Brothers, Sheila C

From: Schroeder, Margaret <m.mohr@uky.edu>
Sent: Friday, December 02, 2016 3:41 PM
To: Brothers, Sheila C; McCormick, Katherine
Cc: Molloy, Janelle
Subject: Proposed PhD in Medical Physics
Attachments: RAS PhD Program - Nov 2016 .pdf

Proposed New PhD in Medical Physics: Radiation and Radiological Sciences

This is a recommendation that the University Senate approve, for submission to the Board of Trustees, the establishment of a new PhD degree in Medical Physics: Radiation and Radiological Sciences, in the Department of Radiation Medicine within the College of Medicine.

Rationale for the Program:

Recent changes in Medical Physics educational standards have been mandated by national entities, including the American Association of Physicists in Medicine (AAPM), the American Board of Radiology (ABR), and the Commission on the Accreditation of Medical Physics Training Programs (CAMPEP). Presently, neither an MS nor PhD graduate degree in Medical Physics is considered sufficient educational preparation for entry into the clinical profession. Entrance into the clinical certification process (administered by the ABR) requires graduation from an accredited Medical Physics residency program, in addition to a graduate degree. Such residency programs are relatively new to the profession and are insufficient in number to meet the demands of the workforce and applicants. Despite the excellent success rate that our current program graduates have achieved in terms of securing the limited residency positions, this has limited our program's ability to grow and has hampered our ability to improve the revenue-expense ratio. A PhD pathway will allow students to pursue academic careers, as well as increase their competitiveness for residency positions. Further, this allows for multiple attempts at residency positions, as these may be sought at the conclusion of the MS portion and the PhD portion of the program.

Please find the revised program attached.

Best-
Margaret

Margaret J. Mohr-Schroeder, PhD | Associate Professor of STEM Education - Mathematics | COE Faculty Council Vice Chair | SAPC University Senate Committee Chair | University Senator/Senate Council Member | Secondary Mathematics Undergraduate Program Chair | | Department of STEM Education | University of Kentucky | www.margaretmohrschroeder.com | Schedule a Meeting with Me

NEW DOCTORAL DEGREE PROGRAM FORM

(Attach completed "Application to Classify Proposed Program"[1])

GENERAL INFORMATION

College:	College of Medicine	Department:	Radiation Medicine
Major Name:	Radiation and Radiological Sciences	Degree Title:	PhD in Medical Physics
Formal Option(s):	NA	Specialty Fields w/in Formal Option:	NA
Date of Contact with Associate Provost for Academic Administration[1]:	2/26/15		
Bulletin (yr & pgs):	_____	CIP Code[1]:	51.2205
Today's Date:	3/17/15		
Accrediting agency (if applicable):	Commission on the Accreditation of Academic Medical Physics Programs (CAMPEP)		
Requested Effective Date:	☒ Semester following approval. OR ☐ Specific Date[2]: _____		
Dept Contact Person:	Janelle A. Molloy	Phone: 257-7612	Email: janelle.molloy@uky.edu

1. Number of transfer credits allowed:	9 hours of relevant graduate course credit may be transferred from another institution or another program if non-medical physics. Students transferring from the Radiation Sciences MS program at UK may transfer course credits from first 2 semesters (see associated documentation). If the student has an MS from another institution or program, up to 18 hours from course credits from the MS may be credited toward the pre-qualifying exam residency requirement.
(Maximum is Graduate School limit of total of 9 hours (or 25% of the credit hours needed to fulfill the pre-qualifying residency requirement.)	
2. Residence requirement:	A student must complete a minimum of 36 hours of residency before the qualifying exam and 2 semesters of residency after qualifying exams.
(Minimum of one year before and after Qualifying Exams.)	
3. Language(s) and/or skill(s) required:	Proficiency in research methods in Medical Physics. This will be demonstrated by completion of the course "Research Methods in Medical Physics, RAS 711" with a grade of 'B' or higher. Successful completion of this course will demonstrate advanced skill in computer programming, hypothesis development, research proposal development and technical writing.
4. Provisions for monitoring progress and termination criteria:	All students must complete the core didactic requirements. This typically requires 4-6 semesters to complete. Candidates will take part 1 of the qualifying exam (written) in the second

[1] Prior to filling out this form, you MUST contact the Associate Provost for Academic Administration (APAA). If you do not know the CIP code, the APAA can provide you with that during the contact.

