SOUTHEAST MISSOURI STATE UNIVERSITY

Department of Biology **BI 400/600**
Environmental Science Program **EV 400/600**

Health Physics **Revision Fall 2012**

I. Catalog Description and Credit Hours:
Radiation physics and biology as related to safe use of ionizing radiation in therapeutic and diagnostic medicine, industry, and research. (3 credit hours – 2 hours lecture, 2 hours lab)

II. Prerequisite(s): BI154 or BS105; CH185 or PH120 or permission of instructor

III. Purposes or Objectives of the Course:
A. Students will demonstrate knowledge of fundamental concepts about radioactive materials, radiation, and radiation producing equipment.
B. Students will demonstrate an understanding of the interactions of radiation with inanimate materials and living cells.
C. Students will demonstrate an understanding of the uses of radioactive materials and radiation producing instruments in science, medicine and industry.
D. Students will demonstrate an understanding of methods used to protect humans from radiation sources in the workplace, in medical procedures and in the environment.
E. Students will demonstrate an understanding of radiation dose assessment and its relevance to health risks.
F. Students will demonstrate the ability to select and use the appropriate radiation detection equipment for particular situations.
G. Students completing the course will receive a certificate of completion of Radiation Worker Training.

IV. Student Learning Outcomes:
A. Students will understand the primary tenants of radiation protection: time, distance, shielding.
B. Students will be able to select appropriate instruments for detection of specific forms of radiation and demonstrate their proper use.
C. Students will be able to describe the risks vs benefits of radiation in a medical or industrial context.

V. Expectations of Students:
A. Students are expected to attend all class activities and complete all assignments on time.
B. Students are expected to perform satisfactorily on task-oriented activities related to use of radiation detection equipment
C. Students are expected to perform satisfactorily on all course assignments, exams, and other activities.
D. Graduate students are expected to produce an extended case study for a medical procedure or an environmental legacy issue not covered in the course.

VI. Course Content or Outline (include number of periods on each topic):

Lecture

Topic	Lecture Periods
Radiation fundamental concepts	3
Overview of uses of radiation/radioactive materials (RAM)	1
Radiation and health risk – reality and perception	2
Radiation protection fundamentals	5
Regulatory agencies and radiation: NRC, DOE, EPA	2
Hallmarks of radiation protection plans and procedures	1
Uses and issues for radiation/RAM in physical science research	2
Uses and issues for radiation/RAM in life sciences research	2
Uses and issues for radiation/RAM in diagnostic medicine	2
Uses and issues for radiation/RAM in therapeutic medicine	2
Uses and issues for radiation/RAM in industry	1
External dosimetry: how it works, when to use it	1
Internal dosimetry: how it works, when to use it	1
Environmental legacy of radioactive materials usage	3
Exams	2

Lab

Topic	Lab Periods
Radioactive materials and radiation producing equipment	1
Radiation risk	1
Radiation detection: Instrument basics	1
Radiation detection: Instrument efficiencies, cpm & dpm	1
Radiation protection: time, distance, and shielding	1
Radiation detection: survey instruments	1
Radiation detection: liquid scintillation counting	1
Radiation surveys: planning and execution	1
Radiation detection: instrument calibration and quality control	1
Dosimetry	1
Case study – fluorography in diagnostic medicine	1
Case study – I-131 therapy	1
Case study – Magill Hall	1
Case study – Three mile Island, Chernobyl, Fukushima	1
Task-specific assessments	1

VII. Textbook and/or Supplemental Materials:

Stabin, Michael G. 2010. Radiation Protection and Dosimetry. Springer. ISBN: 1441923918

VIII. Basis of Student Evaluation:

Undergraduates

Assignments	40 %
Task-oriented assessments	15 %
Exams	45 %

Graduate Students

Assignments	30%
Task –oriented assessments	15%
Exams	45%
Case Study	10%

Grading Scale

Undergraduates	Graduate Students
90% - 100% = A	90% - 100% = A
80% - 89% = B	80% - 89% = B
70% - 79% = C	70% - 79% = C
60% - 69% = D	below 70% = F

There is no "D" grade in the graduate school. Graduate students scoring below 70% will earn a failing grade.

The weight of the evaluation criteria may vary according to each instructor and will be communicated at the beginning of the course.

IX. Academic Policy Statement:

Students will be expected to abide by the University Policy for Academic Honesty regarding plagiarism and academic honesty. Refer to: http://www6.semo.edu/stuconduct

X. Student with Disabilities Statement:

If a student has a special need addressed by the Americans with Disabilities Act (ADA) and requires materials in an alternative format, please notify the instructor at the beginning of the course. Reasonable efforts will be made to accommodate special needs.