

**Neuroscience Major Proposal**  
**Response to Questions from the Undergraduate Council**  
**October 17, 2019**

The Undergraduate Council discussed the proposal for an interdisciplinary neuroscience major at its October 9, 2019 meeting and raised a number of important questions and concerns. This feedback is reproduced below along with responses from the Divisional Dean of Natural Sciences, the department heads of the three contributing departments (Biology, Human Physiology, and Psychology), and the co-proposers of the neuroscience major.

**Questions for neuroscience major proposal**

- **Please provide a more detailed commitment from member departments that includes the below elements:**
  - Neuroscience students should have the same registration priority and access to courses as the departments' majors.
  - Departments will expand offerings for neuro approved courses if these classes cannot accommodate new and existing students. CAS has pledged support for this.
  - Make a good faith effort, to re-evaluate pre-requisites for neuro approved courses so that they are more accessible
  - Commitment to providing faculty for the steering committee, how will these faculty be chosen and recognized for this service.
  - It would also be really nice if Departments would be willing to prioritize regularization of neuro approved experimental courses.

Please see the revised letters of support from the department heads of Biology, Human Physiology, and Psychology, which explicitly address these elements.

- **More specific commitment from CAS – FYI, see list of student services at end of this note:**
  - CAS has already committed to providing support for course expansion.
  - While we understand that this is a moving target, we would like to see a preliminary estimate of FTE support for administration of this program (does not need to be itemized, just the total FTE allotted for this position). This is not to nit pic over numbers or step on HR toes but so that the committee can see that the program has the support needed to provide students with services one would expect of a strong academic program.
  - Will the program have an S&S budget or will S&S expenses be covered by a department, or institute?
- **Please let us know if this major is going to be offered by the PSY Department, much like the BI Department offers both a Biology and a Marine Biology major, or if it will follow the model of the GS, GSS, or ENVS programs and be positioned outside of the affiliated departments, or will the major be administered by a different university unit (there was talk regarding the Institute of Neuroscience)?** If Neuro will be offered by the PSY department, than many of the administrative services could be subsumed by PSY as they are in place for the PSY major (e.g. commencement, degree clearances, change of major processing, advisor assignment, budget management, web site management, S&S). If Neuro will stand alone (like GS, GSS, or ENVS) or if it will be closely tied to a unit that does not currently offer an undergraduate major (like ION)

then the details of who does what, and who pays for what, will need to be more thoughtfully outlined. Below we provided a list of possible duties that will need to be considered.

Our plan is that the Neuroscience major will follow the model of GS and GSS, and we expect it to have similar time requirements. However, this will depend heavily on how popular the Neuroscience major is.

To that end we expect a steady state budget for:

- A program director (at approximately .33 FTE if NTTF). See schedule here for guidelines <https://casweb.uoregon.edu/department-head-and-large-program-director-compensation-schedule>.
- Partial FTE (.25, for example) for classified staff administrative help
- S&S funding on the order of \$2000-\$7000 depending on size and on how we handle graduation down the road.

Regarding the excellent list of possible duties, these will be assigned variously to:

- The director (e.g. Tykeson liaison, academic exceptions and petition review)
- The classified staff administrator (e.g. budget management)
- The members of the faculty advisory committee or undergraduate directors in departments (e.g. transfer evaluations to replace specific courses, interfacing with departments)
- The Tykeson advising team (e.g. change of major and advisor assignment).

We recognize that this response does not dispose of every item on the list, of course, and is meant to provide examples, not a complete answer.

- **Please provide us with several possible 4-year plans (with different options from the upper division electives section). Please include any necessary prerequisites. Consider that many students start UO ready for MATH 111.**

We have prepared two 4-year academic plans, one for a B.A. in Neuroscience and one for a B.S. in Neuroscience. For the versions that go in the catalog, we would prefer not to list specific elective courses in the plans, but for illustration purposes, we have included different options for the upper-division Neuroscience electives in each plan, ensuring that all pre-requisites have been met.

