Term and Year: **Summer 2025**
 	
Course Number and Course Title:
 	
   GS14 1152: Cancer Neuroscience
 	
Credit Hour: **2**
 	
Meeting Location: **MDACC-Main Building**
 	
Building/Room#: **TBD**
 	
   Zoom Link: **Join Zoom Meeting**
	Program Required Course: **No**
	
	Approval Code: **No**
	
	Audit Permitted: **Yes**
	
	Classes Begin: **May 14, 2025**
	
	Classes End: **August 20, 2025**

Class Meeting Schedule

Day	Time
Wednesday	**9:00 am – 11:00 am**

Course Director	Instructors

Course Director
Name and Degree: **Moran Amit, MD, PhD**
 	
Title: **Assistant Professor**
 	
Department: **Head and Neck Surgery**
 	
Institution: **MDACC**
 	
Email Address: MAmit@mdanderson.org
 	
Contact Number: **713-794-5304**
 	
Course Co-Director:
 	
Name and Degree: **Jian Hu, PhD**
 	
Title: **Assistant Professor**
 	
Department: **Cancer Biology**
 	
Institution: **MDACC**
 	
Email Address: JHu3@mdanderson.org
 	
Contact Number: **713-794-5238**
	Instructors
	1. Name and Degree: **Jian Hu, PhD**
	   Institution: **MDACC**
	   Email Address: JHu3@mdanderson.org
	
	2. Name and Degree: **Andrew Shepherd, PhD**
	   Institution: **MDACC**
	   Email Address: AJShepherd@mdanderson.org
	
	3. Name and Degree: **Yuan Pan, PhD**
	   Institution: **MDACC**
	   Email Address: ypan4@mdanderson.org
	
	4. Name and Degree: **Juan Cata, MD**
	   Institution: **MDACC**
	   Email Address: jcata@mdanderson.org
	
	5. Name and Degree: **Patrick Dougherty, PhD**
	   Institution: **MDACC**
	   Email Address: pdougherty@mdanderson.org

NOTE: Office hours are available by request. Please email me to arrange a time to meet.	6. Name and Degree: **Moran Amit, MD, PhD** Institution: **MDACC** Email Address: MAmit@mdanderson.org 7. Name and Degree: **Jeremy Borniger, MD, PhD** Institution: **CSHL** Email Address: bornige@cshl.edu 8. Name and Degree: **Sebastien Talbot, PhD** Institution: **QUEEN MARY CA.** Email Address: sebas.talbot@gmail.com 9. Name and Degree: **Nicole Scheff, PhD** Institution: **UPMC** Email Address: NNS18@pitt.edu 10. Name and Degree: **Yi Ye, PhD** Institution: **NYU** Email Address: yy22@nyu.edu 11. Name and Degree: **Richard Wong** Institution: **MSKCC** Email Address: wongr@mskcc.org 12. Name and Degree: **Shane A Liddelow, PhD** Institution: **NYU** Email Address: shane.liddelow@nyulangone.org

Course Description:

Course Overview
The Cancer Neuroscience course is at the forefront of integrating neuroscience with cancer biology, fostering innovation in cancer research and treatment. Building on two years of successful implementation and student feedback, this course delves into the intricate interplay between the nervous system and cancer. It examines how neural mechanisms influence tumor development, progression, and patient outcomes, thus providing a comprehensive understanding of this emerging field.

Course Highlights
- **Innovative Curriculum**: Explore cutting-edge topics such as neural regulation of cancer, neuro-immune interactions, and neural plasticity within the tumor microenvironment.
- **Interdisciplinary Approach**: Engage with leading experts from neuroscience, cancer biology, immunology, and clinical fields, including oncologists, neurologists, and patient advocates.
- **Practical Application**: Translate research from bench to bedside, addressing quality of life issues and rehabilitation.

Learning Objectives
- Understand the role of the nervous system in cancer initiation and growth.
- Analyze the impact of neuro-immune interactions on cancer progression.
- Evaluate the effects of cancer therapies on neural health and patient quality of life.