[2] Programs are typically made effective for the semester following approval. No program will be made effective until all approvals are received.

	year. Students who successfully pass part 1 of the qualifying exam (2 attempts are permitted) will be permitted to proceed in the PhD program. Students who opt out of the qualifying exam, or who do not pass it, will have the opportunity to complete the remaining requirements for the MS degree, including the existing culminating oral exam. The program is designed to allow for the option of training clinician/investigators. As such, the third year may be spent completing what is now primarily the first year of our Medical Physics Residency. This consists of 4 rotations, each lasting 3 months in duration. Three of these rotations constitute clinical training/service and one is research-oriented. The research rotation will serve towards the research requirement of the PhD degree. The student must orally defend a written proposal for the selected dissertation topic. This oral defense constitutes part 2 of the qualifying exam. The proposal defense will be delivered to the student's dissertation advisory committee, typically before the end of the third year. Following the third year, the student will focus on the selected research topic. Progress will be monitored annually by the student's dissertation advisory committee. The PhD will be granted following completion of an acceptable dissertation and defense following standard University of Kentucky procedures and guidelines. After successful completion of the PhD degree, or when successful completion is imminent, the student may engage in further clinical training activities. This final phase of the program is expected to last 1 year, and will consist of what is now the second year of the 2-year Medical Physics Residency. Fulfillment of the clinical residency requirements will follow appropriate policies and guidelines of relevant oversight entities, such as the Commission on the Accreditation of Medical Physics Education Programs (CAMPEP). Although the program is structured to allow for the combined PhD/Residency pathway, PhD candidates are not required to pursue the clinical training options and are permitted to focus primarily on the research-only pathway. The standards and quality of the research expectations for successful completion of the PhD program shall not be compromised for students pursuing the combined research/clinical training pathway.
5. Total credit hours required:	A minimum of 51 credit hours are required.

	These include 36 hours of pre-qualifying residency and 4 hours of post-qualifying residency.
6. Required courses :	See Attachment A
7. Required distribution of courses within program:	The elective credit hours (18) must include at least 6 credit hours of graduate level (i.e., 4xxG, 5xx, 6xx or 7xx) didactic coursework covering related topics in science, engineering, or medicine (listed as "Variable" in Appendix A). These credits must be approved by the student's dissertation advisor. The remaining 12 credit hours may be fulfilled by any combination obtained from the list of "Course electives for PhD in Radiation Sciences" in Attachment A.
8. Minor area or courses outside program required:	A minimum of 6 credit hours of didactic coursework are required in a related science, engineering or medical field. These must be 4xxG level or above and be approved by the student's dissertation advisor.
9.Distribution of courses levels required (400G-500/600-700):	See Attachment A
10. Qualifying examination requirements	The qualifying exam will consist of two major components, one written and one oral. Students must pass both to be allowed to progress in the PhD program. The written exam will be a problem-based exam consisting of 4 parts. These are; • Radiological Physics and Dosimetry • Physics of Medical Imaging • Physics of Radiation Therapy • Elective topic (select one) o Advanced Radiation Therapy Physics o Advanced Medical Imaging Physics o Other advanced topic approved in advance by the student's dissertation advisory committee The written exam will be taken in the second year of the program and a score of 50% or greater will be required in order to pass. Students who do not pass on the first attempt will be allowed a second attempt. If the second attempt is unsuccessful then the student will not be allowed to proceed in the PhD program. The oral exam will be taken after successful completion of the written exam, but typically not to exceed 3 years from the initial date of enrollment. The student must orally defend a proposal for the selected dissertation topic. The proposal defense will be delivered to the student's dissertation advisory committee.

NEW DOCTORAL DEGREE PROGRAM FORM

11. Explain whether the proposed new program (as described in numbers 1 through 10) involve courses offered by another department/program. Routing Signature Log must include approval by faculty of additional department(s).
A minimum of 6 credit hours of didactic coursework are required in a related science, engineering or medical field. These must be 4xxG level or above and be approved by the student's dissertation advisor. The intent of this requirement is to encourage interdisciplinary collaboration and to develop rigorous scientific skills. The selection of the specific courses is variable.
12. Other requirements not covered above:
None
13. What is the rationale for the proposed new program? Include specific references to accreditation requirements if applicable.
A full description of the program and motivation is included in Attachment B. The addition of a PhD program in Radiation and Radiological Sciences is expected to provide the following benefits • Facilitate recruitment of high quality students • Provide additional training and application opportunities for students seeking to enter Medical Physics Residencies. Such residencies are a recent requirement for entry into the clinical certification process and are extraordinarily competitive. • Support the research mission of the university and medical center by increasing the number of peer reviewed publications, enhancing the imperative for and success of obtaining extramural funding, and facilitate the recruitment of faculty with scholarly skills and motivations. • Improve quality in Radiation Medicine and Radiology through clinically-oriented research projects. • Provide a cost-effective enhancement to the educational and clinical missions by incorporating teaching and graduate assistantships for educational and clinical service, respectively. • Increase our program graduates' ability to succeed in an increasingly competitive market for jobs and clinical residency positions. Increase the stature of the program nationally

