

Brothers, Sheila C

From: Schroeder, Margaret <m.mohr@uky.edu>
Sent: Tuesday, November 10, 2015 1:56 PM
To: Brothers, Sheila C; Hippisley, Andrew R
Subject: Fwd: Proposed New Graduate Certificate: General Radiological Medical Physics
Attachments: Certificate_Proposal-Revision-October2015.pdf

Proposed New Graduate Certificate: General Radiological Medical Physics

This is a recommendation that the University Senate approve the establishment of a new Graduate Certificate: General Radiological Medical Physics, in the Department of Radiation Medicine within the College of Medicine.

The revised proposal is attached.

Best-

Margaret

Margaret J. Mohr-Schroeder, PhD | Associate Professor of STEM Education | [COE Faculty Council Chair](#) | [SAPC University Senate Committee Chair](#) | [University Senator](#) | Secondary Mathematics Program Co-Chair | [STEM PLUS Program Co-Chair](#) | [Department of STEM Education](#) | [University of Kentucky](#) | www.margaretmohrschroeder.com



APR 10 2015

OFFICE OF THE
SENATE COUNCIL
Dean, College of Medicine
Vice President for Clinical
Academic Affairs
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MEMORANDUM

TO: Susan Carvalho, Ph.D.
Associate Provost and Interim Dean

FROM: Frederick C. de Beer, M.D.
Dean, College of Medicine
Vice President for Clinical Academic Affairs

Marcus E. Randall, MD, FACR, FASTRO
Professor and Chair, Department of Radiation Medicine

DATE: November 4, 2014

SUBJECT: Graduate Certificate in General Radiological Medical Physics

I am pleased to offer my support to the effort of the Radiation Sciences division in the Department of Radiation Medicine to create a Graduate Certificate in General Radiological Medical Physics. Given the new ABR requirements for certification of what is known as "Alternative Pathway" Medical Physicists, Ph.D.s from other closely related fields such as Physics or Engineering will need to document the completion of a basic core curriculum in Radiological Medical Physics to become eligible for the certification process. There are limited opportunities for these potential outside candidates to obtain this curriculum. Our existing graduate program in Radiological Medical Physics is well-positioned to offer such a curriculum. The necessary courses and staff are existing infrastructure within the Division of Radiation Sciences and the establishment of this Graduate Certificate will not require any additional resources. This proposal is proceeding in conjunction with an effort by the division of Radiation Sciences to obtain accreditation of this curriculum by the Committee on Accreditation of Medical Physics Education Programs (CAMPEP) as a General Radiological Medical Physics certificate.

University of Kentucky College of Medicine
Division of Radiation Sciences in the Department of Radiation Medicine
November 24, 2014

Proposal for a Graduate Certificate In General Radiological Medical Physics

I. Background and Rationale

The field of Radiological Medical Physics is the study of the use of radiation to diagnose and treat human diseases and is a relative newcomer in medically-related scientific disciplines. The first “Radiological Physics” practitioners were trained in the basic sciences, typically physics. Dedicated Radiological Medical Physics education programs are a recent phenomenon. These programs strive to combine the scientific and medical aspects of the field but they remain small and few in number. To help meet the demand for workers in Radiological Medical Physics, it has been common over the past 40 years to accept persons with closely related scientific backgrounds into the field and provide them with on-the-job training. Even today, a large fraction of practicing Radiological Medical Physicists have degrees in fields other than Radiological Medical Physics. Many of these are leaders in the field and their contributions have been and will remain very important. Their work experience has traditionally provided the pathway into certification for these Radiological Medical Physicists. However, given the recent changes adopted by the Medical Physics education community, these potential outside candidates must document completion of a basic core curriculum in Radiological Medical Physics in addition to a Ph.D. degree received in a closely related discipline in order to qualify for certification by the American Board of Radiology (ABR) in Radiological Physics.

Certification by the ABR in Radiological Physics is imperative for the continued employment of clinical Radiological Medical Physicists in the US. The current process for Radiological Medical Physics certification by the ABR requires the successful completion of three steps. Parts 1 and 2 are written exams and successful completion of these first two parts is followed by a Part 3 oral exam. Candidates are eligible to take the Part I written exam upon entering a Medical Physics education program that is accredited by the Committee on Accreditation of Medical Physics Education Programs (CAMPEP). The types of educational programs included in this requirement are MS or PhD Graduate programs, DMP programs, Certificate programs, or Medical Physics Residency programs. Eligibility for Part 2 requires graduation from a CAMPEP accredited Medical Physics Residency. Part 3 then follows a successful completion of Part 2.

