

**UNIVERSITY OF FLORIDA**  
**COLLEGE OF MEDICINE SYLLABUS**  
**NEUROSCIENCE**

**Organization and Development of the Nervous System (GMS6021: 2 credit hours)**

Semester: Fall 2023

Delivery Format: Online

Instructor Names: Matt Sarkisian PhD, Marieta Heaton PhD

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Office Hours: Arranged by student request

Graduate Assistant: n/a

Preferred Course Communications: Email

Prerequisites : While not required, students in this course should have a basic understanding of cell biology and preferably have taken an introductory course in neuroscience (e.g. GMS6007).

Advanced undergraduate students may inquire about registration.

### **Course Overview**

This course (GMS6021) is organized into ten modules, each of which covers key areas of Developmental Neuroscience. Each module includes reading assignments, Voice Thread (VT) lectures, self-check quizzes, and Module tests. Our goal is to help you to obtain a working knowledge of the field of Developmental Neuroscience that will allow you to appreciate the significance of questions and emerging findings in this field and enable you to pursue more in-depth studies of specific topics in this field.

### **Relation to Program Outcomes**

This course has been designed to provide a foundation in Developmental Neurosciences for MS and PhD graduate students pursuing a Neuroscience-related degree, as well as students enrolled in the online UF Biomedical Neuroscience Certificate and Masters Degree program. Graduate students in other UF colleges and interested advanced undergraduate students are encouraged to inquire about registration.

### **Course Objectives and Goals**

In this course, we will examine the basic principles underlying the development and organization of the nervous system. The objective of the course is to assist you in understanding the fundamental processes underlying brain development. At the end of this course you will be able to answer the following questions:

- How and where does the nervous system originate?
- How are the cell types that constitute the nervous system generated?
- How do progenitors know which cell type to become?
- How do progenitors find and reach their appropriate location in the brain?
- How do maturing neurons form synaptic connections?
- What are the limits of plasticity in the brain?

## Instructional Methods

This is a semester course. It is divided into 10 modules. You will be completing one module each week, each of which covers a specific topic within the field of Developmental Neuroscience. Each module is broken down into 3-7 subunits in an effort to improve your ability to access and understand the information contained in each module. This online course has been designed to allow you maximum flexibility over your learning experience. Face-to-face can be scheduled with the instructors as needed.

Each unit contains a reading assignment, a video lecture in VoiceThread format, and a self-check quiz that will allow you to determine how well you have understood the material presented in the unit. Each VoiceThread lecture is ~10-15 min in duration but can be easily viewed slide-by-slide. You will complete the ten modules sequentially, and each module will be considered complete when you have taken the unit self-check quizzes and the final module tests.

The self-check quizzes, which are due each Friday at 11:59 pm, will constitute 15% of your grade and module tests will constitute 50% of your final grade. The remaining 35% of the final grade will be derived from the two Beyond-the-Basics assignments. For each Beyond-the-Basics assignment, you will write an 800-1000 word essay on a specific topic you will select. We will evaluate the quality and content of your essays using grading rubrics that will be available to you as guides for your work on these assignments.

### ***How to succeed in this online course***

First, you need to be aware that online learning poses its own unique challenges. Because the online classroom is available to you 24 hours a day it is easy to delay work on course material, to forget deadlines, and to fail to put sufficient time into your studies to perform well on exams. These challenges are exacerbated when a student is not a 'self-starter' or does not possess good time management skills, including use of reminders.

Unlike traditional instructional settings in which each student goes to the same class, the online setting enables every student to “create” the class of his or her choosing. In theory, this type of instruction should be more adaptable to a variety of learning styles; however, the reality is that some students have not yet determined what their optimal learning style is.

It is our observation that poor performance in online courses is often directly linked to poor time management (trying to do a week’s worth of work just before the deadline). Rushing to complete assignments before the 11:59 pm deadlines on either Friday or Sunday is NOT a good strategy for success. In doing this you forfeit your opportunity to ask questions about material you do not understand. Being able to ask questions both on the lecture slides and on the module question discussion boards and receive answers from the instructors in a timely manner is a terrific feature of online learning. Completing the self-check quizzes during the work week can help you to identify subject matter that is not clear to you. In general, we answer your posted questions within 12-24 hours of your posting – often much more quickly. Questions posted on Sundays may not be answered before you take your exams that are due at 11:59 pm on Sunday.

