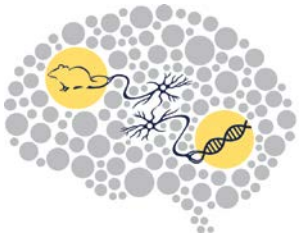
# DEPARTMENT OF NEUROBIOLOGY & BEHAVIOR

## University of California, Irvine



Department *of*
Neurobiology *and* Behavior
*Exploring the Brain: From Molecules to Mind*

# Graduate Student Handbook

# 2018-2019

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# Contact Information

## NEUROBIOLOGY AND BEHAVIOR

http://neurobiology.uci.edu/

Many staff and faculty will help you throughout your academic career at UC Irvine. Here is an introduction to some of them.

| | |
|---|---|
| **Dr. Marcelo Wood**<br>**Department Chair**<br>**2205 McGaugh Hall 2205**<br>**(949) 824-6114**<br>**mwood@uci.edu** | Dr. Wood welcomes graduate students to discuss all aspects of their graduate career with him. As the head of the department, he has the responsibility of representing the department in all administrative matters, supervising all department teaching, providing oversight for all contracts and grants and all animal and human protocols, and approving all department policies and procedures. |
| **Dr. Kim Green**<br>**Department Vice-Chair**<br>**3208 Biological Science**<br>**(949) 824-3859**<br>**kngreen@uci.edu** | The Vice Chair's main responsibility for graduate education is regarding teaching, e.g. matters related to Teaching Assistant (TA) policy and assignments. The Vice Chair also is available for general questions about graduate education. |
| **Dr. Ian Parker**<br>**Graduate Student Advisor**<br>**1217 McGaugh Hall**<br>**(949) 824-7332**<br>**iparker@uci.edu** | The Graduate Advisor is the official representative of the Dean of Graduate Division. As advisor, he is responsible for the supervision of graduate study, student lab advisor assignments and changes of those assignments, approval of courses outside the department as satisfactory of departmental requirements, and approval of advancement and dissertation faculty membership committees. He also serves as a liaison between students and faculty, representing the interests of graduate students. |
| **Graduate Student Representatives:**<br><br>**Susan Gil**<br>**gils1@uci.edu**<br><br>**Sima Chokr**<br>**schokr@ucil.edu** | The graduate student representatives are elected by graduate students and serve two-year terms. The representatives attend faculty meetings and serve as the student voice. They also bring information back from the faculty and central administration to the students. During faculty and graduate recruitment, the representatives schedule meetings between graduate students and prospective candidates. |

# Department Administrative Staff

| | |
|---|---|
| **Sally Dabiri**<br>**Department Administrator**<br>**(949) 824-4727**<br>**sfdabiri@uci.edu** | Department operations management; faculty recruitment, merits and promotions and sabbatical leaves; Graduate student support; General operating budget; Lecturer recruitment and appointment |
| **Brian Paredes**<br>**Purchasing Analyst**<br>**(949) 824-4719**<br>**brian@uci.edu** | Processing requisitions of all materials and supply; responsible for the daily activities of the Purchasing and the required on-going interaction with vendors; primary contact and facilitator for all department space, inventory and equipment needs. |
| **Victoria Leung**<br>**Finance Analyst**<br>**(949) 824-4529**<br>**vleung1@uci.edu** | Contract and grant accounting; processing of accounting forms including purchase orders; reconciliation of ledgers; preparation of reports. |
| **Lin Xi**<br>**Senior Finance Analyst**<br>**(949) 824-5251**<br>**lxi@uci.edu** | Management of departmental operation funds.<br>Assistant to Chair; faculty recruitment; Contract and grant accounting; processing of accounting forms including purchase orders; reconciliation of ledgers; preparation of reports. |
| **Naima Louridi**<br>**Administrative Analyst**<br>**(949) 824-8519**<br>**nlouridi@uci.edu** | Graduate student admissions and recruitment; schedule of classes; general catalog; textbook coordination; undergraduate enrollment; photocopying for teaching purposes; course reports; teaching evaluations; graduate student files; preparation of exams and course materials; conference room scheduling. |
| **Sharon Suh**<br>**Finance Analyst**<br>**(949) 824-2395**<br>**sharos2@uci.edu** | Contract and grant accounting; processing of accounting forms including purchase orders; reconciliation of ledgers; preparation of reports. |
| **Tamara Dehoff**<br>**Finance Analyst**<br>**(949) 824-6303**<br>**tdehoff@uci.edu** | Contract and grant accounting; processing of accounting forms including purchase orders; reconciliation of ledgers; preparation of reports. |

# Other Staff You Should Know

| Name | Title | Phone |
|---|---|---|
| Dr. Karina Cramer | INP Director | 4-4211 |
| Gary Roman | INP administrator | 4-6226 |
| Vicki Thomas | Assistant to Dr. LaFerla | 4-5315 |

# Faculty E-Mail

| Faculty Name | E-Mail |
|---|---|
| Ruth Benca | rbenca@uci.edu |
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# Graduate Student Contact Information

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# School of Biological Sciences Contact Information

http://www.bio.uci.edu/

The Department of Neurobiology and Behavior is one of four departments that constitute the School of Biological Sciences. The other three departments are Developmental and Cell Biology, Ecology and Evolutionary Biology, and Molecular Biology and Biochemistry.

| **Department Offices** | **Location** | **Extension** |
|---|---|---|
| Neurobiology and Behavior | 2205 MH | 4-8519 |
| Molecular Biology & Biochemistry | 3205 MH | 4-6034 |
| Developmental & Cell Biology | 2011,BS3 | 4-6681 |
| Ecology & Evolutionary Biology | 321A SH | 4-6006 |

| **School Offices** | **Location** | **Extension** |
|---|---|---|
| Administrative Offices | 5120 NSII | 4-5315 |
| Facilities Office | 5211 NSII | 4-8085 |
| Undergraduate Student Affairs | BioSci III, 1st floor | 4-5318 |
| Computing Support Helpdesk | 2113 NSII | 4-3555 |

| **Organized Research Units** | **Location** | **Extension** |
|---|---|---|
| Center for the Neurobiology of Learning and Memory | 320 QRL | 4-0314 |
| Institute for Memory Impairments and Neurological Disorders | Bio Sci III | 4-3253 |
| Cancer Research Institute | 236 Sprague Hall | 4-5886 |
| Reeve-Irvine Research Center | 1105 GNRF | 4-0210 |
| Center for Hearing Research | Med. Sciences E, 101 | 4-1539 |
| Center for Autism Research | 2056 Hewitt Hall | 4-3484 |
| Sue and Bill Gross Stem Cell Research Center | 4038 Gross Hall | 4-2487 |
| Irvine Center for Addiction Neuroscience | 2205 MH | 4-5251 |

| Facilities | Location | Extension |
|---|---|---|
| Image Works - Electron reproduction microscope and photography | 2112 NS1 | 4-6414 |
| Optical Biology Core Facility | 4443 MH | 4-3856 |
| Dishwashing/Autoclave Facility | 4311 MH | 4-6040 |
| Arboretum | See campus map | 4-5833 |
| Greenhouse | See campus map | 4-6049 |
| Vivarium | MH Basement | 4-9538 |
| Image Works Copy Center | 2112 NS1 | 4-6414 |
| Computer Room (scantrons) | 2115 NS1 | 4-1120 |
| Dale Herklotz Conference Room | QRL, CNLM | 4-8519 |

# School of Biological Sciences

http://www.bio.uci.edu/

| Name | Title | Location | Extension |
|---|---|---|---|
| **Frank LaFerla** | Dean | 5120 NSII | 4-5316 |
| **Michael Mulligan** | Associate Dean, Graduate Studies | 5219 MH | 4-8433 |
| **Raju Metherate** | Associate Dean, Undergraduate Studies | 1332 BS3 | 4-6141 |
| **Benedicte Shipley** | Assistant Dean | 5120 NSII | 4-5558 |
| **Kristin Caplin** | Personnel Director | 5101 NSII | 4-5467 |
| **Yuanshun Chen** | Director of Finance | 5109 NSII | 4-4247 |
| **Robyn Stiffler** | Facilities Director | 5211 NSII | 4-8284 |
| **Matthew Martinez** | Computer Resource Manager | 2115 NS I | 4-8832 |
| **Jenna Bague-Sampson** | Director, Bio Sci Student Affairs | 1310 BS3 | 4-0326 |

# Graduate Program in Neurobiology & Behavior

The expectations, requirements, and recommendations for making satisfactory progress toward completion of the graduate program in Neurobiology and Behavior (NB&B) are summarized here. Most students will enter the NB&B program in their second year at UCI following a year in the gateway Interdepartmental Neuroscience Program (INP); although it is also possible to enter the program through a different gateway program, or directly in the first year. Graduate students should also review the policies and procedures of the Graduate Division as summarized in the UCI catalog (http://catalogue.uci.edu/).

# Timeline

## First Year

Course Work

Most students will spend their first year at UCI in the INP gateway program, and transfer to the NB&B graduate program at the end of that year. Entry into the NB&B program requires that students satisfy all requirements of the INP program. The NB&B program further requires satisfactorily completion of each part of the NB&B core curriculum, performing at a higher than satisfactory level in at least some courses.

The core curriculum is:

- Neurbio 206: Molecular Neuroscience
- Neurbio 207: Cellular Neuroscience
- Neurbio 207L: Cellular Neuroscience Lab
- Neurbio 208A: Systems Neuroscience
- Neurbio 209: Behavioral Neuroscience

Students in the INP gateway program who envisage transferring to the NB&B graduate program are thus strongly advised to take the above courses in fulfilling the Molecular, Cellular and Systems requirements of the INP program. If the Neurbio 209, Behavioral Neuroscience course is not taken during the first year, this must be taken during the second year, after entering the NB&B graduate program.

Students who enter through other gateway programs are similarly required to satisfy all requirements of that program, and will generally be required to take all of the NB&B core courses during their second

year; although an exception may be granted by the Graduate Advisor to substitute one or more core courses taken in that program.

Research

The excitement of research provides the primary motivation for most students selecting a career in neuroscience and behavior. During first-year research rotations, it is important to stay in close touch with the research efforts of the lab with which you are affiliated and to attend the lab's meetings and seminars. Students planning to enter the NB&B graduate program should identify a research mentor associated with the program by the end of the first year. You can consult the Graduate Advisor and/or Chair for advice on this and other issues at any time.

Evaluations

Students are expected to have an overall GPA of 3.3 or higher by the end of the first year and to have met all the requirements of the gateway program in which they are enrolled. The Graduate Division requires graduate students to have a GPA of 3.1 or higher to serve as TAs. At the graduate level, a grade of B (3.0) indicates satisfactory performance. Students with a B- grade in a single core class may be granted an exception to enter the NB&B graduate program, but are placed on conditional academic status and are required to retake that class and obtain a passing grade (B or higher). Students on conditional academic status are also expected to exceed the department's basic expectations in their regular work while making up earlier deficiencies. To continue in the program, students must have an overall GPA $\geq$ 3.3 and have satisfactorily made up any core course deficiency.

Students obtaining B- grades in two classes, or a grade of C+ or below in a single class during their first year will not be permitted to enter or continue in the NB&B program until the deficiency is remedied.

## Second Year and Beyond

### Teaching

The policy of the School of Biological Science is that graduate students TA a minimum of two quarters at 50% time before they graduate. This total can be reached using up to four 25% TA assignments, as needed.

The Department of Neurobiology and Behavior implements this requirement partly by having students support the undergraduate neurobiology laboratory, N113L. The requirement is as follows (details may change depending on graduate class size and department needs):

Second year at UCI - either Winter or Spring: 50% TA: teaching N113L at 25% and grading N113L at 25%.

In addition to N113L (as described above), students must also TA an additional quarter at 50% (or two quarters at 25%) before they can graduate (as per School policy). The department currently has ~30 slots each year for assisting with N113L or large lecture courses (non-majors, upper division majors and freshman biology). The freshman biology course (Bio 93), in particular, has a strong mentored-teaching component and is highly recommended for students with an interest in teaching.

Students may TA beyond the required amount if they are interested in gaining additional experience or

funds (not to exceed stipend level).

Related information:

a. Students on most federal fellowships or training grants may not receive TA appointments greater than 25%. In these cases, students can TA 25% for N113L in both Winter and Spring to fulfill their departmental requirement.
b. Students supported by a GAANN grant should expect to TA while on the grant, and the assignment should be carefully selected to include a strong mentor component for the student. Students may receive up to 50% TA appointments.
c. Per campus-wide practice, students in the MSTP (MD-PhD program) do not have TA requirements.

## Seminars and Research Presentations

In addition to course work and research, students participate in seminars and other activities. Neuroblitz is a student-run activity in which graduate students deliver presentations on their research, followed by questions and feedback. The program was created as a way to allow students to practice presenting their research in a comfortable and yet formal environment.

