New Course Request

Indiana University

Check Appropriate Boxes:

Undergraduate credit [ ]

Graduate credit [X]

Professional credit [ ]

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1. School/Division: School of Medicine

2. Academic Subject Code: RACN

3. Course Number: D 604 (must be cleared with University Enrollment Services)

4. Instructor: Colleen DesRosers, P

5. Course Title: Medical Physics for Radiation Oncology I

   Recommended Abbreviation (Optional): Med Phys for RadOnc I

   (Limited to 32 Characters including spaces)

   Summer Session II 2010

6. First time this course is to be offered (Semester/Year):

7. Credit Hours: Fixed at ______ or Variable from ________ to ________

8. Is this course to be graded S-F (only)? Yes [X] No [ ]

9. Is variable title approval being requested? Yes [ ] No [X]

10. Course description (not to exceed 50 words) for Bulletin publication:

    Medical Physics I is the first of two parts and will cover nuclear physics, production of X-rays,  ionizing radiation. It provides the basis for the field of medical physics and the production of radiation.

11. Lecture Contact Hours: Fixed at ______ or Variable from ________ to ________

12. Non-Lecture Contact Hours: Fixed at ________ or Variable from ________ to ________

13. Estimated enrollment: ______ of which ______ percent are expected to be graduate students.

14. Frequency of scheduling: once / year. Will this course be required for majors? Yes [ ]

15. Justification for new course: New certificate program developed in medical dosimetry

16. Are the necessary reading materials currently available in the appropriate library? Yes [X]

17. Please append a complete outline of the proposed course, and indicate instructor (if known), textbooks, and other materials.

18. If this course overlaps with existing courses, please explain with which courses it overlaps and whether this overlap is necessary, desirable, or unimportant.

19. A copy of every new course proposal must be submitted to departments, schools, or divisions in which there may be overlap of the new course with existing courses or areas of strong concern, with instructions that they send comments directly to the originating Curriculum Committee. Please append a list of departments, schools, or divisions thus consulted.

Submitted by:

[Signature]

Department Chairman/Division Director

[Date] 7/16/09

Dean of Graduate School (when required)

[Date]

Approved by:

[Signature]

Dean

[Date] 7/21/09

Chancellor/Vice-President

[Date]

University Enrollment Services

[Date]

After School/Division approval, forward the last copy (without attachments) to University Enrollment Services for initial processing, and the remaining four copies and attachments to the Campus Chancellor or Vice-President.
Simon -

The first semester course here is small and introductory, and as a result appears to be pretty strictly focused on physics topics, with little clinical content. I can easily imagine (but have no short term plans for) a physics course that included the first semester material as part of a larger course on radiation and radiation/matter interactions. Assuming that you and your colleagues would have no problem with that, I have no problem with this. The second semester course is far more clinically oriented, so I have no concerns at all.

- Andy

On Jul 20, 2009, at 3:56 PM, Rhodes, Simon J wrote:

Dear Andy,

Please find attached a Word file that outlines a bunch of proposed graduate level courses in dosimetry. I hope to submit them to the IUPUI Grad Advisory Committee (GAC) subcommittee soon. These courses are designed to be part of a proposed new grad certificate program in medical dosimetry that will operate out of the radiation oncology dept. When we submit courses, I like to run them by other units on campus so that there is no conflict of interest. I am usually therefore sending letters to Biology and Chemistry. In this case two of the courses have "Physics" in their title (course # 6604 and 6605) and so I am sending them to you. I do not think that there is any conflict but please review the course outlines and let me know if you agree.

A reply by e-mail would be fine.

Please let me know if you have any questions.

Thanks very much,

Simon
Simon J. Rhode, Ph.D.
Associate Dean for Graduate Studies
Indiana University School of Medicine

<New Course Request.doc>

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NEW COURSE REQUEST

I. Title: Medical Physics for Radiation Oncology I
Course # RAON-D604
Course Director: Colleen DesRosiers, Ph.D.
Instructor: Colleen DesRosiers, Ph.D. et al
Prerequisites: Permission of the instructor

Suggested Course Abbreviation: Med Phys for RadOnc I
Summer Session II 1 credit hour 2 hours/week (6 weeks) (60 min) = 720 minutes

II. Course Description and Rationale
Medical Physics I is the first of two parts and will cover nuclear physics, production of X-rays, ionizing radiation. It provides the basis for the field of medical physics and the production of radiation.

The course will cover topics that are required by the American Association of Medical Dosimetry Curriculum Guide as well as topics for physicists and physicians practicing in radiation oncology.

III. Educational Objectives
Upon completion of this course the student will be able to:
1. Perform rudimentary monitor unit calculations for simple treatments using a calculation program

   Assessment: Clinical competency. The student will observe use of the calculation program and will perform calculation independently with physicist observer.