- **The advanced skills component is a fantastic idea, and adds clear value to the major. Please let us know how the major will be managed so that this component doesn't become an access bottleneck.**

We appreciate this point and have spent considerable time considering how we can accommodate all Neuroscience majors as the major grows. We estimate that in a few years we could have as many as 50 Neuroscience majors in each class year or cohort. Based on the number of faculty currently conducting neuroscience research on campus (i.e., the 28 faculty members of the Institute of Neuroscience) and the current numbers of undergraduate research assistants in their labs, we anticipate that there would be around 25 new research assistant spots available in labs for neuroscience majors each year.

To ensure that all neuroscience majors are able to meet the advanced skills/research requirement, we are adding BI 407 Neuroscience Seminar Series to the list of advanced skills/research courses (see revised curriculum plan). David McCormick, who coordinates the Neuroscience Seminar Series, has indicated that this course could include a maximum of 10-20 undergraduate neuroscience majors at any one time.

Of the other options for fulfilling the advanced skills course/research requirement, BI 410 Introduction to Programming for Biologists (or Matlab for Biologists) will be offered three times this academic year. The Fall course accommodates 48 students, and there are currently 6 empty seats. BI 410 Analysis of Neural Data will be offered in Winter 2020 and is capped at 25 students. This course tends to fill, but we believe that many of the enrolled students would be neuroscience majors, were that currently an option. BI 485 will be offered in Spring 2020 and typically does not fully enroll, although it does require an additional math course (Math 247 or 252) as a pre-requisite. PSY 412 Applied Data Analysis is offered every Fall and is capped at 28 students. This Fall there are 9 seats available.

We believe that with this combination of opportunities, all neuroscience majors will be able to successfully complete the advanced skills course/research requirement, which is a critical component of our major curriculum. As indicated in the letters of support, CAS is committed to expanding the advanced skills course offerings if the need arises.

**Undergrad Council also raised the following questions or discussed the following points**

- **Caleb suggested adding a philosophy of neuroscience component, you might want to discuss this possibility with the stakeholders and identify possible electives if you would entertain these additions.**

This is an excellent suggestion, and we followed up on this recommendation with Erin McKenna, who is faculty in Philosophy. Erin did not feel that it would be appropriate for Philosophy to play an important role in the neuroscience major, given the current make-up of the Philosophy department. Mark Johnson, emeritus faculty, has taught a Philosophy of Mind course in the past, but we could not find this course in the current course catalog. In the future, if this course, or a similar course, becomes a regular course offering in Philosophy with a dedicated faculty member, we would be happy to add the course to the neuroscience major as an upper-division neuroscience elective in the “Cognitive” area.

- **Consider adding ANTH 470 to the statistics category.**

We appreciate the suggestion and have added ANTH 470 Statistical Analysis of Biological Anthropology as an option for the statistics course (see revised curriculum plan).

- **Hal mentioned a CIS course in development that might be more accessible than CIS 472. You might consider adding this course to the proposal now (which will require submitting a syllabus, learning objectives, and a student engagement inventory to course leaf) but you don't have to.**

We would like to keep CIS 472 in the proposal. Although that course has 7(!) nested pre-requisites (CIS 210, 211, 212, 313, 315; MATH 231, 232), the topic is relevant, and it is conceivable, albeit unlikely, that a Neuroscience major would use their elective credits to take this course, in the process fulfilling the requirements for a CIS minor.

We would also like to add CIS 372 (DSCI 372M): Machine Learning for Data Science as an option for our advanced skills/research experience requirement. That course is already in Courseleaf, and we have included it in the revised curriculum plan. Unfortunately, Neuroscience majors would also have to take 7 additional pre-requisites to take CIS 372 (MATH 252, 341, 342; CIS 210, 211, 212; DSCI 345), but again, we would like to make that option available to them.

- **Please consider how you might justify your decision to allow unrestricted overlap with related majors.**

We believe that if students complete all of the requirements for the neuroscience major, then they have earned a degree in neuroscience, whether or not they are also using some of the same courses for a major in Biology, Human Physiology, or Psychology. While there is substantial overlap in the requirements for the Neuroscience major with those of Biology and Human Physiology, a student would need to take an additional 20+ credits to double major. We believe this is sufficient independence to warrant unrestricted overlap.

