BIOCHEMISTRY (GS03)

Course descriptions in school catalogs and the Course Search (https://catalog.uth.edu/course-search/)are correct at the time of publication. See myUTH (https://uthidp.uth.edu/nidp/saml2/sso/?id=Campus-Affiliate-LOA2-DUO&sid=0&option=credential&sid=0) for more recent course information and to register for courses.

GS03 1011 Emerging Fields in Biochemistry and Molecular Biology: RNA Biology (1 Credit)
Prerequisite: None. The goal of this mini-course is to learn cutting-edge RNA biology within a historical context. This course will focus on recent research in RNA biology: differential RNA processing and stability (splicing, polyadenylation, and turnover), the functional significance of various classes of non-coding RNAs (microRNAs, lncRNAs, cRNAs, ceRNAs, eRNAs, etc.), the CRISPR/Cas9 system, and RNA epitranscriptomics (RNA methylation and terminal uridylation). Class lectures and discussions will be predominantly student-led with assistance of topic area experts. Overall, there will be 12 class meetings (two meetings per week) at 1.25 hours each. Letter Graded

GS03 1111 Scientific Writing for Grant Proposals (1 Credit)
Prerequisite: Foundations of Biomedical Research (GS21 1017). The goal of this mini-course will be to learn how to write an effective grant proposal. There will be formal lectures on the components of an NIH grant followed by writing workshops. The course will also include a mock study section with peer review of the written proposals. This course fulfills the GSBS writing requirement. Letter Graded

GS03 1211 CMMTB Module 1: Core Methods in Molecular & Trans Biology (1 Credit)
The Core Module of Current Methods in Molecular and Translational Biology is designed to complement three other modules that focus on more advanced techniques in: 1) Advanced Omics; 2) Structural and Functional Analysis of Proteins; and 3) Animal and Cell Model Systems. Each of the four Modules is a 1-unit course. The Core Module consists of 14 lectures. Individual lecturers in the Core Module are chosen based on their first-hand expertise in the relevant technologies. The spectrum of technologies includes antibodies, fundamentals of DNA and RNA analysis, microscopy and cell culture, expression of proteins in foreign hosts, and protein isolation. The goal of the lectures is to provide students with a sound foundation in the principles of the techniques as well as their common applications. The lecturers will also pass on their personal experiences regarding pros and cons of the technologies and lab-bench ¿tips¿. Letter Graded

GS03 1221 Current Methods in Cell and Translational Biology (CMMTB) Module 2: Advanced OMICS (1 Credit)
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. Letter Graded

GS03 1231 Cur Mthds in Mol and Trans Biology Module 3: Structural and Functional Analysis of Proteins (1 Credit)
This module is a component of the course ¿Current Methods in Molecular and Translational Biology¿ that is designed to introduce students to methods they can apply to their own research and to evaluate the rationale and pros and cons of specific techniques that are employed in experiments they are exposed to at seminars and conferences. This module provides an overview of modern experimental and computational structural biology techniques for the study of protein structure, dynamics and function, and introduces fundamental concepts of chemical and computational screening methods of targeted drug discovery. Major experimental techniques to be covered include NMR spectroscopy, X-ray crystallography, Cryo-EM microscopy, single-molecule FRET, and high throughput chemical screeding of small molecules. Key methods in computational structural biology will include concepts and applications of molecular dynamics (MD) simulations, artificial intelligence-based methods for structure prediction and modeling, and structure-based virtual screening of small molecule ligands. Depending on a student¿s project, this course can be taken as an elective to satisfy the 3-units Methods in Molecular Translational Biology (MTB) course required by MTB program students, in combination with any of the other three modules of the Course for 2-3 credits, or as a stand-alone 1-credit course by any GSBS student or students from affiliated institutions. Letter Graded

GS03 1241 Cur Mthds in Mol and Trans Biology Module 4: Cell, Tissue and Animal Model Systems (1 Credit)
This module is a component of the course ¿Current Methods in Molecular and Translational Biology¿ that is designed to introduce students to methods they can apply to their own research and to evaluate the rationale and pros and cons of specific techniques that are employed in experiments they are exposed to at seminars and conferences. The module provides an overview of state-of-the-art methods and model systems used in modern studies of biological systems from the cell to the tissue and organ level in various organismal models. Both invertebrate and vertebrate models will be introduced, as well as primary and immortalized cell lines, iPS models, organoids, lab-on-a-chip, bioprinted, computational models and digital pathology using AI. Both dynamic and static models will be described. Depending on a student¿s project, this course can be taken as an elective to satisfy the 3-units Methods in Molecular Translational Biology (MTB) course required by MTB program students, in combination with any of the other three modules of the Course for 2-3 credits, or as a stand-alone 1-credit course by any GSBS student or students from affiliated institutions. Letter Graded

GS03 1711 Seminars in Biochem and Molecular Biology (1 Credit)
Prerequisite: General knowledge of biochemistry. This course will consist of formal seminars given by staff and visiting scientists in the broad disciplines of biochemistry and molecular biology. Pass/Fail