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 2027**

Course Number and Course Title:
GS07 1015: Microbial Genetics and Physiology

Credit Hours: **5**

Meeting Location: **UTHealth Houston**
McGovern Medical School

Building/Room#: **MSB 1.180**

WebEx/Zoom Link: **N/A**

Program Required Course: Yes

Approval Code: No

Audit Permitted: No

Classes Begin: January 11, 2027

Classes End: April 30, 2027

Final Exam Week: N/A

Class Meeting Schedule

Day	Time
Monday - Friday	9:00 – 10:30 am

Course Director

Name and Degree: **J. Christian Perez, PhD**

Title: Associate Professor

Department: Microbiology and Molecular Genetics

Institution: UTH

Email Address: Jose.C.Perez@uth.tmc.edu

Contact Number: 713-500-5432

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

Instructors

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	15. **Souvik Bhattacharyya, PhD** Institution: UTH Email Address: souvik.bhattacharyya@uth.tmc.edu 16. **Diana Proctor, PhD** Institution: UTH Email Address: Dinah.M.Proctor@uth.tmc.edu

Course Description:
This course will provide our second-semester, first-year students with a broad knowledge of prokaryotic and eukaryotic microbial biology. Topics covered include genetics, gene expression, signal transduction and stress responses, cell biology, pathogenesis, host responses and antimicrobial therapy. The course is divided into 15 one-week units composed of at least two faculty-led lectures and two roundtable discussions of the primary literature. Letter grades are based on participation (25%), writing exercises focused on the papers discussed in class (50%), and a weekly problem set (25%).

Textbook/Supplemental Reading Materials

N/A; individual class reading materials will be provided weekly.

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

1. gain a thorough understanding of the core concepts in prokaryotic and eukaryotic microbial biology;
2. be able to analyze and interpret results from a variety of microbiology and molecular biology methods;
3. develop critical thinking skills through the reading and analysis of primary scientific literature;
4. be able to develop a research hypothesis and design experiments to test the hypothesis using appropriate methods;
5. gain written and oral scientific communication skills and should be able to present and discuss scientific ideas and methodology.

Student Responsibilities and Expectations:
Students enrolled in this course will be expected to perform the following activities each week:

1. Attend all classes;
2. Review all nessesary class materials (distributed weekly);
3. Actively participate in all learning activities and contribute to discussions during every class;
4. Read at least two research articles and complete two corresponding graded writing assigments.
5. Complete weekly Homework assignments.

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.

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.
Grading System: **Letter Grade (A-F)**
Student Assessment and Grading Criteria :

Percentage	Description
Class Participation (25%)	Based on active participation in class discussions, questions/answers session etc.
Writing assigments (50%)	Two pre-class writing assigments are based on the primary research articles.
Homework (25%)	Weekly assessment tool in leu of final examination, due on Monday the following week.

CLASS SCHEDULE

Block I

Week 1: Bacterial genetics (Kaplan) Jan 11 - 15
- Screens, Selections, and Inheritance
- Genetic Analysis of the Lac Operon
- Mapping mutations
- Learning activity: Three-factor crosses and complete Table 4 Mapping by Hfr and co-transduction

Week 2: Bacterial cell envelope (Konovalova) Jan 19 - 22 (No class 18th, MLK day)
- Bacterial cell envelope structure and biogenesis
- Bacterial cytoskeleton, cell wall biogenesis, and cell shape

Week 3: Bacterial Cell Cycle, Division, and Differentiation (Margolin) Jan 25 - 29
- Cell cycle and cytokinesis
- Cell differentiation
- Sporulation

Week 4: Yeast genetics (Lorenz) Feb 01 - 05
- Yeast as a model eukaryote
- Forward and reverse genetics in yeasts

Week 5: Bacterial secretion/molecular machines (Christie) Feb 08 - 12
- General secretory pathways
- Dedicated protein/DNA transfer systems
- Post-secretory protein modification

Block II

Week 6: Bacterial gene expression regulation (De Lay) Feb 15 - 19
- Transcription and its regulation;
- Posttranscriptional regulation by small RNAs;
- Regulated proteolysis

Week 7: Signal Transduction (Kaplan) Feb 22 - 26
- Two-component systems and chemotaxis
- c-di-GMP signaling
- Quorum sensing

Week 8: Protein folding and homeostasis (Morano and Hu) Mar 01 - 05
- Protein folding and heat shock response
- Protein methods: pulse-chase labeling, protein gels, etc.
- Structural biology approaches to study protein folding

Week 9: Uni-cellular parasites (Li) Mar 08 - 12
- Parasite life cycle and biology
- Genetic methods in parasites

March 15 - 19 Spring Break (no classes)

Week 10: Multi-cellular parasites (Lee) Mar 22 - 26
- Biology of mutlicellular parasites
- Genetic and cell biology approaches to studying multicellular parasites

Block III

Week 11: Microbial virulence (Krachler and Bhattacharyya) Mar 29 – Apr 02
- Adherence and invasion
- Toxins
- Genome-wide approaches to study virulence

Week 12: Antimicrobials (Bhattacharyya) Apr 05 - 07 (No class 8th-9th for MID/MMG retreat)
- Antimicrobials and resistance
- Phage therapy

Week 13: Human-associated fungi (Perez and Proctor) Apr 12 - 16

- Human fungal pathogens
- Mycobiota
- Antifungals

Week 14: Microbiome and microbial genomics (Krachler and Walker) Apr 19 - 23

- Concepts and basic metrics in microbiome research
- Intro to microbial genomics technologies

Week 15: Antimicrobial immunity (Garsin) Apr 26 - Apr 30

- Model hosts systems
- Innate immunity systems
- Adaptive immunity and vaccination