## Annual Advisory Committee Meetings

Students must meet annually with a faculty advisory committee, except when they are advancing (normally in the 3rd year) or defending (normally in the 5th year), and submit a meeting report to be placed in the student's file. The policy on Annual Advisory Committees and the form to be filled out by the committee can be obtained from Naima Louridi in the department office. Students should consider members of their advisory committee to be scientific mentors, and should feel free to meet with them informally throughout the year. Advisory committee members will provide guidance to help develop the thesis project; in this way, the coherence and completeness of the project will be monitored throughout the student's graduate career.

Presentation of an Individual Development Plan (IDP) is required for all graduate students at the annual thesis committee meeting. The IDP will be prepared in consultation with the thesis advisor, presented at the first thesis committee, and updated annually at all future thesis committee meetings. The IDP should describe the student's career goals, desired training, and milestones associated with professional development and academic training (fellowship applications, technical workshops, meeting presentations, pedagogical training, development of communications skills, etc.).

## Course Work

Students are encouraged to satisfactorily complete at least two advanced graduate courses before advancing to candidacy and are required to complete at least four before the dissertation defense. These classes must be taken for a letter grade, not on an S/U basis, to count toward the required minimum of four advanced classes. With the consent of the graduate advisor, graduate courses from other departments may satisfy part of this requirement if they are not primarily introductory or technically-oriented.

Students should begin taking advanced courses in their second year and are strongly encouraged to enroll in NB257 (Statistics and experimental Design) in Fall quarter of their second year or, with the approval of the graduate advisor, in an equivalent statistics class offeed by another department. This class counts

toward he required minimum of four advanced classes.

Students are expected to maintain a GPA of 3.3 or higher throughout their time in the graduate program.

## Evaluations

Students are evaluated once a year, at the end of spring quarter, unless they are on conditional academic status or are behind in their progress toward the Ph.D. Evaluation of students who have completed the core is based on (i) performance in advanced courses; (ii) laboratory research; (iii) timely preparation for and performance on the advancement to candidacy exam; and (iv) teaching. If a student's performance has fallen below the department's expectations in more than one course, more than one area (e.g., course work and research, course work and teaching or research and teaching), or more than one quarter, or if the student has not made up deficiencies in a timely manner, the faculty may immediately recommend that the student be academically disqualified by the Graduate Division.

## Advancement To Candidacy

In consultation with their research advisor and the Graduate Advisor, students should select an advancement to candidacy committee no later than spring quarter of their third year. Through individual and/or group meetings with the committee members, the student should take good advantage of their expertise when developing a research plan for the dissertation and critiquing the literature in that area. The student should take the initiative in seeking their advice and should not postpone contact with them until the advancement to candidacy exam.

Before the end of the spring quarter of the third year, students are expected to write an advancement document that includes 1) a critical review of the literature in the area in which they plan to do their dissertation and 2) a proposal presenting plans for the dissertation research. Although it is good to have preliminary data to include, this is not a strict requirement. The scope of this document will depend on the research area, and students generally consult with their research advisor and committee members to determine an appropriate range of topics.

Student are expected present this work to their Advancement Committee and to take the advancement to candidacy exam. The area defined by the review and proposal provides a focus for much of the oral exam, but candidates are expected to be able to discuss issues and answer questions in the broader domain of neurobiology and behavior. Details on the format for preparing the review and proposal are available from the graduate advisor, and examples of previous advancement documents can be obtained from the Department Office. The advancement document should be distributed to the committee at least a week before the exam.

Advancing to candidacy in the spring of the third year gives students two years to complete their Ph.D. within the department's expected time-to-degree of five years. Students for whom a second exam must be scheduled are expected to pass it by the end of the next quarter. Students may advance to candidacy well before the deadline indicated, but those that have not met the deadline will not be considered to be making normal progress to the Ph.D.

The advancement committee, which must be approved in advance by the Graduate Advisor, generally consists of your research advisor, three additional Neurobiology and Behavior faculty members and one “outside” member, for a total of five. The committee must have a minimum of three Neurobiology and Behavior faculty.

The student may prepare Ph.D. Form I (Report on Qualifying Examination) before the exam for signatures by the committee members after the exam. The student then indicates on the form the three faculty members who will serve as the Ph.D. dissertation committee: two departmental faculty who served on the advancement to candidacy committee plus the student's research advisor. The form is delivered to the Cashier's office by the student with their check for $90.00, which partially covers microfilming of the dissertation. The stamped form is then returned to the department. If the student does not pass the oral exam, a second exam will be scheduled before the end of the next quarter. Having prepared a research proposal and received critical comments from the committee, students who have advanced to candidacy may choose to submit their proposal as part of an application for an individual pre-doctoral fellowship to NIH or another source. This decision should be made in consultation with the research advisor and graduate advisor.

After advancement to candidacy, students may optionally submit paperwork and obtain a master's degree. Contact Naima Louridi to submit paperwork.

After advancement to candidacy, annual thesis committee meetings should directly assess and provide guidance for academic publication.

### Doctorate Thesis

Students are expected to complete their research, write their dissertation and successfully defend it by the end of their fifth year. Students should work closely with their dissertation committee throughout the time from advancement to candidacy and completion of the degree. By the policies of the University of California, the final exam is open to the public but the privilege of examining the candidate remains with the committee unless extended by the chair.

Students must enroll and pay fees every quarter until they complete the requirements for the degree. If all of the requirements are satisfied except submission of the final version of the dissertation or completion of the final exam, a student may apply to pay only a filing fee. By the end of the quarter for which the filing fee was paid, the dissertation must be approved by the manuscript advisor in Graduate Division. During the quarter for which the filing fee was paid, the student normally may not use University services (e.g., the library) or be employed by the university as a TA, graduate student researcher or in any other capacity. Students are allowed to receive employment positions (GSR/TA) during Summer while on filing Fee and maintain housing and library privileges.

The dissertation must be prepared according to guidelines available online:
http://etd.lib.uci.edu/electronic/tdmanuale.

### Dissertation Defense and Pre-Defense Exam

PhD candidates will schedule a "pre-defense" meeting with their dissertation committee for an oral examination based on a near-final draft of the dissertation. The meeting will be scheduled only after the draft is delivered to the committee, to ensure at least two weeks for evaluation. At the meeting, the student will give a brief oral presentation and answer questions about the draft. The committee may identify problems with the dissertation that should be addressed in the final draft. Note that the intent of this meeting is to strengthen the written document and not, for example, to identify problems with the experimental design (which should have been identified earlier, e.g., during annual advisory meetings). When the committee has signed off on the revised, final draft, only then can the public oral defense be scheduled.

After the public defense the committee and student will meet briefly behind closed doors for feedback on the presentation and to sign the paperwork.

During their final year of graduate study, doctoral students will present a detailed plan for post-graduate career development and employment to the thesis committee at 6 to 12 months in advance of degree completion

## Submitting Your Manuscript

The library is very particular about the format of the manuscript. A manual has been prepared for you to follow and is available for purchase from the UCI Bookstore. The manual is also available at the Libraries Research Resource website located at http://etd.lib.uci.edu/electronic/tdmanuale.

## Matriculation

Before candidates leave UCI, they are expected to do each of the following:

- Provide the department with three clean copies of the manuscript. The department will pay for one copy. You will need to take copies to a bindery company. Kater Crafts is recommended by the UCI Library (http://www.katercrafts.com/welcome.htm).
- Pay all departmental liens.
- Return all departmental and school property (e.g., keys, etc.).
- Sign all personnel and payroll forms.
- Provide the department with the title and location of the first employment opportunity.
- Provide the department with a forwarding address.
- Advise the department of the disposition of reprint requests (i.e., forward or refer elsewhere).
- If at any time during their training, candidates received support from the training grant or a fellowship, they must file a termination report with the supporting agency.
- Meet all Office of Graduate Division requirements.

### IMPORTANT FORMS

**Advancing to Candidacy**
**Ph.D. Form I: Report of the Ph.D. Candidacy Committee**
http://www.grad.uci.edu/forms/

**Defending A Dissertation**
**Ph.D. Form II: Report On Final Examination For Ph.D. Degree**
http://www.grad.uci.edu/forms/

**Ph.D. Dissertation Submission**
**Dissertation-Thesis Approval Form**
http://www.grad.uci.edu/forms/

# Services

## UCI Campus Services

### Graduate Division

http://www.grad.uci.edu/

The **Dean of Graduate Division** administers graduate education in accordance with academic policies established by the Academic Senate and by the Graduate Council, a standing committee of the Irvine Division of the Academic Senate. The staff of Graduate Division is prepared to answer questions about admissions, academic policies and procedures, graduate programs and degrees, financial assistance, student services, and other matters of concern to graduate students. They are available at Aldrich Hall 120, x4-4611.

### Counseling Center

https://counseling.uci.edu/services/

The counseling Center is the primary counseling and mental health agency for UC Irvine graduate students. They strive to assist students with their academic success by developing dimensions of well-being.

### Registration / Enrollment

https://www.reg.uci.edu/registrar/soc/webreg.html

Your registration at UCI consists of two separate steps that must be completed to be officially registered:

1. Enrollment in classes with a minimum of 12 and a maximum of 16 units.
2. Payment of fees; Once you have registered, your fees (which are paid for by the department or lab) are electronically transferred to the Cashier's office.

Be sure to register and see that your fees have been paid for each quarter by the deadline online through WebReg (http://www.reg.uci.edu/registrar/soc/webreg.html ). You will be charged a late enrollment fee of $50 if you are not enrolled at the end of the second week of instruction. Also be aware, late registration may affect your FICA status. If your account shows a positive balance for fees, contact the department office right away.

### Address Changes

http://www.reg.uci.edu/request/changeaddress.html

Address information should be updated with the department. Please change your university records via StudentAccess (Frequently campus offices use e-mail to communicate with students so be sure to activate your UCINetID and check your e-mail frequently).

## Student Photo ID Card

http://uci.bncollege.com/webapp/wcs/stores/servlet/BNCBHomePage?storeId=88256&catalogId=10001&langId=-1

UCI photo ID cards are often required when conducting business with various campus services. The IDs are available for all graduate students at **UC Bookstore, the Hill** in the Student Center. Once your employment appointment is in place in our personnel records, take your student and employee identification numbers with you to obtain your UCI photo ID card.

## Parking

http://www.parking.uci.edu/
http://www.parking.uci.edu/at/modes/octa.cfm

All vehicles must display a valid UC Irvine parking permit when parked on campus or used metered spaces. The parking and Transportation Service Office is located in Room 200 in the Public Services Building, at the corner of Berkeley and Pereira.

All graduate students are eligible to register for the free sustainable transportation program. This allows you 60 parking passes for the year. For students living on campus, it also allows unlimited nighttime and weekend parking. Register at https://www.parking.uci.edu/AT/.

A good way to avoid parking costs is to ride the OCTA bus. University Pass allows students at UC Irvine to ride OC bus all day, every day for a fraction of the most compared to regular fare. https://www.parking.uci.edu/AT/modes/OCTA.cfm

The Anteater Express is a UCI-run bus system. Rides between graduate student housing and the main UCI campus are free. http://www.shuttle.uci.edu/

## Internet

http://www.oit.uci.edu/

Office of Information Technology (OIT) operates the UCI campus network and telephone system. UCI offers mobile internet access via Wi-Fi across many locations on campus. UCInet Mobile Access provides UCI affiliates and visitors a fast and convenient way to connect to the web with mobile computers and devices.

## E-Mail

https://activate.uci.edu/activate/menu.php

UCI provides free e-mail accounts to all its affiliates - faculty, staff and students. When you receive your employee or student ID number you will automatically be given an e-mail account. University offices frequently use e-mail to communicate information to students, so it is important to activate your UCINetID and check your e-mail frequently. To activate your account, go to the website and follow the on-screen instructions.

## Anteater Recreational Center

http://www.campusrec.uci.edu/

The Anteater Recreational Center (ARC) is equipped with two different gymnasiums, an elevated running track, a rock climbing wall, a fitness lab, and several activity rooms. Its Aquatics Plaza contains a 25 by 25 yard heated recreational lap pool and a 10,000 square foot weight and cardio room. Students can pursue their own fitness programs or participate in a full myriad of campus recreation programs. These programs include in-line skating, scuba, kickbox aerobics, Aikido, sailing and more! Tours of the ARC are available by calling x4-5346 to make an appointment. ARC Fee is included in your fees and paid except during Summer.

### Housing

http://www.housing.uci.edu/

The Housing Office, located at G458 Student Center, x4-7247, provides a wide variety of affordable housing options on campus with different amenities and living arrangements such as studios, one, two, and three-bedroom units, townhouses, flats, graduate residence hall, laundry rooms, recreation rooms, park, child care centers, gardens, and internet connections.

In addition, they provide information and services to help students locate and obtain off- campus housing, including lists of apartments, houses for rent, rooms for rent in private homes, roommates wanted, roommates available, and temporary housing. The housing office publishes "Living Around UCI", a guide to local apartment communities which includes information about rental prices, local realtors, budgeting expenses, roommate selection, and tenant/landlord rights and responsibilities. For more detailed information please visit their website.

