Master’s Program Handbook
Department of Neurobiology
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PROGRAM OVERVIEW

The Master’s Program in Neurobiology features independent, hands-on research training combined with focused classroom instruction, preparing students for careers in medicine, industry, academic research, and teaching. The program is designed so students can earn an M.S. degree after one year of intensive study and research.

The program provides an unparalleled opportunity to learn and collaborate with highly renowned scholars in the field of Neurobiology. Graduates of the program go on to MD or PhD programs at top institutions around the country or choose to directly enter careers in academic or industrial research.

Neurobiology MS Program Personnel

<table>
<thead>
<tr>
<th>NAME</th>
<th>PHONE</th>
<th>OFFICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mark A. Segraves, PhD (Director)</td>
<td>847 491-5072</td>
<td>Cook 2137</td>
</tr>
<tr>
<td>Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:m-segraves@northwestern.edu">m-segraves@northwestern.edu</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tiffany Schmidt, PhD (Associate Director)</td>
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<td>Pancoe 1121</td>
</tr>
<tr>
<td>Assistant Professor</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:tiffany.schmidt@northwestern.edu">tiffany.schmidt@northwestern.edu</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anthony Keevan</td>
<td>847 491-5996</td>
<td>Hogan 2166</td>
</tr>
<tr>
<td>Assistant Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:anthony.keevan@northwestern.edu">anthony.keevan@northwestern.edu</a></td>
<td></td>
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</tr>
<tr>
<td>Chad Gilliland</td>
<td>847 467-1573</td>
<td>Hogan 2163</td>
</tr>
<tr>
<td>Program Assistant</td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="mailto:chad@northwestern.edu">chad@northwestern.edu</a></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The Graduate School’s Policies and Procedures

You can review all of TGS’ policies and procedures at:
http://www.tgs.northwestern.edu/about/policies/index.html

Many graduate programs, including the MS in Neurobiology Program, are administered through the Graduate School (TGS).
Students must be admitted to TGS before they can be enrolled in the MS Program in Neurobiology. All applicants must apply online via the CollegeNET website.

For information on admissions, see the TGS admissions webpage. Their webpage also provides information on financial aid, tuition, and academic services.

You can review all of TGS’ admissions policies at: https://www.tgs.northwestern.edu/admission/index.html

The Departmental application deadline is March 1. The Department's admissions committee relies on the research experience, letters of recommendation, transcripts, and personal statement of purpose in making choices for admission.

GRE and/or MCAT scores are not required but may be included.

The required statement of purpose that accompanies your application for graduate study at Northwestern is very important and is often a crucial factor in the decision to admit. A clear, well-focused statement reveals your potential for graduate work and may compensate for less than stellar grades and test scores.

In order to be considered for the graduate program, students whose first language is not English must take the TOEFL or IELTS examination.

- For the TOEFL exam, students must score:
  - 600 or higher on the paper-based test
  - 250 or higher on the computer-based test
  - 100 or higher on the internet-based test.
- For the IELTS exam, students must score a 7.0 or higher.

Tests must be taken no more than two years before the intended quarter of entry.

Note that Departmental requirements supplement, but do not supersede, those from TGS.
GENERAL REQUIREMENTS FOR THE M.S. DEGREE

Students commence their studies in the Fall Quarter. Students must complete a total of nine credit hours to receive their degree. Students must also meet deadlines set forth by both TGS and the MS Program.

TGS Master’s Degree Requirements

For all TGS Master Degree requirements and policies see: http://www.tgs.northwestern.edu/about/policies/masters-degree-requirements.html

Briefly, TGS requires that all students in graduate level programs meet or exceed the following:

- Students must maintain a minimum GPA of at least 3.0
- Students cannot have more than two Incomplete grades
- Students must meet all required deadlines

All Northwestern University graduate students must also fulfill a set of requirements regarding:

- Residency
- Approved coursework
- Grades
- Filing for graduation

Residency and Courses

To be eligible for a Master’s degree, a student must successfully complete at least nine graded courses (non P/NP) authorized for graduate credit and meet the minimum residency requirement. Residency is calculated in terms of quarters of full-time study:

- Students must meet a residency requirement of the equivalent of three quarters of full-time registration in courses authorized by the Graduate Faculty for graduate credit.

Timeline

Students must complete all requirements for the master's degree within five years of the date of their initial registration in The Graduate School, which falls on the last day of the 20th quarter.

Students who do not complete their degree within five years will not be considered in good academic standing and will be placed on academic probation.

Students in the MS Program in Neurobiology are expected to graduate by the summer of their first academic year. Extending degree completion to later quarters will require the approval of the Program Directors and their advisor.
**Degree Completion**
Each Master’s program administers a final comprehensive examination, which may be oral, written, or both. A minimum of two individuals must serve on the Master's exam committee.

**At least two members of the committee, including the chair, must be members of the Northwestern University Graduate Faculty.**

In order to receive the master's degree, the student must:

- Complete all required coursework and program requirements for the degree.
- File for degree by completing an Application for a Degree form via TGS Forms in CAESAR by the date specified in the Academic Calendar.
- Complete the Master's Degree Completion form via TGS Forms in CAESAR and receive program approval of the form by the date specified in the Academic Calendar.
- Have at least a 3.0 cumulative GPA and no X, Y, or NR grades. All grades must be entered and Change of Grade forms submitted by the grade deadline specified on the Academic Calendar.

**Grades**
A minimum GPA of 3.0 is required for all work presented for a graduate degree. Grades given for completed, credit-bearing graduate courses not taken on a pass/no credit (P/N) basis are:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade Points</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0</td>
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<tr>
<td>A-</td>
<td>3.7</td>
</tr>
<tr>
<td>B+</td>
<td>3.3</td>
</tr>
<tr>
<td>B</td>
<td>3.0</td>
</tr>
<tr>
<td>B-</td>
<td>2.7</td>
</tr>
<tr>
<td>C+</td>
<td>2.3</td>
</tr>
<tr>
<td>C</td>
<td>2.0</td>
</tr>
<tr>
<td>C-</td>
<td>1.7</td>
</tr>
<tr>
<td>F</td>
<td>0</td>
</tr>
<tr>
<td>X</td>
<td>Failed to earn credit: missed final examination 0</td>
</tr>
<tr>
<td>Y</td>
<td>Failed to earn credit: work incomplete 0</td>
</tr>
</tbody>
</table>

The following notations are ignored in computing the grade point average:

P: Pass with credit
N: No grade, no credit
K: In progress
S: Satisfactory: noncredit course
U: Unsatisfactory: noncredit course
W: Withdrawn by permission
NR: No grade reported by instructor
X, Y, NR, and F: Do not count toward the accumulation of quarters of residency required for a degree.