Signature Routing Log

General Information:

Proposal Name: _____

Proposal Contact Person Name: _____ Phone: _____ Email: _____

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
		/ /	
		/ /	
		/ /	
		/ /	

NEW DOCTORAL DEGREE PROGRAM FORM

Signature Routing Log

General Information:

Proposal Name: _____

Proposal Contact Person Name: _____ Phone: _____ Email: _____

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
Dept. of Radiation Medicine	01/15/2015	/ /	
College of Medicine - Faculty Council	10/13/2015	/ /	
Graduate Council	12/11/2015	/ /	
		/ /	
		/ /	

Section II

Abstract

Medical Physics is a profession that includes clinical, industrial and academic practices. Clinically, medical physicists provide support services primarily in Radiation Therapy and Diagnostic Radiology settings. Both areas involve varying degrees of hardware and algorithm development. For example, intensity modulated radiation therapy is a method of delivering radiation with very high spatial precision. It required development of mathematical algorithms, complex linear accelerator delivery systems, and patient-specific testing protocols.

Presently, the Radiation Sciences program at the University of Kentucky provides training in Medical Physics via a terminal Masters degree under the Plan B, non-thesis option. This program is referred to elsewhere is the submitted documentation as our "legacy" MS program. This includes an intensive clinical practicum which is unique compared to other Medical Physics training programs and is the source of our national recognition. The legacy MS program requires 30 hours of didactic coursework.

This training traditionally prepared students for careers in clinical medical physics, most typically supporting patient treatment in private practice radiation therapy clinics. Although the MS level training can be considered sufficient for these types of positions, clinics housed in academic departments, and even some private clinics, prefer to hire candidates with terminal degree credentials (i.e., PhD).

Recent changes in Medical Physics educational standards have been mandated by national entities, including the American Association of Physicists in Medicine (AAPM), the American Board of Radiology (ABR), and the Commission on the Accreditation of Medical Physics Training Programs (CAMPEP). Presently, neither an MS nor PhD graduate degree in Medical Physics is considered sufficient educational preparation for entry into the clinical profession. Entrance into the clinical certification process (administered by the ABR) requires graduation from an accredited Medical Physics residency program, in addition to a graduate degree. Such residency programs are relatively new to the profession and are insufficient in number to meet the demands of the workforce and applicants. Despite the excellent success rate that our current program graduates have achieved in terms of securing the limited residency positions, this has limited our program's ability to grow and has hampered our ability to improve the revenue-expense ratio.

There is speculation that candidates for Medical Physics Residency positions are more competitive if they possess a PhD degree. Data indicate that approximately half of all residency positions go to candidates with MS degrees and half to those with PhDs. As such, students in our program are only eligible for about half of the available residency slots.

A PhD pathway will allow students to pursue academic careers, as well as increase their competitiveness for residency positions. Further, this allows for multiple attempts at residency

positions, as these may be sought at the conclusion of the MS portion and the PhD portion of the program.

The Medical Physics/Radiation Sciences program at UK has operated for over 40 years, is one of the longest standing programs in the country, and is nationally recognized for its emphasis on clinical training. There are only 47 CAMPEP-accredited graduate programs in the country and the UK program is the only one in the Commonwealth of Kentucky. Past program graduates have gone onto successful clinical careers throughout Kentucky and the US. Some have achieved nationally-recognized professional status including 3 AAPM presidents, 1 AAPM professional council chair, and 1 Chairman of the Board of CAMPEP. We expect that the addition of a PhD track will further enhance the stature and competitiveness of the program nationally, as we compete for high quality students with benchmark institutions such as MDAnderson, the University of Wisconsin and Duke University.