Course Structure
The course includes a mix of lectures, workshops, and panel discussions covering:

- Neural and glial cell regulation of cancer
- Cancer neuro-immunology
- Central and peripheral nervous system malignancies
- Neurological sequelae of cancer therapies
- Quality of life, neural health, and rehabilitation

Target Audience

This course is designed for students and professionals in neuroscience, cancer biology, immunology, and related fields who are interested in the cross-disciplinary study of cancer neuroscience.

Unique Features
- **Expert-Led Sessions**: Learn from renowned specialists and gain insights into the latest research and clinical practices.
- **Collaborative Learning**: Participate in discussions with a diverse group of stakeholders, including patients and advocates, to enrich your understanding of cancer neuroscience.

By the end of this course, students will be equipped with the knowledge and skills necessary to contribute to advancements in cancer neuroscience, enhancing both research and clinical outcomes.

Textbook/Supplemental Reading Materials

Cancer Neuroscience. Amit M, Scheff N et al. 2023, springer nature. Will be provided to the students.

Each class the students will have a landmark research paper and a review paper to read prior to class.

Student that will not be able to attend will be requested to submit a synopsis of the original research paper. The synopsis (500 words) assessment will be included in the attendance/participation score.

Each student will be asked to lead a 30 min discussion on the original paper relevant to the class in the presence of the course directors and the lecturer of that class. This task will be graded independently by the course directors and additional feedback will be given to the student based on that score.

1. https://www.science.org/doi/10.1126/science.1236361

2. https://www.nature.com/articles/nrc. 2016.38

3. https://www.nature.com/articles/s41586-020-1996-3

4. https://www.nature.com/articles/s41586-019-1576-6

5. https://pubmed.ncbi.nlm.nih.gov/18992743/

6. https://linkinghub.elsevier.com/retrieve/pii/S0092-8674(20)30327-5

7. https://www.nature.com/articles/s41593-024-01654-y

8. https://www.nature.com/articles/s41586-023-06036-1

9. https://www.nature.com/articles/s41586-019-1563-y

10. https://www.nature.com/articles/s41586-023-05968-y

11. https://aacrjournals.org/cancerdiscovery/article/12/10/2454/709464/Reprogrammed-Schwann-

Cells-Organize-into-Dynamic

12. https://www.biorxiv.org/content/10.1101/2024.06.20.599888v1

13. https://www.biorxiv.org/content/10.1101/2023.01.19.524430v1

14. https://www.researchsquare.com/article/rs-39208/v1

15. https://www.nature.com/articles/s41467-023-40314-w

16. https://www.nature.com/articles/s41586-021-04075-0

Course Objectives:

Upon successful completion of this course, students will gain an in-depth understanding of:
- Neural Regulation of Cancer: Explore how both the central and peripheral nervous systems influence cancer development, progression, and metastasis.
- Cancer's Impact on the Nervous System: Understand the ways in which cancer and its treatments affect neural function and overall neurological health.

Specific Learning Objectives
1. Cancer Modeling Systems in Neuroscience: Learn about the methodologies and systems used to model cancer within the context of neuroscience, with a focus on CNS and PNS regulation of cancer.
2. Electrophysiology in Cancer Biology: Understand the electrophysiological changes associated with cancer, particularly in relation to neuroimmunology and neural regulation.
3. Concepts of Neural Regulation of Cancer: Delve into the mechanisms by which neural processes influence cancer, including neurogenesis, axonogenesis, and the role of glial and Schwann cells.
4. Concepts of Neural Spread: Study the pathways and mechanisms of cancer spread via neural routes, including perineural invasion and brain-body interactions.

Clinical Implications of Cancer Neuroscience: Explore the clinical applications of cancer neuroscience, focusing on the effects of cancer therapies on CNS function and the integration of neuroscience in cancer treatment strategies. These objectives are aligned with the course schedule, ensuring that students engage with each topic comprehensively to develop a robust understanding of the intersection between neuroscience and cancer biology.

