Albany Medical College
Graduate Studies Program
Course Descriptions

These “AMC” courses are more general courses taken by students of all the Basic Science Departments, please see individual departments for their individual core and elective courses.

AMC 502 Research Colloquium in the Biomedical Sciences Credits: 1
Course Directors: Dr. Mark Fleck & Dr. John Schwarz
The Research Colloquium Series is essentially a critical reading course, which is presented with two main learning objectives: First is to better prepare incoming students with the skills required to critically evaluate and present research papers in the primary literature. Second is to expose students to papers related to the topics and methods being discussed concurrently in the Foundations of Biomedical Research course. **Learning Assessment** is based on regular attendance, preparedness, presentations and contributions to the general discussion. (Year 1, Fall semester only)

AMC 507 Introduction to Scientific Integrity Credits: 0
Course Directors: Dr. John Kaplan, Dr. Thomas Andersen, Dr. Ralf-Peter Czekay
Students attend a total of three, two-hour class meetings and participate in workshops and discussions. Short readings are assigned. Sessions address current issues in scientific integrity, ethical principles and theory, introduction to ethics case analysis, an ethical skills workshop, and considerations in selecting a mentor. At the end of this course students will have a basic appreciation of ethical principles in relation to standards of professional conduct in science. Students will also develop their skills and confidence in their ability to analyze and discuss ethical and professional standards as they apply to specific aspects of scientific research. This course is required of all first-year students. **Learning Assessment** is based on attendance, preparedness, discussion and a presentation. Prerequisite for AMC 612. (Year 1, Fall semester only)

AMC 510 Biochemistry Credits: 2
Course Director: Dr. Ralf-Peter Czekay
A major challenge to biomedical students is gaining a better understanding of the structures, functions and interactions of molecular systems used in nature. The elucidation of protein and membrane structure, the role of enzymes in metabolic processes and cell signaling, and the modeling of life processes in the laboratory provide fundamental insights into normal physiological processes and into pathophysiological conditions. This course will provide an integrated exposure to major current concepts in biochemistry including protein structure, enzymology, membrane structure/function, and metabolism. This course covers three central themes common to all advanced courses within the various training programs: Protein Structure/Function, Biological Membranes, and Metabolism. The first block of lectures includes the topics primarily on bioenergetics and metabolism. It will include a set of three conferences to integrate and review the material taught in each section. AMC-510-Biochemistry, was carefully planned to integrate with "AMC-511-Molecular Cell Biology" and "AMC-515-Foundations of Biomedical Research." Together these three courses will provide MS and PhD students at AMC with the fundamentals that they will need to begin their research careers. **Learning Assessment** is determined from in class written examinations. (Year 1, Fall semester only)
AMC 511 Molecular Cell Biology Credits: 3
Course Directors: Dr. Rebecca Keller and Dr. John Schwarz
The overall goal of this course is to provide students with a basic understanding of molecular and cell biology and the relevance of these topics to normal and pathophysiology. This course is part of a new integrated core curriculum for all first-year graduate students designated to give students the fundamentals needed for upper level graduate courses, to read primary literature, and to understand the health relevance of the basic sciences. Learning Objectives of this course is to provide students with an understanding of the following:
1. Mechanisms and regulation of the flow of genetic information from DNA to protein.
2. Genetics and its role in disease.
3. How cells interact with each other and their extracellular environment
4. Basic signaling cascades and the regulation of cell proliferation and survival.
5. The structural components of cells and the regulation of these components, including the cytoskeleton, intracellular compartments and vesicular trafficking. Learning Assessment is determined from in class written examinations. (Year 1, Fall semester only)

AMC 515 Foundations in Biomedical Research Credits: 4
Course Director: Dr. Ralf-Peter Czekay
Foundations in Biomedical Research builds on molecular biology, biochemistry and cellular biology to understand the workings of cells, tissues, and organ systems. This course introduces students to experimental approaches currently used in biomedical research. The goal of this course is to provide first-year graduate students with an understanding of basic experimental approaches used in research to jumpstart their ability to plan and execute their own research and to understand the primary literature. To this end, the course covers the principles and theory behind currently used experimental approaches, practical details for those research methods that are commonly used, and examples from the primary literature. This course is an “active learning” course where students are expected to complete readings prior to class and actively participate in the discussion of these experimental approaches during class. Course Objectives: 1. To determine the appropriate experimental approach to answer a biomedical question. 2. To identify the strengths, weaknesses, and pitfalls of various biomedical techniques. 3. By the completion of this course, a student should be able to analyze an unfamiliar technique or method and have the skills to investigate how to implement that new technique and evaluate what would be “learned” from employing this new technique. Learning Assessment: This course is assessed by homework, short projects, or other learning experiences assigned at the end of each session. Additionally, there is a group project (4 students per group) that culminates in a written mock grant application and an oral presentation of that project at the end of the course. (Year 1, Fall semester only)
AMC 600 Biostatistics Credits: 2
Course Directors: Dr. Paul Feustel and Dr. Peter Vincent

This course is designed to teach the student basic statistics so that they can perform appropriate statistical analysis of their research and so they can determine if appropriate analysis was performed when reading the literature in their field of study. The first part of the course is lecture/exercise-based sessions run by the faculty that exposes students to basic principles and tests commonly used in biostatistics, including sessions on what inferential statistics is and determining the statistical analysis as part of your experimental design. In the second part of the course students bring in experiments and/or data from their laboratory and describe the experimental design and the statistical test that was used (or will be used) to analyze the data and how this allowed (or will allow) them to formulate a conclusion from the data.

