**GIDP in Neuroscience**
**Guide to Neuroscience (NRSC) Curriculum**

**NRSC Student Advisory Committee**
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## A. Overview

**Year 1**

- Complete core curriculum, take elective and minor courses.
- Complete three research rotations, 10 weeks each
- By the end of the year:
  - Select a mentor
  - Select committee members

**Year 2**

- Complete all course work
- Fulfill teaching requirement
- Select comprehensive exam committee members, schedule first committee meeting
- It is encouraged the student take the comprehensive exam by the end of year 2 to achieve "Advanced Candidacy" (passed both exams) before fall of year 3

**Years 3-5**

- Meet at least annually with thesis committee
- Complete dissertation work in subsequent years 3-5
- Write dissertation and defend thesis no later than by the end of year 5

## B. Required credits

The Graduate College requires at least 63 units of graduate work, including major and minor coursework, rotation research (NRSC 700) and dissertation research (NRSC 920). The combination of major and minor coursework must total a minimum of 36 units; at least half of these units must be taken for letter grades.

- 36 units are required to become eligible for taking the comprehensive exam

| | |
|---|---|
| 8 units | Neuroscience core courses (NRSC 560 and 588) |
| 5-6 | Statistics, Writing, and Ethics courses |
| 2 | Neuroscience Colloquium (NRSC 695F) |
| 9 | Research rotations (NRSC 700) |
| 3-6 | Neuroscience elective courses (see Table 3) |
| 9 | Minor courses |
| ≥ 36 units | (at least half of the units must be taken for a letter grade) |

- Another 36 additional units are typically required to graduate (after reaching Advanced Candidacy). These can be derived from:
  - NRSC 900 Research (or additional research rotation)
  - NRSC 920 Dissertation research
  - NRSC 599/699 Independent study
- A total of 72 units is required for graduation
- Students must take a minimum of 12 units per semester in their first year. After their first year, students must be enrolled in 6 units each semester to meet minimum enrollment requirements.

**NRSC students are expected to maintain an overall grade-point average of at least 3.0 (B) and to have no more than a total of 2 grades of C; failure to achieve such a record can result in a recommendation of dismissal to the Graduate College and dismissal from the program.**

**C. Required courses (Table 1)**

Core curriculum courses are NRSC 588, NRSC 560, two semesters of NRSC 695F, one Statistics course, one Writing, and one Ethics course, and three research rotations (see below).

At least three research rotations (NRSC 700) must be completed in three different laboratories (10 weeks each). The first rotation can start earlier during the summer. A total of 9 units is recommended. After rotations, students should join a lab or add a 4th rotation.

**TABLE 1**: Core Coursework (***** indicates required core courses)

| ***Semester*** | ***Course*** | ***Units*** | ***Faculty coordinator*** |
|---|---|---|---|
| *Fall core* | *NRSC 588 Principles of Cell & Mol Neurobiology | 4 | Bhattacharya |
| | *NRSC 700 Research rotations | 3-6 | NRSC faculty |
| | *NRSC 695F Neuroscience Colloquium | 2 | Wohlgemuth |
| | (NRSC elective or minor course to reach total ≥ 12 units per semester) | varies | Faculty |
| *Spring core* | *NRSC 560 Systems Neuroscience | 4 | Fuglevand |
| | *NRSC 700 Research rotations | 3-6 | NRSC faculty |
| | *NRSC 695F Neuroscience Colloquium | 2 | Wohlgemuth |
| | (NRSC elective or minor course to reach total ≥ 12 units per semester) | varies | Faculty |
| **Ethics* | HSD 649 – Survival Skills and Ethics | 3 | Sawyer/Hoit (*spring*) |
| | PHCL 595B – Scientific Writing, Presentation & Bioethics | 2 | Streicher, Largent-Milnes (*spring*) |
| | MCB 695E – Science, Society & Ethics | 1 | Capaldi (*spring)* |
| **Writing/ Communi-cations* | IMB 521 – Scientific Grantsmanship | 2 | Wilson, Riegel, Streicher 2nd year PhD students only (*spring)* |
| | IMB/NRSC 575 – Scientific Writing for Predoctoral Fellowships Workshop | 1 | Bhattacharya & Bhattacharya, 7.5 week course (*fall)* |
| | SLHS 696a – Topics in Speech, Language, and Hearing Sciences | 1-3 | Plante (S*pring*)<br>Alt (fall) |
| | Note: grant citizenship requirement and one time only submission rule https://www.nsf.gov/ | | |
| **Statistics* | Please see Table 2 | | |

**Statistics courses**

At least two units of statistics are required. Students may choose from the list below or request the NRSC Graduate Advisory Committee to have an equivalent course considered for meeting the requirement.

**TABLE 2:** Statistic Courses (* request instructor approval for enrollment)

| ***Courses in statistics*** | | ***Faculty*** | ***Offerings*** |
|---|---|---|---|
| EIS 513 | Applied Biostatistics | An | 4 units *(fall)* |
| BIOS 576B | Biostatistics for Research | Roe | 3 units (*spring, fall)* |
| PSY 510 | Statistics Fundamentals | Flores | 4 units *(fall)* |
| Other | by approval of the NRSC Program Graduate Advisor | | 3-4 units |
| For help choosing a stats course: https:gtas.arizona.edu/course-sequences | | | |

**Teaching**
Because teaching is an important element in academic careers in Neuroscience, supervised experience in university-level teaching is considered essential. Each student is therefore required to serve as a Teaching Assistant for at least one semester during the first 3 years.