**We had discussed the relational for structuring the program for breadth instead of depth.**

We appreciate this point and would like to provide more rationale for our decision to prioritize breadth over depth. We designed the neuroscience major with the idea of generating ideal neuroscience graduate students, the type of students we would welcome into our own labs, and we preferred the idea of well-rounded scientists. We also realized that a breadth structure would more fairly distribute the labor among the three contributing departments, as each of the elective categories is represented more strongly by one of the three departments (e.g., Cellular/Developmental by Biology). We were also concerned that requiring more depth rather than breadth would create a bottleneck in terms of completing the upper-division electives. Finally, we believe that the advanced skills/research requirement provides depth into a particular area of study or particular set of skills.

- **Phil mentioned the possibility of expanding the graduate level neuroscience seminar to include Neuro undergraduates, If you would like to add this component to this proposal please let us know.**

BI 407/507 Seminar is already an existing course, for which students earn credit by attending the Neuroscience Seminar Series along with discussions of papers authored by the seminar speakers. As mentioned above, we would like to add BI 407 Seminar as an option for the advanced skills courses/research experience and have included it in our revised curriculum plan.

Below is a list of duties that may need to be assigned to either the director or steering committee or affiliated department. Many of these should be considered when calculating an appropriate FTE commitment from CAS.

- Advising coordination (with Tykeson, and other advising units)
- Advising beyond what Tykeson can provide
- Transfer evaluations
- Academic Exceptions and petition review
- Curriculum oversight, updates, and review
- Program assessment (from LO assessment section)

- Tracking students, survey and maintaining contact (from LO assessment section)
- Interfacing with member department and CAS and advocating specifically for undergraduates (personally I think this is of primary importance because these students will not have the same access to the resources that a traditional department can offer.)
- Shepherding students into research labs (considering the advanced requirement component)
- Honors administration (who will make the decisions, maintain consistency, and oversee honors)
- Document creation and updates
- Degree clearances
- Change of major processing and advisor assignment
- Commencement planning, and execution (this is a significant undertaking that might need to be worked out sooner rather than later, the high overlap between this major and existing majors means that the program might have graduates very soon after its establishment)
- Budget management
- Web site administration
- Keeping a program mailing list and disseminating info through it (Canvas can be used for this, BI uses a traditional listserve)
- Internship partnership development
- planning and executing special programming/events for majors
- Who covers S&S expenses (copies, phone, CAS stickers, commencement costs)



October 16, 2019

Dear Colleagues,

I am writing to express my support as Head of the Department of Biology for the interdepartmental Neuroscience major at the University of Oregon.

To ensure the success of this new program I would like to specify the following accommodations that the Department of Biology will enact the following:

- 1) Neuro majors will be treated equally to Biology and Marine Biology majors for course registration priority.
- 2) We will add service on a steering committee for one faculty member to our list of committee assignments. I will start raising this possibility with Neuroscience faculty, with the goal of assigning a faculty member in the Fall 2020.
- 3) We will take on the task of identifying faculty and suggesting to them changes in prerequisites to their classes, making their classes more accessible to Neuroscience majors.
- 4) We will provide support to faculty for the regularization of experimental (BI 410) classes.
- 5) As the program grows, we will seek to expand the offering of upper level neuroscience-approved courses, as long as CAS supports these efforts.

I hope that these steps will provide a supportive environment for this new major and hope to see it implemented in the next academic year.

Sincerely,

Bruce Bowerman, Ph.D.  
Professor and Head  
Department of Biology  
University of Oregon

**DEPARTMENT OF BIOLOGY**

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October 17, 2019

TO: Undergraduate Council

RE: Proposal for Neuroscience Major

Dear Council Members,

I am pleased to see the proposal for the Neuroscience Major is beginning to move through the various curriculum committees and the Undergraduate Council. I believe the major has a chance to draw students to UO that would otherwise pursue a neuroscience degree at one of our competitor institutions.