**MS Program Requirements**
Separate from TGS, the department requires the following for successful program completion:

<table>
<thead>
<tr>
<th>Fall</th>
<th>Winter</th>
<th>Spring</th>
<th>Summer (if necessary)</th>
<th>Graduation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elective Course</td>
<td>Neurobio-402</td>
<td>Elective course</td>
<td></td>
<td>Submit Thesis Forms (May 17)</td>
</tr>
<tr>
<td>Neurobio 595</td>
<td>Neurobio 595</td>
<td>Neurobio 595</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quarterly meeting with Directors</td>
<td>Quarterly meeting with Directors</td>
<td>Quarterly meeting with Directors</td>
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<tr>
<td>Seminar Attendance (minimum of two)</td>
<td>Seminar Attendance (minimum of two)</td>
<td>Seminar attendance (minimum of two)</td>
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**Quarterly Progress Meetings**
Students meet individually each quarter with the Program Directors to evaluate their progress. This meeting should occur near the end of each quarter. The meeting can be arranged through the Program Assistant in person, via email, or over the phone.

Students will be notified via an official email, letter, or the Graduate Student Tracking System (GSTS) notification whether they are making satisfactory or unsatisfactory progress after the meeting. The Directors may block registration for a subsequent quarter for any student that has not met requirements.

Students will receive a minimum of one progress notification during the one-year program. If a student is making unsatisfactory progress, they will be monitored closely and may receive progress letters more frequently.
Satisfactory Progress
When evaluations, such as quarterly progress meetings, reveal a student’s progress is not meeting program standards, the student will be given one quarter to improve laboratory skills and productivity before being reevaluated. Students will first be notified in writing that they have been placed on probation. This written communication will include a detailed description of the reason(s) for placing the student on probation and the goals that the student must accomplish in order to be taken off probation. This letter will be sent to TGS and to the student. Students will typically have one quarter to regain good standing in the program or they may be terminated.

When a student who is not on probation fails one of the major examinations (thesis proposal, Master’s defense), the student will be placed on probation and given a second opportunity to pass that examination. This second examination must be taken within one month of the first examination. Failure on the second examination may result in termination from the program. When a student who is already on probation fails one of the major examinations, they may or may not be given a second opportunity to pass that examination, at the discretion of the Directors.

In all cases, termination of a student requires a decision by the Directors and cannot be made by an individual faculty member or examination committee. Terminations are final.
Choosing an Advisor

Choosing an advisor and lab are the first steps in the program. We ask that students begin thinking about which lab they are interested in during their application process. Available advisors and labs can be found in the List of Research Advisors section in the Appendix. Students will be notified after their acceptance into the program as to when to initiate contact with faculty members.

Selection of an advisor and the research lab where you will complete your thesis project is one of the most important activities that you will undertake when you begin your graduate career at Northwestern.

It is the student’s responsibility to identify an advisor with help from one of the Neurobiology Master’s Program Directors. Students are required to contact at least two potential advisors to discuss potential projects early in the fall quarter if not before. To assist, the program will host a Data Blitz where students will meet multiple labs that are interested in taking students. This often provides students exposure to areas of interest they may not have otherwise pursued. Following the Data Blitz, students will meet individually with the Directors to discuss their lab preferences.

After, and only after, the advisory meeting with the directors may the student make an agreement with his or her chosen advisor. At this point, the student, advisor, and one of the Directors will sign the Advisor Agreement form. Under no circumstances should any agreements, formal or informal, be made prior to the advisory meeting. Students are welcome and encouraged to contact either the Director or Associate Director for any advice on potential advisors prior to Orientation.

Upon choosing an advisor, students must notify the Program Assistant via email. You must also formally notify the program with the Student-Advisor Agreement form, provided in the Appendix section. This form must be filled out and returned by October 19. However, we recommend that students formalize their choices as soon as possible after meeting with the Program Directors to allow the student to initiate his or her thesis research as soon as possible.
Thesis Committee
Thesis committees should be formed before the thesis proposal deadline (January 25).

To meet TGS requirements:
1) a minimum of two individuals must serve on the thesis committee, and
2) at least two members of the committee, including the Chair, must be members of the Northwestern University Graduate Faculty.

For the Neurobiology MS program, most committees have at least 3 members.

Students should seek the advice of their advisor in choosing committee members. They are also encouraged to confer with the Directors for suggestions. Typically, the committees will include the advisor, the Director or Associate Director of the program, and a third individual selected by the student in consultation with his/her advisor and the program directors. Ideally, this third committee member is someone who is well-suited to both guide the student in the development and execution of their thesis project, and to evaluate the completed thesis project and its defense. Final approval of committee members must be obtained from the Director or Associate Director.

Changing Advisors
Changing advisors is a rare occurrence. Changing advisors can result in a significant setback in both time and effort and may require that a student extend their time in the MS program beyond the traditional one-year window. These cases are handled on an individual basis. If a student needs to change labs, they should start by contacting the Director or Associate Director.
PROGRAM COURSES

Neurobio 402
2 credits (Winter)

This Winter Quarter course is designed to expose students to cutting-edge research in neurobiology and emphasize reading and critical discussion of primary literature.

Neurobio 595 (Independent Lab Research)
1 credit (Winter), 2 credits (Fall & Spring)

The specific objectives for the student are:

(1) To understand the research topics the laboratory investigates
(2) To understand the research methods the laboratory uses
(3) To develop critical thinking skills, the ability to meaningfully design scientific experiments, a work ethic consistent with those of a professional scientist, and appropriate time management skills

Electives
2 credits (Fall & Spring)

Each full-time student is required to take one elective during the Fall and Spring Quarters (Please see the Electives attachment in the Appendix for available courses). Note that some students will be restricted in their elective choice by their advisor.

TGS 512
0 credit (Summer and beyond, if needed)

Available to students who completed the program coursework and are continuing in their degree program (writing a thesis or dissertation and/or performing research required for the degree), but not receiving University or external funding. TGS 512 is a full-time registration intended for students who are continuing to work in a full-time capacity toward degree completion. TGS 512 is $100 per additional quarter.

Course Registration
The Program Assistant registers all Master’s students in program courses (Neurobio and TGS). It is the responsibility of the student to register for elective courses – one in the Fall and one in the Spring. The Program Assistant will send a confirmation email indicating students are registered for the required program classes for the quarter. Students can log in to CAESAR to verify.
How to Register for a Course

Step 1: To access online registration, login to CAESAR. Your Student Homepage appears.