Student responsibilities and expectations:

students are expected to engage in a rigorous and comprehensive set of activities each week. These responsibilities are designed to ensure a deep understanding of the material and active participation in the course.

1. **Weekly Reading and Analysis**

   - **Seminal Reviews**: Read, process, and critically analyze 1-2 seminal reviews related to the week's topic in cancer neuroscience.

   - **Research Articles**: Thoroughly read and evaluate 6 research articles, including both review and primary research papers.

2. **Literature Synopses**

   - **Writing Assignments**: Write a one-page synopses for the assigned research articles. These synopses should summarize the key findings, methodologies, and implications of the research, demonstrating a comprehensive understanding of the material.

3. **Journal Club and Discussions**

   - **Journal Club presentation**: Attend and actively participate in the weekly journal club review sessions, offering insights and engaging in critical discussions.

   - **Course Discussions Moderation**: Contribute meaningfully to discussions during lectures and review sessions, demonstrating engagement with the material and peers.

4. **Preparation and Engagement**

   - **Pre-Class Preparation**: Complete all assigned reading materials before class to facilitate informed participation in discussions and activities.

   - **Collaborative Learning**: While collaboration in studying and discussing course materials is encouraged, all written assignments must be completed individually to maintain academic integrity.

5. **Ethical Conduct**

   - **Academic Integrity**: Adhere to the highest standards of academic integrity. Plagiarism and failure to properly cite sources will result in disciplinary action, including potential dismissal from the course. Cheating or unethical behavior during quizzes and exams will also lead to dismissal without credit and further disciplinary measures.

These responsibilities are structured to ensure that students dedicate substantial effort and time to mastering the course content, thereby justifying the 2 credit hours. The course's rigorous demands are intended to cultivate a deep and nuanced understanding of cancer neuroscience, preparing students for advanced research and professional practice in the field.

Grading System: **Letter Grade**

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

Percentage	Description
Presentation (75%)	**Journal Club with clinical correlation**
Participation and/or Attendance (25%)	**In-person or virtual**

CLASS SCHEDULE -Summer 2025

Date	Duration	Lecture Topic	Lecturer/s
Wednesday, May 14 @ 9am - 11 am	2 hours	CNS Regulation of Cancer I	Dr. Jian Hu
Wednesday, May 21 @ 9am - 11 am	2 hours	CNS Regulation of Cancer II	Dr. Jian Hu
Wednesday, May 28 @ 9am - 11 am	2 hours	Neuroimmunology in Cancer I	Dr. Nicole Scheff
Wednesday, June 4 @ 9am - 11 am	2 hours	Mechanisms of Cancer- and Cancer-Treatment induced Nerve injury	Dr. Patrick Dougherty
Wednesday, June 11 @ 9am - 11 am	2 hours	Effect of cancer therapy on CNS function	Dr. Yuan Pan
Wednesday, June 18 @ 9am - 11 am	2 hours	PNS Regulation of Cancer	Dr. Moran Amit
Wednesday, June 25 @ 9am - 11 am	2 hours	Neuroimmunology in Cancer II	Dr. Sebastien Talbot
Wednesday, July 2 @ 9am - 11 am	2 hours	Brain-body interactions in cancer neuroscience	Dr. Jeremy Borniger
Wednesday, July 9 @ 9am - 11 am	2 hours	Perineural invasion, 4th route of metastasis	Dr. Juan Cata
Wednesday, July 23 @ 9am - 11 am	2 hours	The role of glial cells in cancer	Dr. Shane Liddelow
Wednesday, July 30 @ 9am - 11 am	2 hours	Role of Schwann cells in cancer	Dr. Yi Ye
Wednesday, Aug 6 @ 9am - 11 am	2 hours	Clinical cancer neuroscience	Dr. Jian Hu, Moran Amit, and Richard Wong
Wednesday, Aug 13 @ 9am - 11 am	2 hours	Cancer Neuroscience- Students Project presentations	Dr. Jian Hu, Moran Amit,

MA/jal