**Registration information**
Schedule of classes: see, UAccess website
On-line course registration: see, UAccess website

**D. Neuroscience elective courses**
Elective and required courses (Table 3) must add up to a minimum of 36 units (not including dissertation research and independent study). At least half of the 36 units must be taken for a letter grade (not pass/fail). Additional courses of interest that are not listed in Table 3 can be accepted after confirmation with the student's Advisory Committee or the Graduate Advisor. The Graduate College discourages cross-listing of classes, hence some of the courses listed in the table below do not carry the 'NRSC' prefix. Irrespective of the prefix, all these courses will be accepted as Neuroscience electives.

**TABLE 3:** Coursework for the Neuroscience electives. *Specific courses selected to fulfill the core requirements cannot also be counted as electives.*

| ***Foundational Electives*** | | | | |
|---|---|---|---|---|
| ***Sem.*** | ***Course #*** | ***Title*** | ***Units*** | ***Instructor*** |
| Spring | NRSC 695D | Advanced Analysis of Human Genetic Disease (*spring-even years*) | 3 | Restifo |
| Spring | NRSC 572 | Neurodevelopment in Action (*spring-odd years*) | 3 | Madhavan |
| Spring | NRSC 694 | Teaching Course-Based Research Experiences (CURES) | 3 | Bhattacharyra |
| ***Additional Electives*** | | | | |
| ***Sem.*** | ***Course #*** | ***Title*** | ***Units*** | ***Instructor*** |
| Fall | BIOC 565 | Proteins and Enzymes | 3 | Walti |
| Spring | BIOC 568 | Nucleic Acids, Metabolism and Signaling | 4 | Cordes |
| Fall | CMM 518 | Fundamental Genetic Mechanisms | 3 | Ellis/Maggert |
| Spring | CMM 565A | Fundamentals of Light Microscope and Electronic Imaging | 3 | Padilla-Rodriquez |
| Fall | CMM 577 | Principles of Cell Biology | 4 | Team taught |
| Spring | CMM 595H | Problems in the Biology of Complex Diseases | 2 | Vercelli |
| Fall/Spr | COGS 517 | Introduction to Cognitive Science | 3 | Dornhaus |
| Fall/Spr | COGS 595 | Cognitive Science Colloquium | 1 | Andrews-Hanna |
| Fall | GENE 670 | Recent Advances in Genetics | 2 | Ellis |

| | | | | |
|---|---|---|---|---|
| Fall/Spr | INFO 521 | Intro to Machine learning | 3 | Palacios |
| Spring | MATH 571B | Design of Experiments | 3 | An |
| Spring | MCB 546 | Genetics & Molecular Networks | 4 | Buchan |
| Fall | MCB 572A | Cell Systems | 4 | Weinert |
| Fall | MCB 580 | Introduction to Systems Biology | 2 | Capaldi |
| Fall/Spr | MCB 595 | MCB Journal Club | 1 | Tax |
| Fall/Spr | NRSC 599-057 | Neuroscience and Audiology | 1 | Musiek |
| Spring | PATH 515 | Mechanisms of Human Disease/ Basic Pathology | 4 | Briehl |
| Spring | PCOL 630 A/B | Cellular Communications & Signal Transduction | 3 | Smith |
| Fall | PHCL 530 | Pain/Neuropharmacology | 2 | Vanderah |
| Fall | PHCL 601A/B/C | Pharmacology: General Principles | 2 | Team taught |
| Spring | PHCL 553 | Neuropharmacology | 3 | Yin |
| Spring | PHCL 545 | Drugs of Abuse | 3 | Largent-Milnes |
| Spring | PHCL 552 | Substance Abuse Disorder and Addiction | 3 | Riegel |
| Fall | PS 503 | Cellular & Molecular Physiology | 6 | Eggers Ronaldson Pires |
| Fall | PSIO 572 | Quant. Modeling of Biol. Systems | 3 | Secomb |
| Spring | PSIO 603A | Human Physiology | 6 | Team taught |
| Fall/Spr | PSY 504A | Human Brain-Behavior Relationships | 3 | Grilli |
| Fall | PSY 595A | Cognition and Neural Systems Colloquium | 1 | Ekstrom |

Students and faculty are welcome to consult with the Graduate Student Advisor to determine whether neuroscience-related courses that are not listed might be acceptable as electives.

**E. Minor coursework for Neuroscience students (at least 9 units are required).**

Predoctoral students can pursue a minor in any established program, as determined by the guidelines of the respective program. Alternatively, the student may choose a minor in Neuroscience option that offers a flexible curriculum tailored to the student's interests.

*The minor should be selected in consultation with the dissertation advisor and must be approved by the NRSC Graduate Advisory Committee.*

Examples of established programs for consideration include Biochemistry, Cell Biology & Anatomy, Entomology and Insect Science, Genetics, Molecular & Cellular Biology, Medical Pharmacology, Physiological Sciences, Psychology, Speech & Hearing Sciences, and others.

**F. Minor in Neuroscience for graduate students in other programs (at least 9 units are required)**

The minor in Neuroscience requires:

- passing one of the core courses NRSC 560 ***OR*** 588 (4 units)
- and 5 additional units in courses that are cross listed in NRSC. The NRSC Colloquium course NRSC 695f is valid for the minor.

**The provided information may be subject to change with reasonable advance notice, as deemed appropriate by the Executive Committee of the Neuroscience GIDP.**