Step 2: If you have any “Holds” or “To Do” items on your account, a notification will be visible on your Tasks tile. Click on the Tasks tile to access more detail, along with links and instructions on how to remedy them. You must take care of holds related to registration before you can enroll.

Step 3: Review the time and date that your registration appointment begins. Click on the Manage Classes tile. The NU Manage Classes page appears. Some students also have access to the New Manage Classes tile.

Step 4: Select “Enrollment Appointment/Dates” from your left-hand menu.
**Step 4:** To use enrollment functions, click on the “**Shopping Cart and Enroll**” menu item to reveal the Shopping Cart and related enrollment actions.

**Find Classes (Search for Classes) and Plan Your Schedule**

Before you register, you might plan an ideal schedule and list of alternative classes. It’s helpful to have the 5-digit class numbers ready when your registration appointment time begins. Class offerings and numbers are in both the pdf version of the schedule and on CAESAR.

**Step 1:** From your **Student Homepage**, click on the “**Manage Classes**” tile. Next, click on **Class Search** in the left-hand menu. The **Search for Classes** page appears. You may select different search criteria on the page for any of the values provided. [Note that the Term and Course Career fields will fill in automatically based on your **Campus Preferences**. You may view or edit your **Campus Preferences** by selecting **My Preferences** from the **Actions List**, and then selecting the menu item called "**Campus Preferences**".] Enter **Course Subject** and **Course Number** criteria (if appropriate) and press the **Search** button. Or, click on the **Additional Search Criteria** button or **Class Attributes/Requirements** button to expand your search options.

**Step 2:** Select any additional desired search criteria in the fields provided. Narrow your search by setting criteria in multiple fields. You must select at least two criteria such as **Course Subject**, **Catalog Number**, **Description** (course title), or **Course Career** in order to perform a search.
**Step 3:** Once your search criteria are set, press the **Search** button. A list of results matching your search criteria will be returned in the **Class Search Results** page. [Note: The more restrictive your search, the faster this list will appear.]

**Step 4:** If searching before your registration appointment, note the 5-digit Class Number (**Class Nbr**) and meeting times of classes that you want to enroll in on the "**Course Planning Worksheet**" found at www.registrar.northwestern.edu/registration/. To view further information about a class on the search results list, click on the link provided in the section column. The **Class Detail** page appears.

**Add a Class**

**Step 1:** To add a class, click on the “Manage Classes” tile on the Student Homepage. The **NU Manage Classes** page appears.

**Step 2:** Click on "**Shopping Cart and Enroll**" from the left-hand menu. The **Shopping Cart - Add Classes to Shopping Cart** page appears.

**Step 3:** Enter a 5-digit class number in the **Class Nbr** field and press **Enter** (or press Search to access the Shopping Cart – Enter Search Criteria page to search and select a course). If the class has a related component(s), such as a discussion section(s) or lab, they will appear beneath the lecture component. [Note: You must register for discussion or lab sections with the lecture. You cannot register for labs and discussion sections independently.]

**Step 4:** The Enrollment Preferences page displays registration options available for the class(s) in which you are enrolling, which you may be able to modify depending on the class. If permission is required for this course, you will need to enter the permission number in the Class Permission Nbr field. If this is a variable credit course, you will need to enter the number of credits that you will receive for passing the class in the Units field. Finally, when multiple grading options are available, such as "P/Not Pass", the Grading field will allow you to elect the desired grading basis. You may also place a check mark in the "Wait list if class full box" to be placed on a waitlist if the course is full and maintains an online waitlist.

To proceed to the next step, press the Next button.
Step 5: You have now successfully added this class to your shopping cart. The Add Classes–Select classes to add page now displays the following message and the contents of your shopping cart:

![Shopping Cart Image]

Step 6: Repeat the steps above to add additional classes to your Shopping Cart or press the Proceed to Step 2 of 3 button to move to the confirmation stage of the enrollment process.

Step 7: The Add Classes–Confirm Classes page displays the classes you’ve selected from your shopping cart to add at this time. Confirm your selections and click the Finish Enrolling button.

Step 8: When your transactions have been processed, the Add Classes–View Results page appears. Successful enrollments will display a green checkmark next to the class, and unsuccessful enrollments will display a red X next to the class. If a class addition or swap is unsuccessful, Errors will be displayed in the Message field.

Step 9: Press the Add Another Class button to add another class or press the My Class Schedule button to view and print a copy of your class schedule. Confirm that your schedule is correct, press the Printer Friendly Page link in the lower right hand corner and then print a copy if you wish. [Alternately, you can navigate from the Main Menu by selecting Enrollment > View My Class Schedule.]

Drop a Class

Step 1: To Drop a class from your schedule click on the Enroll link from the Student Center. The Add Classes–Select Term page appears.
**Step 2:** Press the drop link. The Drop Classes–Select Term page appears.

**Step 3:** Select the term and press the Continue button. The Drop Classes–Select classes to drop page appears.

**Step 4:** Select the classes you wish to drop and press the Drop Selected Classes button. The Drop Classes–Confirm your selection page appears.

**Step 5:** Review the page to confirm the course(s) to drop. Press Finish Dropping to complete the drop transaction or press Cancel to exit without dropping your class(es). If the action is successful, CAESAR will display Success in the Message field. If the drop is unsuccessful, Errors will be displayed in the Message field. Press My Class Schedule to review your new schedule.

If there are any questions, please contact the Program Assistant at: 847-467-1573 or chad@northwestern.edu.
**Department of Neurobiology Seminar Series Attendance**

Most good scientists consider it important and valuable to regularly attend seminars and colloquia, even when the topic is not directly related to their own work. It is an easy way to stay in touch with fields that may not be familiar and, importantly, provides an opportunity to interact informally with colleagues.

To promote these habits and expose students to research beyond Northwestern University, students are required to attend a minimum of two department-hosted seminars each quarter, excluding the summer quarter. To document attendance, students are required to complete a brief statement indicating which seminars they attended (speaker name, institution, title, date) and a summary or critique of each seminar (no more than 1-2 paragraphs).

The **Online Seminar Attendance Summary** is due on the last Friday of the exam week for each quarter.

**Time in the Lab**

The research course will be 1 credit for the Winter Quarter and 2 credits for the Fall and Spring Quarters. The student will be spending on average at least **25-35** hours per week in the mentor’s laboratory (past evaluations suggest that it is typically more). The student is expected to design and perform experiments, attend any laboratory research meetings, attend any laboratory journal clubs, discuss ongoing projects with laboratory members, etc.

