

## APPLICATION FOR NEW COURSE

1. Submitted by College of Health Sciences Date 22 May 2006

Department/Division offering course Department of Clinical Sciences/ Div. of Radiation Sciences

2. Proposed designation and Bulletin description of this course

a. Prefix and Number RAS 650 b. Title\* Physics of Radiation Therapy II: Brachytherapy Physics

\*NOTE: If the title is longer than 24 characters (including spaces), write

A sensible title (not exceeding 24 characters) for use on transcripts

Brachytherapy Physics

c. Lecture/Discussion hours per week 2 d. Laboratory hours per week 0

e. Studio hours per week 0 f. Credits 2

g. Course description

A presentation of the full scope of use of implanted radiation sources for medical purposes. The course includes consideration of all aspects of brachytherapy dosimetry and treatment planning as well as modern and cutting-edge brachytherapy clinical practice. Characteristics of interstitial, intracavitary, and intraluminal implants, as well as remote afterloaders, are considered.

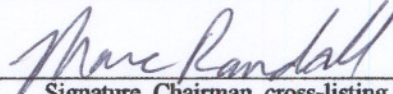
h. Prerequisites (if any)

RAS/RM/PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite)

i. May be repeated to a maximum of \_\_\_\_\_ (if applicable)

4. To be cross-listed as

RM 650  
Prefix and Number

 10-19-06  
Signature, Chairman, cross-listing department

5. Effective Date Spring Semester 2007 (semester and year)

6. Course to be offered  Fall  Spring  Summer

7. Will the course be offered each year?  Yes  No  
(Explain if not annually)

8. Why is this course needed?

In recent years, the (expanded) bulk of the brachytherapy physics instruction in the Radiation Science Program largely has been offered in bits and pieces of two lecture courses, a seminar, and required clinical practicum. In the interest of faculty efficiency and better educational practice, we now wish to offer most of the didactic brachytherapy instruction in the form of a specialized course offered to all interested program students.

9. a. By whom will the course be taught? Initially, by Prof. Ali Meigooni, with other Radiation Science faculty as needed.

b. Are facilities for teaching the course now available?  Yes  No  
If not, what plans have been made for providing them?

## APPLICATION FOR NEW COURSE

10. What enrollment may be reasonably anticipated? 8
11. Will this course serve students in the Department primarily?  Yes  No  
Will it be of service to a significant number of students outside the Department?  
If so, explain.  Yes  No
- 
- Will the course serve as a University Studies Program course?  Yes  No  
If yes, under what Area? \_\_\_\_\_
12. Check the category most applicable to this course
- traditional; offered in corresponding departments elsewhere;
  - relatively new, now being widely established
  - not yet to be found in many (or any) other universities
13. Is this course applicable to the requirements for at least one degree or certificate at the University of Kentucky?  Yes  No
14. Is this course part of a proposed new program:  
If yes, which?  Yes  No
- 
15. Will adding this course change the degree requirements in one or more programs? \*  Yes  No  
If yes, explain the change(s) below
- (Initially, we wish to pilot this course without necessarily requiring it of all students. If we like this approach, we will incorporate it as part of a larger program change in 2-3 years.)
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16. Attach a list of the major teaching objectives of the proposed course and outline and/or reference list to be used.
17. If the course is a 100-200 level course, please submit evidence (e.g., correspondence) that the Community College System has been consulted.  Check here if 100-200.
18. If the course is 400G or 500 level, include syllabi or course statement showing differentiation for undergraduate and graduate students in assignments, grading criteria, and grading scales.  Check here if 400G-500.
19. Within the Department, who should be contacted for further information about the proposed course?
- Name Ralph Christensen, Ph.D., Director of Graduate Studies Phone Extension 3-1100 X-80847

\*NOTE: Approval of this course will constitute approval of the program change unless other program modifications are proposed.



**RAS/RM 650 (2) Section 001 Physics of Radiation Therapy II: Brachytherapy Physics MW 4-4:50 p.m.  
Tentative Syllabus 10/18/06**

**Instructor:** Ali S. Meigooni, Ph.D., Professor, Departments of Radiation Medicine and Clinical Sciences (Radiation Sciences)

**References:** **Physics of Radiation Therapy, Third Edition** (2003), F. Khan  
**Principles and Practice of Brachytherapy** (1997), S. Nag, editor  
**Physics of Radiology, Fourth Edition** (1983) H. Johns and J. Cunningham  
**AAPM TG-43 Report**, in Medical Physics 25: 2093-2115 (1998)  
**AAPM updated TG-43 Report**, in Medical Physics 31: 633-674 (2004)