Course Objectives: 1) Students will be able to design experiments that will include choosing the appropriate test based on the type of data they will collect, and the comparisons/relationships they want to determine. 2) Students will be able to determine which methods should be used in the analysis of data. 3) Students will be able to determine how many experimental units are needed to test hypotheses (power analysis). 4) Students will be able to recognize what conclusions can and cannot be drawn from the statistical analysis of experimental data.

Learning Assessment is based on class participation, homework assignments and two in class exams.
(Fall semester only)

AMC 603 - Introduction to Grant Writing Credits: 1
Course Directors: Dr. C. Michael DiPersio and Dr. Peter Vincent.

This course is designed to provide the student with an introduction to writing research grants and to the grant review process. The course will focus on what should be included in the different sections of a NIH research proposal (Research Plan Section). To emphasize the purpose of this information in supporting the grant proposal, students will be provided with sections of well written proposals, as well as proposals that did not do well in study sections. Discussions of these examples will highlight how proposals can be improved. As part of each module, students will write (1) a Specific Aims page, (2) a Significance and Innovation section, and (3) an Approach section that is focused on one of the specific aims. Students will then read and critique one another’s written assignments and discuss their reviews using a study section format. Students will then revise their section in response to the reviewers’ critiques. The course will culminate in a mock study section performed by AMC faculty with experience serving on NIH grant review panels, in order to demonstrate how the grant peer review process works at the NIH.

Learning Assessment is based on class participation and homework assignments.

AMC 607 Reactive Oxygen Species & Nitric Oxide in Physiology & Pathophysiology
Course Directors: Dr. Dana Crawford and Dr. Michael DiPersio

This course covers the role of oxidant-mediated injury in human pathology using didactic instruction and review of published research papers. Basic mechanisms of injury caused by reactive oxygen- and reactive nitrogen-species will be covered as well as antioxidant mechanisms of protection. In addition, current literature will be reviewed and critically evaluated for evidence supporting a role for oxidant-mediated pathogenesis in various disease states such as cancer, brain disorders, atherosclerosis, immune system dysfunction, diabetes, cataracts, and disorders of metal metabolisms. Learning Assessment is based on class participation, class presentations and exams.

(Offered every other year, Spring semester only)
AMC 608  Bioimaging from Molecules to Animals  Credits: 3
Course Directors: Dr. Margarida Barroso, Dr. Alejandro Adam, Dr. Joseph Mazurkiewicz

The goal of this course is to teach the student basic principles of fluorescence imaging using different methods to visualize single molecules, organelles, cells and tissues in vitro as well as in vivo. This course will introduce the students to fluorescence-based imaging techniques such as confocal and TIRF microscopy, super-resolution approaches, quantitative based methods such as FRET, FRAP and FCS as well as preclinical small animal imaging. The course methodology is to expose students to these techniques by showing how researchers can use them to answer important questions or gaps of knowledge in Cellular and Molecular Biology; in particular, we will focus on cell adhesion, GPCR membrane organization and membrane trafficking of membrane bound receptors. Students will learn how to select the right imaging tool to solve specific cellular biology problems in living cells and tissues. Learning Assessment is based on class participation, student presentations and one exam.

AMC 612  Discussions in Scientific Integrity  Credits: 1
Course Directors: Dr. John Kaplan, Dr. Thomas Andersen, Dr. Ralf-Peter Czekay

This course utilizes a case-study based discussion format to provide a vehicle for students to learn and reflect upon the responsible conduct of research. Topics covered include an overview of ethical theory, conducting research, reporting research, peer review, handling research materials and information, mentoring and laboratory supervision, misconduct in research, conflict of interest, human subjects and clinical research, animals in research and genetic research. This course also familiarizes students with both internal and national policies regulating research conduct. (This program fulfills the NIH requisite for predoctoral students and postdoctoral fellows on National Research Service Award Training Grants.) Instructors: This course is team-led by a basic scientist and ethicist. It utilizes the text, "Teaching the Responsible Conduct of Research Through a Case Study Approach", prepared by the American Association of Medical Colleges. Learning Assessment is based on attendance, preparedness, discussion and a presentation. Prerequisite: AMC 507 (Year 2, Fall semester only)