**Leave of Absence**

A student who needs to take a leave from the university (general leave, medical leave, family leave, or childbirth accommodation), must request an official leave of absence. Students should use the “Petition for Absence” form via TGS Forms in Caesar to apply for a leave of absence. The form is reviewed by both the MS program and TGS.
ONBOARDING

TGS provides orientation prior to the academic term. Below is some additional information you may find helpful in getting set up at the University.

**Housing**

**On-Campus Graduate Student Housing**

Engelhart Hall Apartments are open to all graduate students, their partners, and families. Recently renovated apartment units feature redesigned floor space and new kitchens with all new appliances. Staff is on-site.

For more information, visit Graduate Housing at: [http://www.northwestern.edu/living/housing-options/graduate-housing/index.html](http://www.northwestern.edu/living/housing-options/graduate-housing/index.html).

**Off-Campus Housing Options**

The Division of Student Affairs Off-Campus Housing Guide contains information and resources available to students living off-campus, from apartment hunting to being a good neighbor within the Chicago/Evanston and Northwestern communities.

Most students live in Evanston or the Chicago neighborhoods directly south of Evanston (Rogers Park, Edgewater, Ravenswood, Uptown). Free apartment finding resources include: Craigslist Chicago, Domu Chicago, The Apartment People, Chicago Apartment Finders, HotPads, and Chicago Padmapper.

**Tuition**

For detailed information about fees and tuition costs, visit the TGS tuition and fees page at: [http://www.northwestern.edu/sfs/tuition/graduate/the-graduate-school.html](http://www.northwestern.edu/sfs/tuition/graduate/the-graduate-school.html)

**Quarterly Billing and Payment Schedule**

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<tr>
<th>Term</th>
<th>eBill available</th>
<th>Online Payment deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td>August 10</td>
<td>September 1</td>
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<tr>
<td>Winter</td>
<td>December 10</td>
<td>January 1</td>
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<td>Spring</td>
<td>March 10</td>
<td>April 1</td>
</tr>
<tr>
<td>Summer</td>
<td>June 10</td>
<td>July 1</td>
</tr>
</tbody>
</table>

- AY 2017-18 Master’s Full-time Tuition: $17,413 per quarter
- Activity Fee: $125 per quarter (3 quarters)
- TGS 512: $100 per quarter
Financial Support

The master's program does not provide financial aid in the form of academic scholarships, assistantships, TA opportunities, or stipends.

Federal financial aid policies will not allow a student to borrow federal funds for more than 150% of the program length (i.e., the limit for federal financial aid is 18 months for a 12-month program). The NU Financial Aid office will contact student's that are registered for more than 18 months in the MS program and have federal financial aid.

CAESAR – Student Help Resources

Obtaining a Net-ID, Email, and Wildcard

NetID

Your NetID is your electronic identity at Northwestern. The most common format of a NetID is a combination of three letters (often related to your name) and three or four numbers. Your NetID is different from your seven-digit student/employee number.

You will use your NetID to access important University systems including, but not limited to:

- University email
- NU online directory
- NU Library online resources
- Grades and transcripts (CAESAR)
- Campus wireless network
- Off-campus access to the NU Network (VPN)

Your Net-ID should have been provided to you via email by NUIT. Please contact the department if you have yet to receive any notification.
Email at Northwestern

For more information visit: http://www.it.northwestern.edu/collaborate/how-to/e-mail.html

Northwestern University provides faculty and staff with a centrally hosted email service, available after activating a NetID. Most students are provided with an @u.northwestern.edu collaboration account upon NetID activation.

WildCard

For more information visit http://www.northwestern.edu/uservices/wildcard/

All students, faculty, and staff are issued a campus WildCard, the official Northwestern photo identification card. Other members of the Northwestern community are also eligible for NU ID Cards, including spouses.

The WildCard can be obtained in the basement of the Norris Center. You will need your Net-ID and a government issued photo ID such as a driver's license.

WildCard Access and Keys

Most Neurobiology labs require WildCARD authorization for access. Some labs may require you to be issued physical keys. For Neurobiology WildCard accesses and keys, please visit the Front Desk in Hogan 2-160 to pick up a Neurobiology Key & Wildcard Authorization form.

Health Services


All full-time Northwestern students are required to have health insurance coverage either through the Northwestern University Insurance Plan or the student’s own health insurance carrier. Those who elect to waive the NU Plan must ensure their health insurance meets the Northwestern University Standards.

Please refer to the site above to learn more about obtaining student health insurance as well as the policies under the NU Insurance Plan.

Transportation & Parking

- Northwestern University operates several shuttles for students, faculty and staff on the Evanston and Chicago campuses. A valid WildCard is required to ride the shuttles. For more information, visit:
  - http://www.northwestern.edu/uservices/transportation/shuttles/
- For information on Evanston campus parking visit:
  - http://www.northwestern.edu/up/parking/
- In addition to driving to Northwestern, there are several transportation options available to commuters. For more information on commuting visit:
  - http://www.northwestern.edu/uservices/transportation/commuter/index.html
• U-Pass: The Graduate School and CTA provide the CTA University Pass (U-Pass) to graduate students enrolled full-time in The Graduate School. This is not offered to students enrolled in TGS 512. For more information, visit:
  o http://www.tgs.northwestern.edu/campus-life/housing-transportation/u-pass.html

Mail
Mail that comes for you to the Neurobiology office will be placed in your own personal mailbox outside of the office. Mail should be directed to the following address:

Your Name
Department of Neurobiology
Northwestern University
2205 Tech Drive, Hogan 2-160
Evanston, IL 60208

Please do not have any personal letters or bills sent to the department office. Your mailbox is strictly for materials you will receive from the University or for letters, articles, etc. pertaining to your research and graduate studies. Also, the University Shipping and Receiving office has policies against sending personal packages to your University address – if you have a personal package, it is best to have it sent to your residence instead.

Intercampus mail and USPS mailboxes are located across the hall from the Neurobiology office (Hogan 2-108). Intercampus mail must be in intercampus envelopes and include name, department, building, campus, and mail code. Intercampus envelopes may be found in the Neurobiology suite in Hogan 2-160.

Research Safety
Safety is an important component of conducting proper scientific research. After you choose a research advisor, it is important that you register as a lab worker in their lab and take the required training in the Northwestern Safety Information System (NSIS). Your lab’s safety designate should be able to assist you in getting an account for NSIS in their lab.

TGS also provides introductory safety courses, the dates for these courses can be found in the Milestones section in the Appendix.