The field of Medical Physics is unique and there are no other programs at UK that provide training in this area. Further, the educational program is provided by the Departments of Radiation Medicine and Radiology, both of which are clinical departments within the UK Healthcare enterprise, thus providing a unique culture and context to the training. Research areas involve collaborative efforts between students, clinical physicists and physicians, and often possess direct clinical applicability. The collaborative nature of the program structure allows for didactic, clinical and research training in therapeutic and diagnostic medical physics.

We anticipate interest in the proposed PhD program to come from students who desire to enter a clinical career primarily, but who want to acquire the additional skills and credentials that accompany a PhD. Program content and accreditation standards require a strong undergraduate education in physics. Related disciplines, such as engineering and biology, are acceptable undergraduate preparation, if accompanied by physics remediation. Further, we expect that the proposed PhD program will allow us to attract students who otherwise would not apply or matriculate due to the current lack of a PhD option.

Comprehensive program description and complete curriculum

The proposed program will allow students to obtain a PhD in Medical Physics. The didactic coursework will consist primarily of shared coursework with our existing legacy MS program, with the addition of 6 variable credit hours of 600 level courses, and a 1 credit hour research seminar. Research will be conducted primarily under the mentorship of existing program faculty. Presently, 7 of whom possess PhDs. Research projects can be conducted using existing clinical equipment, combined with other readily available technical resources, including computer programming and simulations, and interdisciplinary collaborators.

The course requirements are listed below in Tables 1 and 2.

Table 1. Core course requirements for PhD in Medical Physics

Radiological Sciences (51.2205)						
Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)						
Course Prefix	**Course #**	**Course Title**	**Course Description**	**Type of Course: program core (C) or pre-major/ pre-professional (P)**	**Credit Hours**	**Existing (E) or New (N) Course**
RAS	546	Introduction to Medical Physics	The uses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq or concur: RM/PHY 472G or consent of instructor. (Same as PHY/RM 546.)	C	2	E
RAS	472 G	Interactions of Radiation with Matter	Basic aspects of the interaction of ionizing radiation with matter. Bohr atom, atomic spectra, radioactivity, energetics of decay. Sources of radiation, penetration of charged particles, electromagnetic radiation, and neutrons through matter; excitation and ionization processes; slected nuclear reactions; basic radiation detection and dosimetry. Prereq: PHY 213 or 232; MA 114 (may be taken concurrently); or equivalent. (Same as PHY/RM 472G.)	C	3	E
RM	740	Radiobiology	The physical and biological sequelae of radiation effects will be discussed emphasizing human and mammalian responses and radiation health. Emphasis will be for health and medical workers. Prereq: Consent of instructor; BIO/RM 540 or RM 546 or equivalent background. (Same as BIO 740.)	C	2	E
RAS	647	Physics of Medical Imaging 1	Specialized and advanced topics in diagnostic imaging, including modulation transfer function analysis, image processing algorithms, acceptance testing, CT, NMR, ultrasound, etc. Prereq: PHY/RM/RAS 546 or consent of instructor. (Same as RM 647.)	C	3	E
RAS	648	Physics of Medical Imaging 2	A continuation of RAS/RM 647. Specialized and advanced topics in nuclear medicine imaging physics, including positron emission tomographic procedures, emerging new modalities, and quality control. Prereq: RM/RAS 647 or consent of instructor. (Same as RM 648.)	C	3	E
RAS	601	Dosimetry Systems	Advanced aspects of the interaction of radiation with matter and specialized topics in the dosimetry of ionizing radiations. Modifications of Bragg-Gray theory for application to megavoltage sources. Beta dosimetry. Specialized calibration techniques. Relative response functions of various media. Nontraditional techniques. Dosimetry of radiation fields including complex spectra. Prereq: PHY 472G, RM 546, or equivalent. (Same as RM 601.)	C	2	E
RAS	649	Physics of Radiation Therapy	Specialized external beam and brachytherapy treatment planning; advanced Bragg-Gray cavity applications, including Ngas and TG- 21; calibration, acceptance testing, and quality control of therapy physics equipment. Prereq: RAS/RM/PHY 546 and RAS/RM 601, or consent of instructor. (Same as RM 649.)	C	3	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)	C	4	E
RAS	651	Imaging Physics Laboratory	Specialized experiments involving the use, calibration, and quality control of x-ray and other diagnostic imaging equipment, and the appropriate use of radiation detectors in diagnostic physics measurements. Laboratory, approximately 30 hours per credit. May be repeated to a maximum of three credits. Prereq: RM/PHY 472G, RAS/RM 546; and concurrent: RAS/RM 647, or equivalent, plus	C	2	E
RAS	710	Special Topics in Medical Physics	Topics of current interest relating to radiation and its applications in the areas of radiological medical physics and health physics. May be repeated to a maximum of four credit hours with consent of instructor. Prereq: Graduate standing in a radiation-related science.	C	1	E
RAS	711	Research Methods in Medical Physics	This course will introduce the student to, and give them practical experience in, writing research proposals, research reports and carrying out research work. The course will be jointly taught vy various medical physics faculty and guest lecturers. Students will be asked to present their own work to be critiqued by the class. The goal is to give the student a hands-on experience of what is involved in doing funded clinical research on human subjects and getting it published in an academic journal.	C	1	N
RAS	767	Post Qualifier Residency (research)	Registration for this course recognizes that the student is conducting research toward fulfillment of their thesis requirements.	C	4	N
RAS	545	Radiation Hazards and Protection	An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Prereq: PHY/RM 472G or consent of instructor. (Same as PHY/RM 545.)	C	3	E
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) **Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table**		**33**	**NA**