An alternative pathway into the certification process is allowed for PhDs from closely related, non-Medical Physics backgrounds. These candidates can become eligible for accredited Medical Physics Residencies given documented evidence of completion of a core Radiological Physics curriculum. This curriculum can be obtained from any Medical Physics

graduate program or from an institution offering a Radiological Medical Physics Certificate program, either of which is accredited by CAMPEP. The required curriculum is outlined in The American Association of Physicists in Medicine (AAPM) report 197S. Since Radiological Medical Physics programs or courses are uncommon, most graduates from traditional physics or other scientific programs wanting to enter Radiological Medical Physics through the alternative pathway will not have had the opportunity to complete the required core coursework. Unless provided with an opportunity to complete this core curriculum, these outside candidates would be effectively barred from competing for Radiological Medical Physics residencies.

The Radiological Medical Physics program at the University of Kentucky is a logical choice to offer this core curriculum given the course structure currently in place. Ours is one of the oldest programs of its kind and has been in existence for more than 40 years. We are currently providing the core curriculum in Radiological Medical Physics as defined by AAPM Report 197S as part of our CAMPEP accredited MS degree program. Therefore, we are well-positioned to offer a core curriculum training certificate for those persons from other backgrounds needing such coursework but not needing another graduate degree. It is a valuable service we could provide for the Radiological Medical Physics community and it could be implemented immediately and without the need for any additional resources.

II. The Radiological Medical Physics Program at UK

The Radiological Medical Physics MS degree program is administered in the Division of Radiation Sciences and is accredited by CAMPEP. Radiation Sciences is a unit of the Department of Radiation Medicine in the College of Medicine. This program has existed within the University of Kentucky for over 40 years and has a well-established reputation for training clinically oriented medical physicists. The current Radiation Sciences Division is administered by Janelle Molloy, Ph.D, Director and E. Lee Johnson, Director of Graduate Studies. J. Molloy would be the proposed director of the Graduate Certificate program. The Radiation Sciences division currently has 6 members on the Graduate Faculty and two other faculty members in the College of Medicine, which contribute to the instructional components of the program. We believe the infrastructure is in place to successfully incorporate a Graduate Certificate Curriculum within the Division of Radiation Sciences that meets the requirements of the Graduate School and the University of Kentucky.

III. The Proposed Graduate Certificate Curriculum

Certificate Director: Janelle Molloy, Ph.D is the proposed certificate director. Dr. Molloy is currently the Division Director of Radiation Sciences, the Director of Medical Physics in the Department of Radiation Medicine in the College of Medicine, and a member of the graduate faculty.

Graduate Faculty of Record: Graduate Faculty of Record are the graduate faculty in the Radiation Sciences Division. They include the following members:

Dennis Cheek, Ph.D., DABR
 Janelle Molloy, Ph.D., DABR, FAAPM
 Peter Hardy, Ph.D., DABMP
 Lee Johnson, Ph.D., DABR
 Wei Luo, Ph.D., DABR
 Travis Painter, MS, DABR
 Jie Zhang, Ph.D., DABR
 William St. Clair, MD, Ph.D
 Mahesh Kudrimoti, MD

If a graduate faculty member leaves the graduate faculty of record, the remaining graduate faculty of record will meet together to elect a replacement.

Certificate Prerequisites: The following courses are preferred to be prerequisites for the certificate but may be taken concurrently upon approval of the certificate director. Suitable equivalents may be substituted.

| Course Listing | Course Name | Credit Hours |
|----------------|---------------------------------------|--------------|
| ANA 209 | Human Anatomy | (3) |
| PGY 206 | Human Physiology | (3) |
| RM/PHY 472G | Interactions of Radiation with Matter | (3) |

