APPLICATION FOR NEW COURSE

1. Submitted by College of ____________________________ Date ________________

   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

3. 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.

4. Prerequisites (if any)

   RAS/RMPHY 546; RM/PHY 4726; RAS/RM 649 (may be co-requisite)

5. May be repeated to a maximum of ____________________________ (if applicable)

4. To be cross-listed as

   Prefix and Number RM 650

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?
      If not, what plans have been made for providing them?

   ☑ Yes ☐ No
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?*
    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.)

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.
APPLICATION FOR NEW COURSE

Signatures of Approval:

Sharon R. (for Dr. Baker) 5-23-06
Department Chair

Sharon R. 8-14-06
Dean of the College

Date

Date

Date of Notice to the Faculty

*Undergraduate Council

*University Studies

*Graduate Council

*Academic Council for the Medical Center

*Senate Council (Chair)

Date

Date

Date

Date

Date of Notice to University Senate

*If applicable, as provided by the Rules of the University Senate

ACTION OTHER THAN APPROVAL

Rev 3/04
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

Grading:
- Quizzes and homework: 30%
- Midterm: 30%
- Final: 30%
- In-Class Participation: 10%

Tentative grading ranges: A: 90%-100%; B: 80%-89%; C: 70%-79%; Fail below 70%

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

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<td>15</td>
<td>Source localization: orthogonal film &amp; stereo-shift</td>
<td>Khan 385-386</td>
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<td>16</td>
<td>Dose prescrip: interstitial, intracavitary, intraluminal</td>
<td>Khan 387-397</td>
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<td>17</td>
<td>(continued)</td>
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<td>18</td>
<td>Prostate Seed implants</td>
<td>Khan 539-547</td>
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<td>19</td>
<td>(continued)</td>
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<td>20</td>
<td>Short half-life permanent seed implants</td>
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<td>21</td>
<td>Remote afterloading systems</td>
<td>Khan pp 429-430, 521-537</td>
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<td>22</td>
<td>(continued)</td>
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<td>23</td>
<td>Seed eye-plaques</td>
<td>Handout</td>
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<td>24</td>
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<td>25</td>
<td>Acceptance testing in brachytherapy</td>
<td>Khan pp 444-447</td>
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<td>26</td>
<td>Licensure and quality assurance in brachytherapy</td>
<td>Khan pp 525-530, 535-536</td>
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<td>27</td>
<td>HDR source calibration</td>
<td>Khan pp 531-532</td>
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<tr>
<td>28</td>
<td>Review</td>
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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.
August 14, 2006

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

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).