GENERAL COURSE IMPLEMENTATION DATE: September 2017
REVISED COURSE IMPLEMENTATION DATE: November 2022
COURSE TO BE REVIEWED: (six years after UEC approval)

OFFICIAL UNDERGRADUATE COURSE OUTLINE FORM

Note: The University reserves the right to amend course outlines as needed without notice.

Course Code and Number: PHYS 375  Number of Credits: 4  
Course Title: Radiobiology and Radiation Protection  
Course Short Title (if title exceeds 30 characters): Radiobiology  
Faculty: Faculty of Science  Department (or program if no department): Physics  

Calendar Description:
An introduction to the essentials of radiation protection in different environments (especially medical), as well as the fundamentals of radiobiology, i.e. the study of the behavior of cells when exposed to different forms and levels of radiation.  

Note: This course will be held off campus at the BC Cancer Agency (Abbotsford Hospital).

Prerequisites (or NONE):
PHYS 275, (one of the following: STAT 104, STAT 106, MATH 270/STAT 270, or PHYS 232), and instructor's permission. Note: Both PHYS 225 and BIO 202 are recommended prerequisite courses.

Corequisites (if applicable, or NONE): 
NONE

Pre/corequisites (if applicable, or NONE):
Equivalent Courses (cannot be taken for additional credit)
Former course code/number:
Cross-listed with:
Equivalent course(s):
Note: Equivalent course(s) should be included in the calendar description by way of a note that students with credit for the equivalent course(s) cannot take this course for further credit.

Transfer Credit
Transfer credit already exists: ☐ Yes  ☒ No
Transfer credit requested (OReg to submit to BCCAT): ☐ Yes  ☒ No  (if yes, fill in transfer credit form)
Resubmit revised outline for articulation: ☐ Yes  ☒ No
To find out how this course transfers, see bctransferguide.ca.

Total Hours: 90  
Typical structure of instructional hours:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture hours</td>
<td>20</td>
</tr>
<tr>
<td>Seminars/tutorials/workshops</td>
<td>10</td>
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<tr>
<td>Laboratory hours</td>
<td>45</td>
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<tr>
<td>Field experience hours</td>
<td>10</td>
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<tr>
<td>Experiential (practicum, internship, etc.)</td>
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<tr>
<td>Online learning activities</td>
<td></td>
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<tr>
<td>Other contact hours: Final Exam and Presentations</td>
<td>5</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>90</strong></td>
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Special Topics
Will the course be offered with different topics?
☐ Yes  ☒ No
If yes, different lettered courses may be taken for credit:
☐ No ☐ Yes, repeat(s) ☒ Yes, no limit
Note: The specific topic will be recorded when offered.

Maximum enrollment (for information only): 6

Expected frequency of course offerings (every semester, annually, every other year, etc.): Based on student demand and availability of a BC Cancer instructor

Department / Program Head or Director: Dr. Jeff Chizma  Date approved: September 2016
Faculty Council approval  Date approved: September 2016
Campus-Wide Consultation (CWC)  Date of posting: October 14, 2016
Dean/Associate VP: Dr. Lucy Lee  Date approved: September 2016
Undergraduate Education Committee (UEC) approval  Date of meeting: November 25, 2016
Learning Outcomes
Upon successful completion of this course, students will be able to:

- Evaluate the radiation hazards in different radiological environments.
- Determine the measures needed to protect against specific radiation hazards.
- Describe the basic interactions between living tissues and various forms of radiation.
- Safely measure the amounts of a variety of types of radiation under different scenarios.

Prior Learning Assessment and Recognition (PLAR)
☒ Yes ☐ No, PLAR cannot be awarded for this course because

Typical Instructional Methods (guest lecturers, presentations, online instruction, field trips, etc.; may vary at department’s discretion)
Core material is presented in lecture format, backed up by experimental work; homework assignments will reinforce the understanding of fundamental concepts. Guest lecturers, seminars, and field trips will also be an integral part of the course.

Grading system: Letter Grades: ☒ Credit/No Credit: ☐ Labs to be scheduled independent of lecture hours: Yes ☐ No ☒

NOTE: The following sections may vary by instructor. Please see course syllabus available from the instructor.

Typical Text(s) and Resource Materials (if more space is required, download Supplemental Texts and Resource Materials form)

<table>
<thead>
<tr>
<th>Author (surname, initials)</th>
<th>Title (article, book, journal, etc.)</th>
<th>Current ed.</th>
<th>Publisher</th>
<th>Year</th>
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Required Additional Supplies and Materials (software, hardware, tools, specialized clothing, etc.)
Calculator, lab book, lab coat.

Typical Evaluation Methods and Weighting

<table>
<thead>
<tr>
<th>Final exam: 30%</th>
<th>Assignments: 15%</th>
<th>Midterm exam: %</th>
<th>Practicum: %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quizzes/tests: %</td>
<td>Lab work: 30%</td>
<td>Field experience: 5%</td>
<td>Shop work: %</td>
</tr>
<tr>
<td>Presentation: 15%</td>
<td>Workshops: 5%</td>
<td>Other: %</td>
<td>Total: 100%</td>
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Details (if necessary):

Typical Course Content and Topics

Lectures:
Week 1. Physics and chemistry of radiation absorption
Week 2. Cell survival curves
Week 3. Radio-sensitivity and cell age in the mitotic cycle
Week 4. Repair of radiation damage and the dose-rate effect
Week 5. Oxygen effect and re-oxygenation
Week 6. Linear energy transfer and relative biologic effectiveness
Week 7. Acute effects of total-body irradiation
Week 8. Radiation carcinogenesis
Week 9. Effects of radiation on the embryo and fetus
Week 10. Doses at risks in diagnostic radiology, interventional radiology and cardiology, and nuclear medicine
Week 11. Dose-response relationships for model normal tissues
Week 12. Clinical response of normal tissue
Week 13. Time, dose, and fractionation in radiotherapy

Possible experiments:
#1 – Dosimeter measurements around beam
#2 – Dosimeter measurements through materials
#3 – Radiation measurements around scattering body