I greatly appreciate how Human Physiology has been included as a stakeholder in discussions and helped develop the proposal along with our colleagues in Psychology and Biology. I have read the proposal and shared key parts with our departmental undergraduate program committee as well as the instructors for our courses that are included in the proposal. As a unit, we are happy to support this proposal with the following commitments:

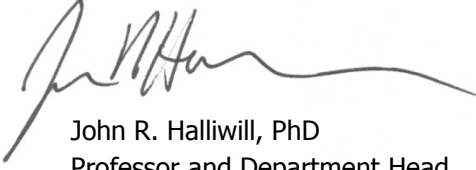
- 1) We can work with the Neuroscience Major team to make the small changes necessary to support the proposed major, such as changing the requirements for some of our courses to open them to non-HPHY majors. **We will make a good-faith effort to re-evaluate pre-requisites for the neuro approved courses so that they are more accessible.** We have done this in the past for HPHY 333 to allow entry of PSY majors.
- 2) Over the last few years, we have lost some faculty who contributed courses that would fit well within the major, but hope to replace those faculty this year and that will bring comparable offerings into our program. We can maintain a dialog as to what those courses are and how they may fit into the Neuroscience Major and our plans evolve. **We have already regularized most of the neuro approved courses, and we will prioritize regularization of any that are still experimental or that may created by recent addition of faculty members.**
- 3) Our lower-division courses HPHY 211 and HPHY 212 likely have enough bandwidth at present to accommodate an influx of students due to the new major when it launches, **and if need be, we will work with CAS on support to expand those offerings should demand exceed current capacity.** Our current 300-level offerings also should have sufficient seats as they are.
- 4) Neuro majors will be on equal footing for enrollment with our own majors for our 200, 300, and most of our 400-level offerings that were included in the proposal (i.e., **they will have the same priority registration as HPHY majors**). However, we do have two of our 400-level capstones courses fill to capacity each year (specifically, HPHY 412 Sleep Physiology and HPHY 433 Neurophysiology of Concussion). As we do not have the personnel resources to expand those two courses or offer them more than once a year, unfortunately, we will need to maintain a priority registration for HPHY majors over Neuro majors. We recognize that may preclude their inclusion in the neuro major, but also believe we have several other relevant 400-level capstones that can be made available to neuro majors with priority registration (e.g., HPHY 432 Neural Development and 436 Clinical Neuroscience)
- 5) Human Physiology has four tenure track faculty members who work in the neuroscience domain. While we are stretched thin as a department, we recognize the importance of this initiative and **will work to provide a faculty member who can serve on the steering committee.** We must acknowledge that three of the potential members are very junior, and so will need to be somewhat protective of their time commitments.

**DEPARTMENT OF HUMAN PHYSIOLOGY**

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The department will let faculty interest lead the selection process, and we will recognize this service contribution as we do any service load that resides outside the department.

Sincerely,

A handwritten signature in black ink, appearing to read "John R. Halliwill", with a long, sweeping horizontal line extending to the right.

John R. Halliwill, PhD  
Professor and Department Head

1.541.600.4337 | [halliwil@uoregon.edu](mailto:halliwil@uoregon.edu) | <http://eeplab.uoregon.edu> | Schedule @ [doodle.com/halliwill](https://doodle.com/halliwill)





*Re: Psychology's support for Neuroscience Major*

To whom it may concern,

Our department enthusiastically supports the creation of a new Neuroscience Major. In this context we commit to the following points:

- 1) Neuroscience students will have the same registration priority and access to courses as Psychology majors.
- 2) The department will make a strong effort to expand offerings for courses approved for the Neuroscience major, if these classes cannot accommodate additional students. We understand that the College of Arts and Sciences (CAS) has pledged to support such efforts.
- 3) We will make a good faith effort to re-evaluate and adjust pre-requisites for Psychology courses that are approved for the Neuroscience major so that they are more accessible for Neuroscience students.
- 4) Psychology faculty will be involved in overseeing the Neuroscience major and will be recognized for these duties at a minimum as part of their regular service obligations. In case of increased oversight demands, such as when larger curriculum changes become necessary, we will work with CAS to try to provide course releases.
- 5) Should there be experimental courses that are relevant for the Neuroscience Major, we will prioritize regularizing them.