Animal Care and Use Committee (IACUC)

Office of Research Safety: http://www.research.northwestern.edu/ors/
IACUC: http://www.research.northwestern.edu/oprs/acuc/

If your research work will involve the use of vertebrate animal subjects or humans, it is important to get animal use approval as soon as possible. This can delay the start of your research if it is not done expediently.
The university holds many campus events that you as a student are entitled to attend. Most officially hosted events can be found on **PlanIt Purple**.

Norris University Center is another great resource for events and activities. They offer events such as Cinema in the Park or Norris at Night, rentals of bikes, hammocks and other outdoor equipment, mini courses, etc.

**Checklist for When You Arrive and Depart**

*When you arrive:*

- Obtain keys for your lab. You will need a Neurobiology Key & WildCard Authorization form.
- Receive departmental coffee mug
- Check mailbox (ask the Program Assistant where this will be located)
- Request to be added to pertinent listservs
- Have your picture taken for the bulletin board
- Safety Training (TGS has required training, and your lab may require additional training depending on your research)

*When you leave:*

- Notify the Neurobiology main office
- Return your lab keys (*Do not leave them in lab or give them to another lab member*)
DEGREE COMPLETION AND GRADUATION

Thesis Proposal
Students must successfully present and defend their thesis proposal. The thesis proposal is an oral presentation of relevant background, the scientific questions the student plans to address, and the experimental methods they plan to use. During the thesis proposal, the students:

1. Provide their committee with a scientific “roadmap,” explaining why the question they wish to address is important and what experiments they intend to perform to address the issue;
2. Demonstrate to their committee how they will conduct their experiments, how the data will be analyzed, and how their results will fit into the existing knowledge of the field;
3. Provide their committee the opportunity to give suggestions and guidance to hopefully avoid any delays in their research;
4. Complete the Master’s Thesis Proposal form. This form will be signed by members of the Thesis Committee at the end of a successful thesis proposal presentation and should be submitted to the Dept. of Neurobiology Office in Hogan 2-160.

Application for Degree
To participate in Commencement, graduate students must submit an Application for Degree to TGS. The form can be completed online through Caesar. This process is used to reserve the student’s spot in the Commencement ceremony. The spring graduation deadline for the Application for Degree is April 13th. Note: if you are unable to complete your thesis defense by the Spring Quarter but intend to participate in Commencement, you will still need to meet this deadline.

Login to Caesar, click on "Main Menu"-> "TGS Forms" and navigate to "Application for a Degree" form.

Students that do not complete all degree requirements before the TGS deadline for June graduation may still defend over the summer and can receive their degree after summer quarter.

TGS requires that students be registered as a student in the fall, winter, and spring quarters until they graduate. Students do not have to register over the summer but have the option of doing so, particularly if they are required to be a full-time student for loan or visa compliance. If a student has completed all the required MS program coursework and is only working on research and writing, they must register for TGS 512 during the non-summer quarters. Registration is $100 per quarter and must be paid by the student, per TGS rules.

Thesis Defense
To satisfactorily complete the program, all MS students must submit a written thesis and present an oral thesis defense to their committee. A style guide is provided for students
to use for formatting the written thesis. Students will also be given a Thesis Defense Checklist to help them prepare for the defense.

The student must also complete the Defense Approval Form in writing and the Master’s Completion form in CAESAR, and after their defense have each member of their committee sign the form. Both the written thesis and the Defense Approval form must be turned in before the Program Assistant can validate the MS Completion Form online. The thesis may be sent in PDF format. Note: Arranging a thesis defense requires coordinating your thesis committee members’ schedules and reserving a conference room. With this in mind, remember to plan well in advance!

Master’s Completion Form (TGS)
The following TGS forms are available to students on CAESAR:

- Application for Degree
- Master’s Degree Completion
- Petition for Absence

Once you submit a form on CAESAR, the information will be sent to the program for approval. Once approved, TGS will be notified and, barring any problems or holds, will also approve. You will receive emails notifying you of form submission and final approval.

Exit Survey
To help us monitor and improve the quality of our program, we ask our graduating students to complete the Neurobiology exit survey before leaving the University.

Neurobiology Exit Survey: https://weinberg.co1.qualtrics.com/jfe/form/SV_d456pGuDr9CV71z
CONFLICT RESOLUTION

TGS realizes that conflicts emerge occasionally, and they have devised the following guidelines for students for the chain of communication when dealing with different types of conflicts.

Conflicts Not Involving Discrimination, Harassment, or Sexual Harassment

When a conflict arises, whether with a student’s advisor, a fellow student, or someone else in the University, TGS recommends that students first talk to one of the program directors. One function of the program directors is to address student concerns and grievances and to be available when students are experiencing academic difficulty. If a student is unsure who his or her program director is, please contact TGS. This information is also located in the beginning of this Handbook.

If the Director and/or Associate Director has a conflict of interest, the Chair of the student’s department is the next resource. In the case that a student cannot or does not want to speak with anyone in the program or department, the next resource is TGS. In TGS, the Associate Dean for Student Affairs handles student conflict issues and works directly with the academic school Associate Deans and faculty, as needed.

The program directors, department chairs, TGS staff, and TGS Deans can treat students’ concerns confidentially unless the concerns involve sexual harassment, discrimination, or a safety issue, in which case they are obligated to report the issue to the appropriate University office.

Conflicts Involving Discrimination and Harassment

Harassment, whether verbal, physical, or visual, that is based on race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship, or veteran status is a form of discrimination. Discrimination and harassment complaints should be referred to the Office of Equal Opportunity and Access.

Sexual Harassment

It is the policy of Northwestern University that no member of the Northwestern community - students, faculty, administrators, staff, vendors, contractors, or third parties - may sexually harass any other member of the community. For information or assistance regarding a sexual harassment complaint, please see the University’s Sexual Harassment Policy.

Office of Equal Opportunity and Access: http://www.northwestern.edu/hr/eeo/

Sexual Harassment Policy: http://www.northwestern.edu/sexual-misconduct/title-IX/index.html
Milestone Dates for Academic Year 2018-19

**September**
- **Saturday, September 1, 2018**: Fall Tuition Due
- **Monday, September 17, 2018**: TGS Graduate Student Orientation
- **Monday, September 24, 2018**: New Graduate Student Fall Registration begins 9 a.m.
- **Wednesday, September 25, 2018**: MS in Neurobiology Orientation
- **Thursday, September 27, 2018**: Change of Registration (Drop/Add)/Late registration for returning students begins
- **Thursday, September 27, 2018**: Fall classes begin 8 a.m.