You are expected to adhere to the posted assignment deadlines; however, you should note that the assignments, quizzes, and tests associated with each Module can be completed at your own pace over the course of each week. The self-check quizzes associated with each Module are due Fridays at 11:59 pm and the tests associated with each Module are due Sundays at 11:59 pm.

### Description of Course Content:

Week	Date(s)	Topic(s)	Readings
1		Start Module : Course Introduction, Voice Thread Tutorial, Course Handbook, Syllabus and Deadlines	
2		<b>Module 1: The mature human brain</b> Unit 1: major structures of the human brain; Unit 2: major structures of the human spinal cord; Unit 3: Cells of the nervous system	Assigned readings from online/linked chapters

3		<p><b>Module 2: Neural Induction</b> Unit 1: Gastrulation and Neurulation; Unit 2: The molecular nature of the neural inducer</p>	<p>Chptr 1, Sanes, Reh and Harris (4th Edition) Stern, CD (2005) Neural induction: old problem, new findings, yet more questions. <i>Development</i>, 132:2007-2021.</p>
4		<p><b>Module 3: Neural Patterning</b> Unit 1: Establishment of the Embryo Axes; Unit 2: Organizing centers in the developing brain; Unit 3: Neural crest</p>	<p>Chapter 2 - Sanes, Reh and Harris (4th edition) pg 27-34, 37-39, 44-47. Chapters 2-4 Sanes, Reh and Harris (4th edition) pg 47-49, 74-77, 99-102.</p>
5		<p><b>Module 4: Neurogenesis and Gliogenesis</b> Unit 1: Importance of neurogenesis and gliogenesis, Unit 2: Acquisition of cell fate during proliferation; Unit 3: Proliferation of neural progenitors in the neural tube; Unit 4: Differentiation of radial glia and ordered birth of neurons; Unit 5: Postnatal/adult neurogenesis; Unit 6 Differentiation of glial cell subtypes</p>	<p>Chapter 1 - pg 18-23, Chapter 3 pg 55-65, and Chapter 4 , pg 91-99, in Sanes, Reh and Harris (4th edition).</p>
6		<p><b>Module 5: Neural Migration</b> Unit 1: Introduction and neural crest migration; Unit 2: Neuron migration in the cerebellum, Unit 3: Radial migration in the cerebral cortex, Unit 4: Cortical and olfactory bulb histogenesis, Unit 5: Genetic defects affecting neuronal migration, Unit 6: Tools</p>	<p>Chapter 3 - pg 58-81 in Sanes, Reh and Harris (4th edition).</p>

		to explore gene function during neuronal migration	
7		<b>Module 6: Neural Differentiation</b> Unit 1: Spatiotemporal generation of neurons, Unit 2: Environmental and genetic influences on neural differentiation, Unit 3: Specification of cortical areas, Unit 4: Patterning and establishment of brain maps, Unit 5: Glial nature of neural differentiation	Chapter 4 -pg 85-89 and 99-114 in Sanes, Reh and Harris (4th edition).
8-9		<b>Beyond the Basics 1: Essay 1 submission</b>	Assigned primary research articles (may vary semester to semester)
10		<b>Module 7: Axon Growth and Pathfinding</b> Unit 1: Growth cones Unit 2: Guidance cues, Unit 3: Complex axon growth	Chapter 5 - pg 119-131, 131-146, 146-152 in Sanes, Reh and Harris (4th edition)
11		<b>Module 8: Target Selection and Synaptogenesis</b> Unit 1: Target selection Unit 2: Topographic mapping, Unit 3: Synaptogenesis	Chapter 6 - pg 159-164, 164-177, 177-188, 227-251 in Sanes, Reh and Harris (4th edition).
12		<b>Module 9: Regulation of Neuron Survival</b> Unit 1: Recognizing and removing dying cells, Unit 2: Role of cell death in shaping CNS morphology, Unit 3: Relationship between neural cell survival and target-derived trophic support, Unit 4: Activity-dependent nature of neural cell death	Chapter 7 - pg 195-219 in Sanes, Reh and Harris (4th edition).