Certificate Curriculum: The core Radiological Medical Physics curriculum topics to be addressed in our proposed certificate curriculum, as outlined in the AAPM report No. 197S, are as follows: 1) Radiation Physics and Dosimetry, 2) Radiation Safety and Protection, 3) Fundamentals of Medical Imaging, 4) Radiobiology, and 5) Radiation Therapy Physics. Note that Anatomy and Physiology are also required topics but are taught outside the Radiation Sciences division. These topics, therefore, will be listed as prerequisites and are considered outside the scope of this proposed certificate. Based on the current course structure in the Radiological Medical Physics MS program in the Division of Radiation Sciences, the required core topics would be covered in the following offerings:

| Course Listing | Course Name | Credit Hours |
|----------------|---|------------------|
| RAS/RM 545 | Radiation Protection and Radiation Safety | (3) |
| RAS/RM 546 | General Medical Physics | (3) |
| RAS/RM 647 | Physics of Diagnostic Imaging I | (3) |
| RAS/RM 649 | Radiation Therapy Physics | (3) |
| RAS/RM 601 | Advanced Radiation Dosimetry | (2) |
| RM/BIO 740 | Mammalian Radiation Biology | (2) |
| | | Total Credits:16 |

As outlined above, the proposed certificate curriculum would require the completion of these 16 credit hours. Under the current course schedule, RAS/RM 546 and RM/BIO 740 are taught every fall semester and RAS/RM 545, RAS/RM 601, RAS/RM 647, and RAS/RM 649 are taught every spring. Participants would be expected to complete the certificate program within a 5 year period and maintain a minimum 3.0 GPA. However, a highly-motivated student could complete the requirements in one year given that the proposed course outline is a subset of the courses taken in the first year by students in the MS Graduate program. Even at slower rate of one course per semester, participants could complete the certificate in the reasonable time of 3.5 years.

IV. Requirements for Admission

The working premise is that participants in this certificate curriculum would not need to obtain a degree from the Radiation Sciences division and would not be admitted into the MS Radiological Physics program upon completion of the certificate curriculum. Admission requirements would be as follows:

1. Applicants must satisfy the minimum requirements of the Graduate School for admission to a Graduate Certificate. These are the same requirements applied to applicants seeking Post Baccalaureate status.
2. Applications for the General Radiological Medical Physics Graduate Certificate must be submitted in accordance with the procedures of the Graduate School.
3. Applicants must satisfy one of the following conditions: a) Have successfully completed ANA 209 Human Anatomy (3), PGY 206 Human Physiology (3), and RM/PHY 472G Interactions of Radiation with Matter (3) or their equivalents; or b) Take these courses concurrently with the General Radiological Medical Physics Graduate Certificate. Fulfillment of this requirement is as determined and/or approved by the certificate director.
4. Applicants to the General Radiological Medical Physics Certificate must meet one of the following conditions: a) Be concurrently enrolled in a Ph.D. graduate degree program in Physics, Engineering, or other closely related scientific program at an accredited University; or b) Have previously earned a Ph.D. graduate degree in Physics, Engineering, or other closely related scientific program from an accredited University.
5. Acceptance in the General Radiological Medical Physics Graduate Certificate is at the discretion of the certificate director and is based, in part, on the candidates past academic history. The certificate director may request additional information be provided by the applicant to aid in the evaluation process.

V. Requirements for Completion of the Certificate

Requirements for the completion of the General Radiological Medical Physics Graduate Certificate are as follows:

1. Completion of the 3 prerequisite courses.
2. Completion of all required certificate coursework.
3. Maintenance of a 3.0 GPA as determined from all certificate curriculum coursework.
4. Completion of all required courses within 5 years of admission.

Upon successful completion of the above outlined requirements, the Director shall complete and submit a Graduate Certificate Completion Form to the Dean of the Graduate School.

1. Introduction

1.1. Program Goal:

It is the goal of the certificate to prepare “Alternative Pathway” PhD candidates from other programs, such as Physics or Engineering, to become eligible for CAMPEP accredited Medical Physics Residency programs. The certificate will document the basic Radiological Medical Physics curriculum required for a Medical Physics residency has been met. This curriculum is designed to assure the candidate has achieved basic proficiency in theory and practice in Radiological Medical Physics. We propose to use the RAPHEX exam as the metric by which to measure progress through the certificate curriculum.

1.2. Basic Assessment Approach

Students will be assessed for learning outcomes by select program faculty or graduate committees. Student scores and evaluations will be compiled at the direction of the Program Director who, along with appropriate program faculty, will use the statistics for program review as outlined below. Recommendations on program improvement will be formulated based on the program review and taken to the full faculty for discussion and implementation. This report, including recommendations, then goes to the Office of University Assessment, where it will be evaluated by the University Assessment Council (UAC) and then the UAC liaison will facilitate communication between UAC and the M.S/Ph.D. program faculty, as appropriate.