2. Describe atomic structure on the cursory level required for medical physics

   Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

3. Explain the atomic circumstances under which nuclear decay is likely to occur

   Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

4. Perform mass defect calculations

   Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

5. Describe the different types of radioactive decay
Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

6. Describe nuclear decay mathematically

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

7. Perform nuclear decay calculations

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

8. Diagram an x-ray circuit

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

9. Describe the components in an x-ray circuit and their function

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

10. Define the relationships between tube voltage, filament voltage, time, energy, x-ray production and efficiency

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

11. Diagram the components of a linear accelerator

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

12. Describe the functions of the components of a linear accelerator

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

13. Describe historic types of radiation producing equipment

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

Assessment: Written homework based on lecture, review of text, to be reviewed and graded by a physicist.

IV. Course Content – Syllabus
Course content will be based on the text, The Physics of Radiation Therapy, by Faiz M. Khan. It will include a series of lectures given by the Medical Physics Staff in the Department of Radiation Oncology at the IU Simon Cancer Center.

1. Review of Math and Physics Concepts/Calculations (homework will be worth 10% of total grade)
   a. Qualitative relationship between depth, field size, distance, and monitor units
   b. Description of calculation program
   c. Demonstration of use of calculation program
   d. Independent operation of calculation program

2. Structure of matter (homework will be worth 10% of total grade)
   a. Atomic structure/composition
   b. Neutron/proton ratio and its relationship to nuclear stability
   c. Mass defect
   d. Concepts of energy and binding energy
   e. Nuclear forces and energy levels
   f. Dual nature of radiation

3. Nuclear Transformations (homework will be worth 10% of total grade)
   a. Definition of radioactivity
   b. Types of radioactive decay and relationship to n/p ratio
   c. Radiation units
   d. Radioactive decay

4. Production of x-rays (homework will be worth 10% of total grade)
   a. Components of an x-ray tube
   b. X-ray tube circuit diagram
   c. Rectification
   d. Production efficiency
   e. Bremsstrahlung and characteristic radiation

5. Clinical Radiation Generators (homework will be worth 10% of total grade)
   a. Linear accelerators
      i. Operational theory of wave guides
         1. Standing wave guides
         2. Traveling wave guides
      ii. Bending magnet systems
      iii. Flattening filters
      iv. Electron scattering foils
      v. Targets
      vi. Factors affecting
         1. Beam energy
2. Entrance dose
3. Depth of maximum dose
4. Beam uniformity
5. Dose rate

vii. Monitor chamber
viii. Collimation systems
   1. Primary and secondary collimators
   2. Coupled and independent jaws (including virtual wedges)
   3. Multileaf collimators
b. Cyclotron
c. Microtron
d. Cobalt units
e. Therapeutic x-ray (<300 kVp)

6. Interactions of Ionizing Radiation (homework will be worth 10% of total grade)
a. Description of photon interactions
   i. Coherent scatter
   ii. Photoelectric effect
   iii. Compton effect
   iv. Pair production
   v. Photoproduction disintegration
b. Interactions in human tissues
   i. Energy dependence
   ii. Atomic number dependence
   iii. Electron density dependence

V. Required and Recommended Texts
   The Physics of Radiation Therapy, Khan, Faiz M.

VI. Evaluation and Grading
This didactic course will be evaluated on the basis of scheduled exams and homework assignments. The final grade will be based on homework assignments (60%), weighting given in the Course Content section and final exam (40%)

The Indiana University grading scale will be applied.

VII. Cheating and Plagiarism:
Students are instructed to make themselves aware of University regulations concerning plagiarism, the maintenance of academic honesty and the definitions of unacceptable behavior and cheating. Academic misconduct of any sort will not be tolerated and will be dealt with as outlined in the IU/PUI Code of Student Rights, Responsibilities, and Conduct, which can be viewed at:

http://www.iupui.edu/code/

Examples of misconduct include but are not limited to:
1. Cheating
   A student must not use or attempt to use unauthorized assistance, materials, information, or study aids in any academic exercise.

2. Fabrication
   A student must not falsify or invent any information or data in an academic exercise including, but not limited to, records or reports, laboratory results, and citations to the sources of information.

3. Plagiarism
   A student must not adopt or reproduce ideas, words, or statements of another person without appropriate acknowledgment. A student must give credit to the originality of others and acknowledge an indebtedness whenever he or she does any of the following:
   a. Quotes another person’s actual words, either oral or written.
   b. Paraphrases another person’s words, either oral or written.
   c. Uses another person’s idea, opinion, or theory, or
   d. Borrows facts, statistics, or other illustrative material, unless the information is common knowledge.

4. Interference
   a. A student must not steal, change, destroy, or impede another student’s work.
   b. A student must not give or offer a bribe, promise favors, or make threats with the intention of affecting a grade or the evaluation of academic performance.

Potential consequences for academic misconduct:

If the instructor has information that one of his/her students committed an act of academic misconduct, the faculty member will hold an informal conference with the student. The conference will be prompt and private. If the faculty member concludes that the student is responsible for the misconduct, then the faculty member will impose an appropriate academic sanction (i.e., lower or failing grade on the assignment, assessing a lower or failing grade for the course).

VIII. Americans with Disabilities Act:
If you need any special accommodations due to a disability, please contact Adaptive Educational Services at (317)-274-3241. The office is located in CA 001E.