

CALIFORNIA STATE UNIVERSITY CHANNEL ISLANDS

NEW COURSE PROPOSAL

PROGRAM AREA BIOLOGICAL AND PHYSICAL SCIENCES

- 1. Catalog Description of the Course.** *[Include the course prefix, number, full title, and units. Provide a course narrative including prerequisites and corequisites. If any of the following apply, include in the description: Repeatability (May be repeated to a maximum of ___ units); time distribution (Lecture ___ hours, laboratory ___ hours); non-traditional grading system (Graded CR/NC, ABC/NC). Follow accepted catalog format.]*

BIOL 416 RADIOBIOLOGY AND RADIONUCLIDES (3)

Prerequisites: PHYS 201 ; BIOL 300

Three hours lecture per week.

Topics include: nature and effects of ionizing radiation on biomolecular structures and living cells; applied radiobiology and radionuclides; genetic effects of ionizing radiation and methods of protection and dosimetry.

Same as PHYS 416

PHYS 416 Radiobiology and Radionuclides (3)

Prerequisites: PHYS 201 ; BIOL 300

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- 2. Mode of Instruction.**

	Units	Hours per Unit	Benchmark Enrollment
Lecture	<u>3</u>	<u>1</u>	<u>20</u>
Seminar	<u> </u>	<u> </u>	<u> </u>
Laboratory	<u> </u>	<u> </u>	<u> </u>
Activity	<u> </u>	<u> </u>	<u> </u>

- 3. Justification and Learning Objectives for the Course.** (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

The course would be part of a proposed Medical Imaging emphasis within the Biology major, preparing students for graduate or professional studies in the medical sciences.

Through this course, students will be able to

- explain the basic concepts and principles of radiation physics
- explain the genetic effects of ionizing radiation
- calculate radiation doses and estimate risk
- use a variety of simulation programs, featuring data analysis and display, to derive conclusions about radiation exposure and dose
- explain the principles of radiation protection
- explain the principles of operation of various radiation detectors
- critically evaluate scientific and medical literature
- organize and express ideas clearly and convincingly in oral and written forms.

The course is not designed to satisfy the University Writing or Language requirements, although it will include substantial components of writing and oral presentation.

- 4. Is this a General Education Course** **YES** **NO**
If Yes, indicate GE category:

A (English Language, Communication, Critical Thinking)	
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B (Mathematics & Sciences)	
C (Fine Arts, Literature, Languages & Cultures)	
D (Social Perspectives)	
E (Human Psychological and Physiological Perspectives)	

5. Course Content in Outline Form. *[Be as brief as possible, but use as much space as necessary]*

Properties of matter and energy. Properties of radiation, measurement units. Sources of ionizing radiation. Interaction of radiation with matter. energy transfer processes.
Biological effects of ionizing radiation. Dose-response characteristics, theories of cell survival, direct and indirect effects, acute and delayed effects.
Radiation dosimetry: exposure-dose relationship, kerma, half-life, Medical Internal Radiation Dose (MIRD) method.
Relative Biological Effectiveness (RBE) and Quality Factor (QF). Dose equivalent. Risk estimates.
Radiation protection guides, ALARA principle, exposure limits.
Radiation detectors.

6. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

E.L.Alpen. Radiation Biophysics. Academic Press, 1998, 2nd ed. (ISBN 0120530856).
S.C. Bushong. Radiation Protection. McGraw-Hill, 1999. (ISBN 0-07-012013-7).
J.J. Bevelacqua. Basic Health Physics: Problems and Solutions. Wiley-Interscience, 1995. (ISBN 0471297119).
J.J. Bevelacqua. Contemporary Health Physics: Problems and Solutions. Wiley-Interscience, 1995. (ISBN 0471018015).
S.B.Dowd. Practical Radiation Protection and Applied Radiobiology. WB Saunders, 1994.
H.Cember. Introduction to Health Physics. McGraw-Hill, 1996. (ISBN 0071054618).
W.R.Hendee & E.R.Ritenour. Medical Imaging Physics. John Wiley, 4th edition, 2002. (ISBN 0-471-38226-4).
R.R.Carlton & A.M.Adler. Principles of Radiographic Imaging; an Art and a Science. Delmar, 2001. (ISBN 0-7668-1300-2)

7. List Faculty Qualified to Teach This Course.

Dr. Geoff Dougherty: Physics faculty
Dr. Louise LutzeMann: Biology faculty

8. Frequency.

a. Projected semesters to be offered: Fall _____ Spring X Summer _____

9. New Resources Required.

- Computer (data processing), audio visual, broadcasting needs, other equipment
- Library needs

Books listed in para.6.

- Facility/space needs

10. Consultation.

Attach consultation sheet from all program areas, Library, and others (if necessary)

11. If this new course will alter any degree, credential, certificate, or minor in your program, attach a program modification.

Geoff Dougherty
Proposer of Course

1/3/03
Date