### Safety Training

http://uclc.uci.edu/

Graduate students are required to complete a variety of online safety training modules. Some of these are specific to the laboratory environment, while some are required for all graduate students.

# School of Biological Sciences Services

A variety of services and equipment are available through the School of Biological Sciences; most will require a grant or other fund number.

### Image Works

http://imageworks.bio.uci.edu/

Image Works, located in 2112 Nat Sci 1, x4-6414, provides a large number of services, including production of slides, film development, black and white prints, color scanning of images and gels, high resolution drum scanning, wide format poster printing, binding, as well as a full-service copy center. The facility manager is Matthew Martinez.

## Dishwashing and Autoclaving

http://www.bio.uci.edu/research/services-and-resources/

Dishwashing and autoclaving facilities are located on the third floor of Steinhaus Hall and the fourth floor of McGaugh Hall.

## Vivarium

Animal care facilities are located in McGaugh Hall, Steinhaus Hall, and the Bonney Research Laboratory. Access to these areas is restricted; Jefferson Chau, Vivarium Manager (jlchau@uci.edu and x4-9538) must grant permission. Please be certain to check with your faculty advisor for instructions about the care and handling of research animals. All laboratories have protocols approved and on file.

## Computer Services

http://comp.bio.uci.edu/

Computer support is provided free of charge to the School of Biological Sciences faculty, staff, and graduate students. This is your starting point for help with computing problems.
•Visit their walk-in support center in 2112 NS1.
•Call to talk with helpdesk support staff at x4-3555 (949-824-3555) from 8:00a.m. to 6:00 p.m. weekdays.
•Email for assistance to bcshelp@uci.edu
•Urgent messages can be left at x4-3555 (#4 to mark urgent) for after hour requests on weekends and holidays. Staff is automatically paged and you will be called back.

BCS has various media equipment on loan in their office, such as computer projector, laptop, etc. To reserve equipment, call ahead at least a day in advance to their helpdesk.

## Travel Funding

Some research-related expenses, such as travel, can be obtained through Dr. Michael Mulligan, Associate Dean of Graduate Affairs. If you are presenting a poster at a scientific meeting, such as the annual Society for Neuroscience, send him a written request detailing your travel i.e., expenses, location and title of your presentation, and he will reimburse up to ~$300.

# Department of Neurobiology & Behavior Services

## Mail Boxes

All graduate students are assigned a locking mailbox located just outside the department office. Please be careful not to misplace your key, as they are difficult to replace. Please check your box regularly for class information, announcements, telephone messages, documents to be signed, etc.

Your official department address is University of California, Irvine, Department of Neurobiology and Behavior, 2205 McGaugh Hall, Irvine, CA 92697-4550.

## Mail Service

Mail related to University business can be mailed from the department office. Outgoing off-campus mail must contain your name, return address, “zot” code, and your lab mail code. Your advisor or bookkeeper can help you to determine the correct mail code. On-campus mail should include at least a zot code and a department name. A list of campus zot codes is in the campus telephone directory. Mail pick-up and delivery is approximately at 10:00 am. Departmental letterhead and envelopes are available upon request from the department office.

## Fax

You may use the fax machine in the department office to receive and send faxes. The fax number is 949-824-2447. Faxes addressed to you are put in your mailbox. If you send a research-related fax, use your lab account number on the fax log and your advisor's permission to use the account. Personal faxes are allowed, but you will be asked to reimburse the department for the cost.

## Telephones

http://www.oit.uci.edu/

To dial on-campus extensions, first dial 4, for example, 4-XXXX.
To call off-campus, dial "9" and then the number.
If you wish to reach UCI emergency assistance from a cellular phone, you must dial 949-824-5223 to reach the UCIPD emergency dispatch line.

## Photocopying

Photocopy machines in McGaugh Hall are located on the second and fourth floors. These copiers require code numbers, available from your faculty advisor. See photocopier key operators for help with copier problems, and also to make certain you are using the correct name brand for transparencies. Photocopiers are also located in the libraries.
To copy materials for classes you are teaching or serving as TA, see the Administrative Analyst in the department office for the copy code. **Copies made for classes are not to be charged to your advisor's copy number.**

## Bulletin Boards and Announcements

You may subscribe to a weekly listserve calendar of seminars in the life sciences, presented at the UCI College of Medicine and Biological Sciences campuses. To subscribe and unsubscribe, please follow the below instructions:

To subscribe or unsubscribe send an email with the correct body message email address below to the listserve:
1) Send an email message to: listserv@uci.edu
2) In the body of the message type only the line:
SUBSCRIBE BIO-SCI-SEMINARS YOUR NAME or…

UNSUBSCRIBE BIO-SCI-SEMINARS YOUR NAME

The School of Biological Sciences also offers an on-line calendar of coming events and seminar at: http://www.bio.uci.edu/events/
Bulletin boards on first and second floors of McGaugh Hall contain class information, seminar notices, research and academic job opportunities, and a variety of other information.

## Building Emergencies

For emergency reports, please call Facilities Management Service Desk, (949) 824-5444, or after hours call Central Plant at (949) 824-5520

## Fellowships

If you and your advisor decide that you should apply for an NIH or private fellowship, contact Jason Park at X4-5593 for assistance. He can help you identify potential funding agencies and will guide you through the application process. Never send an application directly to an agency.

# Finances

## Purchases

### PO/PALCards

To order supplies and/or equipment, you will need to complete a Purchase Order worksheet and have your faculty advisor sign off. To submit for purchase, you will need to login to KFS (Kuali Financial System), complete the requisition and upload the PO worksheet as signature approval in the Notes and Attachments tab. There is a $25.00 minimum purchase. If any questions, please contact the Purchasing Analyst to assist. **Never place a purchase order directly with a vendor.** PALcards are UCI credit cards used for the purchase of goods and services that may be available in your lab. Always check with your faculty advisor and lab manager to determine the specific purchasing procedure for their lab.

### Repairs

Equipment repairs are considered an outside purchase, whether you will be charged for the repair or not. **Always check with NB&B Finance staff before you take or send any UCI Equipment off-campus.**

### On-Campus Stores

Before purchasing any item on campus, make sure you have your faculty advisor's approval and the appropriate recharge number with your KFS account and project number .

Always obtain a receipt for your purchase and forward it to NB&B finance staff.

### Reimbursements for Supplies

For purchases of $100 or less, you may choose to pay for the supplies with your own money and be reimbursed. However, **please note that buying with own funds should be last resort and for urgent matters**. **It is highly discouraged since you are not an approved buyer for UCI.** To do this, you must have a **receipt and a detailed explanation of how the items are being used in your research.** Your receipt **must** have the store name printed or stamped on it and a printed product description, and date of purchase. All receipts must be submitted for reimbursement within 15 days of the purchase date.

Bring your receipts with your explanation/description of their use to NB&B accounting staff for reimbursement. We prefer to prepare a Disbursement Voucher reimbursement depositing the funds directly into your checking account.

A Disbursement Voucher document will be completed by NB&B accounting staff, which will require your faculty advisor's signature on the cover sheet. You will receive e-mail notification from UCI's Central Accounting that a deposit has been made to your account.

# Travel Reimbursements

Here are some guidelines to help you plan your trips for university business. Please keep this handy for future reference, but if you have any questions, please ask your finance analyst. It is to your advantage to plan ahead for your trip as much as possible. This advance notice also helps the administrative staff prepare the required paperwork. When you are going somewhere, let us know and we will help you through the process.

## How to Pay for Your Trip

After approval from your faculty advisor, travelers normally register for a scientific conference and book their own domestic flights through an on-line resource called CONNEXXUS. Connexxus is a UCI's preferred method for making travel arrangements. Any UCI employee who needs assistance accessing Connexxus may contact Alexa Lopez via telephone at ext. 4-3032 or through email at askconnexxus@uci.edu
https://portal.uci.edu/uPortal/f/u30l1s6/p/webproxy-cms-file-view.u30l1n140/max/render.uP?pP_cmsUri=public%2FAccounting%2FTravel%2FHowToUseConnexxus.xml

Please ensure you have a TEM profile created in KFS. If you do not, please contact your finance analyst for assistance. Please complete the TEM checklist (your finance analyst can provide it to you), include all information, obtain your faculty Advisor signature, and project/account to be charged. Students must submit original receipts for airline tickets, lodging, meals, car rentals, taxis, registration, etc., to the finance analyst. The reimbursement is processed within 3 weeks through direct deposit.

If you are planning a trip outside of the United States, please see NB&B Accounting staff first! Many restrictions apply to foreign travel that may need to be resolved before you register or book your flight.

# Paychecks

Paychecks are available on the first of every month and will be available for pick-up after 2:00pm. If the first of the month falls on a weekend or holiday, checks will be available on the last workday prior to the first of the month. **The only exception is January 1**.

Graduate Student stipends can be paid via check or direct deposit. Checks should be picked up at 2205 McGaugh Hall. Direct deposit is available and often preferable to receiving a paycheck that you must take to the bank. You may review your check stub through "At Your Service" at the following link: *https://atyourserviceonline.ucop.edu/ayso/*
This is the same information that is normally shown on a check stub and will show you how much was deposited into your account. If you are interested in this option, please contact the Personal Analyst Ext. 4-4529. Reimbursement checks for entertainment, travel expenses, supplies, etc., will also be direct deposited.

Each of you received a letter describing the salary level at which you will be paid during your first year in our program. The sources from which you will be paid each year may vary as the department has several different types of funding sources. Each new academic year begins July 1.

University fellowships may supply not only a stipend but also the payment of out-of-state tuition and/or applicable educational fees. Other support will be paid from teaching assistantships and graduate student research appointments.

Some advanced students are paid from pre-doctoral training grants. Some others are paid by individual pre-doctoral fellowships (for which they applied) from the National Institutes of Health or the National Science Foundation. As fellowship and training grant checks are not produced through the payroll system, no deductions for taxes, social security, etc. are taken from them. However, according to the tax laws which went into effect 1/1/87, the income received from such sources is tax liable. You will want to be putting some money aside to pay the tax obligation. The Internal Revenue Service publishes a "Students Guide to Federal Income Tax" which explains the federal tax laws that apply to you. It describes your responsibilities in filing and paying taxes, how to file, and how to get help. To order IRS Publication 4, call (800) 829-3676.

# Federal Student Aid

Financial aid to graduate students is available from the Federal government in two forms. The first is grants and fellowships, and the second is student loans. For both types, you need to file a Free Application for Federal Student Aid. The FAFSA form can be obtained from the Financial Aid office at 102 Aldrich or it can be completed on-line at http://www.fafsa.ed.gov/ . The application instructions are fairly straightforward.

# Retirement Plan

Retirement Benefit Defined Contribution Plan (DCP) Safe Harbor is a valuable component of the UC Retirement Saving Program offered to the University community. DCP is not a tax but a mandatory contribution to a self-directed investment account and is administered by Fidelity Investments. The enrollment in DCP automatically happens on the first day of an appointment. During the academic quarters when you are 1) enrolled in classes and hold a 50% appointment no DCP and Medicare are deducted from your pay check. During Summer when you are not 1) enrolled in classes and 2) hold an appointment greater than 50% DCP and Medicare are deducted from your paycheck.
https://portal.uci.edu/uPortal/f/welcome/p/webproxy-cms-file-view.u20l1n201/max/render.uP?pP_cmsUri=public%2FAccounting%2FPayroll%2FnfoPagePayrollDeductionTaxes.xml

**What are your responsibilities?**

- Register for classes on time, every quarter.
- If you want to deposit your contribution in something other than the Savings Plan, transfer your balance on-line.
- Upon separation from the University, complete a DCP Distribution Kit available in the department office.

# Establishing Residence

http://www.reg.uci.edu/registrar/residence/

The UC system is considerably more expensive for non-California residents. During your first year as an out-of-state graduate student, non-resident tuition is paid by the department but after that, you are still non-California resident, you will be responsible for this charge. It is therefore vital that out-of-state domestic students establish themselves as California residents during their first year. In order to be considered as a resident, you must obtain a Petition for Resident Classification from the Office of the Registrar, fill it out, and return it to them by the appropriate deadline. You then produce the required proof of residency at the end of one year. The following items are useful in demonstrating residence: Personnel Report showing date employment started, California Driver's License, California automobile registration, California voter card, California income tax return, bank statements, utility bills, and rent receipts, especially for summer months. Please be sure to update your permanent address to your home address right away.

If you don't start the proceedings early, you won't establish your residency in time and will have to pay the higher fees. Contact the Residence Deputy in the Office of the Registrar, at X4-6129 or regres.uci.edu if you have questions, or look at the Registrar's Office website at http://www.reg.uci.edu/navigation/residency.html

# Medical Insurance

http://www.shs.uci.edu/Health_Insurance_Privacy/Insurance.aspx

University of California Student Health Insurance Plan (UC SHIP) is the University sponsored health insurance program for graduate students. **Eligible students are automatically enrolled in UC SHIP, and the premium for this insurance is assessed each term on the graduate student's registration fee statement**. You may request to waive out of this plan if you can demonstrate comparable and verifiable health coverage that meets the campus' minimum standards for insurance.

