Health Physics

Course Learning Outcomes are measurable statements that are used to identify the specific knowledge and skills that a student should have at the end of a course.

HPHY 2217
L1- Obtain applied experience applicable to radiation safety and Health Physics prior to beginning academic program.

HPHY 2218
L2- To understand the basics of radiation physics and radiation safety terminology.
L2- To understand the fundamentals of atomic and nuclear structure.
L3- To understand the principles of radiation physics.
L4- To understand how radiation and radioactive materials are produced in active machines.

HPHY 2219
L1- Obtain applied experience applicable to radiation safety and Health Physics during semester break in academic program.

HPHY 2225
L1- Learn about and gain experience with standard laboratory and portable radiation detection and measurement equipment

HPHY 2226
L1- Students will learn about the principles of Radiation Protection with regard to basic techniques for internal exposure control.
L2- Students will learn about the principles of Radiation Protection with regard to basic techniques for external exposure control.
L3- Students will learn about the techniques for radiation field and radioactive contamination surveys, inspections, and the appropriate analytical techniques associated with this protocol.
L4- Students will learn about the principles of radiation exposure incident and radioactive material event emergency response and emergency preparedness.

HPHY 2227
L1- Students will understand the fundamentals of personnel dosimetry including the logistics of operations, the standard of care associated with the prescription of various types of dosimetry and applications of various types of radiation detection devices for the assessment of radiological environments and worker radiation exposures.
L2- Students will understand the fundamental philosophy of ALARA as applicable to strategies of time distance and shielding and risk versus benefit.
L3- Students will learn the basics of environmental control strategies including; Hazard assessment, ventilation, PPE, contamination control and shielding practices.
L4- Students will learn about the basics of internal dosimetry and bioassay techniques relevant to programmatic logistics.

HPHY 2228
L1- Students will learn about key regulations associated with the regulation of radiation and radioactive materials.
L2- Students will learn about various consensus standards developed by national and international organizations associated with the safe use of radioactive materials and radiation producing machines.

HPHY 3300
L1- Students will learn about basic electrical circuit theory including series and parallel circuit rules for resistors, capacitors, and inductors.
L2- Students will learn details of analog x-ray machine operations.
L3- Students will learn about electrical safety and how electricity effects human anatomy and physiology.

HPHY 3321
L1- Students will learn about the basics of radiation physics.
L2- Students will learn about the interaction of radiation with biological systems including detailed descriptions of stochastic and nonstochastic outcomes of radiation exposure.
L3- Students will learn about the underlying radiation physics associated with quality diagnostic medical imaging.

HPHY 4411
L1- Students will learn about the fundamentals of particle accelerator design and operation.
L2- Students will learn about the anticipated radiological consequences and environments associated with accelerator operations.
L3- Students will understand the health and safety issues and operational safety protocol associated with accelerator operations.

HPHY 4412
L1- Students will learn about the methods for mathematically modeling the transport and fate of contaminants (both radiological and non-radiological but with emphasis on radiological) released into the environment.
L2- Students will learn about methods for estimating the magnitude of a contaminant released into the environment.
L3- Students will learn about the characteristics of various transport media (air, ground water, and terrestrial) with respect to transport and dispersion.
L4- Students will learn about the state-of-the-art environmental transport cods used to predict contaminant behavior in the environment.

HPHY 4413
L1- Students will understand how to recognize, evaluate, and control hazards arising from physical agents in the occupational environment.
L2- Students will learn about the exposure consequences associated with the physical agents associated with classical occupational injury.
L3- Students will learn about normal and pathological responses to environmental insult of physical agents encountered in the workplace.
L4- Students will learn about regulations and consensus standards associated with controls of physical agents in the work environment.

HPHY 4416
L1- Students will learn how to detect and measure radiation fields and various types of radiation (alpha, beta, gamma, and neutron) emitted from radioactive materials or produced by machines.
L2- Students will learn the theory of operation of various types of radiation detection devices.
L3- Students will gain experience in trouble shooting skills of NIM electronics.
L4- Students will learn how to write laboratory reports consistent with the quality anticipated in peer reviewed scientific journal articles.