Please let me know, if you have additional questions,

**ULRICH MAYR, PROFESSOR  
PSYCHOLOGY DEPARTMENT**

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<http://www.uoregon.edu/~mayr>

## Neuroscience Major 4-Year Academic Plans

Department: BI, HPHY, & PSY

Degree, Major: BA Neuroscience

### YEAR 1

FALL COURSES	CREDITS	MILESTONES
CH 111 Intro to Chem Principles	4	
MATH 111 College Algebra	4	
WR 121 College Composition I	4	
Language 101	4	First term of first-year second-language sequence
<b>TOTAL</b>	<b>16</b>	

WINTER COURSES	CREDITS	MILESTONES
CH 221 General Chemistry I	4	
MATH 112 Elementary Functions	4	
WR 123 College Composition III	4	Recommended instead of WR 122
Language 102	4	Second term of first-year second-language sequence
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
CH 222 General Chemistry II	4	
MATH 246 Calculus for Bio Sciences	4	Recommended instead of MATH 251
PSY 201 Mind & Brain	4	
Language 103	4	Third term of first-year second-language sequence
<b>TOTAL</b>	<b>16</b>	

### YEAR 2

FALL COURSES	CREDITS	MILESTONES
BI 211 General Biology I: Cells	4	
CH 223 General Chemistry III	4	
HPHY 211 Medical Terminology	3	
Language 201	4	First term of second-year second-language sequence
<b>TOTAL</b>	<b>15</b>	

WINTER COURSES	CREDITS	MILESTONES
BI 212 General Biology II: Organisms	4	
HPHY 212 Scientific Invest. In Phys.	4	
Core education course	4	Arts & Letters or Social Science
Language 202	4	Second term of second-year second-language sequence
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
BI 214 General Biology IV: Populations	4	
PSY 302 Statistical Methods in Psych.	4	
Core education course	4	Arts & Letters or Social Science
Language 203	4	Third term of second-year second-language sequence
<b>TOTAL</b>	<b>16</b>	

## Neuroscience Major 4-Year Academic Plans

### YEAR 3

FALL COURSES	CREDITS	MILESTONES
HPHY 321 Human Anatomy I	5	First term of neuroscience core sequence
HPHY 322 Human Anatomy II	5	
PHYS 201 General Physics I	4	
BI 401, HPHY 401, or PSY 401 Research	2	Join a research lab
<b>TOTAL</b>	<b>16</b>	

WINTER COURSES	CREDITS	MILESTONES
PSY 304 Biopsychology	4	Second term of neuroscience core sequence
PHYS 202 General Physics II	4	
Core education course	4	Arts & Letters or Social Science
BI 401, HPHY 401, or PSY 401 Research	2	
<b>TOTAL</b>	<b>14</b>	

SPRING COURSES	CREDITS	MILESTONES
BI 360 Neurobiology	4	Third term of neuroscience core sequence
PHYS 203 General Physics III	4	
Core education course	4	Arts & Letters or Social Science
BI 401, HPHY 401, or PSY 401 Research	2	If not involved in research, take an advanced skills course
<b>TOTAL</b>	<b>14</b>	

### YEAR 4

FALL COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: BI 322 Cell Biology or other Mol/Cell/Devo course
Core education course	4	Arts & Letters or Social Science
Elective course or multicultural course	4	
BI 401, HPHY 401, or PSY 401 Research	2	Consider BI 403, HPHY 403, or PSY 403 Thesis; or advanced skills course
<b>TOTAL</b>	<b>14</b>	

WINTER COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: PSY 445 Brain Mechanisms Behavior (PSY 303 pre-requisite waived for NEURO majors) or other Systems course
Upper-division NEURO elective	4	Example: PSY 449 Cognitive Neuroscience (PSY 303 pre-requisite waived) or other Cognitive course
Core education course	4	Arts & Letters or Social Science
Core education course	4	Arts & Letters or Social Science
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: PSY 438 Perception (PSY 303 pre-requisite waived)
Core education course	4	Arts & Letters or Social Science
Elective course or multicultural course	4	
<b>TOTAL</b>	<b>12</b>	