**UC SHIP is a comprehensive health plan that provides medical, mental health, pharmacy, vision and dental coverage.** It features year-round, world-wide coverage using the Anthem Blue Cross PPO network. UC SHIP provides optimal coverage for services on campus and in the UC Irvine community and peace of mind for both parents and students.

For UC SHIP members, the Student Health Center (SHC) is their primary care provider. Primary care providers and specialists at the Student Health Center will administer treatment and/or, if necessary, they will generate a referral for the student to receive additional services in the community or be seen by a specialist in the community if those services are not offered at SHC. Please note that, under the terms of the UC SHIP plan, students must first obtain a referral authorization from a Student Health Center primary care provider BEFORE seeking treatment from a non-SHC provider in the community. If a referral authorization is not obtained in advance, then the claim will be denied. Exceptions to the referral requirement are listed below in the section entitled "How To Use SHIP".

Your insurance is in effect as of the first day of fall quarter, providing your fees have been paid and you are enrolled. Insurance premiums are paid in Fall, Winter and Spring quarters only. Paying fees and enrolling in Spring quarter will extend insurance through Summer until the beginning of the subsequent academic year.

## Accidents

We always hope that no one will be hurt when they are working or teaching, but accidents do happen. All employees are covered under Workers' Compensation Insurance for injuries and/or illnesses that arise out of or in the course of their employment. If your injury or illness requires medical attention, please go immediately to Student Health Services. If that unit is not open, assistance can be sought from any hospital or emergency unit. Whether or not you seek medical assistance, an accident report form must be completed within 24 hours. Please see the Personnel Analyst, in 2205 McGaugh Hall office for these forms.

# Emergency Preparedness

https://www.ehs.uci.edu/

UCI endeavors to protect employees and students, to minimize program interruption, and to reduce property damage during disaster. An Emergency Operations Center (EOC) has been established and will be activated as the central command center for managing a campus emergency or disaster. Every building has a "Building Coordinator" and each floor of each building has a "Floor Warden." In a disaster, Floor Wardens will assist in evacuation and report damage to Building Coordinators, who in turn, coordinate efforts with "Zone Captains". In a disaster response situation, Zone Captains provide the prime linkage between each campus zone and the EOC. To find out who your disaster response team is, contact your lab advisor or e-mail your request to *prepared@uci.edu*.

Advance planning is your best protection and your responsibility; forethought and preparation prevent panic. Use the following guide to develop your own personal disaster plan if you have not already done so.

# At Work

- Know who the Floor Warden and Building Coordinator are and what they expect of you in a disaster.
- During an earthquake, get under a desk or table.
- When safe, evacuate the building. If you detect the odor of gas or any other unusual odors, do not use matches or candles. Open windows, shut off power, and leave the building immediately. Do not use elevators, use the stairs.
- Move cautiously and observe surrounding hazards.
- Assist the disabled.
- Assemble at your pre-determined meeting point.
- Report any problems to your Floor Warden or Building Coordinator.
- Tune in to local radio stations for information and reports.

## Emergency Supplies

The following supplies need to be assembled and packed so that they can be quickly taken when exiting the building.

- A three-day supply of un-spoilable food and water
- A first-aid kit that includes your prescription medications
- Emergency tools, including a battery-powered radio, flashlight, gloves and extra batteries
- Sanitation supplies

# In Laboratories

- Secure items that could present a hazard during an earthquake, such as heavy equipment, furnishings, chemicals, and gas cylinders.
- A two-chain securing device (either welded links or straps) must secure gas cylinders at all times. Experience shows that the force of moving gas cylinders can easily snap a single twisted chain or strap.
- Make sure all chemicals are stored properly on shelves equipped with seismic restraining cords or in cabinets with positive latching doors. "Bungee" cords stretched across the front of chemical shelves are an effective means of restraining bottles.
- Separate acids and bases to an extent that will reduce the likelihood of their mixing if spillage occurs in a seismic event.
- Move heavy overhead storage to a lower level.
- Secure experimental apparatus firmly to racks or other stabilized hardware.
- As TV coverage of the Kobe earthquake revealed, fire can contribute to as much loss of life and property as ground-motion. The above measures pertaining to chemical storage and gas cylinders can markedly reduce the risk of fire or explosion. In addition, make it a safety practice to affix sources of open-flames against seismic tip over. (Building Coordinators can provide advice and assistance in this regard.)
- Know the location of emergency exits, fire alarms, and fire extinguishers. Hold meetings periodically with your Floor Wardens, Building Coordinators, and Zone Captains to discuss emergency procedures and the course of action during emergencies.

# Other Sources of Information

• The UCI Environmental Health & Safety Office coordinates campus training programs for disaster preparedness (http://www.ehs.uci.edu/).

•The UCI Emergency Preparedness website at http://www.police.uci.edu/em/UCI_EmerProc.pdf is also a warehouse of information.

# School of Biological Sciences & UCI Academic Policies

## STATEMENT OF SCHOOL OF BIOLOGICAL SCIENCES POLICY FOR TA APPOINTMENTS

The School policy is that an exception to the 3.1 GPA criterion may be requested for a student that is in good academic standing and has a GPA greater than 3.0. Exceptions for students with a G.P.A. of less than 3.0 or are otherwise not in good academic standing are not recommended and will not be approved within the School. A letter of exception is a formal statement that the department considers the student to be in good standing and is eligible to serve as a TA. If the School finds itself in a position to request that the student be dismissed from the graduate program, the credibility of the dismissal case has been weakened with a statement from the school that the student is in good standing. All requests for an exception to the GPA policy must be approved by Associate Dean Mulligan, prior to submission to Graduate Division for consideration. Exceptions may only be approved by Graduate Division.

### TA Appointment

For appointment as a Teaching Assistant, graduate students must be enrolled in a full-time program of study and making satisfactory academic progress. No student is permitted to begin an appointment who has not met all of the applicable academic criteria as listed below.

For new and continuing graduate students:

1) Enrollment in at least 12 units during the current quarter (i.e., the academic quarter in which the teaching appointment occurs).

2) Combined campus-wide employment of 50 percent time (220 hours of assigned workload) or less during any academic quarter.
For continuing graduate students:

3) During each of the three most recent quarters of enrollment:
• Completion of 8 units or more of upper division or graduate level credit courses.
• A letter grade of C, S, or above in all courses completed.
• No more than two incomplete (I) grades except where stricter school policies apply, as indicated

below:
• A cumulative GPA of 3.1 or higher in those courses where a letter grade (A through F) was received.

# STATEMENT OF SCHOOL OF BIOLOGICAL SCIENCES POLICY FOR GSR APPOINTMENTS

**The School policy is that an exception to the 3.0 GPA criterion or other academic probation may be requested for a student for one quarter. A student is expected to remove any academic deficiency during the subsequent academic quarter. If the deficiency requires re-taking a class that is only offered once per year, the thesis advisor is expected to submit a letter stating that the student is making satisfactory academic progress. All requests for an exception to the GPA policy must be approved by Associate Dean Mulligan, prior to submission to Graduate Division for consideration. Exceptions may only be approved by Graduate Division.**

## GSR Appointment

Appointment as a Graduate Student Researcher (GSR) or Graduate Student Associate Researcher (GSAR) in combination with other campus-wide employment may not exceed 50% time during any academic quarter. Between academic year sessions (quarters) and during the summer recess, appointments may not exceed 100% time. No student is permitted to begin an appointment who has not met all of the applicable academic criteria as listed below.

For new and continuing graduate students:

1) Satisfactory academic progress toward the degree objective.

2) Enrollment in at least 12 units during the current quarter.

3) Combined campus-wide employment of no more than 50 percent time (220 hours of assigned workload) or less during any academic quarter.

4) During each of the three most recent quarters of enrollment:
• Completion of 8 units or more of upper division or graduate level credit courses.
• A letter grade of C, S, or above in all courses completed.
• No more than two incomplete (I) grades except where stricter school policies apply, as indicated below:
• A cumulative GPA of 3.0 or higher in those courses where a letter grade (A through F) was received.

# School and Campus Reporting Requirements

**Every Year:**
Annual faculty committee/Thesis committee meeting

**Year 3:**
Advancement to Candidacy Exam (PhD Form I)

**Year 5 (6/7)**
Pre-defense and Thesis Defense (PhD form II)

**Caution: The maximum time to degree is 7 years or 21 quarters.**

**UNIVERSITY OF CALIFORNIA, IRVINE**
**DEPARTMENT OF NEUROBIOLOGY & BEHAVIOR**
**2205 MCGAUGH HALL**
**IRVINE, CA 92697-4550**
**Phone: (949) 824-8519**
**Fax: (949) 824-2447**
**http://neurobiology.uci.ed**

# NEUROBIOLOGY & BEHAVIOR GADUATE PROGRAM

# CORE CURRICULUM AND LEARNING OBJECTIVES

# 2018-19



[Note – Syllabi and dates are from the 2017-2018 academic year]

# Molecular Neuroscience, Fall 2017
## (Neurobio N206)

**Instructors**: Dr. Mathew Blurton-Jones, 3014 Gross Hall, 4-5243, mblurton@uci.edu
Dr. John F. Guzowski, 108 Bonney Research Lab., john.g@uci.edu
Dr. Karina Cramer, 2215 McGaugh Hall, cramerk@uci.edu

**Class times**: 10:30 AM - 12:00 PM, M, W, F - 2246 McGaugh Hall

| **Date**: | | | **Topics**: | **Instructor**: |
|---|---|---|---|---|
| Sept | 9 | F | Introduction | Blurton-Jones |
| Oct | 2 | M | Manipulating gene expression in the CNS-I | Blurton-Jones |
| | 4 | W | Manipulating gene expression in the CNS-II | Blurton-Jones |
| | 6 | F | *Discussion* | Blurton-Jones |
| | 9 | M | Disease Mechanism: Neurologic Disorders | Blurton-Jones |
| | 11 | W | Protein-protein interactions/Proteomics | Blurton-Jones |
| | 13 | F | Cell trafficking | Blurton-Jones |
| | 16 | M | *Discussion* | Blurton-Jones |
| | 18 | W | **Exam I** | Blurton-Jones |
| | 20 | F | Neuronal Signaling, Gene Expression, & Synaptic Plasticity | Guzowski |
| | 23 | M | Dendritic spines, Structure & Signal transduction / Integration | Guzowski |
| | 25 | W | Mechanisms of synaptic activity-regulated gene transcription | Guzowski |
| | 27 | F | Epigenetic regulation of neuronal gene expression | Guzowski |
| | 30 | M | *Discussion #1* – Group presentation of primary research papers | Guzowski |
| Nov | 1 | W | Post-translational regulation of synaptic gene expression | Guzowski |
| | 3 | F | Molecular mechanisms of synaptic plasticity and homeostatic scaling | Guzowski |
| | 6 | M | Connecting molecular mechanisms of plasticity to memory & addiction | Guzowski |
| | 8 | W | *Discussion #2* - Group presentation of primary research papers | Guzowski |
| | 10 | F | *NO CLASS: VETERAN'S DAY HOLIDAY* | |
| | 13 | M | **Exam 2** | |
| | 15 | W | *NO CLASS: SOCIETY FOR NEUROSCIENCE MEETING* | |
| | 17 | F | Introduction: Neural Polarity & Induction | Cramer |
| | 20 | M | Regionalization | Cramer |
| | 22 | W | Neurogenesis & Neuronal Migration | Cramer |
| | 24 | F | *Discussion #1* – Early brain development – paper discussion | |
| | 27 | M | Neuronal Fate Specification | Cramer |
| | 29 | W | Axon Guidance | Cramer |
| Dec | 1 | F | Synaptogenesis and Synaptic Pruning | Cramer |
| | 4 | M | Programmed Cell Death | Cramer |
| | 6 | W | *Discussion #2* – Neuronal Fate/circuit development – research articles | Cramer |
| | 8 | F | **Exam 3** (10:30-12:30) | Cramer |

**NB 206—Molecular Neuroscience**
**Learning Goals and Outcomes**

**Dr. Mat Blurton-Jones**

**Introduction: DNA-RNA-Proteins**
Learning Goal: Students will learn about the relationship between DNA, RNA, and proteins and how the transcription and translation proceed. They will also begin to learn about basic DNA cloning methods.

Learning Outcomes:

- Understand how DNA can change over time: Intragenic mutation, gene duplication, DNA segment shuffling, horizontal transfer.
- Understand DNA base pairing and predict a complementary sequence.
- What happens during the three stages of transcription of DNA into RNA (initiation, extension, termination).
- How does translation begin and proceed to produce polypeptides, what is a reading frame?
- What controls the folding of proteins?
- Understand how posttranslational modifications can affect protein function.
- Understand how we can use plasmid-based cloning to produce useful new experimental tools.