Table 2. Course electives for PhD in Medical Physics

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)						
Course Prefix	**Course #**	**Course Title**	**Course Description**	**Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)**	**Credit Hours**	**Existing (E) or New (N) Course**
RAS	650	Physics of Brachytherapy	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. Prereq: RAS/RM/ PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite). (Same as RM 650.)	P	0- 2	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)	P	0-12	E
RM or RAD	660	Clinical Practicum	Clinical Practicum		0-6	N
Variable		Related science/engineering/medicine Focus area courses 300/400 level or higher		P	6-18	E
# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table					**18**	**NA**

It is instructive to understand the training environment into which the PhD program will be embedded. A large number of Medical Physicists practice in a clinical setting, and provision of clinical training is what our program has always excelled at. The Department of Radiation Medicine offers a 2 year, accredited Medical Physics Residency program. These residency positions are filled with graduates of our MS graduate program. Presently, there are 2 such positions per year, for a total cohort of 4 Medical Physics residents. Graduation from a CAMPEP-accredited residency program is absolutely essential in order to be able to proceed into clinical practice as a Medical Physicist.

The proposed PhD program is designed to allow for the option of training clinician/investigators. As such, the third year may be spent completing what is now primarily the first year of our Medical Physics Residency. This consists of 4 rotations, each lasting 3 months in duration. Three of these rotations constitute clinical training/service and one is research-oriented. The research rotation will serve towards the research requirement of the PhD degree.

The student must orally defend a proposal for the selected dissertation topic. This oral defense constitutes part 2 of the qualifying exam. The proposal defense will be delivered to the student's dissertation advisory committee, typically by the end of the third year. Following the third year, the student will focus on the selected research topic. Progress will be monitored annually by the student's dissertation advisory committee. The PhD will be granted following completion of an acceptable dissertation and defense following standard University of Kentucky procedures and guidelines.

Resources (Available):

The majority of required resources for the PhD in Medical Physics already exist. The didactic coursework is provided presently to our Masters students and the PhD track is not expected to have a significant impact on the workload associated with these existing courses. One additional course will be offered through the Radiation Sciences program (711, Research Methods in Medical Physics). This is a one credit hour course and will be absorbed by existing program faculty. The Radiation Sciences program is currently housed in the Department of Radiation Medicine and supported collaboratively by the Department of Radiology, within the College of Medicine. The program is supported by the Program Director (J. Molloy), Director of Graduate Studies (L. E. Johnson) and a full-time Administrative Assistant. Coursework, research and clinical mentoring are provided by program faculty, which includes 7 in the Department of Radiation Medicine, 2 in the Department of Radiology, and one contract faculty member. Of this faculty, 7 possess PhDs and are qualified to serve as research mentors. The 9 full-time program faculty members have primary clinical appointments in either Radiation Medicine or Radiology. Their distribution of effort directed towards clinical service ranges from 50% - 90%.