HPHY 4417
L1- To understand the physics of aerosol particles based upon trajectory analysis.
L2- To understand the details of the ACGIH method of local exhaust-system ventilation design.
L3- To understand how to design a local-exhaust ventilation system.

HPHY 4418
L1- To learn the effects of nonionizing radiation on cells, and apply this knowledge to the understanding of human health issues.

L2- To understand the occupational safety and health issues of human exposure to nonionizing radiation.
L3- To explore the current literature in nonionizing radiation and communicate scientific work to a lay audience.

HPHY 4419
L1- The student will understand key principles of emergency response including communication protocol, chain of command, and roles and responsibilities.
L2- The student will learn about standard components of emergency preparedness for various types of nuclear facilities including: planning, infrastructure expectations, and the anticipated scope of exercises expected by regulatory agencies.
L3- The student will learn about various emergency response protocol associated with health and safety professionals including modeling and assessment, evaluation of exposure pathways, measurements, control, and decontamination principles associated with emergency response.

HPHY 4420
L1- To have a basic understanding of reactor physics and reactor designs .
L2- To understand the nuances peculiar to reactor health physics.
L3- To be able to understand and critique radiation safety approaches within the nuclear fuel cycle.

HPHY 4431
L1- Students will learn the fundamentals of atomic and nuclear structure, facets of atomic and nuclear reaction energy, terminology, and the history of discovery.
L2- Students will understand the principles of radiation physics while learning about different types of radiation, the properties of radiation, radioactive decay, decay schemes and decay kinetics, and equilibrium conditions.
L3- Students will learn about the interaction of radiation with matter with emphasis on photon interactions, charge particle interactions and neutron absorption interactions, radiation attenuation, principles of radiation shielding, inverse square processes, and standard literature references in which fundamental physics data may be accessed.
L4- To understand how radiation and radioactive materials are produced in active machines.

HPHY 4432
L1- To understand radiation physics at an advanced level with emphasis on understanding the relationship between dosimetric quantities and units.
L2- To understand the theory and technology of radiation detection and measurement.
L3- To understand the radiobiology needed to have an advanced understanding of radiation protection.

HPHY 4433
L1- Students will learn current ICRU terminology and symbols associated with radiation metrics.
L2- Students will understand the point kernel technique and be able to solve complex extended source geometrical problems for source characterization and shielding and also common geometry extended source problems with analytical techniques.
L3- Students will learn NCRP 147 techniques for the design of radiation shielding appropriate for medical facilities.
L4- Students will learn about various techniques available for the external measurement of radiation dose both in high radiation fields and occupational situations under both normal and emergency conditions.

HPHY 4434
L1- Students will learn the fundamental prerequisites necessary to determine the dose equivalent received by individuals who have had an uptake of radioactive material into their body.
L2- Students will review the historical ICRP II techniques for internal radiation dose assessment.
L3- Students will learn the ICRP26 and ICRP 30 techniques for internal dose assessment.
L4- Students will learn about advanced ICRP 60, ICRP 66 through ICRP 100 techniques and models applicable to internal dosimetry.

HPHY 4455
L1- To learn special topics in Health Physics not covered in non-elective Health Physics classes.
L2- To explore the current literature in Health Physics special topics and communicate scientific work to a lay audience.

HPHY 4456
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L2- To explore the current literature in Health Physics special topics and communicate scientific work to a lay audience.

HPHY 4480
L1- Students will completed a guided projects which integrates information from all core classes to various extent as appropriate into a completed project.

HPHY 4488
L1- To learn the effects of radiation on cells and sub-cellular particles, and apply this knowledge to understanding of human health issues.
L2- To understand the effects of radiation on tissues and multicellular organisms, and apply this knowledge to understanding of human health issues.
L3- To explore the current literature in radiobiology and communicate scientific work to a lay audience.

HPHY 4490
L1- To develop and improve the knowledge and skills needed to take and pass Part I of the ABHP Certified Health Physics Exam.
L2- To develop and improve the knowledge and skills needed to take and pass Part II of the ABHP Certified Health Physics Exam.