## Neuroscience Major 4-Year Academic Plans

Department: BI, HPHY, & PSY

Degree, Major: BS Neuroscience

### YEAR 1

FALL COURSES	CREDITS	MILESTONES
CH 111 Intro to Chem Principles	4	Preparation for CH 221
MATH 111 College Algebra	4	
WR 121 College Composition I	4	
Core education course	4	Arts & Letters or Social Science
<b>TOTAL</b>	<b>16</b>	

WINTER COURSES	CREDITS	MILESTONES
CH 221 General Chemistry I	4	
MATH 112 Elementary Functions	4	
WR 123 College Composition III	4	Recommended instead of WR 122
Core education course	4	Arts & Letters or Social Science
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
CH 222 General Chemistry II	4	
MATH 246 Calculus for Bio Sciences	4	Recommended instead of MATH 251
PSY 201 Mind & Brain	4	
Core education course	4	Arts & Letters or Social Science
<b>TOTAL</b>	<b>16</b>	

### YEAR 2

FALL COURSES	CREDITS	MILESTONES
BI 211 General Biology I: Cells	4	
CH 223 General Chemistry III	4	
HPHY 211 Medical Terminology	3	
Elective course or multicultural course	4	
<b>TOTAL</b>	<b>15</b>	

WINTER COURSES	CREDITS	MILESTONES
BI 212 General Biology II: Organisms	4	
HPHY 212 Scientific Invest. In Phys.	4	
Core education course	4	Arts & Letters or Social Science
Elective course	4	
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
BI 214 General Biology IV: Populations	4	
PSY 302 Statistical Methods in Psych.	4	
Core education course	4	Arts & Letters or Social Science
Elective course or multicultural course	4	
<b>TOTAL</b>	<b>16</b>	

## Neuroscience Major 4-Year Academic Plans

### YEAR 3

FALL COURSES	CREDITS	MILESTONES
HPHY 321 Human Anatomy I	5	First term of neuroscience core sequence
HPHY 322 Human Anatomy II	5	
PHYS 201 General Physics I	4	
BI 401, HPHY 401, or PSY 401 Research	2	Join a research lab
<b>TOTAL</b>	<b>16</b>	

WINTER COURSES	CREDITS	MILESTONES
PSY 304 Biopsychology	4	Second term of neuroscience core sequence
PHYS 202 General Physics II	4	
Core education course	4	Arts & Letters or Social Science
BI 401, HPHY 401, or PSY 401 Research	2	
<b>TOTAL</b>	<b>14</b>	

SPRING COURSES	CREDITS	MILESTONES
BI 360 Neurobiology	4	Third term of neuroscience core sequence
PHYS 203 General Physics III	4	
Elective course	4	Example: BI 322 Cell Biology (as pre-requisite for 400-level BI course)
BI 401, HPHY 401, or PSY 401 Research	2	If not involved in research, take an advanced skills course
<b>TOTAL</b>	<b>14</b>	

### YEAR 4

FALL COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: HPHY 333 Motor Control or other Systems course
Upper-division NEURO elective	4	Example: BI 427 Molecular Genetics of Human Disease or other Mol/Cell/Devo course
Core education course	4	Arts & Letters or Social Science
BI 401, HPHY 401, or PSY 401 Research	2	Consider BI 403, HPHY 403, or PSY 403 Thesis; or advanced skills course
<b>TOTAL</b>	<b>14</b>	

WINTER COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: BI 410 Neural Basis of Cognition or other Cognitive course
Core education course	4	Arts & Letters or Social Science
Elective course	4	
Elective course	4	
<b>TOTAL</b>	<b>16</b>	

SPRING COURSES	CREDITS	MILESTONES
Upper-division NEURO elective	4	Example: PSY 433 Learning & Memory (PSY 303 pre-requisite waived)
Elective course	4	
Elective course	4	
<b>TOTAL</b>	<b>12</b>	

## REVISED NEUROSCIENCE MAJOR CURRICULUM PLAN

October 17, 2019

As outlined below, the Neuroscience major consists of the following components: 1) foundation courses in the natural sciences; 2) math and statistics coursework; 3) life science fundamentals; 4) a core neuroscience sequence; 5) upper-division elective courses; and 6) advanced skills courses and/or research experience. The total number of credits is 104-107 (depending on whether majors complete the General Biology Sequence or the Biology Honors Sequence).