Existing research resources include clinical equipment, computers, desk space and faculty mentors. Clinical equipment includes large scale clinical devices such as state-of-the-art linear accelerators (4), a Gamma Knife Stereotactic Radiosurgery unit, computerized treatment simulation systems, and numerous imaging devices including Computed Tomography, Magnetic Resonance Imaging, Ultrasound, Nuclear Medicine and Positron Emission Tomography scanners. Small-scale equipment includes radiation measuring devices such as ion-chamber and diode arrays, geometric and anthropomorphic test phantoms, and other various radiation measuring systems such as ionization chambers, Geiger counters, thermoluminescent dosimeters, radiochromic film and diode dosimetry systems.

The Radiation Sciences program provides a student workroom with seating for up to 14 students simultaneously, an ancillary work area with room for 4 students, and 14 computer workstations. In addition, a full-scale, server-based treatment simulation system is available for academic, non-clinical use. A Monte-Carlo-based radiation transport computer system is available. An array of generally available academic software is routinely used in the program, including Matlab, MCNP and EGSnrc Monte Carlo simulations, C++ and the Microsoft Office suite of programs including Excel, Access and Word.

Resources (Needed):

- To recruit one research-oriented faculty member – *(already approved and recruited as of 11/2016)*
- To convert existing residency pay scale to graduate assistantship level
- Per table:

- 6 GAs in residency (split between first and second year residents)
- 4 TAs in PhD in program 4th year (research 100%, TA)
- 4 RAs in PhD (research 100%)

Table 3 Expenses: Required, incremental resources/expenses for PhD in Medical Physics

Resource	Annual incremental expense ($)	Comment
Additional faculty member	**195,000**	(salary and benefits)
6 Graduate Assistants/first year residents	**195,000**	25,000 stipend + benefits x 6
4 Teaching Assistantships	**130,000**	25,000 stipend + benefits x 4
4 Research Assistantships	**130,000**	25,000 stipend + benefits x 4
Total	**650,000**	

Table 4 Revenue: Estimated incremental resources/revenue for PhD in Medical Physics

Resource	Annual incremental revenue ($)	Comment
Additional faculty member	**20,000**	Sponsored research
Reclassification of 4 existing residency positions (2 first year, 2 second year)	**260,000**	50,000 stipend + benefits x 4
4 Teaching Assistantships	**253,000**	1.5 FTE reduction in faculty DOE at $130,000/year plus benefits
4 additional students per year x 2 year MS	**140,000**	Tuition revenue increase (2 in-state, 2 out-of-state per year). ½ in-state. Can be accommodated via

program		lab-based training enabled by Teaching Assistants
Total	**673,000**	

The training, funding and experience for the Medical Physics Educational programs (both Graduate and Residency) possess didactic, clinical and research components. As such, it is advantageous to students, faculty and the UK Enterprise, to enlist the trainees in clinical training and service. This yields a funding mechanism in addition to the traditional teaching and research assistantships offered in non-clinical programs. The graduate assistantships included in Tables 3 and 4 are payment for clinical service and training obtained during what is now structured as our Medical Physics residency.

One of the benefits of the new proposed structure is that it allows for some redistribution of the existing instructional effort away from senior level medical physics faculty onto teaching assistants. The four teaching assistantships required will mainly provide laboratory-based instruction for the early components of our clinical practicum as well as our laboratory-based RAS 545, Radiation Hazards and Protection. An associated benefit of this structure is that it allows for program expansion. Presently, the majority of clinical training in the master's program is provided by faculty physicists in a live clinical setting. By shifting much of the early instruction into off-line tutorials assisted by recent MS program graduates (i.e, PhD candidates), our existing MS program will be able to accommodate additional student capacity and thus yield the associated tuition revenue increases that are included in Table 4. We expect that part of this MS program expansion will derive from our new affiliation with Jilin University in Changchun China. The budget assumes an additional 2 students per year in the program based on this affiliation, although we anticipate that it could be up to 7 additional students per year.

Course descriptions and bulletin information

RADIATION and RADIOLOGICAL SCIENCES PhD

Medical Physics is a profession that includes clinical, industrial and academic practices. The Radiation and Radiological Sciences PhD program is designed primarily for students who desire to enter a clinical career, but who want to acquire the additional skills and credentials that accompany a PhD.

This educational program is provided by the Departments of Radiation Medicine and Radiology, both of which are clinical departments within the UK Healthcare enterprise, thus providing a unique culture and context to the training. Research areas involve collaborative efforts between students, clinical physicists and physicians, and often possess direct clinical applicability. The collaborative nature of the program structure allows for didactic, clinical and research training in therapeutic and diagnostic medical physics.

