

# Health Physics

## HPHYS 300

### Radiation Physics I [RE] • 5.0 Credits

This course is intended to teach students the basic fundamentals of health physics beginning with a review of physical principles, atomic and nuclear structure, radiation sources, radioactive decay series and differential equations, and the physical theory of interaction of radiation with matter. Students will develop skills by learning how to use available resources such as Brookhaven National Laboratory National Nuclear Data Center, Oak Ridge National Laboratory Radiological Toolbox and national Health Physics Society membership resources. **Prerequisite: Acceptance into the Health Physics BAS program at CBC.**

## HPHYS 305

### Radiation Physics II [RE] • 5.0 Credits

This course is intended to teach students advanced fundamentals of health physics beginning with radiation exposure, dosimetric quantities, radiation biology, standards and guidance relating to radiation safety, radiation detector theory and measurement counting statistics. Students will develop skills by learning how to use available resources, such as Brookhaven National Laboratory's National Nuclear Data Center, Oak Ridge National Laboratory's Radiological Toolbox and national Health Physics Society membership resources. **Prerequisite: Completion of HPHYS 300 with a 2.5 or higher, or instructor permission.**

## HPHYS 310

### Nuclear Forensics [RE] • 5.0 Credits

This course explores the chemical, physical and nuclear aspects associated with nuclear material production and identification. Topics will include nuclear fuel cycle, analysis of recovered material, nuclear policy and nuclear forensic case histories. **Prerequisite: Acceptance into the Health Physics BAS program at CBC.**

## HPHYS 315

### Radiological and Nuclear Emergency Response [RE] • 5.0 Credits

This course is intended to teach students the national framework for responding to incidents involving radiological and nuclear materials and the role of historical impacts on shaping policy and accident analysis. A description of the National Contingency Plan and how it envelops the EPA, investigative units, medical management of patients, response and recovery, societal issues, and factors affecting decision making. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 320

### Environmental Radioactivity [RE] • 5.0 Credits

This course is intended to teach students the sources of natural and technologically enhanced radioactivity in the environment. Basic environmental transport methods and software will be explored and applied to determine dose to a worker and a member of the public based on a composite of real-world situations, in a hypothetical setting, that have historically occurred in the health physics industry. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 325

### Reactor Health Physics [RE] • 5.0 Credits

This course is intended to teach students about the health physics challenges of nuclear power reactors, research reactors, and proposed future reactors (small modular reactors, microreactors, fusion reactors). The course will include a discussion on historic reactor and critical assembly accidents. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 350

### Health Physics Seminar I [RE] • 1.0 Credit

This course is intended to cover a broad spectrum of topics in contemporary health physics (e.g., state and federal regulations, waste disposal, emergency response, dosimetry, IAEA activities, nuclear nonproliferation, radiation oncology, etc.) delivered by field experts. Additionally, the students will increase their knowledge of employment opportunities and learn basic skills, such as resume writing and interview techniques. **Prerequisite: Acceptance into the Health Physics BAS program at CBC.**

## HPHYS 397

### Special Studies Lecture [RE] • 1.0–5.0 Credits

A class used to explore new coursework or for a specific topic of interest. **Prerequisite: Acceptance into the Health Physics BAS program at CBC and instructor permission.**

## HPHYS 398

### Special Studies Lab [RE] • 1.0–5.0 Credits

A class used to explore new coursework for a specific topic of interest. **Prerequisite: Acceptance into the Health Physics BAS program at CBC and instructor permission.**

## HPHYS 399

### Special Studies Field Based Experience [RE] • 1.0–5.0 Credits

A class used to explore new coursework or for a specific topic of special interest. **Prerequisite: Acceptance into the Health Physics BAS program at CBC and instructor permission.**

## HPHYS 400

### External Dosimetry [RE] • 5.0 Credits

This course is intended to teach students external radiation protection, point kernel techniques, shielding calculations including National Council on Radiation Protection and Measures (NCRP) 147, and external dosimetry measurement techniques. Students will develop skills by learning how to use industry shielding software and available resources, such as Oak Ridge National Laboratory's Radiological Toolbox. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 405

### Internal Dosimetry [RE] • 5.0 Credits

This course is intended to teach students internal radiation protection based on international recommendations that include International Commission on Radiological Protection (ICRP), National Council on Radiation Protection and Measurements (NCRP) and journal publications. Furthermore, the course will include discussion and applications of Medical Internal Radiation Dose (MIRD) methods for calculating internal dose. Students will develop skills by learning how to use industry dosimetry software, such as Integrated Modules for Bioassay Analysis (IMBA) and Oak Ridge National Laboratory's Radiological Toolbox. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 410

### Radiation Biology [RE] • 5.0 Credits

This course is intended to teach students molecular mechanisms of radiation interaction, cell survival curves, cellular radiosensitivity, dose fractionation, acute radiation syndrome, medical countermeasures, radiation carcinogenesis, teratogenesis, and radiation protection. Students will develop skills by learning how to use applicable sections of the Oak Ridge National Laboratory's Radiological Toolbox. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

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## HPHYS 415

### **Radiation Detection and Measurement & Lab [RE] • 5.0 Credits**

This course is intended to teach students the basic physics principles and applications of radiation detecting instruments, with laboratory exercises. The course emphasizes techniques and instrumentation for nuclear radiation detection and measurements as they relate to health physics (radiation safety) and nuclear physics. Laboratory exercises implement classroom knowledge through experience with various counting systems.

**Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 420

### **Medical Health Physics [RE] • 5.0 Credits**

This course is intended to provide students an introduction to the field of Medical Health Physics. Topics in this course will include the diagnostic and therapeutic use of x-rays and nuclear medicine, radiation protection and regulation, radiation accidents, waste management and disposal.

**Prerequisite: Acceptance into the Health Physics BAS program at CBC.**

## HPHYS 425

### **Nuclear and Radiological Regulatory Framework [RE] • 5.0 Credits**

This course is intended to teach students the formation of the nuclear and regulatory environment in the United States and the role of Independent Domestic and International Consensus Standards. **Prerequisite:**

**Acceptance into the Health Physics BAS program at CBC.**

## HPHYS 430

### **CHP Exam Preparation and Problem Solving [RE] • 5.0 Credits**

This course is intended to prepare students to take the nationally recognized Certified Health Physicist (CHP) exam with an emphasis on problem-solving skills. This course reviews all general areas of health physics and is recommended for students who are completing the Health Physics BAS program. This course reviews the fundamentals of health physics beginning with radiation physics, environmental radioactivity, internal dosimetry, external dosimetry, instrumentation, regulations, counting statistics, and nonionizing radiation. Students will develop skills in problem-solving techniques and techniques applicable to the industry. **Prerequisite: Completion of HPHYS 305 with a 2.5 or higher, or instructor permission.**

## HPHYS 450

### **Health Physics Seminar II [RE] • 1.0 Credit**

This second seminar in the series is intended to expand knowledge spectrum of topics in contemporary health physics, delivered by field experts, and explore local employment opportunities. **Prerequisite:**

**Acceptance into the Health Physics BAS program at CBC.**