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 one of 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 1183: Biology of Neurological Diseases

Credit Hours: 3

Meeting Location: **UT MDACC**

Building/Room#: **BSRB S3.8355**

WebEx/Zoom Link:
https://mdacc.zoom.us/j/86893866500?pwd=WjdtZWZrOWt1d2d6enpQaFRTYkFCdz09
Meeting ID: **868 9386 6500**
Password: **232610**

Program Required Course: **No**

Approval Code: **No**

Audit Permitted: **Yes**

Classes Begin: **January 12, 2026**

Classes End: **May 8, 2026**

Final Exam Week: **No final exam**

Class Meeting Schedule

Day	Time
Tuesday (Lecture)	**1:30-3:30 PM**
Monday (Review & JC Discussion)	**1:30-3:30 PM**

Course Director

Name and Degree: **Sheng Zhang, PhD**
Title: Associate Professor
Department: **IMM & NBA**
Institution: UTH
Email Address: Sheng.Zhang@uth.tmc.edu
Contact Number: (713) 500-3493

Course Co-Directors:
Name and Degree: **Jian Hu, PhD**
Title: Professor
Department: Cancer Biology
Institution: MDACC
Email Address: jhu3@mdanderson.org
Contact Number: 713-794-5238

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

Instructors

1. **Sheng Zhang, PhD**
   Associate Professor
   Institute of Molecular Medicine
   Department of Neurobiology and Anatomy
   UTHealth Houston| McGovern Medical School
   Sheng.Zhang@uth.tmc.edu
2. **Jian Hu, PhD**
   Professor
   Cancer Biology
   The University of Texas MD Anderson Cancer Center
   jhu3@mdanderson.org
3. **Wei Cao, PhD**
   Professor, Center for Perioperative Medicine
   Department of Anesthesiology
   UTHealth Houston| McGovern Medical School
   Wei.Cao@uth.tmc.edu

4. **Andrey Tsvetkov, PhD**
   Associate Professor
   Department of Neurology
   UTHealth Houston| McGovern Medical School
   Andrey.S.Tsvetkov@uth.tmc.edu

5. **Gabriel R. Fries, Ph.D**
   Assistant Professor
   Translational Psychiatry Program
   Louis A. Faillace, MD, Department of Psychiatry and Behavioral Sciences Center for Precision Health
   School of Biomedical Informatics
   UTHealth Houston
   Gabriel.R.Fries@uth.tmc.edu

6. **Myriam Fornage, PhD, FAHA**
   Professor of Molecular Medicine and Human Genetics
   Laurence and Johanna Favrot Distinguished Professor
   The University of Texas Health Science Center at Houston
   Myriam.*Fornage@ut*h.tmc.edu

7. **Edgar T. Walters, PhD**
   Professor of Integrative Biology and Pharmacology
   Fondren Chair in Cellular Signaling
   Co-Director, M.D./Ph.D. Program (MSTP)
   UTHealth Houston| McGovern Medical School
   Edgar.T.Walters@uth.tmc.edu

8. **Rodrigo F. Morales, PhD**
   Professor
   Mitchell Center For Alzheimer's Disease & Brain Disorders
   Department of Neurology
   UTHealth Houston| McGovern Medical School
   Rodrigo.MoralesLoyola@uth.tmc.edu

9. **Kartik Venkatachalam, PhD**
   Professor
   Department of Integrative Biology and Pharmacology
   UTHealth Houston| McGovern Medical School
   Kartik.Venkatachalam@uth.tmc.edu

	10. Laura Farach, MD Associate Professor Division of Medical Genetics Department of Pediatrics UTHealth Houston| McGovern Medical School Laura.S.Farach@uth.tmc.edu

Course Description:

This course will focus on the etiologies underlying major neural diseases. Led by GSBS faculty with related expertise, the course will review representative neural diseases and discuss seminal research papers in the respective fields, with emphasis on the current understanding of these diseases at molecular, cellular, and system levels. By completing this course, students should grasp the knowledge of the fundamental biology of major neural diseases, appreciate the common and distinctive mechanisms underlying these diseases, learn the existing hypotheses and experimental paradigms as well as outstanding questions and main challenges in the field, and hone the ability to develop novel strategies for scientific and translational discoveries for this unique group of diseases.

Textbook/Supplemental Reading Materials (if any)

- No textbook
- List of reading materials will be provided weekly by lecturing instructors

Course Objective/s:

Upon successful completion of this course, students will have a broad understanding of the basic biology, existing hypotheses, experimental paradigms and major challenges related to major neural diseases, and learn to develop new hypotheses and strategies to tackle these unique diseases.

***Specific Learning Objectives*:**

1. Learn the basics of neuropathology of major neural diseases,.nderstand the shared and distinct pathologic and molecular features associated with the diseases
2. Gain knowledge on the genetic, molecular and cellular basis of major neural diseases, understand the existing hypotheses and major controversies regarding the molecular and cellular mechanisms of these diseases.
3. Learn the methods and model systems used to study these diseases, their strength, and shortcomings.
4. Distill scientific literature into key elements and findings, identify shortcomings and propose future directions.
5. Apply the knowledge learned to develop new hypotheses and experiments to test them.

Student responsibilities and expectations:

Enrolled students are expected to complete the following activities:

1. Read 1-2 review papers relating to the week's topics assigned by the lecturers
2. Read 1-2 primary research articles assigned by the week's lecturer

3. Write one 1-2 page literature synopses for one of the assigned research articles (see Course Grading for more detail)
4. Present and lead a discussion on research papers in the weekly review and journal club (JC) session
5. Participate in and contribute to course discussions during lecture and JC review sessions

Students are expected to complete all assigned reading material (reviews and research papers) prior to class. You are encouraged to work and discuss all course materials and assignments in groups, but all writing assignments must be your own.