**Manipulating gene expression in the CNS-I**
Learning Goal: Students will learn about PCR and the practical and experimental aspects of plasmid-based cloning. We'll also discuss methods to deliver genes of interest to cells.

Learning Outcomes:

- Practically speaking how does traditional Plasmid cloning work?
- How does PCR work and why does it require a thermostable polymerase?
- Be familiar with some of the newer more efficient cloning methods that are available.
- How is DNA sequenced, understand the traditional dideoxyribonucleoside method and how easy it is now!
- The class will go through and become familiar with all the steps involved in generating a new plasmid driving a gene of interest by a promoter of interest.
- How can we transfect cells and what is the difference between transient versus stable transfection?

**Manipulating gene expression in the CNS-II**
Learning Goal: Students will learn how can molecular approaches be used to generate animal models and how regulatable expression can be achieved in mice.

Learning Outcomes:

- How are transgenic mice made?
- How are knockout and knockin mice made (or where until very recently)!
- Why would we need regulatable expression of genes or knockouts in mice?
- How can tet-regulatable and Cre-Lox systems be used to address this need?
- What is optogenetics and how can it be used in mice?

**Discussion Section: 2 papers will be introduced and presented by student groups. One will be related to CRISPR the other will be how iPSCs were developed.**

**Protein-protein interactions/Proteomics**
Learning Goal: Students will learn about

Learning Outcomes:

- What do we mean by primary, secondary, tertiary, and quintenary structure of proteins?
- How can we detect specific proteins? How are antibodies made and what is the difference between polyclonal and monoclonal antibodies?
- What is immunohistochemistry and how does it work?
- How do Western blots and 2D gel electrophoresis/mass spec work?
- How can we examine protein protein interactions? Co-IP, yeast-2 hybid,FRET.

**Cell trafficking**

Learning Outcomes:

- Review the key cellular organelles.
- What do signal sequences in peptides do?
- What is gated transport, where does it occur in the cell and how is it regulated?
- What is transmembrane transport, where does it occur in the cell and how is it regulated?
- What is vesicular transport, where does it occur in the cell and how is it regulated?

- How are unwanted or misfolded proteins and larger aggregates degraded by the cell?

**Disease Mechanism: Neurologic Disorders**
Learning Goal: Students will learn about how molecular tools can be used to study Alzheimer's, Parkinson's disease, and ALS.

Learning Outcomes:
- What are AD, PD, and ALS? Basic understanding of symptoms, genetics, and pathology.
- Why have treatments for AD failed thus far? Why does L-DOPA often loose efficacy with time?
- How can scientists model these disorders? Examples of both transgenic and iPSC modeling will be discussed.
- What are the commonalities between these disorders and how might lessons from one disease aid research in another?
- Review and discussion of a previous midterm

**Discussion Section: 2 papers will be presented by student groups.**
**One will be related to studying protein-protein interactions and the other will be related to new RNA/Protein technologies such as PaperClip, TRAP, iDISCO/clearing, optogenetics.**

**Dr. John F. Guzowski**

**Overview of the section:** In this section, we will discuss molecular mechanisms that neurons use to modify synaptic connections in the adult brain in an activity-dependent manner, which provide the bases for adaptive behaviors in the adult animal.

**Lecture 1. Neuronal signaling, gene expression, & synaptic plasticity: Current questions and approaches**

Learning Goal: To identify the specific cell biological challenges faced in understanding how neurons of adult animals can rapidly modify synaptic connections in an input specific fashion

Learning Outcomes:
- Identify different mechanisms of synaptic and neural plasticity
- Explain the fundamental concepts of synaptic plasticity as a means for adaptive behavior in animals
- Describe the dual challenges of "synapse to nucleus" and "nucleus to synapse" for molecular regulation of synaptic plasticity

**Lecture 2. Dendritic spines: Structure and signal transduction / integration**

Learning Goal: To gain a fundamental understanding of how the protein-protein interactions in dendrites facilitate the conversion of extracellular signals to changes in dendritic structure and function

Learning Outcomes:

- Understand how dendritic spines compartmentalize proteins to allow precise signaling
- Discuss how diverse extracellular signals (including neurotransmitters, neuropeptides, growth factors, etc.) transmit information to the postsynaptic neuron
- Describe how scaffold proteins facilitate protein-protein interactions to optimize communication between neurotransmitter receptors and intracellular signaling complexes

**Lecture 3. Mechanisms of synaptic activity-regulated gene transcription**

Learning Goal: To gain understanding of how neurons can convert changes in synaptic and spiking activity to regulated changes in transcription of gene required for establishing long-lasting synaptic changes

Learning Outcomes:

- Distinguish distinct mechanisms that convert alterations of synaptic activity and neural firing to changes in neuronal gene transcription
- Describe the distinct control points that allow neurons refined and precise regulation of transcription to extracellular signals
- Identify transcription factors and regulatory mechanisms that convert increases in intranuclear Ca2+ to rapid transcriptional upregulation of immediate-early gene mRNAs

**Lecture 4. Epigenetic regulation of neuronal gene expression**

Learning Goal: To understand the different mechanisms that promote, facilitate, and refine patterns of neuronal gene expression necessary for plasticity

Learning Outcomes:

- Describe how alterations of histone proteins modulates transcriptional processes
- Describe how activity-dependent changes in DNA and RNA methylation regulates gene expression
- Understand the role of long noncoding RNAs in regulating transcription

**Discussion 1: Group presentations of primary research papers covering lectures 1-4**

Learning Goal: To gain experience reading and understanding peer-reviewed original research in the field of molecular neurobiology

Learning Outcomes:

- Explain the rationale for the study described in the paper
- Understand the experimental methods and research strategy
- Describe the results of the experiments
- Interpret the results of the study and identify the new contribution to the field

**Lecture 5: Post-transcriptional regulation of synaptic gene expression: mRNA trafficking, microRNA, and local translation**

Learning Goal: To understand the cellular mechanisms that provide neurons the means for precise spatio-temporal regulation of protein expression

Learning Outcomes:

- Describe how RNA-protein interactions in the nucleus allow dendritic targeting of specific mRNAs
- Describe how microRNAs provide refined regulation of specific mRNAs at synapses
- Understand how synaptic activity and intracellular signaling pathways activate local translational machinery
- Describe how splicing structural of specific mRNAs predestines these mRNAs for rapid translation-dependent degradation via nonsense mediated decay machinery

**Lecture 6: Molecular mechanisms of synaptic plasticity and homeostatic scaling**

Learning Goal: To gain familiarity with key molecular mechanisms underlying long-term synaptic plasticity and homeostatic synaptic scaling, two processes critical for information storage in neuronal networks

Learning Outcomes:

- Describe the temporal biochemical changes allowing spine growth and AMPA receptor insertion in long-term potentiation
- Describe the concept of "synaptic tagging" which allows targeting of new mRNAs and proteins to synapses undergoing long-term potentiation
- Understand the need for homeostatic synaptic scaling, as a means to prevent runaway excitation
- Describe an activity-dependent mechanism of glutamatergic synaptic scaling

**Lecture 7. Connecting molecular mechanisms of plasticity to memory & addiction: Approaches & challenges**

Learning Goal: To understand how neuroscientists have sought to link experimental forms of synaptic plasticity to memory and addiction in the intact, behaving animal

Learning Outcomes:

- Describe basic transgenic and vector-based approaches used to test key elements of the hypothesis that synaptic plasticity underlies adaptive behaviors
- Become familiar with key experimental findings that have supported the above hypothesis
- Identify limits of our current understanding, and describe potential approaches to overcome these limitations

**Discussion 2: Group presentations of primary research papers covering lectures 5-7**

Learning Goal: To gain experience reading and understanding peer-reviewed original research in the field of molecular neurobiology

Learning Outcomes:

- Explain the rationale for the study described in the paper
- Understand the experimental methods and research strategy
- Describe the results of the experiments
- Interpret the results of the study and identify the new contribution to the field

**Dr. Karina S. Cramer**

**Lecture 1**: Introduction; Neural Polarity and Induction

Learning Goal: To understand the central problems in developmental neurobiology and to understand how the nervous system emerges during embryogenesis

Learning Outcomes:

- Become familiar with the model organisms and strategies for studying development
- Become familiar with gastrulation and identify the origins of three germ layers
- Describe neurulation
- Understand the Spemann-Mangold experiments and neural induction
- Identify the function of BMP signaling in induction
- Learn how Notch and Delta interact to regulate neural cell fate

**Lecture 2**: Regionalization
Learning Goal: To understand how the body plan is specified in early embryonic development.

Learning Outcomes:

- Understand maternal factors that influence polarity
- Describe segmentation in vertebrates and invertebrates
- Describe the expression and function of homeotic selector genes in segment identity
- Identify factors that promote regionalization in the forebrain
- Identify factors that regulate dorsoventral patterning

**Lecture 3**: Neurogenesis and Neuronal Migration
Learning Goal: To understand how the nervous system produces the right numbers of neurons and glia and how these cells get to the right part of the nervous system.

Learning Outcomes:

- Explain the factors that regulate cell number
- Identify the role of the ventricular zone in the cell cycle
- Neurogenesis and histogenesis in the cerebral cortex: understand the formation of layers, neurons, and glia
- Understand the connection between migration route and fate of neural crest cells
- Identify disorders related to defective neural crest cell migration

- Identify the source and tangential migratory pathway of inhibitory neurons
- Identify sites of adult neurogenesis and migration

***Discussion 1***: Early brain development – paper discussion
Learning Goal: To gain experience reading and understanding peer-reviewed original research in the field of developmental neurobiology.

Learning Outcomes:

- Explain the rationale for the study described in the paper
- Understand the experimental methods and research strategy
- Describe the results of the experiments
- Interpret the results of the study and identify the new contribution to the field

**Lecture 4**: Neuronal Fate Specification
Learning Goal: To understand the factors that determine cell type in the developing nervous system.

Learning Outcomes:

- Review experimental strategies for determining whether cells or tissues are committed
- Understand mosaic versus regulatory development
- Understand how networks of transcription factors contribute to cell fate specification
- Describe the functions of morphogens and transcription factors that contribute to specification of ommatidia in *drosophila* and the vertebrate retina
- Identify factors that contribute to fate specification in the spinal cord and peripheral nervous system
- Understand the role of timing, as in the competence of cortical cells to contribute to distinct layers at different times

**Lecture 5**: Axon Guidance
Learning Goal: To become familiar with axonal growth cones and the molecular influences that regulate their growth.

Learning Outcomes:

- Be familiar with growth cone structure
- Identify the major classes of axon guidance molecules
- Describe chemoattractive and chemorepulsive mechanisms

**Lecture 6**: Synaptogenesis and synaptic pruning
Learning Goal: To understand the factors that promote formation of synapses and subsequent elimination of excess synapses.

Learning Outcomes:

- Understand the molecular mechanisms required for assembling synapses
- Identify molecules needed to cluster receptors
- Understand the role of activity in synaptogenesis
- Describe the role of activity in synapse pruning
- Describe the function of glial cells in synapse pruning

**Lecture 7**: Programmed Cell Death
Learning Goal: To understand the regulation and cellular mechanisms underlying developmental apoptosis, or programmed cell death

Learning Outcomes:

- Distinguish between apoptosis and necrosis
- Understand the role of neurotrophic factors and the key experiments that demonstrated these roles
- Become familiar with signaling pathways that promote cell survival or cell death
- Describe the importance of afferent input for cell survival
- Identify examples of cell death and sexual dimorphism

***Discussion 2***: Neuronal cell fate/circuit development – discussion of research articles
Learning Goal: To gain experience reading and understanding peer-reviewed original research in the field of developmental neurobiology.