**October**
- **Wednesday, October 3, 2018**: Last day for students in The Graduate School to change grading status from grade to P-N or vice versa for Fall Quarter
- **Wednesday, October 3, 2018**: Last day to add a class or change a section for Spring
- **Wednesday, October 3, 2018**: Last day to change status to or from part time with tuition adjustment
- **Wednesday, October 3, 2018**: No reductions are made to bills for dropped or swapped classes after this date. Last day for a tuition refund
- **Friday, October 19, 2018**: Student Adviser Agreement Form Due
- **Monday, October 29, 2018**: Winter quarter courses viewable for students in CAESAR

**November**
- **Friday, November 2, 2018**: Application for a degree due to The Graduate School to receive a degree in Fall
- **Friday, November 2, 2018**: Last day to drop a class for Fall. (No tuition adjustment after October 3)
- **Monday, November 12, 2018**: Registration for Winter 2019 begins
- **Wednesday, November 21, 2018**: Thanksgiving vacation begins 6 p.m.
- **Thursday, November 22, 2018**: Thanksgiving day
- **Monday, November 26, 2018**: Fall Classes resume 8 a.m.

**December**
- **Monday, December 3, 2018** - **Friday, December 7, 2018**: Fall Quarterly Progress Meetings with the Program Directors
- **Monday, December 3, 2018**: WCAS Reading Period begins
- **Friday, December 7, 2018**: Master's completion form due for TGS Fall master's candidates
- **Saturday, December 8, 2018**: Fall classes end
- **Sunday, December 9, 2018**: WCAS Reading Period ends
- **Monday, December 10, 2018**: Fall examinations begin
- **Friday, December 14, 2018**: Seminar Attendance Summaries Due
- **Saturday, December 15, 2018**: Fall examinations end
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>Saturday, December 15, 2018</td>
<td>Winter Break Begins</td>
</tr>
<tr>
<td>Monday, December 17, 2018</td>
<td>Fall grades due at 3 p.m.</td>
</tr>
<tr>
<td>Friday, December 21, 2018</td>
<td>Fall Degrees Conferred</td>
</tr>
<tr>
<td><strong>January</strong></td>
<td></td>
</tr>
<tr>
<td>Tuesday, January 1, 2019</td>
<td>Winter Tuition Due</td>
</tr>
<tr>
<td>Monday, January 7, 2019</td>
<td>Winter Change of Registration (Drop/Add)/Late registration begins</td>
</tr>
<tr>
<td>Monday, January 7, 2019</td>
<td>Winter Classes begin 8 a.m.</td>
</tr>
<tr>
<td>Monday, January 7, 2019</td>
<td>Winter Recess ends</td>
</tr>
<tr>
<td>Friday, January 11, 2019</td>
<td>Last day for students in The Graduate School to change grading status from grade to P-N or vice versa for Winter Quarter</td>
</tr>
<tr>
<td>Friday, January 11, 2019</td>
<td>Last day to add a class or change a section for Winter</td>
</tr>
<tr>
<td>Friday, January 11, 2019</td>
<td>Last day to change status to or from part time with tuition adjustment</td>
</tr>
<tr>
<td>Friday, January 11, 2019</td>
<td>No reductions are made to bills for dropped or swapped classes after this date. Last day for a tuition refund</td>
</tr>
<tr>
<td>Monday, January 21, 2019</td>
<td>Suspension of classes for observance of Martin Luther King Jr. Day</td>
</tr>
<tr>
<td><strong>February</strong></td>
<td></td>
</tr>
<tr>
<td>Friday, February 8, 2019</td>
<td>Application for a degree due to The Graduate School to receive a degree in Winter</td>
</tr>
<tr>
<td>Monday, February 11, 2019</td>
<td>Spring quarter courses viewable for students in CAESAR</td>
</tr>
<tr>
<td>Friday, February 15, 2019</td>
<td>Last day to drop a class for Winter. (No tuition adjustment after January 11)</td>
</tr>
<tr>
<td><strong>March</strong></td>
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<tr>
<td>Tuesday, March 12, 2019</td>
<td>WCAS Reading Period Begins</td>
</tr>
<tr>
<td>Friday, March 15, 2019</td>
<td>Master's completion form due for TGS Winter master's candidates</td>
</tr>
<tr>
<td>Saturday, March 16, 2019</td>
<td>Winter Classes End</td>
</tr>
<tr>
<td><strong>Monday, March 11, 2019</strong></td>
<td>Winter Quarterly Progress meetings with the Program Directors</td>
</tr>
<tr>
<td><strong>Friday, March 15, 2019</strong></td>
<td></td>
</tr>
<tr>
<td>Sunday, March 17, 2019</td>
<td>WCAS Reading Period ends</td>
</tr>
<tr>
<td>Monday, March 18, 2019</td>
<td>Winter Examinations Begin</td>
</tr>
<tr>
<td><strong>Friday, March 22, 2019</strong></td>
<td>Seminar Attendance Summaries Due</td>
</tr>
<tr>
<td>Saturday, March 23, 2019</td>
<td>Spring Break Begins</td>
</tr>
<tr>
<td>Saturday, March 23, 2019</td>
<td>Winter examinations end</td>
</tr>
<tr>
<td>Monday, March 25, 2019</td>
<td>Winter grades due at 3 p.m.</td>
</tr>
<tr>
<td>Friday, March 29, 2019</td>
<td>Winter Degrees Conferred</td>
</tr>
<tr>
<td><strong>April</strong></td>
<td></td>
</tr>
<tr>
<td>Monday, April 1, 2019</td>
<td>Spring Break Ends</td>
</tr>
<tr>
<td>Monday, April 1, 2019</td>
<td>Spring Change of Registration (Drop/Add)/Late registration begins</td>
</tr>
<tr>
<td>Monday, April 1, 2019</td>
<td>Spring Classes begin 8 a.m.</td>
</tr>
<tr>
<td>Monday, April 1, 2019</td>
<td>Spring Tuition due</td>
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<tr>
<td>Date</td>
<td>Event</td>
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</tr>
<tr>
<td>Friday, April 5, 2019</td>
<td>Last day for students in The Graduate School to change grading status from grade to P-N or vice versa for Spring Quarter</td>
</tr>
<tr>
<td>Friday, April 5, 2019</td>
<td>Last day to add a class or change a section for Spring</td>
</tr>
<tr>
<td>Friday, April 5, 2019</td>
<td>Last day to change status to or from part time with tuition adjustment</td>
</tr>
<tr>
<td>Friday, April 5, 2019</td>
<td>No reductions are made to bills for dropped or swapped classes after this date. Last day for a tuition refund</td>
</tr>
<tr>
<td>Monday, April 8, 2019</td>
<td>Summer quarter courses viewable for students in CAESAR</td>
</tr>
<tr>
<td>Friday, April 13, 2019</td>
<td><strong>Application for a degree due to The Graduate School to receive a degree in Spring</strong></td>
</tr>
<tr>
<td>Monday, April 15, 2019</td>
<td>Registration for Summer Session 2019 begins</td>
</tr>
<tr>
<td>Friday, April 19, 2019</td>
<td>Last day for undergraduates to change grading status from grade to P-N or vice versa for Spring</td>
</tr>
<tr>
<td>Saturday, April 20, 2019</td>
<td>Passover begins</td>
</tr>
<tr>
<td>Sunday, April 21, 2019</td>
<td>Easter</td>
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**May**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday, May 6, 2019</td>
<td>Fall quarter courses viewable for students in CAESAR</td>
</tr>
<tr>
<td>Friday, May 10, 2019</td>
<td>Last day to drop a class for Spring. (No tuition adjustment after April 8)</td>
</tr>
<tr>
<td><strong>Friday, May 17, 2019</strong></td>
<td><strong>Completed Thesis Defense Form Due</strong></td>
</tr>
<tr>
<td><strong>Friday, May 17, 2019</strong></td>
<td><strong>Master's completion form due for TGS Spring master's candidates</strong></td>
</tr>
<tr>
<td>Monday, May 27, 2019</td>
<td>Memorial Day (no classes)</td>
</tr>
</tbody>
</table>