2. Assessment Oversight, Resources

- 2.1. College Learning Outcomes Assessment Coordinator – Lana Spicer & Dr. Terry Stratton
- 2.2. Unit Assessment Coordinator – Dr. Janelle Molloy

3. Program-Level Learning Outcomes

- 3.1. Knowledge: The student demonstrates the ability to recall factual information such as physical constants, definitions, patient specific doses, radioactive decay properties, dose calculation methodologies, imaging components, and types of radiological physics equipment. The Essential Didactic Elements for Alternative Pathway candidates are:
 - 3.1.1. Radiological Physics and Dosimetry
 - 3.1.2. Radiation Protection and Radiation Safety
 - 3.1.3. Fundamentals of Imaging in Medicine
 - 3.1.4. Radiobiology
 - 3.1.5. Radiation Therapy Physics
- 3.2. Comprehension: The student demonstrates comprehension of complex concepts and ideas by the application of analytical and problem solving skills.

4. Curriculum Map

| Learning outcome | RAS546 <i>Intro to Med Radiological Physics,</i> | RAS 647 <i>Physics of Diagnostic Imaging I</i> | RM 601 <i>Advance Radiation Dosimetry</i> | RAS545 <i>Radiation Hazards and Protection</i> |
|---|--|--|--|--|
| | RM740 <i>Mammalian Radiation Biology</i> | RAS 649 <i>Physics of Radiation Therapy</i> | | |
| Demonstrate a mastery of the fundamental principles of Medical Physics | I | I,R | I,R,E | I,R,E |
| Demonstrate comprehension by pulling together concepts in solving complex problems. | I | I,R | I,R,E | I,R,E |

I- outcome introduced
 R- outcome reinforced
 E- outcome emphasized
 A- outcome applied

5. Assessment Methods and Measures (Formative and Summative recommended)

5.1. Direct Methods

5.1.1. RAPHEX Exam

5.1.1.1. RAPHEX is a yearly practice exam written by the New York chapter of the American Association of Physicists in Medicine (AAPM) intended to help residents in Radiation Medicine prepare for board exams. National participation is approximately 300 per year. The proctored exam is administered locally but scored and analyzed by Medical Physics Publishing. Therefore, we consider the exam to be an unbiased estimator of Radiological Medical Physics knowledge and understanding. RAPHEX sample questions are shown below.

5.1.1.2. Our plan is to administer the exam at three different time points. The first (P1) being in the Fall upon entry into our certificate curriculum, the second (P2) will occur after completion of at least 1/2 of the required credit hours, and finally at the completion of the certificate (P3). We propose to use credit hours completed for the determination of the test points due to the fact that the rate of progress through the certificate coursework will likely vary among individuals enrolled in the certificate.

5.1.1.3. We plan to collect the national percentile ranking as reported by Medical Physics Publishing for each student at each time point. Our benchmarks will be time point specific. For P1, we low scores. This is reasonable since students will, in all likelihood, not have any significant previous exposure to Radiological Medical Physics. Scores in the bottom 10th percentile are realistic. For P2, our target is elevation for all student scores into range between the 10th and 30th percentile. Scores above the 30th percentile are expected for the final testing period, P3. These expectations are lower but in line with those of our MS students.

5.1.1.4. Student progress will be monitored by the certificate director and exams will be scheduled when required. The certificate director will collect and analyze the test scores and document student progress.

5.2. Benchmarks/Goals are determined through the assessment process of the Master's Degree program.

6. Assessment Cycle and Data Analysis

6.1 Assessment of the Graduate Certificate will be housed within the Master of Radiation Medicine for reporting purposes. This will meet SACSCOC and University Assessment Council (UAC) annual and cyclical reporting requirements.

6.1.1. Reports are due to the University Assessment Council every October 31st for the previous Academic Year (i.e., the 2015-2016 Academic Year is reported on October 31st, 2016).

6.2. Data Analysis Process/Procedures

Data will be collected and compiled by faculty and provided to the unit coordinator/DGS. The data will be analyzed by two or more individuals, where improvement actions will be sought for the program. The final results and suggested improvement actions will be discussed at a faculty meeting, where a timeline for improvement implementation and any other suggestions can be discussed.

7. Teaching Effectiveness

7.1. The University of Kentucky administered Teacher Course Evaluation (TCE) process will be used by all instructors to permit evaluation of teaching effectiveness by their students each semester. The Department Chair will review, for each program instructor, several informational items (the TCE results, teaching portfolio, teaching philosophy, pedagogical style and relevant supplemental information such as voluntary mid-course evaluations or peer review assessments) and provide feedback to the instructor. This will occur near the end of even numbered calendar years for tenured teaching faculty and every year for non-tenured instructors).