Learning Outcomes:

- Explain the rationale for the study described in the paper
- Understand the experimental methods and research strategy
- Describe the results of the experiments
- Interpret the results of the study and identify the new contribution to the field

# Cellular Neuroscience (NB&B 207) - Winter 2018

M,W,F 10:30 – 11:50 : 2246 McGaugh Hall

**Instructors –** Ian Parker (course coordinator) iparker@uci.edu, Gyuri Lur, glur@uci.edu, Katumi Sumikawa ksumikaw@uci.edu

**Grading Policy**: Grades will be based on exams and take-home quizzes
**Text:** There is no assigned text. Handouts and readings will be assigned during lectures. Purves et al. "Neuroscience" can be used for introductory material. The 2nd edition is available free at http://www.ncbi.nlm.nih.gov/books/NBK11103/

| Date | Topic | Instructor |
|---|---|---|
| | ***Section #1 Ion channels and neuronal electrophysiology*** | |
| Jan 8 | Introduction to electrical concepts | IP |
| Jan 10 | Passive electrical properties of membranes | IP |
| Jan 12 | Membrane potential, Nernst, Goldman equations | IP |
| Jan 15 | **Martin Luther King Holiday** | |
| Jan 17 | Ion channels – electrophysiology, patch clamping | IP |
| Jan 19 | Ion channels – voltage-gated channels | IP |
| Jan 22 | Ion channels – ligand-gated channels | IP |
| Jan 24 | Action potentials | GL |
| Jan 26 | The Hodgkin & Huxley Axon | GL |
| Jan 29 | Discussion/review session | IP/GL |
| Jan 31 | **EXAM #1** | |
| | ***Section #2 Synaptic transmission*** | |
| Feb 2 | Chemical synapses, quantal transmission | GL |
| Feb 5 | $Ca^{2+}$ and neurotransmitter release, EPSPs and IPSPs | GL |
| Feb 7 | Slow synaptic potentials | GL |
| Feb 9 | Synaptic integration | GL |
| Feb 12 | Neurotransmitters | KS |
| Feb 14 | Molecular mechanisms of neurotransmitter release | KS |
| Feb 16 | Neurotransmitter receptors KS | |
| Feb 19 | **Presidents Day Holiday** | |
| Feb 21 | Second messenger pathways #1 | KS |
| Feb 23 | Second messenger pathways #2 | KS |
| Feb 26 | Synaptic plasticity | KS |
| Feb 28 | Discussion/review | KS/RM |
| March 2 | EXAM #2 (during lecture period – before lab class) | |

# Cellular Neuroscience N207 - Learning Objectives

## *Parker*
## *Electrophysiology of neuron membranes and ion channels*

At the completion of this section students should have gained intuitive and quantitative understandings of how the resting membrane potential of neurons is generated, and how the membrane potential is regulated by the openings of voltage- and ligand-gated ion channels. Students will be expected to know and understand each of the topics listed below, to solve numerical examples, and to apply this knowledge to analyze experimental data from electrophysiological experiments. Assessment will be in the form of in-course take-home quizzes as well as a final exam.

**Lecture 1, Introduction to electrical concepts**

- Ohm's Law; voltage, current, resistance
- Other electrical concepts; charge, conductance
- Circuits with resistors in series and parallel; potential dividers
- Capacitance; factors determining the capacitance of a capacitor
- Charging of capacitors; time constants of RC circuits; high- and low-pass circuits

**Lecture 2, Passive electrical properties of membranes**

- Structure of cell membranes, electrical properties
- Concepts of specific membrane capacitance and resistance
- Input resistance of a cell
- A neuron as a passive RC circuit
- Passive electrical transmission, cable properties of axons, space constant
- Dependence of space constant on diameter and other properties of an axon

**Lecture 3, Origin of the resting potential**

- Diffusion as a random walk process
- Diffusion potentials arising from selective movement of ions across a membrane
- Concept of the equilibrium potential; Nernst equation to predict equilibrium potential
- Ion concentration gradients across cell membranes; selective permeability to K+ as primarily determining the resting potential

- Goldman equation for membranes permeable to more than one ion

**Lecture 4, Ion channels and how to record from them**

- Ways of looking at ion channels; molecular structure, physical structure, electrophysiological properties
- Generic properties of single channel gating and ion conductance
- Channel conductances, I/V relationship
- Patch clamp technique for recording single-channel currents
- Analysis of patch clamp records to determine single channel kinetics and conductance

**Lecture 5, Voltage-gated ion channels**

- Diversity of voltage-gated channels, categorization by ion selectivity and gating properties
- Relationships between single-channel and whole-cell currents as exemplified by voltage-gated Na+ and K+ channels
- Mechanism of voltage-dependent activation, gating charge movement
- Channel inactivation mechanisms, 'ball and chain' model for Shaker K+ channel inactivation

**Lecture 6, Ligand-gated ion channels**

- The nicotinic ACh receptor at the nerve-muscle junction as an exemplar of a ligand-gated ion channel
- Pentameric structure of the nAChR with two ACh binding sites, and consequences for concentration-dependence of channel gating
- Analysis of single-channel kinetics to derive Hill coefficient
- A simplified model of nAChR channel gating to explain kinetic parameters of channel open and closed time distributions

## ***Lur***

## *The action potential and synaptic transmission*

At the completion of this section students should have gained understanding of how excitable membranes generate the action potential, how synaptic transmission occurs in general and specifically for excitatory and inhibitory synapses that involve ionotropic and metabotropic receptors. Each lecture will include historical background that demonstrates the evolution of concepts and thinking about nerves and synapses. Students will be expected to know and understand both general concepts and important details each of the topics listed below. Assessment will be in the form of a final exam.

**Lecture 7, Action potentials**

- Resting potential, equilibrium
- Action potential
- Voltage-gated membrane currents

**Lecture 8, The Hodgkin & Huxley Axon**

- Membrane permeability during the action potential
- Action potential threshold
- Action potential propagation

**Lecture 9, Chemical synapses, quantal transmission**

- Electrical synapses and transmission
- Chemical synapses
- Quantum hypothesis

**Lecture 10, $Ca^{2+}$ and neurotransmitter release, EPSPs and IPSPs**

- Miniature end plate potentials
- Quantal analysis
- Calcium requirement for synaptic transmission
- Fast (ionotropic) EPSPs
- Ionotropic IPSPs
- Residual calcium hypothesis

**Lecture 11, Slow synaptic potentials**

- Metabotropic receptors and slow synaptic potentials
- Neuromodulation

**Lecture 12, Synaptic integration**

- Integration of multiple inputs at synapses
- Spatial summation of inputs
- Temporal summation of inputs

## ***Sumikawa***

### *Neurotransmitters, neurotransmitter receptors and second messengers*

At the completion of this section students should have understandings of the basic mechanisms of synaptic transmission, controlling neuronal signaling, and synaptic plasticity. Main learning objectives for each lecture are listed below.

**Lecture 13, Neurotransmitters**

- Changes in synthesis, storage, release, action, and removal can either increase or decrease synaptic potentials
- Synthesis, storage, and removal require specific proteins (enzymes and transporters), some of which are specific markers for identification of cell types
- Transporters function to store or remove neurotransmitters

**Lecture 14, Molecular mechanisms of vesicular release**

- Vesicular neurotransmitter release requires unique proteins
- Synaptic potentials can be modulated presynaptically
- Presynaptic ion channels and neurotransmitter receptors are involved in modulating synaptic potentials

**Lecture 15, Neurotransmitter receptors**

- Neurons produce synaptic signals by controlling the flow of ions through postsynaptic neurotransmitter receptors
- Neurotransmitter receptor channels have two important properties: they are ion-specific ($Na^+/K^+$, $Ca^{2+}$, or $Cl^-$) and regulated
- Neurotransmitter receptor function can be regulated by voltage, external ligands (neurotransmitters), internal ligands (second messengers), phosphorylation, and protein-protein interactions

**Lecture 16, Second messenger pathways #1**

- Many G protein-coupled receptors (GPCRs) can activate multiple G proteins
- GPCRs enable activation of different second messenger pathways dependent on coupling of receptor subtype

**Lecture 17, Second messenger pathways #2**

- Ion channels, ligand-gated and G protein-coupled receptors activate signaling pathways to produce second messengers
- Second messengers regulate the activity of second messenger-dependent protein kinases

**Lecture 18, Synaptic plasticity**

- Second messenger-dependent protein kinases regulate ion channels and receptors
- Ion channels, ligand-gated and G protein-coupled receptors regulate protein phosphorylation
- Phosphorylation is important mechanisms for modulating receptor function/number, and thereby neuronal function

# 207L CELLULAR NEUROSCIENCE LABORATORY CLASS

## 34th Annual Edition –--- March 5th-- 15th, 2018

*Instructors: Ian Parker, Gyuri Lur, Raju Metherate, Ian Smith, Angelo Demuro*

**Experiments** (March 5th – 13th)

1. Compound action potential of sciatic nerve. (I.P.)

2. Intracellular recording from muscle – resting potential, miniature end-plate potentials. (I.P.)

3. Quantal analysis of transmitter release at the muscle endplate. (I.P.)

4. *Xenopus* oocytes: voltage clamp and $Ca^{2+}$-dependent $Cl^-$ currents evoked by $IP_3$ (A.D.)

5. Total internal reflection microscopy of $Ca^{2+}$ signals in neuroblastoma cells (I.S.)

6. Extracellular field recording from rat hippocampal slices. (Metherate lab) (R.M., G.L.)

**March 13, 14th:** Preparation for presentations

**March 15th:** Student presentations (lunch : pizza provided)

## 207L Cellular Neuroscience Laboratory - Learning Objectives

In this full-time, hands-on laboratory class students will;

- Learn practical skills of intracellular and extracellular voltage recording using glass and wire microelectrodes.
- Reinforce their knowledge of synaptic transmission by undertaking classical experiments to record and analyze the quantal nature of neurotransmitter release.
- Study the compound action potential in frog sciatic nerve.
- Analyze properties of excitatory and inhibitory synaptic transmission in the hippocampal slice preparation.
- Learn the use of voltage clamp to determine passive and active properties of the cell membrane.
- Experience the use of advanced imaging techniques to study cellular calcium signaling.

# SYSTEMS NEUROSCIENCE (FALL 2017)
# [Neurobio 208A and Anat 210A]

Neurbio 208A is required for 1st year graduate students in Neurobiology and Behavior and serves as "S" area core courses for the INP. Anat 210A is open to all graduate students in Anatomy and Neurobiology. Graduate students from other departments may enroll in either Neurbio 208A or Anat 210A with permission from the course director, Dr. Ron Frostig.

*Time/place*: 9:00-10:20AM, MWF in MH 2246

*Text: Neuroscience*, 5th Edition, Purves, D. *et al*. (Eds.) Sinauer, 2011. The instructors will distribute other readings.

*Exams and grading*: The final grade will be based on performance on the midterm exams. The instructor for that section will announce the format of each exam. Exams will be predominately essay. There will be **no** cumulative final exam, and grades will be normalized to the number of lectures leading to the midterm before final grade averaging of all midterms.

***Participating Faculty***:

| *Neurobiology & Behavior* | *Anatomy & Neurobiology* |
|---|---|
| Ron Frostig, director | Steve Cramer |
| Georg Striedter | |
| Steve Mahler | |

## Fall 2017

| **Date** | **Topic** | **Instructor** | **Readings** (in text unless noted) |
|---|---|---|---|
| Fri 9/29 | Primate Neuroanatomy | Striedter | http://zoomablebrain.bio.uci.edu/ |
| Mon 10/2 | Principles of Brain Organization | Striedter | William James, 1890, chapter 2 (http://psychclassics.yorku.ca/James/Principles/prin2.htm) |
| Wed 10/4 | Introduction to sensory systems | Frostig | |
| Fri 10/6 | The eye: structure and function | Frostig | Ch.11 |
| Mon 10/9 | The eye: structure and function | Frostig | Ch.11 |
| Wed 10/11 | Central visual pathways I | Frostig | Ch.12 |
| Fri 10/13 | Central visual pathways II | Frostig | Ch. 26 |
| Mon 10/16 | Plasticity in the visual system | Frostig | Ch.24 |
| Wed 10/18 | Discussion: visual system | Frostig | |
| Fri 10/20 | **1-st Midterm** | Frostig | |
| Mon 10/23 | Somatosensory system | Frostig | Ch.9 |
| Wed 10/25 | Plasticity in the somatosensory system | Frostig | |
| Fri 10/27 | Auditory system I | Frostig | Ch.13 |
| Mon 10/30 | Auditory system II | Frostig | Ch. 13 |
| Wed 11/1 | Discussion Somato/Auditory | Frostig | Ch. 13 |
| Fri 11/3 | **2-nd Miderm** | Frostig | |

| | | | |
|---|---|---|---|
| Mon 11/6 | Motor systems: organization, motoneurons, spinal cord, supraspinal controls | Cramer | Ch. 16 & Ch. 17, pp. 375-380 |
| Wed 11/8 | Motor, premotor cortex | Cramer | Ch. 17, pp. 380-397 |
| Fri 11/10 | No class - Veteran's day | | |
| Mon 11/13 | No class – SFN meeting | | |
| Wed 11/15 | No class – SFN meeting | | |
| Fri 11/17 | Clinical aspects of motor system function | Cramer | |
| Mon 11/20 | Basal Ganglia Cerebellum & brainstem postural controls | Cramer | Ch. 18 |
| Wed 11/22 | Cerebellum & brainstem postural controls | Cramer | Ch. 19 |
| Fri 11/24 | No class- Thanksgiving | | |
| Mon 11/27 | **3-rd midterm** | Cramer | |
| Wed 11/29 | Prefrontal Cortex 1 | Mahler | TBD |
| Fri 12/1 | Prefrontal Cortex 2 | Mahler | TBD |
| Mon 12/4 | Modulatory Systems-Theory and the Clinic | Mahler | TBD |
| Wed 12/6 | Modulatory Systems 1 | Mahler | TBD |
| Fri 12/8 | Modulatory Systems 2 | Mahler | TBD |
| | **4-th Midterm exam during finals' week** | Mahler | |

**Systems Neuroscience N208A (Anat210A) - Learning Objectives**

## Frostig

Major themes for all the lectures in my section:

1) Elucidating ***general rules*** of organization (structural and functional) that apply to **all** sensory systems.
2) Emphasizing that sensory processing and perception are ***active*** processes that **create** your sensory world.
3) Examining the interaction between ***neuronal level*** and the ***perceptual level*** of sensory processing.
4) Emphasizing the dynamic aspects of structure and function i.e., ***plasticity***.
5) Highlighting relevant ***clinical*** studies.