13		<b>Module 10: Refinement of Synaptic Connections</b> Unit 1: Activity dependent refinement of synapses, Unit 2: Critical periods, Unit 3: Molecular mechanisms underlying critical periods	Chapter 9 - pg 269-288 in Sanes, Reh and Harris (4th edition) Chapter 9 - pg 288-292 and Chapter 10 pg 328-335 in Sanes, Reh and Harris (4th edition). Assigned research articles
14-15		<b>Beyond the Basics 2: Essay 12 submission</b>	Assigned primary research articles (may vary semester to semester)

### Course Materials and Technology:

#### Reading Material

Required textbook: Sanes, Reh, and Harris (2019) **Development of the Nervous System** Fourth Edition Elsevier ISBN: 978-0-12-8040287

#### Required technology

- Laptop or desktop computer equipped with microphone and video camera. A microphone and video camera may be used to post comments to VoiceThread and for online Face-2-Face meetings if requested.
  - a. There is a Canvas app that can be used to access the course.
  - b. There are VoiceThread apps that are available for iOS and Android devices that can be used to view and post comments on VTs. While these portable devices are excellent for watching lectures and asking questions, we strongly recommend that you use laptop or desktop computers when working on this course.
- High speed, broadband internet connection such as DSL or cable. We highly recommend that you use a broadband, stable Internet connection when taking exams.
  - c. SPECIAL NOTE: Some users with satellite Internet service may find their online courses do not load quickly or consistently due to satellite network issues.
- Installation of LockDown Browser on computer that you will use for taking tests for this course. The computer you use to take exams should be “hard wired” to the internet.

WiFi is not stable enough to support a reliable connection and can result in poor performance of the LockDown Browser.

- It is highly recommended that you work with Canvas and VT through the **Firefox or Chrome Browsers**. For specific questions about browser compatibilities and general questions about e-learning at UF please visit <https://wiki.helpdesk.ufl.edu/FAQs/E-Learning>.
- You will also need to insure that you have the **most recent version of Adobe Flash player** installed on your computer. Adobe Flash player can be downloaded from [this website](#).

For additional technical support for this class, please contact the UF Help Desk at:

- [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu)
- (352) 392-HELP - select option 2
- [UF eLearning](#)

## Academic Requirements and Grading

### Assignments and Grading

For each of the 10 modules, students will complete 2-6 self-check unit quizzes and a two-part module test (exception is that module 1 has a single test). Self-check quizzes are due each Friday by 11:59 pm and tests are due each Sunday at 11:59 pm.

Each Module test consists of two separately timed parts: the Module test and the Module Essay test. The Module tests consist of T/F, multiple choice, matching, fill-in-the-blank, and multiple answer questions. The Module Essay tests consist of short essay questions. Both of these tests are timed and the questions will be randomized. **You will use LockDown Browser to access and take all unit self-check quizzes and tests in this course.** Importantly, the time limit for completing each exam starts when you start the exam. *If you begin a 40 min exam 20 minutes before it is due, you will be given only 20 min to complete the exam because it automatically submits your exam when it is due.*

**We highly recommend that you take the online tests during UF Help Desk hours whenever possible so that you can obtain assistance if needed and that you do not use a slow internet connection.**

The scores from the self-check quizzes will be weighted to represent 15% of your grade and the module test scores will be weighted to represent 50% of your course grade. The remaining 35% of your course grade will come from two Beyond-the-Basics assignments that will be completed mid-way through the course and at the end of the course. You will be given grading rubrics for these assignments so that you will understand what is required to successfully complete these assignments and how they will be evaluated.

### **Weighting of course assignments (% of final grade)**

Unit Self-check quizzes: 15% Grade

Module tests: 50% Grade

Beyond-the-Basics Assignments: 35% Grade

### ***Assignments, quizzes and tests will not be accepted late.***

All self-check quizzes for a module are due Fridays at 11:59 pm. You will be able to view the correct answers for all quizzes that you submit for 24 hours starting at 12:01 am on the Saturday following the Friday on which they are due. Self-check quizzes not completed by the Friday 11:59 deadline will result in zeros for those quizzes.

As a rule, unless you have a medical excuse or a confirmed family emergency with appropriate documentation, we will not accept late assignments, quizzes, and tests. We recognize that personal circumstances arise that may interfere with your ability to meet a deadline. If this occurs, please let us know as soon as you know – preferably a minimum of 24 hrs prior to the deadline. We will not be receptive to retrospective requests for deadline extensions. Your emails will be responded to within 24 business hours (typically sooner).

If you encounter computer technical difficulties, be sure to include a UF helpdesk ticket number in your request for a deadline extension if you plan to request one. The extension request **MUST** be submitted within 24 hours of the technical difficulty.