8. What are the plans to evaluate students' post-graduate success?

- 8.1. Initial residency placement records will serve as an indication of initial post-graduate performance. This is to be supplemented by anecdotal evidence indicating successful completion of the residency and ultimately certificate by the American Board of Radiology. Further opportunities will be explored by the Radiation Medicine and Radiology Graduate Program Committee.

9. Appendices

9.1. Sample RAPHEX Questions

therapy questions

- ✓ T1. Beta-plus decay has a _____ energy distribution because the energy is shared between the _____.
- A. Discrete beta-plus particle and the recoil nucleus.
 - B. Continuous beta-plus particle, antineutrino, and recoil nucleus.
 - C. Continuous beta-plus particle, neutrino, and recoil nucleus.
 - D. Discrete beta-plus particle, anti-neutrino, and recoil nucleus.
- ✓ T2. Listed below are some elements and their atomic numbers (Z). ^{60}Co decays via beta-minus decay to which of the following isotopes?
- | Element | Z |
|---------|----|
| Fe | 26 |
| Co | 27 |
| Ni | 28 |
| Cu | 29 |
- A. ^{59}Fe
 - B. ^{59}Co
 - C. ^{60}Ni
 - D. ^{60}Cu
- ✓ T3. It is determined that 60 ^{125}I seeds, of a specified activity, are needed for an implant. The case is then postponed for 10 days. How many of these same seeds would you need to implant on the new date? (Half-life of ^{125}I = 60 days.)
- A. 60
 - B. 67
 - C. 70
 - D. 77
- ✓ T4. A novel isotope with a half-life of 15 days was used for a permanent seed implant. Total dose will be 100 Gy. When the patient returns for further evaluation 30 days post-implant, what dose has he already received?
- A. 75 Gy
 - B. 78 Gy
 - C. 83 Gy
 - D. 90 Gy
- ✓ T5. A diagnostic x-ray tube is running at 80 kVp and 10 mAs. The settings are changed to 120 kVp and 5 mAs. What is the *approximate* change in tube output?
- A. Does not change
 - B. Decreases by 50%
 - C. Increases by 10%
 - D. Decreases by 10%
 - E. Increases by 50%

SIGNATURE ROUTING LOG

General Information:

Proposal Type: Course Program Other

Proposal Name¹ (course prefix & number, pgm major & degree, etc.): Graduate Certificate In
General Radiological Medical
Physics

Proposal Contact Person Name: Lee Johnson Phone: 323-1570 Email: elijj@uky.edu

INSTRUCTIONS:

Identify the groups or individuals reviewing the proposal; note the date of approval; offer a contact person for each entry; and obtain signature of person authorized to report approval.

Internal College Approvals and Course Cross-listing Approvals:

| Reviewing Group | Date Approved | Contact Person (name/phone/email) | Signature |
|-----------------------------|---------------|---|-----------|
| Basic Science Sub-Committee | 1/8/15 | Tom Roszman / 859-257-5286 / tlos00@email.uky.edu | |
| Curriculum Committee | 1/20/15 | Chris Feddock / 859-257-5286 / chris.feddock@uky.edu | |
| | | / / | |
| | | / / | |
| | | / / | |

External-to-College Approvals:

| Council | Date Approved | Signature | Approval of Revision ² |
|------------------------------|---------------|----------------------------|-----------------------------------|
| Undergraduate Council | | | |
| Graduate Council | 4/9/15 | Roshan Nikou | |
| Health Care Colleges Council | | | |
| Senate Council Approval | | University Senate Approval | |

Comments:

¹ Proposal name used here must match name entered on corresponding course or program form.

² Councils use this space to indicate approval of revisions made subsequent to that council's approval, if deemed necessary by the revising council.