**June**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, June 1, 2019</td>
<td>Summer Tuition due</td>
</tr>
<tr>
<td><strong>Monday, June 3, 2019</strong>-<strong>Friday, June 7, 2019</strong></td>
<td><strong>Spring Quarterly Progress Meetings with the Program Directors</strong></td>
</tr>
<tr>
<td>Tuesday, June 4, 2019</td>
<td>WCAS Reading Period begins</td>
</tr>
<tr>
<td>Saturday, June 8, 2019</td>
<td>Spring classes end</td>
</tr>
<tr>
<td>Sunday, June 9, 2019</td>
<td>WCAS Reading Period ends</td>
</tr>
<tr>
<td>Monday, June 10, 2019</td>
<td>Spring examinations begin</td>
</tr>
<tr>
<td><strong>Friday, June 14, 2019</strong></td>
<td><strong>Seminar Attendance Summaries Due</strong></td>
</tr>
<tr>
<td>Saturday, June 15, 2019</td>
<td>Spring examinations end</td>
</tr>
<tr>
<td>Monday, June 17, 2019</td>
<td>Spring Grades Due at 3 p.m.</td>
</tr>
<tr>
<td>Friday, June 21, 2019</td>
<td>Commencement</td>
</tr>
<tr>
<td>Friday, June 21, 2019</td>
<td>Spring Degrees Confirmed</td>
</tr>
<tr>
<td>Monday, June 24, 2019</td>
<td>Summer Change of Registration (Drop/Add)/Late registration begins</td>
</tr>
<tr>
<td>Monday, June 24, 2019</td>
<td>Summer Classes Begin</td>
</tr>
</tbody>
</table>

**July**

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday, July 4, 2019</td>
<td>Independence Day (no classes)</td>
</tr>
<tr>
<td><strong>Friday, July 19, 2019</strong></td>
<td><strong>Application for a Degree due to The Graduate School to receive a degree in Summer</strong></td>
</tr>
</tbody>
</table>

**August**
<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>Saturday, August 3, 2019</td>
<td>Six-week session ends</td>
</tr>
<tr>
<td>Friday, August 16, 2019</td>
<td>Completed Thesis Defense Form Due</td>
</tr>
<tr>
<td>Friday, August 16, 2019</td>
<td>Master's completion form due for TGS Summer master's candidates</td>
</tr>
<tr>
<td><strong>September</strong></td>
<td></td>
</tr>
<tr>
<td>Friday, September 6, 2019</td>
<td>Summer Degrees Conferred</td>
</tr>
</tbody>
</table>
Dissertation Guidelines

ARRANGEMENT OF THE DISSERTATION:

Each dissertation must be arranged in the following order. Specific information about each section is on the following pages. Italicized pages are optional.

- Title Page
- Copyright Page (optional)
- Abstract
- Acknowledgment page (optional)
- Preface (optional)
- List of abbreviations (optional)
- Glossary (optional)
- Nomenclature (optional)
- Dedication (optional)
- Table of Contents
- Lists of Tables, Illustrations, Figures, or Graphs
- Introduction
- Text body (divided into chapters following a logical outline)
- Tables, Illustrations, Figures, Graphs: If not incorporated into the main body of the text, these items should immediately follow the text, not at the end of chapters.
- References
- Appendices (optional)
- Vita (optional)
FORMATTING AND LAYOUT REQUIREMENTS:

PAGE SIZE
- Page size should be 8.50 x 11.00 inches, standard US Letter size.

MARGINS
- 1 inch on all sides, including page numbers.
- Page numbers should be at least 1 inch from the top and right-hand edges of the page.

SPACING
- The preliminary pages and text must be double spaced.
- Under certain conditions, quotations may be single spaced, if recommended by an approved style manual.
- Table of Contents and lists with lengthy entries may be single spaced with a double space between entries.
- References may be single spaced, with a double space between entries.

PAGINATION
- Every page in a dissertation is numbered, except the title page.
- Page numbering will begin on the second page with Arabic numeral 2 in the upper right-hand corner of the page.
- No empty pages
- On pages of the dissertation that are formatted with landscape orientation, the page number must appear in the upper right-hand corner when the page is rotated to portrait orientation.
NORTHERN UNIVERSITY

{TITLE; e.g., Title of Dissertation in Title Case Goes Here}

A DISSERTATION

SUBMITTED TO THE DEPARTMENT IN PARTIAL FULFILLMENT OF THE REQUIREMENTS

for the degree

MASTER OF SCIENCE

Field of NEUROBIOLOGY

By

{Full Name}

EVANSTON, ILLINOIS

{Month and year of degree conferral – ask MS program if not sure}
DISSERTATION TITLE GUIDELINES
Dissertations are a valuable resource for other scholars only if they can be easily located. Modern retrieval systems generally use the words in the title to locate a document. It is essential that the title be an accurate and meaningful description of the content and that obscure references be avoided. Please use these guidelines when formulating a dissertation title:

**CASE:** The first and last words and all nouns, pronouns, adjectives, verbs, and adverbs (if, because, as, that, etc.) are capitalized. Articles (a, an, the), coordinating conjunctions (and, but, or, for, nor), and prepositions, regardless of length, are lowercased unless they are the first or last word of the title or subtitle. Only acronyms should be set in full capitals.