### **Grading scale**

A letter grade will be given at the end of the course that will reflect the weighted percentages of the points you have earned:

93-100% = A

90-92%= A-

87-89% = B+

83-86% = B



80-82% = B-

77-79% = C+

73-76% = C

70-72% = C-

67-69% = D+

63-66% = D

<63% =E

### **Exam Policy:**

Students will be expected to complete all requirements for one module each week. There will be no deadline extensions for completion of a module unless granted by the course directors prior to the scheduled completion date. You will receive zeros for failure to submit module self-check quizzes or module tests by their deadlines in the absence of an approved excuse.

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

### **Policy Related to Required Class Attendance:**

This course is entirely online and is asynchronous. Thus there is no formal class attendance policy. Requirements for make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Excused absences must be consistent with university policies in the Graduate Catalog (<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#attendance>). Additional information can be found here:

<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

### **Expectations Regarding Course Behavior:**

#### **Communication Guidelines**

## **WHEN DO I CONTACT THE UF HELPDESK?**

In the event that you have **technical difficulties with E-learning**, please contact the UF helpdesk at [learning-support@ufl.edu](mailto:learning-support@ufl.edu), or (352) 392-4357 - select option 2. If your technical difficulties will cause you to miss a due date, you **MUST** report the problem to E-learning. Include the ticket number that you are given in an e-mail to the instructor to explain the late assignment/quiz/test.

Types of questions that should be directed to the Help Desk:

1. I can't log into E-learning
2. I have clicked on the "submit" button for my quiz and nothing is happening
3. I can't upload an assignment (be sure that you have reviewed the tutorial on how to do this **BEFORE** you contact the Help Desk)
4. E-learning has given me an error message and I can't submit my assignment.

***NOTE:*** Late work that involves technical difficulties with E-learning **MUST** be accompanied by a ticket number from the Help Desk.

***ALSO*** - Be sure to be familiar with the hours of operation for the UF help desk since they are oftentimes not available after 10:30pm on workdays and after 8:00 pm on weekends. There hours are posted at <http://helpdesk.ufl.edu/about/business-hours/>

## **WHEN DO I POST QUESTIONS TO THE COURSE QUESTIONS DISCUSSION BOARD?**

Questions that deal with the course itself should be submitted to the Course Questions board. Posted questions should **NOT** be about grades or a private matter. Do not post personal grade questions on the Course Questions discussion board.

Before posting a question, check those already posted to be sure that you are not duplicating a question. These should be things that other students in the class might have trouble with. For example:

1. I am unable to post comments to VoiceThread.
2. The link to specific VoiceThread is not working.
3. One of the quiz questions did not display properly.

Posting on the Course questions board is the fastest way to get an answer to your question. Be sure to give it a meaningful heading!

**Questions of a private nature should be e-mailed to the course instructor** (see below on how to e-mail within E-learning). In all cases, please allow 24 hours for a response. Every effort will be made to answer questions posted over the weekend with 24 hours. If not addressed, they will be addressed on the following Monday.

## **WHEN DO I EMAIL MY INSTRUCTOR?**

Questions about the course should be e-mailed to the instructor through the e-mail tool in E-learning.

Examples of e-mail questions for the instructor to get clear, concise responses:

1. I think there is an error in my grade for the assignment in module 3 (be sure to explain exactly why you think there is an error and provide documentation)
2. I am behind in the course and I would like to know how I may catch up (in such a case, your instructor may ask you to set up a Skype meeting or a time to call on the telephone)

If you have questions about the course itself, please reread the syllabus before asking a question. If the answer is not in the syllabus, check the Course Questions discussion board (this discussion board can be located by clicking on the discussions menu tab on the left of the course home page). If the answer to your question is not there, please post the question on the Course Questions discussion board.

DO NOT e-mail the instructor with general course questions. If your question is of a personal nature, e-mail your instructor from within e-learning system using the instructions below. Late work that involves technical difficulties with E-learning MUST be accompanied by a ticket number from the Help Desk.

### **HOW TO EMAIL YOUR INSTRUCTOR**

When emailing your instructor, please do so through Canvas.

To send an e-mail from the course:

1. Click on the mail icon that is located the left side of your screen.
2. Click the "Compose Message" button.
3. "To: window" will display.
4. Locate your instructor's name.
5. Always include a description in your subject line
6. Type your message and add any necessary attachments. Be sure that your subject line is meaningful.
7. Click "send."