**Grading:** Quizzes and homework: 30%      **Office & Hours:** TBA    O-17A Markey Cancer Center  
Midterm 30%      **Telephone:** 859-323-0284  
Final 30%      **E-mail access:** alimeig@uky.edu  
In-Class Participation 10%  
Tentative grading ranges: A: 90%-100%; B: 80%-89%; C: 70%-79%; Fail below 70%

<u>Lecture #</u>	<u>Tentative Topic</u>	<u>Reference</u>
1	Intro. to brachytherapy	Khan pp 357-358; Nag pp 3-11
2	Decay of radioactive materials	Khan pp 12-17
3	Radioactive equil; modes of decay	Khan pp 17-27; Nag pp 47-54
4	Sources for implant radiotherapy: interstitial, intracavitary, intraluminal	Khan pp 358-364
5	Activity (apparent vs. actual)	Khan pp 364-366
6	mg RaEq & Air Kerma Strength	Khan pp 366-369
7	Characteristics of various brachy sources	Khan p 358
8	(continued)	
9	Calculation of dose (point source)	Khan pp 369-377; Nag pp 54-64
10	(continued)	
11	Calculation of dose (line source), lookup tables	Khan pp 369-377; Nag pp 54-64
12	(continued)	
13	Calculation of dose (line source), TG-43	Handout
14	Calculation of dose (line source), updated TG-43	Handout

**MIDTERM EXAMINATION**

15	Source localization: orthogonal film & stereo-shift	Khan 385-386
16	Dose prescrip: interstitial, intracavitary, intraluminal	Khan 387-397
17	(continued)	
18	Prostate Seed implants	Khan 539-547
19	(continued)	
20	Short half-life permanent seed implants	
21	Remote afterloading systems	Khan pp 429-430, 521-537
22	(continued)	
23	Seed eye-plaques	Handout
24	(continued)	
25	Acceptance testing in brachytherapy	Khan pp 444-447
26	Licensure and quality assurance in brachytherapy	Khan pp 525-530, 535-536
27	HDR source calibration	Khan pp 531-532
28	Review	

**FINAL EXAMINATION**

## **RAS 650 Physics of Radiation Therapy II: Brachytherapy Physics**

### **TEACHING OBJECTIVES**

Students will:

1. Learn (and practice how to calculate doses with) fundamental dose calculation algorithms and their applications for different treatment procedures. The most recent brachytherapy protocols and the most commonly used algorithms for brachytherapy dose calculations will be learned and used.
2. Use knowledge of the operational characteristics of the current commercially available brachytherapy sources and equipment in planning patient treatments.
3. Demonstrate an understanding of quality assurance tests applied to equipment and treatment planning systems used for clinical brachytherapy applications, and list what resources to use to remain current in professional QA practice.
4. Learn and practice quick and approximately correct methods of dose calculations (hand calculations), for use as primary methods of calculation or as double-checks or verification of computer-calculated doses.
5. Demonstrate knowledge of various prescription methods for different styles of brachytherapy treatment related to various organs, etc.
6. Perform actual dose calculations from a set of radiographic films or CT or MRI images, using currently available local treatment planning systems.
7. List procedures necessarily followed as one adopts new methods of treatment.
8. Demonstrate a working knowledge of the history, units, and technology used in modern brachytherapy practice
9. List ways in which brachytherapy procedures are used in conjunction with other therapeutic modalities such as external beam.



UNIVERSITY OF KENTUCKY

August 14, 2006

**Office of the Dean**

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**Memorandum**

**TO:** Associate Provost for Academic Affairs

**FR:** Sharon R. Stewart, Associate Dean for Academic Affairs  
College of Health Sciences

**RE:** Request of New Course, Division of Radiation Sciences, Department of Clinical Sciences, College of Health Sciences

A handwritten signature in cursive script, reading 'Sharon Stewart', written in black ink.

The purpose of this memorandum is to submit a proposal for new course in the Division of Radiation Sciences entitled Physics of Radiation Therapy II: Brachytherapy Physics (RAS 650). The completed New Course form and RAS 650 syllabus accompany this memorandum.

In recent years, the bulk of the brachytherapy physics instruction in the Radiation Sciences Program has been offered in bits and pieces of two lecture courses, a seminar, and required clinical practice. The proposed specialized course is a more pedagogically sound and efficient way to offer course content to all interested program students.

The proposed changes were reviewed and recommended for approval by the CHS Academic Affairs Committee, and I support the proposals. For additional information, please contact: Ralph Christensen (3-1100, ext 80847).