### **Foundation courses in natural sciences** (46-49 credits)

- General Biology Sequence: BI 211, 212, and 214 (12 credits) OR Biology Honors Sequence: BI 281H, 282H, 283H (15 credits)
- General Chemistry Sequence: CH 221, 222, 223 OR Chemistry Honors Sequence: CH 224H, 225H, 226H (12 credits)
- Introductory Physics Sequence: PHYS 201, 202, 203 OR Foundations of Physics Sequence: PHYS 251, 252, 253 (12 credits)
- General Chemistry Laboratory: CH 227, 228, 229 OR General Physics Laboratory: PHYS 204, 205, 206 (6 credits)
- Mind & Brain: PSY 201 (4 credits)

### **Math and statistics courses** (8 credits)

- MATH 246 or 251
- PSY 302 Statistical Methods in Psychology OR MATH 425 Statistical Methods I OR [ANTH 470 Statistical Analysis of Biological Anthropology](#)

### **Life science fundamentals** (8 credits)

- HPHY 211 Medical Terminology
- HPHY 212 Scientific Investigations in Physiology

### **Core neuroscience sequence** (18 credits; recommended, but not required, to be taken in this order)

- HPHY 321 Human Anatomy I & HPHY 322 Human Physiology I (Fall)
- PSY 304 Biopsychology (Winter)
- BI 360 Neurobiology (Spring)

**Upper-division elective courses** (16 required credits with at least 12 credits from 400-level courses; at least one course from each of the three areas)

#### **Molecular/Cellular/Developmental**

- BI 320 Molecular Genetics
- BI 322 Cell Biology
- BI 328 Developmental Biology
- BI 356 Animal Physiology
- BI 422 Protein Toxins in Cell Biology
- BI 427 Molecular Genetics of Human Disease
- BI 463 Cellular Neuroscience
- BI 466 Developmental Neurobiology
- HPHY 337 Clinical Pharmacology
- HPHY 432 Neural Development

## Systems

- BI 353 Sensory Physiology
- BI 399 Visual System
- BI 410 Auditory Systems
- BI 461 Systems Neuroscience
- HPHY 333 Motor Control
- HPHY 412 Sleep Physiology
- HPHY 433 Neurophysiology of Concussion
- HPHY 434 Movement Disorders
- HPHY 436 Clinical Neuroscience
- PSY 445 Brain Mechanisms of Behavior
- PSY 450 Hormones & Behavior

## Cognitive

- BI 410 Neural Basis of Cognition
- PSY 305 Cognition
- PSY 348 Music & the Brain
- PSY 383 Psychoactive Drugs
- PSY 433 Learning & Memory
- PSY 436 Human Performance
- PSY 438 Perception
- PSY 440 Psycholinguistics
- PSY 449 Cognitive Neuroscience
- PSY 458 Decision Making
- PSY 475 Cognitive Development

## Advanced skills courses and research experience (8 required credits)

- BI 401 Research, BI 403 Thesis, BI 407 Seminar, BI 410 Introduction to Programming for Biologists, BI 410 Matlab for Biologists, BI 410 Analysis Neural Data, BI 485 Techniques in Computational Neuroscience, [CIS 372M Machine Learning for Data Science](#), CIS 472 Machine Learning, HPHY 401 Research, HPHY 403 Thesis, PSY 401 Research, PSY 403 Thesis, PSY 412 Applied Data Analysis

## Criteria for Honors

To graduate with Honors in Neuroscience, the following requirements must be met:

1. A completed Neuroscience Honors application with signature of a faculty research advisor from BI, HPHY or PSY
2. Completion of all Neuroscience major requirements
3. A minimum 3.5 GPA in all courses applied to the major
4. At least three credits in BI 403, HPHY 403, or PSY 403 Thesis (*These credits may be applied to the advanced skills courses and research experience requirement*).
5. Completion of an honors thesis under supervision of a committee, consisting of one BI, HPHY, or PSY faculty member and at least one other committee member (Ph.D. student, postdoctoral scholar, or faculty) from BI, HPHY, or PSY.