form to first-time researchers, and the 2-credit form for returning researchers who want to continue an existing project.

Deliverables

Student must complete all the items indicated in the syllabus of BIOL 2995 (in Brightspace) as well as **ALL** Nunez lab-specific deliverables (indicated with a *****) as outlined below:

Time frame	Deliverable	Description
First two weeks of the semester	An Enrollment Form	See Brightspace
First two weeks of the semester	One-page proposal	The proposal briefly states the goals of the ongoing research, the role of the student in the project, and lists 10 skills the student will develop during the semester
Weekly*	In person progress reports to Dr. Nunez	These occur during the mentoring meeting
Last three weeks of the semester*	A progress report to the lab	This is a short 15-20 min presentation during lab meeting summarizing work done during the semester
End of the semester (Exact date in Brightspace)	Final Paper	Students will prepare a paper in standard journal format under the supervision of the research mentor. The length of the paper should reflect the time devoted to the project (depending on the number of credits and one or two semesters).
(Conditional) Whenever 6 credits of research are accrued + Biological Science and Zoology BS majors	Research Presentation	UVM Student research conference or other approved conference

Assessment

See below.

BIOL 3995: Undergraduate Research II

BIOL 3995 is the advanced version of research for credit taken by Biology undergraduates at UVM. Only students working on advanced projects will be sponsored.

Effort expectations

Students are expected to invest 80 semester hours of "lab work" for every two credit hours (i.e., in the Nunez lab, the minimum number of credit hours for 3995 is 2 credits). These hours apply exclusively to those spent in the lab (molecular or computational). In addition to these 80 hours, and similar to 2995, students are expected to commit 30 hours of professional development activities sanctioned by the Nunez lab (lab and mentoring meetings). Students are also

expected to spend additional “out-of-class” or “homework” hours preparing for meetings, reading papers, and preparing their final paper for publication.

BIOL 3995 is offered in the form of 2 credits or, on exceptional occasions, 3 credits, as follows:

Credit Load	2 cr. version	3 cr. version
Lab Meeting hours	22.5	22.5
Mentoring hours	7.5	7.5
Lab hours (credited)	80 (5.3 per week)	120 (8 per week)
Extra preparation hours	10-30 (flexible)	10-30 (flexible)
Total time commitment	120-140 per semester	140-160 per semester

Deliverables

Student must complete all the items indicated in the syllabus of BIOL 3995 (in Brightspace) as well as **ALL** Nunez lab-specific deliverables (indicated with a *****) as outlined below:

Time frame	Deliverable	Description
First two weeks of the semester	An Enrollment Form	See Brightspace
Due by the end of the add/drop period	A 5–8-page proposal	The research project must center on a conceptual problem in BIOLOGY, and the proposal should include the statement of a problem, presentation of a hypothesis, organization of observations to test that hypothesis, collection of data, and analysis of those data. The proposal is often started in the summer or over break before the semester in which the research occurs.
Weekly*	In person progress reports to Dr. Nunez	These occur during the mentoring meeting
Last three weeks of the semester*	A progress report to the lab	This is a short 15-20 min presentation during lab meeting summarizing work done during the semester
Sometime during the semester*	Lead journal club	All 3995 students are expected lead a 1-hour journal club discussing

		primary literature. This may occur during lab meeting or other Nunez lab approved event, such as DIG (<i>Drosophila</i> Interest Group).
End of the semester (Exact date in Brightspace)	Final Paper	A report in the style of a journal article is required during the last week of classes. Students will prepare a paper in standard journal format under the supervision of the research sponsor. The length of the paper should reflect the time devoted to the project (depending on the number of credits and one or two semesters)
(Conditional) Whenever 6 credits of research are accrued + Biological Science and Zoology BS majors	Research Presentation	UVM Student research conference or other approved conference

Assessment rubric for BIOL2995 and BIOL3995

Letter grade	Rubric
A+	The student has completed all deliverables with the highest possible quality, and <i>one of the following accomplishments</i> : (1) The student has gone above and beyond the expectations of BIOL2995/BIOL3995 in terms of their contributions to the lab community and overall research enterprise. (2) The student has successfully secured research funding in the form of a grant or fellowship for their research accomplishments. (3) The student directly contributed to a peer reviewed publication through their research. The student will be invited to rejoin research in the coming semester. Students can request strong letters of recommendation without reservation and list Dr. Nunez as a professional reference in their Resume or job application.
A	The student has completed all deliverables with the highest possible quality. The student will be invited to rejoin research in the coming semester. Students can request strong letters of recommendation without reservation and list Dr. Nunez as a professional reference in their Resume or job application.
B+	The student has made progress in their research project and has completed all deliverables to acceptable quality. Yet, the student lacks self-motivation to continue the project. The student may not be invited to rejoin research in the coming semester. Students can request

	letters of recommendation, yet the letter will indicate a “recommended with reservation” (please consult with Dr. Nunez.)
B	The student has made progress in their research project and has completed some but not all deliverables to acceptable quality. Yet, the student lacks self-motivation to continue the project. The student may not be invited to rejoin research in the coming semester. Letters of recommendation are given on a <u>case-by-case</u> basis, yet the letter will indicate a “recommended with reservation” (please consult with Dr. Nunez.)
C	The student failed to make meaningful progress in their research project. Deliverables were partially completed or completed to the bare minimum. The student failed to honor more than 15% of their TOTAL time commitments to BIOL2995/3995 and lacks self-motivation to continue the project. The student will NOT be invited to rejoin research in the coming semester. The student should NOT expect a letter of recommendation.
D	The student failed to make meaningful progress in their research project. Deliverables were not completed. The student failed to honor more than 25% of their TOTAL time commitments to BIOL2995/3995 and lacks self-motivation to continue the project. The student will NOT be invited to rejoin research in the coming semester. The student should NOT expect a letter of recommendation.
F	The student failed to make meaningful progress in their research project. Deliverables were not completed. The student failed to honor more than 50% of their TOTAL time commitments to BIOL2995/3995 and lacks self-motivation to continue the project. The student will NOT be invited to rejoin research in the coming semester. The student should NOT expect a letter of recommendation.

BIOL 4996: Honors Thesis in the College of Arts and Sciences

BIOL 4996 is offered exclusively to HCOL students in CAS. BIOL4996 is only available to students with a cumulative GPA of 3.40 or higher at the time of application and must submit their application to CAS and HCOL by the appropriate deadline based on their planned graduation date. Details on 4996 can be found here <https://www.uvm.edu/cas/pursuing-honors-thesis>