### **Academic Integrity:**

#### **PLAGIARISM**

Students **must understand what plagiarism is and must not engage in this behavior when completing assignments and tests in this course.** The University of Florida Student Honor Code states that plagiarism includes but is not limited to:

1. Quoting oral or written materials including but not limited to those found on the internet, whether published or unpublished, without proper attribution.
2. Submitting a document or assignment that in whole or in part is identical or substantially identical to a document or assignment not authored by the student.

Student whose assignments/tests exhibit evidence of plagiarism will receive zeros for those assignments and tests for the first offense and will receive a warning. Students who continue to engage in this behavior after the first warning will be reported to the UF Dean of Students Office.

***PROHIBITED COLLABORATION OR CONSULTATION***

Student found to be involved in sharing answers and/or collaborating on exams or assignments will receive zeros for those exams and assignments. Students who continue to engage in this behavior after the first warning will be reported to the UF Dean of Students Office.

Students are expected to act in accordance with the University of Florida policy on academic integrity. As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge:

**“We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.”**

You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied:

**“On my honor, I have neither given nor received unauthorized aid in doing this assignment.”**

It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For additional information regarding Academic Integrity, please see Student Conduct and Honor Code or the Graduate Student Website for additional details:

<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>

<http://gradschool.ufl.edu/students/introduction.html>

Please also review the use of copyrighted materials, which can be found on the Health Science Center Library’s web page:

<http://www.library.health.ufl.edu/services/copyright.htm>

**Please remember cheating, lying, misrepresentation, or plagiarism in any form is unacceptable and inexcusable behavior.**

### **Online Faculty Course Evaluation Process:**

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### **Support Services:**

#### **Accommodations for Students with Disabilities:**

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. The College is committed to providing reasonable accommodations to assist students in their coursework.

#### **Counseling and Student Health:**

Students sometimes experience stress from academic expectations and/or personal and interpersonal issues that may interfere with their academic performance. If you find yourself facing issues that have the potential to or are already negatively affecting your coursework, you are encouraged to talk with an instructor and/or seek help through University resources available to you.

- The Counseling and Wellness Center 352-392-1575 offers a variety of support services such as psychological assessment and intervention and assistance for math and test anxiety. Visit their web site for more information: <http://www.counseling.ufl.edu>. On line and in person assistance is available.
- You Matter We Care website: <http://www.umatter.ufl.edu/>. If you are feeling overwhelmed or stressed, you can reach out for help through the You Matter We Care

website, which is staffed by Dean of Students and Counseling Center personnel.

- The Student Health Care Center at UF Health is a satellite clinic of the main Student Health Care Center located on Fletcher Drive on campus. Student Health at UF Health offers a variety of clinical services. The clinic is located on the second floor of the Dental Tower in the Health Science Center. For more information, contact the clinic at 392-0627 or check out the web site at: <https://shcc.ufl.edu/>
- UF Health Emergency Room / Trauma Center: For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32698, [ufhealth.org/emergency-room-trauma-center](http://ufhealth.org/emergency-room-trauma-center).
- University Police Department: Visit [police.ufl.edu/](http://police.ufl.edu/) or call 352-392-1111 (or 9-1-1 for emergencies).
- Crisis intervention is always available 24/7 from:

Alachua County Crisis Center:

(352) 264-6789

<http://www.alachuacounty.us/DEPTS/CSS/CRISISCENTER/Pages/CrisisCenter.aspx>

Do not wait until you reach a crisis to come in and talk with us. We have helped many students through stressful situations impacting their academic performance. You are not alone so do not be afraid to ask for assistance.

### **Academic Resources**

**E-learning technical support:** Contact the UF Computing Help Desk at 352-392-4357 or via e-mail at [helpdesk@ufl.edu](mailto:helpdesk@ufl.edu).

**Career Connections Center:** Reitz Union Suite 1300, 352-392-1601. Career assistance and counseling services [career.ufl.edu/](http://career.ufl.edu/).

**Library Support:** [cms.uflib.ufl.edu/](http://cms.uflib.ufl.edu/) ask various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center:** Broward Hall 352-392-2010 or to make an appointment 352 392-6420. General study skills and tutoring. [teachingcenter.ufl.edu/](http://teachingcenter.ufl.edu/)

**Writing Studio:** 2215 Turlington Hall, 352-846-1138. Help brainstorming, formatting, and writing papers. [writing.ufl.edu/writing-studio/](http://writing.ufl.edu/writing-studio/)

**Student Complaints On-Campus:** [sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/](https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/)

**On-Line Students Complaints:** [distance.ufl.edu/student-complaint-process](https://distance.ufl.edu/student-complaint-process)