Grading System: **Letter Grade (A-F)**

Student Assessment and Grading Criteria: A total of 520 points is available during the course. Grade (A-F) based on % of points you earned) will be determined by the following items.

Percentage	Description
Literature Synopses (~80%) (30 points/synopses, 420 points total)	For each week's lecture, students will be assigned 1 review paper and 1-2 primary research papers to read critically. Students will choose one of the assigned papers to write a one-page synopsis that (1) describe the questions, method/experimental design and key findings; (2) identify potential shortcomings in the paper or new questions arising from the paper, and suggest some follow-up studies to address them. The students will have one week to complete each synopses.
Lecture Attendance and Participation (~5 %) (2 point/lecture, 28 points total)	Students are required to be physically present for lecture. Students are encouraged to ask questions and engage in discussion with classmates and instructsors during lecture, and to submit written questions or discussion points after class.
Review/JC Attendance and Participation (~5 %) (2 point/JC session, 28 points total)	Students are expected to be physically present and actively engaged in JC discussion.
JC presentation (~8% and higher) (22 point/JC presentation, 44 points total expected, but 10 bonus points can be earned/as leader of each additional JC session).	Students are expected to sign up to lead the JC sessions during the semester together with the leading faculties of the week. Multiple students can join together to lead each JC session.

CLASS SCHEDULE - Biology of Neurological Diseases -SPRING 2026

Week	Date Tuesday 1-3:00pm Thursday 1-2pm	Duration (Hours taught by Lecturer)	Lecture Topic	Instructors
1	**1/12/2026 Monday**	**2**	**1. Course introduction 2. Overview of neural diseases**	**Sheng Zhang, Ph.D.**
2	**01/13/2026 Tuesday**	**2**	**Parkinson's diease-1: PD review, aSynuclein and Dopmaine pathways in PD etiology**	**Sheng Zhang, Ph.D.**
	01/19/2026 (MLK day) Monday	**1.5-2**	Review/JC	Sheng Zhang, Ph.D.
3	**01/20/2026 Tuesday**	**2**	**Parkinson's diease-2: mitochondria health and membrane dynamics in PD etiology**	**Sheng Zhang, Ph.D.**
	01/26/2026 Monday	**1.5-2**	Review/JC	Sheng Zhang, Ph.D.
4	**01/27/2026 Tuesday**	**2**	**Lysosomal storage diseases**	**Kartik Venkatachalam, PhD**
	02/02/2026 Monday	**1.5-2**	Review/JC	Kartik Venkatachalam, PhD
5	**02/03/2026 Tuesday**	**2**	**Alzheimer's disease**	**Dr. Wei Cao**
	02/09/2026 Monday	**1.5-2**	Review/JC	Wei Cao, PhD
6	**02/10/2026 Tuesday**	**2**	**Stroke and Related Diseases (virtual)**	**Myriam Fornage, PhD**
	02/16/2026 Monday	**1.5-2**	Review/JC (virtual)	Myriam Fornage

7	**02/17/2026 Tuesday**	**2**	**Nucleotide repeat diseases and Polyglutamine diseases**	**Andrey Tsvetkov, PhD**
	02/23/2026 Monday	**1.5-2**	Review/JC	**Andrey Tsvetkov, PhD**
8	**02/24/2026 Tuesday**	**2**	**Mental Health Disorders**	**Gabriel Fries, PhD**
	03/02/2026 Monday	**1.5-2**	Review/JC	**Gabriel Fries, PhD**
9	**03/03/2026 Tuesday**	**2**	**Multiple sclerosis & Demyelinating dieases**	**Jian Hu, PhD**
	03/09-03/13/2026	**Spring Break week, no class**		
	03/16/2026 Monday	**1.5-2**	Review/JC	Jian Hu, Ph.D
10	**03/17/2026 Tuesday**	**2**	**Autism**	**Laura Farach, Ph.D.**
	03/23/2026 Monday	**1.5-2**	Review/JC	Laura Farach, PhD
11	**03/24/2026 Tuesday**	**2**	**Neuropathic pain**	**Edgar T. Walters, Ph.D.**
	03/30/2026 Monday	**1.5-2**	Review/JC	Edgar T. Walters, PhD
12	**03/31/2026 Tuesday**	**2**	**Brain Tumors**	**Jian Hu, PhD**
	04/06/2026 Monday	**1.5-2**	Review/JC	Jian Hu, PhD
13	**04/07/2026 Tuesday**	**2**	**Prion diseases**	**Rodrigo F. Morales, PhD**

	04/13/2026 Monday	**1.5-2**	Review/JC	Rodrigo F. Morales, PhD
14	**04/14/2026 Tuesday**	**2**	**Amyotrophic lateral sclerosis (ALS) and other Motor neuron diseases (MNDs)**	**Sheng Zhang, PhD**
	04/20/2026 Monday	**1.5-2**	Review/JC	Sheng Zhang, PhD
15	**04/21/2026 Tuesday**	**2**	**Tau and tauopathy**	**Sheng Zhang, PhD**
	04/27/2026 Monday	**1.5-2**	Review/JC	Sheng Zhang, PhD
16	**05/04-05/08/2026**	**End of class, last class works due by the end of the week. Individual Q/A sessions with instructors by advanced appointments are welcome.**		

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