ADVANCED COURSE: MULTIDISCIPLINARY APPROACHES TO STUDY DIABETES (GBS VTC 788)

SHEL Bldg. 1215, 10 a.m.-noon, Wednesdays, January 14, 2026 – April 15, 2026

Drs. Sasanka Ramanadham (sramvem@uab.edu) and Sushant Bhatnagar (sushantb@uab.edu) offer this course designed for graduate students in their second year or beyond, as well as postdoctoral and clinical fellows.

Course Description: This Advanced Diabetes course is designed to provide PhD students with a comprehensive understanding of the complex biology underlying diabetes, encompassing diabetes pathophysiology, molecular mechanisms, and evolving therapeutic strategies. Emphasis will be placed on critical thinking, data interpretation, and recent research-driven learning to prepare students for groundbreaking discoveries in diabetes and metabolic disease research.

Course Objectives:

1. **Pathophysiological Understanding**: Students will examine the cellular and molecular mechanisms that drive Type 1 and Type 2 diabetes, including beta-cell dysfunction, insulin resistance, immune-mediated beta-cell destruction, cardiomyopathy, retinopathy, muscular dysfunction, adiposity, and dysregulated lipid metabolism.
2. **Advanced Insights into Glucose Homeostasis**: In-depth discussions will delve into glucose regulation pathways, focusing on tissue-specific mechanisms influenced by the brain, muscle, heart, liver, eyes, kidneys, beta-cells, and adipose tissues.
3. **Molecular and Genetic Drivers**: The course will examine the role of genetic mutations, epigenetic modifications, and metabolic disruptions in contributing to diabetes risk, focusing on the complex interactions within the insulin signaling pathways and beta-cell survival.
4. **Emerging Research**: Students will be introduced to groundbreaking research areas, including the role of GPCRs, autocrine feedback loops, and other regulatory networks that influence body weight, appetite, and metabolic adaptation.
5. **Therapeutic Innovations and Translational Approaches**: In-depth discussions of current and potential therapies, including GLP-1 receptor agonists, SGLT2 inhibitors, and gene-based therapies, will bridge the gap between basic research and clinical application.
6. **Experimental Design and Data Analysis**: Through interactive sessions and discussions, students will enhance their skills in experimental design, statistical analysis, and interpretation of primary research data in the context of diabetes studies.

Course Format:

1. **Lectures**: Core concepts will be presented through lectures paired with case studies, demonstrating real-world applications and problem-solving in diabetes research.
2. **Discussions**: Students are encouraged to discuss recent high-impact journal articles, fostering critical analysis and debate on current research findings and methodologies.
3. **Guest Lectures from Leading Experts**: Renowned researchers and clinicians specializing in diabetes will present seminars, providing students with the opportunity to engage with experts and explore emerging research directions.

Expected Outcomes: Upon completing this course, students will:

1. Demonstrate an advanced understanding of diabetes pathophysiology and critically analyze current research.
2. Apply knowledge of molecular and genetic factors to interpret complex metabolic data.
3. Design and propose research experiments that address gaps in current knowledge of diabetes.
4. Understand and evaluate modern therapeutic approaches, assessing their translational potential for diabetes management.

This course will uniquely prepare the students for impactful careers in diabetes research, promoting the development of innovative solutions to address the growing global burden of diabetes and related metabolic diseases.

The postdoc office instructions for class registration may be found here: https://www.uab.edu/postdocs/current-postdocs/continuing-education/registering-for-classes. Note: it may take longer for international postdoctoral fellows to go through the registration paperwork, so please plan accordingly.