Examples:
- Power and Consumer Behavior
- Outpatient Treatment for Children: Organizational Practices as Predictors of Recovery
- A Comparison of the Methodologies for Determining Achievement in High School

**HYPHENATION:** Consult the dictionary as to whether a word is hyphenated. In general, do not hyphenate words beginning with the prefixes co, non, pre, post, or re unless there is a possibility of confusion (co-op, post-master's) or the root word begins with a capital letter (post-Renaissance). Hyphenate words beginning with the prefix self. Hyphenate compounds used as adjectives (decision-making) but not as nouns (decision maker). Part-time is always hyphenated. When more than one prefix is joined to a base word, hyphenate the prefixes standing alone (micro- and macroeconomics). Do not hyphenate fundraising, freelance, yearlong, health care, African American, Asian American.

Examples:
- Great Nonfiction Works of the Nineteenth Century (Instead of: Great Non-fiction Works of the 19th Century)

**SPELLING AND GRAMMAR:** Dissertation titles should be spell-checked and dictionary spelling of words should be used. Use “and” rather than “&,” and spell out names of centuries and other numbers usually spelled out in text.

Example: The Labour Party in Perspective and Twelve Years Later

**SPECIAL CHARACTERS:** No special characters should appear in the dissertation title (SES/CAESAR cannot accommodate special characters). Terms or phrases that include special characters should instead be written out.

Examples:
- Evaluation of DNA Hybridization and Cleavage Capabilities of Peptide Nucleic Acid-Titanium Dioxide (instead of: Evaluation of DNA Hybridization and Cleavage Capabilities of PNA-TiO2)
- The Role of TGF-beta Variants in Cancer (instead of: The Role of TGF-β Variants in Cancer)
ITALICIZATION: Italics should only be used in dissertation titles when referring to the title of a published work, foreign language words, gene names, scientific names as appropriate, or other words that are usually italicized.

Examples:

- Techniques in *Drosophila* Circadian Biology
- Mechanisms of Differentiated Cell Function *in vitro*

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ABSTRACT
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• The abstract should provide an accurate summary of the contents of the dissertation, including a statement of the problem, the procedures or methods used, the results, and the conclusions.
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OPTIONAL PREFATORY PAGES
• Acknowledgment page
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• List of abbreviations
• Glossary
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TABLE OF CONTENTS
• The format of the table of contents should conform to the guidelines in an approved style manual.
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LISTS OF TABLES, ILLUSTRATIONS, FIGURES, OR GRAPHS
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INTRODUCTION
• This optional section should provide an overview of the dissertation and the research problem that is being addressed. It should also indicate how the research and argument presented will contribute to scholarship in the field.

BODY OF THE TEXT
• Chapters should follow a logical outline, with a clear distinction between chapters, main heads within chapters, and subordinate heads within the main heads.
• The outline and organization of the main body of the text should be accurately reflected in the table of contents.
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• If not incorporated into the main body of the text, these items should immediately follow the text, not at the end of chapters.
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• All text and fonts on figures and legends must be the same and consistent throughout the entire thesis. Legends should be blocked and numbered independently. Below is an example of a table and a figure.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Volume of Tissue Analyzed (µm³)</th>
<th>Number of Inhibitory Varicosities Reconstructed</th>
<th>Density of Inhibitory Varicosities (1/µm³)</th>
<th>Average Volume of Inhibitory Varicosities (µm³)</th>
<th>Proportion of Inhibitory Varicosities that Contain Mitochondria</th>
<th>Average Number of Synapses per Inhibitory Varicosity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil (n = 4)</td>
<td>176 ± 12</td>
<td>27.5 ± 2.9</td>
<td>0.17 ± 0.01</td>
<td>0.28 ± 0.03</td>
<td>0.77 ± 0.05</td>
<td>1.26 ± 0.11</td>
</tr>
<tr>
<td>Mean ± SEM</td>
<td>141 - 195</td>
<td>21 - 35</td>
<td>0.12 – 0.19</td>
<td>0.01 – 1.41</td>
<td>0.69 – 0.86</td>
<td>0 - 6</td>
</tr>
<tr>
<td>Range</td>
<td>180 ± 11</td>
<td>27.3 ± 4.4</td>
<td>0.15 ± 0.02</td>
<td>0.34 ± 0.02</td>
<td>0.80 ± 0.05</td>
<td>1.20 ± 0.09</td>
</tr>
<tr>
<td>Estradiol (n = 4)</td>
<td>154 - 202</td>
<td>17 - 35</td>
<td>0.10 – 0.19</td>
<td>0.04 – 1.35</td>
<td>0.65 – 0.88</td>
<td>0 - 7</td>
</tr>
</tbody>
</table>

Table 1. Tissue analyzed in the pyramidal cell layer from oil and estradiol treated rats did not statistically differ. Between oil and estradiol groups, tissue did not differ on the basis of the volume of tissue analyzed, number of inhibitory varicosities reconstructed, density of inhibitory varicosities, average volume of inhibitory varicosities, proportion of inhibitory varicosities that contain mitochondria, or average number of synaptic contacts per inhibitory varicosity (all p values > 0.10).
Figure 4.  
A, Electron micrograph of a DCV in an inhibitory varicosity in the pyramidal cell layer. The image in panel A is the same as that shown in Fig. 1. B, Use of Reconstruct software to trace a subset of serial electron micrographs (1-15) from a total of 32 sections for an inhibitory varicosity that originates as an axon, develops into a bouton, and terminates as an axon (green), the mitochondrion (blue), synapses (red), and DCV (magenta) contained within the varicosity are additionally traced. C, Two views of three dimensional reconstructions for the traced varicosity and associated mitochondrion, synapses, and DCV.
REFERENCES

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Example:

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Example:

APPENDICES (optional)

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- It is recommended that each copy of the dissertation include a brief vita containing the author's name, place of birth, education, relevant professional experience, and publications. The vita page is numbered.

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We agree to work together as Research Advisor and student on an independent research project for the academic year.

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☐ Schedule a date with your committee. Make sure you reserve a room using the online Life Sciences Scheduler, which can be done through the Program Assistant. If the room you are using does not have a built-in projector, be sure to reserve a projector too.

☐ PROVIDE A COPY OF YOUR THESIS TO YOUR COMMITTEE AT LEAST ONE WEEK BEFORE YOUR DEFENSE.

☐ Before your thesis defense date, go to the Neurobiology front office and get the MS Thesis Signature form. After your committee has approved your thesis and defense, have them sign the form. Fill out the rest of the information, and return the form to the MS Program Assistant.

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☐ Complete the exit survey via Qualtrics.

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CONGRATULATIONS!