IMPORTANT: This syllabus form should be submitted to OAA (gsbs_academic_affairs@uth.tmc.edu) a week before the start of each semester.

NOTE to STUDENTS: If you need any accommodations related to attending/enrolling in this course, please contact the Graduate School's 504 Coordinator, Natalie Sirisaengtaksin, PhD. We ask that you notify GSBS in advance (preferably at least 3 days before the start of the semester) so we can make appropriate arrangements.

Term and Year: Spring 2026 **Course Number and Course Title:** GS14 1223- Neurocircuits and Behavior **Credit Hours:** 3 **Prerequisites:** Molecular and Cellular Neuroscience or Systems Neuroscience **Meeting Location:** McGovern Medical School **Building/Room#:** MSE R649	**Program Required Course:** No **Approval Code:** Yes **(If yes,** the Course Director or the Course Designee will provide the approval code.) **Audit Permitted:** No **Classes Begin:** January 27, 2026 **Classes End:** May 14, 2026 **Final Exam Week:** N/A

Class Meeting Schedule

Day	Time
Tuesdays	9:00 am to 10:30 am.
Thursdays	9:00 am to 10:30 am.

Course Director: Name and Degree: Fabricio H. Do Monte, DVM, PhD Title: Associate Professor Department: Neurobiology and Anatomy Institution: UTH Email Address: Fabricio.h.domonte@uth.tmc.edu Contact Number: 713-500-5613 **Course Director:** Name and Degree: Qingchun Tong, PhD	**Instructor/s**: (See attached)

Title: Professor

Department: Institute of Molecular Medicine

Institution: UTH

Email Address:
qingchun.tong@uth.tmc.edu

Contact Number: 713-500-3453

NOTE: Office hours are available by request. Please email me to arrange a time to meet.

Teaching Assistant: N/A

Course description:
This is an advanced course aimed at students interested in systems neuroscience. The course will be divided into three modules: 1) new technologies in neuroscience; 2) functional neural circuits; and 3) manuscript peer review process. During the **new technologies** module, the students will be exposed to a basic introductory lecture per week about new techniques that are being actively used in current neuroscience research. In the following class, all students will read a scientific article about one of the techniques, and one of the students will lead the scientific discussion. During the **functional neural circuits** module, students will be exposed to an introductory lecture per week about functional neuroanatomy with a special emphasis on behavioral control. In the following class, the students will discuss a representative recent article that applies the previously learned techniques to identify neural circuits and/or cellular mechanisms underlying different types of behavior. These articles will serve as example cases to introduce new development in neuroscience. Given the vast literature on neural circuits and function, students will pre-select three articles directly related with the previous class, and the entire group will decide which article is most relevant for the group discussion. All the article presentations will be in the form of journal club discussion. The final module will be focused on the **manuscript peer review** process. During this module, students will select relevant unpublished manuscripts that are publicly accessible (e.g., BioRxiv), and will independently read, analyze, and evaluate the manuscripts by identifying strengths and weaknesses related to study design, technical approaches, data analysis and interpretation.

Textbook/Supplemental Reading Materials: To be provided during the classes.

Course Objective/s:
Upon successful completion of this course, students will:

- Understand the new research frontier in the rapidly developing field of behavioral and brain functions;

- Gain working knowledge of novel neuroscience techniques that have revolutionized our field in the last few years;

● Develop the ability to interpret and desig neuroscience research experiments using new scientific technology;

● Acquire skills to effectively assess, review, and evaluate research manuscripts that use the latest generation of innovative tools in neuroscience.

Student responsibilities and expectations:

This course is an advanced elective course and requires students to have some basic knowledge of neuroanatomy, neurophysiology and brain functions. The course aims to engage all students to be actively involved in the classes. The structure of the course will be repeated every week. On Thursdays, the students will be given a basic introductory lecture. On Tuesdays, there will be an intensive scientific discussion of a significant article in the field. Each week, a student will be designated as the discussion leader and will prepare a presentation of the selected article to discuss with the class. All students should read the article and take notes on the important points. At least one faculty member will be present to moderate the discussion. Whenever possible, papers with contradictory results will be included to stimulate discussion. During the last weeks of the course, students will be exposed to the peer-review process of scientific articles. They will be asked to read the assigned manuscript and prepare a short write-up that includes a brief background of the field, a general description of the work, the major and minor issues of the manuscript and recommendations on how to address them. All students are expected to participate actively during the classes. Learning resources will include: lecture slides, reviews, and research papers. We will use CANVAS to organize course materials.

