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: **Fall 2025**	**Program Required Course:** Yes
Course Number and Course Title: **GS03 1221: Current Methods in Molecular and Translational Biology (CMMTB) Module 2: Advanced OMICS**	**Approval Code:** No
Credit Hours: 1	**Audit Permitted:** Yes
Prerequisites: The GSBS Core Course is a prerequisite for PhD students. While there is no other specific prerequisite for this course, registered students are expected to have a basic understanding of cell and molecular biology from undergraduate courses.	**Classes Begin:** August 25, 2025
Meeting Location: UTHealth Houston McGovern Medical School	**Classes End:** Sept. 26, 2025
Building/Room #: MSB 3.301	

Class Meeting Schedule

Day	Time
August 25 – September 26, 2025 (Monday, Wednesday, Friday)	**3:00-4:00 pm**

Course Director	**Instructors**
Name and Degree: **Dung-Fang Lee, PhD**	1. **Dung-Fang Lee, PhD**
Title: **Associate Professor**	Institution: UTHealth Houston
Department: **Biochemistry and Molecular Biology**	Email Address: Dung-Fang.Lee@uth.tmc.edu
Institution: **UTHealth Houston**	2. **Xiaotian Zhang, PhD**
Email Address: **Dung-Fang.Lee@uth.tmc.edu**	Institution: UTHealth Houston
Contact Number: **715-500-6132**	Email Address: Xiaotian.Zhang@uth.tmc.edu
Course Co-Director/s: (if any)	3. **Catherine Denicourt, PhD**
Name and Degree: **Xiaotian Zhang, PhD**	Institution: UTHealth Houston

Title: **Assistant Professor**

Department: Biochemistry and Molecular Biology

Institution: **UTHealth Houston**

Email Address: **Xiaotian.Zhang@uth.tmc.edu**

Contact Number: 713-500-5146

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

Email Address:Catherine.Denicourt@uth.tmc.edu

4. **Priyatansh Gurha, PhD**

   Institution: UTHealth Houston

   Email Address: Priyatansh.Gurha@uth.tmc.edu

5. **Juchen Liu, PhD**

   Institution: UTHealth Houston

   Email Address: Junchen.Liu@uth.tmc.edu

6. **Yang Liu, PhD**

   Institution: UTHealth Houston

   Email Address: Yang.Liu.2@uth.tmc.edu

7. **Noriaki Ono, DDS, PhD**

   Institution: UTHealth Houston

   Email Address: Noriaki.Ono@uth.tmc.edu

8. **Ruiying Zhao, PhD**

   Institution: UTHealth Houston

   Email Address: Ruiying.Zhao@uth.tmc.edu

9. **Yong Zhou, PhD**

   Institution: UTHealth Houston

   Email Address: YYong.Zhou@uth.tmc.edu

Course Description:

This module is a component of the course "Current Methods in Molecular and Translational Biology" that is designed to introduce students to the various OMICS research methods applicable to their research studies. It provides an overview of cutting-edge knowledge and techniques in OMICS, covering concepts, analytical skills, and experimental approaches. Over 12 lectures, students will learn essential techniques and approaches for systematically investigating proteins, lipids, metabolites, RNA, modified RNA, DNA, histones, and chromatin architecture using unbiased research methods and thinking to understand biological processes on a genome-wide scale. The lecturers, having applied these techniques in their own research, will share personal insights and experiences, highlighting the practical applications and real-world implementation of these technologies to facilitate students' research.

Textbook/Supplemental Reading Materials

- No general textbook is required, but lecturers will provide teaching materials (slides) and recommend reference readings for specific lectures.

Course Objective/s:
Upon successful completion of this course, students will learn the following specific objectives:

*Specific Learning Objectives***:**

1. Introduce students to the fundamental concepts and techniques of OMICS approaches for their research.
2. Help students gain insights into the practical applications of OMICS techniques in addressing fundamental biological problems through examples.
3. Enable students to be familiar with established programs for OMICS data analysis.
4. Provide hands-on examples for students to practice OMICS analysis.

Student responsibilities and expectations:

Students enrolled in this course are expected to complete the following activities:

1. Students should complete all assigned reading materials before class whenever possible
2. Review all lecture materials, including recommended review articles and research papers
3. Prepare for the final examination using reading materials provided by lecturers
4. Attend all 1-hour lectures
5. Watch recorded lectures if students cannot attend 1-hour lectures.

Students are expected to complete all assigned reading material prior to class. While you may work and discuss all course materials and assignments in groups, all writing assignments must be your own unless otherwise instructed. Whenever relevant, specific guidelines will be provided on whether using AI-generated content is permitted. Plagiarism and failure to properly cite scientific literature and other sources will not be tolerated and are grounds for dismissal from the course and further GSBS disciplinary action. Cheating or engaging in unethical behavior during examinations will be grounds for dismissal from the course without credit and further GSBS disciplinary action.

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

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

Percentage	Description
Homework	At their discretion, Instructors may assign appropriate homework for grading. If homework is assigned for a specific lecture, the homework assignment will be in lieu of questions on that lecture subject matter on the exam.
Homework (90%)	Two (2) in-class exams will represent 90% of the total grade. The specific percent of the total grade assigned to each exam will be at the discretion of the course director. In-class exam 1 will cover all material presented prior to the exam. Exam 2 will cover material presented after Exam 1.

		All individual lectures will be assigned equal points on the exams. Homework may be assigned by a lecturer for a specific lecture in lieu of questions on the exam. Points awarded for the homework assignment will be added to the total points received for the in-class exam.
Participation and/or Attendance (10 %)		The material covered in these lectures is likely new to many students. Therefore, attendance and participation in classroom discussions is considered critical. Attendance will be assessed toward 10% of final grade to encourage participation.

CLASS SCHEDULE

Date	Duration (Hour(s) taught by lecturer)	Lecture Topic	Lecturer/s
08/25	1	Proteomics	Yang Liu
08/27	1	Lipidomics	Yong Zhou
08/29	1	Metabolomics	Junchen Liu
09/03	1	Translatomics	Catherine Denicourt
09/05	1	Transcriptomics	Ruiying Zhao
09/08	1	OMICS Exam 1	
09/10	1	Epitranscriptomics	Dung-Fang Lee
09/12	1	Chromatinomics and Epigenomics	Priyatansh Gurha
09/15	1	Methylomics	Xiaotian Zhang
09/17	1	3D Genomics	Xiaotian Zhang
09/19	1	Single-cell Transcriptomics	Noriaki Ono
09/22	1	Single-cell Transcriptomics	Noriaki Ono
09/24	1	Functional Genomics	Xiaotian Zhang
09/26	1	OMICS Exam2	

DFL/jal