Objectives: Students should develop understanding on how sensory systems work: basic rules; commonalities and differences among systems; neuronal networks and neuronal ensembles beyond single neurons; relationship to perception and relevant clinical cases. Students are also expected to develop, based on class material and assigned papers discussed in class, a sense of experimental design and analysis at the systems' level.

Lecture 1: **The eye: structure and function**

- Visual pathways
- The eye's structure
- The eye's function (retina)

Lecture 2: **Retina/Receptive fields**

- The structure of receptive fields
- Receptive fields and the functional organization of the retina
- Relationship between receptive fields and visual perception
- Receptive fields and the organization of the retina's output

Lecture 3: **LGN to Primary Visual Cortex**

Organization rules for sensory systems
The Lateral Geniculate Nucleus Structure and Function

- Primary Visual Cortex
- Classes of cortical receptive fields within V1
- Organizational rules for the cortex

Lecture 4: **Primary Visual Cortex (con't), and beyond.**

- The columnar organization of cortex
- Parvo, Magno streams within V1

- Visual cortex beyond V1- general outlook, functional streams and relevant clinical cases

Lecture 5: **Cortical plasticity of the developing visual cortex**

- Definition and historical background
- H&W deprivation experiments and their implications to basic and clinical research
- "Environmental surgery" experiments
- General implications of the critical period + clinical cases

Lecture 6: **Somatosensory System (I)**

- Somatosensory receptors
- Somatosensory structure and function as compared to the visual system
- Creating somatosensory perception

Lecture 7: **Somatosensory system (II): adult plasticity**
Adult cortical plasticity in animals and humans

Lecture 8: **Auditory system (I)**
Physics and perception of sounds
Structure and function of the ear

Lecture 9: **Auditory system (II)**

- Beyond the ear: differences and similarities in the central organization of the auditory and visual systems
- Auditory system in other animal models (owl, bat).

Two additional meetings are dedicated to reading relevant papers.

## Cramer

I teach 5 lectures, all related to motor systems. Four are adapted directly from respective assigned pages of Purves textbook. One is a summary motor systems research in my lab.
Whenever possible, I have brought in a live patient with relevant disease (e.g., patient with Parkinson's disease at end of basal ganglia lecture).

Here are the main learning objectives for each of the 5 lectures:

1. Motor System: spinal cord and peripheral nervous system
—understand differences between central and peripheral nervous system
—some details on anatomy of gray matter and white matter of spinal cord
—some details on peripheral sensory and motor axons, motor unit, muscle fiber types
—understand the stretch reflex including supraspinal modulation
—understand anatomy and function of muscle spindles and of Golgi tendon organs

2. Motor System: motor cortices
—Some brief discussion of regenerative capacity of motor cortex (in contrast with peripheral nervous system)
—Extensive discussion comparing/contrasting primary motor cortex vs. premotor cortex; discussion of general CNS motor system anatomy topics
—Some discussion introducing histological differences between neocortical regions, Brodmann areas, functional differences between areas
—Discussion of cortical functional maps, different methods for measuring these in situ vs noninvasive imaging, homonculus
—Introduction to spike-triggered averaging, its methods, some major examples from the literature
—Discussion of primary motor cortex subregions, and using these data to introduce retrograde and anterograde tracers
—Discussion of cortical network circuits; introduction of functional MRI and transcranial magnetic stimulation
—Some clinical correlates that illustrate above points

3. Motor System: latest research findings from a translational motor system lab (S. Cramer lab)
—Discuss motor-related disability following stroke in humans
—Review cellular/molecular basis for spontaneous recovery after stroke
—Review treatments under study, preclinical and clinical, that target improved motor behavioral outcomes after stroke in humans; emphasis on my lab's trials
—Contrast preclinical with clinical models of motor system disease; discuss animal models and their limitations
—Extensive review of covariates that can affect treatment response, patient stratification, biomarkers that inform motor system therapies

4. Motor System: basal ganglia
—Extensive discussion of anatomy and functional circuitry of basal ganglia; striatal medium spiny neurons
—Direct vs indirect pathways
—Examples of cortico-basal ganglia loops from various motor and non-motor loops; review DeLong reading
—Contrast features of basal ganglia disease with those of cerebral cortex
—Discuss pathological/anatomical, clinical, and systems level aspects of Parkinson's disease; and to a lesser degree, Huntington's disease
—Review various dopamine-related topics viz basal ganglia

—Contrast basal ganglia functions with those of cerebellum from basal ganglia perspective

5. Motor System: cerebellum
—Contrast basal ganglia functions with those of cerebellum from cerebellum perspective
—Review cerebellar disease symptoms, contrast with those of basal ganglia or cortical disease
—Review cerebellar gross anatomy in detail
—Review cerebellar cellular, fiber, and systems anatomy in detail
—Discussion of cerebellar contributions to cognitive and emotional functions

## **Mahler**

Lecture 1: Prefrontal Cortex 1—Structure
- -Anatomy across species
- -Anatomy in humans
  - -Subregions
- -Development: least influenced by genes, most by environment.
- -Communication with Cortical Structures Including Hippocampus
- -communication with thalamus
- -Communication with Amygdala
- -Communication with Subcortical Structures
- -Elaboration in Humans
- -Multimodal inputs

Lecture 2: Prefrontal Cortex 2—Function
- How do we know what PFC *does*?
  - -Stroke & other lesion patients
  - -Age-related deficits
  - -Functional imaging
  - -Animal models
- -Top Down Control: biasing other brain circuits
- -Attention- Sustained attention, bottom up vs top down attention.
- -"Executive function": multitasking, inhibition, "consciousness?" "intelligence"
- -Planning: Mental time travel
- -Decision Making: which option is better/less bad? Now *and* in the long run.
- -Conflict Monitoring: competition amongst action plans
- -Learning and Memory: Incorporating the past to plan for the future. Rule learning, Working memory, Long-term memory
- -Emotion and motivation
- -Consciousness?
- -Psychiatric & Neurological Disorders: Strokes, Alzheimers, schizophrenia

Lecture 3: Modulatory Systems: Theory & Clinic

-What are modulatory systems?
-Generality vs. Specificity in function and effects on synaptic processing
-Depression
-Schizophrenia
-Addiction
-Alzheimer's and other cognitive impairments
-Anxiety

Lecture 4: Modulatory Systems 1:

-Dopamine
    Anatomy: VTA,SN
    Receptors
    Theories of function
    Psychosis/Antipsychotic Drugs
-Serotonin
    Anatomy: Raphe
    Receptors
    Theories of function
    Depression, anxiety and antidepressants. Hallucinogens
-Norepinephrine
    Anatomy: Locus Coeruleus
    Receptors
    Theories of function
    Depression, Anxiety, PTSD, ADHD, Sleep Disorders and NE drugs

Lecture 5: Modulatory Systems 2:

-Acetylcholine
    Anatomy: Basal forebrain, brainstem
    Receptors
    Theories of Function
    ADHD, Dementia, ACh Drugs
-Peptide transmitters
    Anatomy: Discrete Nuclei, often peptides are clustered in subnuclei
        CRF, Orexin, Substance P,
    Receptors: Distribution, relationship to function-specific circuits
    Theories of function
    Disorders of Peptides: Narcolepsy, addiction, chronic pain, sleep disorders, obesity, and drugs affecting these systems
-Peripheral Feedback and homeostasis
    -Feeding
    -Drinking
    -Temperature
    -HPA Axis

# NEURBIO 209 LEC A: BEHAVIORAL NEUROSCI (11500)

**N209: Behavioral Neuroscience**
**Spring 2018**

The focus of this course is on understanding the relationship between brain and behavior. The human brain's major naturally-selected function is to generate adaptive behavior under a variety of conditions, including with reference to prior experience. In this course we will discuss how the brain mediates major behavioral functions, how these go awry in psychiatric disorders, and major methodological approaches used in behavioral neuroscience. The format of the course is a mixture of presentations led by the instructor and seminar style discussions incorporating assigned readings. There is a strong emphasis on class discussion and participation, with students expected to have read, thought about, and at times present primary-source papers.

**Lecture times:** MWF 9-10:20AM McGaugh Hall 2246

**Web site:** The class web site https://canvas.eee.uci.edu/courses/4980 will include up-to-date information on the lecture schedule and assigned readings. Lecture slides will also be posted.

**Add & Drop Policy:** Adds and drops are handled exclusively through WebReg. The add/drop deadline is April 13, 2018 and students are responsible for all materials from the start of the term. Failure to take any exams or quizzes, even those given before you have added the course, will result in a zero score for each quiz or exam.

**Instructors:**
Stephen Mahler (coordinator): mahlers@uci.edu
Norbert Fortin: norbert.fortin@uci.edu
Christie Fowler: cdfowler@uci.edu

**Grading:** There will be three midterm exams and each will account for 20% of your total grade. 20% will be based on an end-of-term project proposal, and 20% on class participation.

**Final Presentation:**
Presentations will occur on the last 3 days of class**.** You will do a "data blitz" style presentation (maximum 15 min, preferably 10) on a research question of your choice stemming from presentations/discussions we've had in class.
Guidelines:

15m total time per student, so aim for a maximum of 10min to make sure there is plenty of time for questions (and there will be questions!). You will be cut off at 15min exactly (not counting any questions asked during the presentation), so be careful. Shorter is not equal to worse! We don't need all the details or nuance, the goal here is to convey the major points in an efficient and punchy manner.

Design an experiment or set of experiments to address any of the topics raised during class (but not something that you have done as a project in a rotation lab). KEEP IT SIMPLE! Pretend you're pitching the idea to a grant agency / donor on a 10min elevator ride (a skyscraper I guess?). This is not supposed to be a full grant, just an experiment that tests a single, currently unknown concept or question.

The experiment should be viable, but don't worry about actual costs, and assume a lenient (but realistic) IRB/IACUC. In other words: "Effects of space travel on working memory=OK. Effects of time travel on

working memory=not OK." (but make sure there is a reason to think, e.g., space travel mightaffect memory since gravity is known to affect pyramidal cell function).

Pick a topic, focus in on a concrete question, and design the experiment. Clarity in your thinking is key here. Why are you asking this question--what gap in knowledge is there, and why should I care about this topic? Is the experiment really testing what you want it to? How would we interpret your results?

The presentation should have:

A **brief** background setting the stage for what we know and don't (1-2 slides)

The question and clearly stated hypothesis (1 slide)

The experiment and how the results will address the issue (1-2 slides)

Alternative outcomes / potential problems (1-2 slides).

You will be graded on 1) clarity of the background information/topic to be studied, 2) clarity of, and importance of the question to be addressed 3) efficacy of your experiment in providing an answer to that question, 4) presentation style and ability to answer questions, 5) respecting the time limit.

**Policy on Academic Dishonesty:** The UCI policy on academic dishonesty is stated at: http://www.editor.uci.edu/catalogue/appx/appx.2.htm#academic. Lying to an instructor with the intent of improving a grade, or use of a restricted electronic device during an exam are considered forms of academic dishonesty. Any student aware of academic dishonesty is encouraged to bring this to the attention of the instructor; your confidentiality is guaranteed.

**Readings:** It is your responsibility to read the assigned articles before class. This is a discussion-based class and having read the materials ahead of time is essential

## Lecture schedule and reading assignments

| Date | Instructor | Topic | Reading |
|---|---|---|---|
| **Mon 04/02** | Mahler | Genetics, Epigenetics, and Brain Evolution | Dawkins, The Selfish Gene Ch. X,X |
| **Wed 04/04** | Mahler | Evolutionary Psychology | Cosmides & Tooby, 2013 |
| **Fri 04/06** | Mahler | History and conceptual issues in analysis of brain-behavior relationships | McGaugh (2003) Ch 2-3<br>Lynch & Granger (2008) Ch2-3 |
| **Mon 04/09** | Mahler | Mind and Brain | Kaushik et al 2012; Worth et al 2013 |
| **Wed 04/11** | Mahler | Functional Neuroanatomy: Neural Circuits in Behavior | Zahm 2006; Richard et al 2013 |
| **Fri 04/13** | Mahler | Sleep and Wakefulness | Schwartz & Kilduff, 2015; Donlea et al 2017 |
| **Mon 04/16** | Mahler | Homeostasis: Feeding, Drinking & Temperature | Zimmerman et al 2017; Massadi et al 2017 |

| | | | |
|---|---|---|---|
| **Wed 04/18** | Mahler | **CNLM Meeting** | |
| **Fri 04/20** | Mahler | **CNLM Meeting** | |
| **Mon 04/23** | Mahler | **Exam 1** | |
| **Wed 04/25** | Fowler? | Hormones | TBD |
| **Fri 04/27** | Fowler | Development | |
| **Mon 04/30** | Fowler | Aggression and Stress | |
| **Wed 05/02** | Fowler | Sex and Social Behavior | |
| **Fri 05/04** | Fowler | Motivated Behavior: Reward, Aversion and Addiction | |
| **Fri 05/07** | Fowler | Psychopathology | |
| **Wed 05/09** | Fowler | Neurodegenerative Disorders | |
| **Fri 05/11** | Fowler | **Exam 2** | |
| **Mon 05/14** | Fortin? | Functional Neuroanatomy of Medial Temporal Lobe | TBD |
| **Wed 05/16** | Fortin | Declarative Memory | |
| **Fri 05/18** | Fortin | Multiple Memory Systems | |
| **Mon 05/21** | Fortin | Emotion | |
| **Wed 05/23** | Fortin | Attention | |
| **Fri 05/25** | Fortin | Computational Models of Memory/Spatial Memory | |
| **Mon 05/28** | Fortin | Language and Lateralization | |
| **Wed 05/30** | Fortin | **Exam 3** | |
| **Fri 06/01** | Fortin | **Holiday - no class** | |
| **Mon 06/04** | All | Presentations | |
| **Wed 06/06** | All | Presentations | |
| **Fri 06/08** | All | Presentations | |

## N209 – Behavioral Neuroscience. Learning Objectives

### Mahler

Learning Objectives: At the end of this section, the student should be able to discuss the following topics.

