

# Free Radical and Radiation Biology

## Director

Andreas Burnett (Radiation Oncology)

**Faculty:** <https://frrbp.medicine.uiowa.edu/people>

**Website:** <https://frrbp.medicine.uiowa.edu/>

## Courses

### Free Radical and Radiation Biology Courses

#### **FRRB:3110 Medical Physics I** 1-3 s.h.

Introduction to radiation used in clinical setting; fundamental physical units, measurements, principles, atomic structure and types of radiation; X-ray generating equipment, X-ray production, and its interaction with matter. Requirements: admission to free radical and radiation biology program or acceptance to radiation sciences therapy program, and maxillofacial or radiation oncology resident. Same as RSTH:3110.

#### **FRRB:3130 Introduction to Radiation Safety and Radiobiology** 1 s.h.

Instruction on safe operation of radiation producing equipment and handling of radioactive materials; origin and/or derivation of certain formulae and techniques useful in radiation protection programs; regulatory agencies, regulations, and regulatory guides pertinent to student's field; emphasis on applied aspects of radiation protection; characteristics and biological effects of ionizing radiations, properties and uses of radioisotopes, medical applications, and biological basis for protection procedures. Requirements: enrollment in radiation sciences or nuclear medicine technology program. Same as RSP:3130.

#### **FRRB:3215 Medical Physics II** 0-3 s.h.

Treatment units used in external radiation therapy; beam calculations, isodose distributions, brachytherapy, quality assurance and quality management, protection and safety. Prerequisites: RSTH:3110. Requirements: admission to free radical and radiation biology program or acceptance to radiation sciences therapy program. Same as RSTH:3215.

#### **FRRB:4000 Special Topics: Advanced Undergraduates** arr.

Readings and/or laboratory experience. Offered fall semesters.

#### **FRRB:5000 Radiation Biology** 4 s.h.

Comprehensive study of molecular and biological effects of ionizing radiations with emphasis on biomedical therapeutic applications; mammalian radiobiology, contribution of metabolism to radiation effects, and therapeutic applications of radiation in cancer therapy. Offered fall semesters. Prerequisites: CHEM:2210 and BMB:3120. Requirements: college-level physics.

#### **FRRB:5001 Research: Special Topics** arr.

#### **FRRB:6000 Seminar: Free Radical and Radiation Biology** 1 s.h.

Seminar presentations of cutting edge science in the field of free radical and radiation biology, given by experts in the field as well as trainees.

#### **FRRB:6004 Research: Free Radical and Radiation Biology** arr.

Representation of intensive laboratory-based studies in the field of free radical and radiation biology, determined by mutual agreement between faculty members sponsoring the research and consultation with graduate student.

#### **FRRB:6006 Topics in Free Radical Biology and Medicine** 1 s.h.

Discussion and presentation of new literature reports in the field of free radical biology and medicine in journal club format.

#### **FRRB:6008 Topics in Radiation and Cancer Biology** 1 s.h.

Emerging concepts in the biological effects of radiation and cancer biology; current topics in journal club format.

#### **FRRB:7000 Redox Biology and Medicine** 4 s.h.

Chemistry of free radicals, related oxidants, and antioxidants; antioxidant (redox) enzymes—their structure, biochemical function, regulation, and function in redox biology; targets of oxidants—lipids, proteins, DNA; redox biology of health (infants to healthy aging) and disease (cancer, cardiovascular disease, diabetes, neurodegenerative diseases). Offered spring semesters of even years. Prerequisites: BMB:3120 or CHEM:2210.

#### **FRRB:7001 Molecular and Cellular Biology of Cancer** 3 s.h.

Fundamental aspects of oncology at cellular and molecular levels; mechanisms of cancer initiation and progression, oncogene action, DNA damage and repair, carcinogenesis by radiation, chemicals, viruses; tumor immunology, anticancer therapies. Offered spring semesters. Prerequisites: BMED:5207. Requirements: strong basic science background. Same as CBIO:7001, PATH:7001.