Grading System: Letter Grade (A-F)

Student Assessment and Grading Criteria: *(May include the following:)*

Percentage	Description
Participation and attendance (40%)	N/A
Research article presentations (30%)	See Modules 1 and 2 below
Research article peer-review (30%)	See Module 3 below

CLASS SCHEDULE - GS14 1223: Neurocircuits and Behavior

Directors: Dr. Fabricio Do Monte (Fabricio.H.DoMonte@uth.tmc.edu)

Dr. Qingchun Tong (Qingchun.Tong@uth.tmc.edu)

Class Time: Tuesdays & Thursdays - 9:00 AM to 10:30 AM. (Room MSE R649; 7th floor blue section)

Credits: 3 (45 hours)

Module 1. New Technologies in Neuroscience

General course introduction and group/material distribution (Dr. Fabricio Do Monte & Dr. Qingchun Tong) **(January 27)**

1. Genetic manipulations I (Dr. Qingchun Tong)

Lecture: Introduction to the generation of knockout and transgenic rodents. **(January 29)**

Article discussion **(February 3)**

2. Genetic manipulations II (Dr. Sheng Zhang)

Lecture: Ground rules of CRISPR/RNA interference **(February 5)**

Article Discussion **(February 10)**

3. Brain activity manipulations I (Dr. Fabricio Do Monte)

Lecture: Advances on pharmacology, neurotransmitters, neuropeptides and their receptors. **(February 12)**

Article discussion **(February 17)**

4. Neuroanatomical tools (Dr. QingchunTong)

Lecture: Introduction to neural tracing and immunohistochemical methods. **(February 19)**

Article discussion **(February 24)**

5. Brain activity monitoring in humans (Dr. Mohamed Milad)

Lecture: Principles of human brain research with a focus on fMRI and related research frontiers. **(February 26)**

Article discussion: **(March 3)**

6. Brain activity monitoring in laboratory animals (Dr. Fabricio Do Monte)

Lecture: Fundamentals of single-unit recordings, fiber photometry, 2-photon Ca2+ imaging, and microendoscopy. **(March 5)**

(March 10 and 12 – Spring Break week)

Article discussion: **(March 17)**

7. Brain activity manipulations II (Dr. Fabricio Do Monte)

Lecture: Introduction to optogenetics, chemogenetics, deep brain stimulation (DBS) and transcranial magnetic stimulation (TMS). **(March 19)**

Article discussion **(March 24)**

Module 2. Functional Neural Circuits

8. Hypothalamic function during feeding (Dr. Qingchun Tong)

Lecture: Introduction to hypothalamic functions with special focus on

feeding behavior. **(March 26)**

Article Discussion **(March 31)**

9. Amygdala and emotion (Dr. Fabricio Do Monte)

Lecture: Introduction to amydalar functions with special focus on fear/anxiety. **(April 2)**

Article Discussion **(April 7)**

10. Mesocorticolimbic circuits modulating reward (Dr. Scott Lane)

Lecture: The mesocorticolimbic dopaminergic system in the control of reward seeking. **(April 9)**

Article Discussion **(April 14)**

11. Cortical circuits in cognition and decision-making processes (Dr. Fabricio Do Monte)

Lecture: Cortico-hippocampal pathways modulating learning and memory: from place cells and engram to choice behavior. **(April 16)**

Article Discussion **(April 21)**

12. The brain stem function (Dr. Jessica Butts)

Lecture: The role of midbrain, pons and medulla in basic functions and brain-body communication. **(April 23)**

Article Discussion **(April 28)**

13. Gut-brain interactions (Dr. Shelly Buffington)

Lecture: The crosstalk between central and peripheral nervous system: the microbiota as a major player. **(April 30)**

Article Discussion **(May 5)**

Module 3. Manuscript Peer Review process

Review of publicly accessible manuscripts (Dr. Fabricio Do Monte & Dr. Qingchun Tong) **(May 7, May 12, May 14)**

**Note: Article Discussion and Manuscript Review*: The students will take turns presenting the pre-selected articles as well as the peer reviews during each lecture. A total of 13 articles and 3 pre-print manuscripts will be reviewed. According to the number of participants, the students may be divided into groups at the beginning of the course.