University of Kentucky
Department of Radiation Medicine
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Phone: (859) 323-6486
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November 3, 2015

MEMORANDUM

Physicians

Marcus E. Randall, MD, FACR, FASTRO

Professor

Department Chair

Markey Foundation Endowed Chair

Ronald C. McGarry, MD, PhD

Professor

Vice-Chair for Research

Director of Body Radiosurgery Program

William St. Clair, MD, PhD

Professor

Co-Director of Gamma Knife

Radiosurgery Program

Mahesh Kudrimoti, MD

Professor

Vice-Chair for Clinical Operations

Residency Program Director

Jonathan Feddock, MD

Assistant Professor

Robin Reams, MD

Assistant Professor

Medical Director

Morehead Cancer Treatment Center

Pushpa Patel, MD

Associate Professor

Morehead Cancer Treatment Center

Physicists

Janelle Molloy, PhD, FAAPM

Professor

Director of Medical Physics

E. Lee Johnson, PhD

Associate Professor

Wei Luo, PhD

Assistant Professor

Dennis Cheek, PhD

Assistant Professor

Prakash Aryal, PhD

Instructor

Mike Sanders, MS

Gamma Knife

Sam Gerring, MS

Instructor

Pushpa Otageri, MS

Instructor

Cancer Research

Vivek Rangnekar, PhD

Professor

Alfred Cohen Chair in Oncology Research

Associate Director of Translational Research,

Markey Cancer Center

William St. Clair, MD, PhD

Professor

www.mc.uky.edu/RadiationMedicine

To: Margaret Schroeder,
COE Faculty Council Chair

FROM: Marcus Randall, MD *Marcus E. Randall, MD, FACR*
Chair, Department of Radiation Medicine

RE: New Committee Item SAPC - New Graduate Certificate in
General Radiological Medical Physics

Initial approval to pursue the graduate certificate in General Radiological Medical Physics was given by the Radiation Sciences Graduate Education Committee on September 15th, 2014. Preparation of the proposal commenced soon thereafter. The need for full Radiation Sciences faculty approval was identified during the subsequent review process on October 23, 2015. The proposal was presented to the Radiation Sciences faculty and a voting period opened on October 28th, 2015. The voting was concluded on November 2, 2015 with unanimous approval given by Radiation Sciences faculty members.

Please call our offices at 7-7618 with any questions or concerns.

Department of Radiation Medicine





UNIVERSITY OF KENTUCKY

D r e a m • C h a l l e n g e • S u c c e e d

DEPARTMENT OF PHYSICS AND ASTRONOMY

October 8, 2015

RE: Graduate Certificate in General Radiological Medical Physics

To Whom It May Concern,

The Department of Physics and Astronomy would like to offer our support for the proposal to create a graduate certificate in General Radiological Medical Physics. This certificate provides the necessary coursework for Alternative Pathway PhD candidates (i.e. Physics PhDs) to become eligible for residency training in Medical Physics and transition into a career as a practicing Medical Physicist. This is coursework required for certification in Medical Physics by the American Board of Radiology. Given the limited opportunities for Physics PhDs to obtain this coursework, it seems a reasonable approach to utilize the existing resources in the Radiation Sciences Division for this purpose. Therefore, the Department of Physics and Astronomy fully supports the effort by the Radiation Sciences division to implement the graduate certificate in General Radiological Medical Physics.

Tim Gorringer,

A handwritten signature in black ink, appearing to read 'Tim Gorringer'. The signature is fluid and somewhat abstract, with a large loop at the end.

Director of Graduate Studies,
Department of Physics and Astronomy.



College of Engineering
Dept. of Biomedical Engineering
522 Robotics and Manufacturing
Building
143 Graham Avenue
Lexington, KY 40506-0108

September 24, 2015

RE: Graduate Certificate in General Radiological Medical Physics

To Whom It May Concern

I am writing this letter to offer my support to create a Graduate Certificate in General Radiological Medical Physics in the Department of Radiation Medicine. This program provides an alternative pathway for bioengineering students to become eligible for the certification process. In fact, there are limited opportunities for our students in the Biomedical Engineering Department to obtain this curriculum.

Sincerely yours,

A handwritten signature in blue ink, appearing to read "Guoqiang Yu".

Guoqiang Yu, Ph.D.
Associate Professor
Department of Biomedical Engineering
University of Kentucky
Tel: 859-257-9110
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859 257-1856 (*facsimile*)
abhijit@uky.edu

To whom this may concern:

I am pleased to offer strong support to the proposal for a Graduate Certificate in Radiological Medical Physics that has been submitted by the Radiation Sciences division. It is my understanding that the certificate was created to address the requirements of their accrediting body and the certification organization for persons in Medical Physics. This is a program that some of our students may be interested in pursuing and thus would provide an unmet need at our institution.

Please do not hesitate to contact me should you have any questions about this letter of support.

Sincerely,

A handwritten signature in black ink that reads 'A.R. Patwardhan'.

Abhijit Patwardhan, Ph.D.
Professor and interim chair
Director of graduate studies