*Lecture 1: Genetics, Epigenetics, and Brain Evolution*

-Evolution by natural, sexual, artificial, and other types of selection
-The brain evolved because behavior it produced was naturally selected.
-How do genes influence the brain?
-How does experience influence the brain?

-The selfish meme?

*Lecture 2: Evolutionary Psychology*

-Psychological modules
-Fundamental requirements of an evolved psychological adaptation
-Types of evidence that could support an evolutionary basis for a behavior
-Experimental evolutionary psychology?
-Spandrels, just-so stories, and the trouble with evolutionary psychology

*Lecture 3: History and conceptual issues in analysis of brain-behavior relationships*

-Philosophy and history of mind
-Where is "the mind?"
-Materialism vs. Dualism
-The neuron doctrine
-War of the soups and the sparks

*Lecture 5: Mind and Brain*

-Big Brains-Why?
-Mind control—What if "we" are not in control?
-brain parasites
-addiction and other mental illnesses

*Lecture 6: Functional Neuroanatomy: Neural Circuits in Behavior*

-Methods for studying circuits
-Groupers and Chunkers: searching for meaningful principals of brain organization
-Extended Amygdala
-Corticostriatopallidal circuits
-Ascending modulatory systems
-Specialization vs. general purpose circuits

*Lecture 7: Sleep and Wakefulness*

-What is sleep "for?"
-Stages of Sleep
-studying sleep in humans and animals
-Sleep and wakefulness circuits
-Sleep disorders

*Lecture 8: Homeostasis: Feeding, Drinking & Temperature*

-Principals of homeostasis
-Brain/Body Communication
-Hypothalamus anatomy
-Feeding mechanisms
-Drinking mechanisms
-Temperature regulation

## Fowler

*At the end of this course section, the student should be able to independently discuss:*

*Lecture 9:Hormones*

- Describe the function of the main endocrine glands and the mechanism through which they influence neural activity
- Demonstrate an understanding of the different types of hormones, their receptors, and signaling mechanisms
- Evaluate considerations for conducting research studies in both sexes

*Lecture 10: Development*

- Identify the different stages of brain development
- Evaluate the effects of the environment on neural processes in consideration of developmental stage
- Describe mechanisms guiding brain development for normal physiological function

*Lecture 11: Stress*

- Describe the effects of early life stress on development
- Compare and contrast the impact of acute or chronic stress on HPA activation and resulting brain function
- Evaluate the global effects of stress on cellular function and related impact on behavior

*Lecture 12: Sex and Social Behavior*

- Recognize the brain regions and cellular signaling mechanisms implicated in sexual and social behaviors
- Demonstrate an understanding of the circuit connections between brain structures with relevance to function
- Evaluate the behavioral procedures used to study social behavior with an understanding of potentially confounding variables

*Lecture 13: Motivated Behavior: Reward, Aversion and Addiction*

- Identify various types of motivated behaviors and methods of assessment in animal models
- Describe the differences between factors that promote or decrease the likelihood of a future behavior
- Evaluate the impact of various brain structures in mediating reward- or aversion-related processing
- Compare and contrast the current hypotheses in the field for factors underlying drug addiction and formulate an evidence-based definition

*Lecture 14: Psychopathology*

- Describe the symptoms characteristic of Schizophrenia and affective disorders
- Identify and evaluate the current evidence for the neurobiological mechanisms underlying the disease state
- Compare and contrast similar factors contributing to the disease state, with relevance for comorbidity
- Evaluate the mechanism of action and efficacy for currently available pharmacotherapeutics

*Lecture 15: Neurodegenerative Disorders*

- Identify the symptoms and brain dysfunction found in Alzheimer's disease, Huntington's disease and Multiple Sclerosis
- Describe the current understanding of genetic and neurobiological factors contributing to the disease state

- Evaluate the mechanism of action and efficacy for currently available pharmacotherapeutics

**Fortin**

*Lecture 16: Functional Neuroanatomy of Medial Temporal Lobe*
- Hippocampus
- Amygdala
- Temporal Cortex

*Lecture 17: Declarative Memory*
- Brain Substrates
- Episodic Memory
- Experimental Methods
  - Animals
  - Humans
- Disorders

*Lecture 18: Multiple Memory Systems*
- Brain Substrates
- Nondeclarative memory
- Emotional Memory
- Experimental Methods
  - Animals
  - Humans

*Lecture 19: Emotion*
- Neural Substrates
- Interaction with Cognition
- Experimental Methods
  - Animals
  - Humans

*Lecture 20: Attention*
- Effects on Perception
- Top down vs. bottom up
- Effects on memory
- Experimental Methods
  - Animals
  - Humans

*Lecture 21: Spatial Memory and Computational Models*
- Hippocampus/cortex interactions
- Place cells
- Grid cells

Modeling Memory

*Lecture 22: Language and Lateralization*
- "Right vs. Left Brained"
- Cortical Language Areas
  - Broca's
  - Weirneke's
- Split Brain Studies

UCI - NEUROBIOLOGY & BEHAVIOR GADUATE PROGRAM

# ADVANCED CLASSES

2018-19

## University of California, Irvine
### Department of Neurobiology & Behavior

The list below includes advanced graduate classes offered by the department. In addition, with the approval of the graduate advisor, appropriate graduate classes offered by other departments may be substituted for the requirement of a minimum of four advanced graduate classes.

## Fall 2018

**NEURBIO 247. Programming for Neuroscience Research . 4 Units.**

A neuroscience-specific introduction to programming and data analysis using either MATLAB or Scientific PYTHON. Students will learn general programming skills and effective use of programming for data management, statistical analysis, and image analysis.

**NEURBIO 257. Statistics for Neurobiologists. 4 Units.**

IIntroduction to common methods for statistical analysis used in neurobiology. Topics covered include t-tests, ANOVAs, correlations and regressions, general linear model, power analysis, and non-parametric tests.

**NEURBIO 260. Auditory Neuroscience. 4 Units.**

Multidisciplinary overview of brain mechanisms of hearing. Emphasizes breadth of auditory function and research: single neurons to psychoacoustics, the chochlea to the cortex, and basic science to clinic.

**Winter 2019**

**NEURBIO 231. Clinical and Epidemiological Aspects of Neurodegenerative Diseases. 4 Units.**

Clinical and epidemiological aspects of neurodegenerative disorders causing dementia will be reviewed, including AD, PD, FTD, HD and cerebrovascular disease. Seminar format will include student presentations and group discussion.

**NEURBIO 237. Neurobiology of Brain Aging. 4 Units.**

Outlines some of the significant changes that occur in the aging brain, with a special emphasis on risk factors and protective strategies that promote successful brain aging. Topics include changes in synaptic plasticity, neurotrophic factors, and molecular mechanisms in aging.

**NEURBIO 240. Advanced Analysis of Learning and Memory. 4 Units.**

Advanced analysis of contemporary research concerning the nature and neurobiological bases of learning and memory. Special emphasis is given to time-dependent processes involved in memory storage.

**NEURBIO 255. History of Neuroscience. 4 Units.**

An overview of the conceptual and technical foundations of contemporary neuroscience from ancient times to the present. The subjects include synapses, neurons, brain organization, sensory, motor and regulatory systems, learning and memory, human brain function and dysfunction.

**Spring 2019**

**NEURBIO 220. Neural Coding, Computation, and Dynamics. 4 Units.**

Theoretical principles and biological mechanisms underlying how brains acquire, assimilate, store, and retrieve information, compute adaptive responses to external inputs, and how knowledge is extracted from experience to generate an internal model of the world.

**NEURBIO 233. Neurobiology of Drug Addiction. 4 Units.**

Provides a comprehensive overview of topics in the addiction field, including drug pharmacology, models/approaches to investigate addiction, brain circuits, genetics, epigenetics, and the cellular and molecular biology of drug addiction.

**NEURBIO 236. Cortex: Structure, Function, and Plasticity. 4 Units.**

Structured to include lectures and presentation of papers about cortex with emphasis on sensory-motor cortex. Both historical and current perspectives on cortical structure-function relationship will be critically evaluated.

**NEURBIO 249. Electronics for Biologists. 4 Units.**

Basic principles of electricity; properties and use of discrete components and integrated circuits; circuit analysis and design. Intended for advanced students in the life sciences.

**NEURBIO 292. Scientific Communication. 4 Units.**

Students learn how to effectively communicate scientific ideas and results. Activities include learning how to effectively write a scientific proposal, how to perform a coherent, persuasive slide presentation, and how to give meaningful, constructive review critiques.

## NOTICE OF INTENT TO CHANGE LABORATORY ASSIGNMENT

Please notify the Neurobiology & Behavior Department Office of your intent to change labs by submitting this form to the Student Affairs Officer in MH 2205. You must collect signatures from your current advisor, your new advisor, and the graduate advisor in order for the lab assignment to be authorized.

Graduate Student Name:_____ Date Lab Change Will Be Effective: _____

By submitting this form I intend to change my laboratory assignment.

Student Signature: _____

As the current advisor, I understand that the graduate student named above will relinquish their assignment in my laboratory.

Current Advisor Name: _____ Signature: _____

As the new advisor, I accept the above named graduate student into my laboratory effective on the date specified above. This includes financial responsibilities, if any.

New Advisor Name: _____ Signature: _____

I hereby approve the above named graduate student's request to change their laboratory assignment.

Graduate Advisor Approval Signature: _____

# Policy on Annual Graduate Student Advising

## Pre-Advancement

A faculty committee that includes the student's advisor and at least two other departmental faculty members will meet annually with each graduate student at the end of the first year. Other faculty, who need not be members of the department, can be included on an *ad hoc* basis in addition to the three department faculty. The purpose of the pre-advancement meetings is to make sure that the student is aware of, and is meeting, degree requirements and expectations in a timely fashion. Note that the purpose of these meetings is NOT to evaluate the student's research or progress towards identifying a research topic, although such issues can be discussed. In addition, these meetings provide the opportunity to advise students on research opportunities, professional development, and scholarship and fellowship opportunities. A meeting report will be added to the student's academic file after each meeting.

## Advancement to Candidacy

Graduate students are expected to advance by the end of the third year. The Advancement committee may or may not include the same faculty as the Pre-Advancement committee (contact the Graduate Advisor for details on the Advancement committee).

## Post-Advancement

Students are expected to meet at least once each year with a thesis committee consisting of their advisor and at least two other department faculty members. At each meeting, the student and the committee will discuss recent progress, remaining objectives, and a timetable for completion of the doctoral thesis. A meeting report will be added to the student's academic file after each meeting.

The standardized School form (below) may be modified by individual departments to suit their needs; however, forms must include all of the information on the standard form.

*GRADUATE STUDENT ADVISING -ANNUAL COMMITTEE MEETING REPORT*

**NAME**:_____ **TODAY'S DATE:_____**

Quarter and year student entered graduate school: _____ Expected date of advancement to candidacy: _____

Quarter and year student entered NB&B graduate program: _____

Expected quarter & year of thesis defense: F W S S _____ Date of previous committee meeting: _____

INP Student: Yes____ No____ MSTP Student: Yes____ No____

Student has completed Core satisfactory: Yes____ No____ MSTP student has completed 209 course: Yes____ No____

**THESIS ADVISOR COMMENTS:**

**COMMITTEE MEMBER COMMENTS:**

**STUDENT COMMENTS & SIGNATURE**:

Student Signature: _____

**COMMITTEE MEMBER SIGNATURES:**

Name: _____ Signature: _____ Satisfactory Progress?: _____

Name: _____ Signature: _____ Satisfactory Progress?: _____

Name: _____ Signature: _____ Satisfactory Progress?: _____