The didactic coursework consists of a core of 33 credit hours, with an additional 18 hours of guided electives. Research will be conducted primarily under the mentorship of faculty in the Radiation Medicine or Radiology Departments. Research projects can be conducted using clinical equipment, combined with other available technical resources, including computer programming and simulations, and interdisciplinary collaborations.

Admission Requirements

In addition to the general requirements of the Graduate School, the Radiation and Radiological Sciences Program requires the following. At a minimum, candidates must show the equivalence of a minor in physics. To meet this requirement, candidates must have completed the following: 1) Calculus through Ordinary Differential Equations; 2) The Calculus-based introductory General Physics sequence with labs (2 semesters); and 3) Three upper division Physics electives (300 level or above). Courses in Human Anatomy, Physiology, Computer Science, and Scientific Statistics are preferred but, if missing, may be incorporated into the graduate program at the discretion of the Director of Graduate Studies.

Most of our entering students possess undergraduate physics degrees, although students possessing related physical science backgrounds are eligible and qualified. These students are counseled prior to their arrival of the need to comply with the entrance requirements. Most students have some missing prerequisites that are remediated in their first year. These most typically include anatomy, physiology, and sometimes include an upper level physics course. The deficiencies described above are remediated via formal, coursework. These courses are almost exclusively taken here at the University, although may be completed via coursework at another accredited college.

Retention: Students must maintain at least a 3.0 G.P.A for retention in the program. A student's progress will be reviewed annually by their graduate committee and any deficiencies or concerns identified will be followed up with the student.

Completion: Student will be required to pass their masters oral exam, two components of the qualifying exam and successful defense of the dissertation.

Application Information

Application to the program is online through the Graduate School using the link http://www.gradschool.uky.edu/ProspectiveStudents/prospective.html . The applicant will be required to submit GRE General Test scores, transcripts for all undergraduate work, and three letters of recommendation. Only self-reported, unofficial General GRE scores and transcripts are required at the time of application. Official versions must be submitted upon entry into the program. A personal statement and/or a CV may be included but are not required. A personal interview, typically on-campus, is required. However, on-line interviews may be allowed in cases of severe travel restrictions. Fluent spoken English skills are required and are assessed during the interview.

Admission to the program occurs once annually with new classes beginning in the Fall semester. The deadline for applications is April 30th, however, offers for admission are usually made early in the preceding Spring semester with completion of the class roster by May. Therefore, it is recommended that applications be completed by January 31 to assure full consideration.

Degree Requirements

A minimum of 51 credit hours are required. These include 36 hours of pre-qualifying residency and 4 hours of post- qualifying residency. The elective credit hours (18) must include at least 6 credit hours of graduate level (i.e., 4xxG, 5xx, 6xx or 7xx) didactic coursework covering related topics in science, engineering, or medicine. These credits must be approved by the student's dissertation advisor. The intent of this requirement is to encourage interdisciplinary collaboration and to develop rigorous scientific skills. The selection of the specific courses is variable. The remaining 12 elective credit hours may be fulfilled by any combination obtained from the list of "Course electives for PhD in Radiation and Radiological Sciences" below.

The qualifying exam will consist of two major components, one written and one oral. Students must pass both to be allowed to progress in the PhD program. The written exam will be a problem-based exam consisting of 4 parts. These are:

- Radiological Physics and Dosimetry

- Physics of Medical Imaging
- Physics of Radiation Therapy
- Elective topic (select one)
    - Advanced Radiation Therapy Physics
    - Advanced Medical Imaging Physics
    - Other advanced topic approved in advance by the student's dissertation

Advisory Committee: The written exam will be taken in the second year of the program and a score of 50% or greater will be required in order to pass. Students who do not pass on the first attempt will be allowed a second attempt. If the second attempt is unsuccessful then the student will not be allowed to proceed in the PhD program. Such students will, however, be allowed to attempt to complete the degree requirements for an MS degree in Radiation Sciences and be awarded that degree upon successful completion.

The oral exam will be taken after successful completion of the written exam, but typically not to exceed 3 years from the initial date of enrollment. The student must orally defend a proposal for the selected dissertation topic. The proposal defense will be delivered to the student's dissertation advisory committee.

Core courses for PhD in Radiation and Radiological Sciences

Radiological Sciences (51.2205)						
Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)						
Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
RAS	546	Introduction to Medical Physics	Theuses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq: or concur: RM/PHY 472G orconsentof instructor. (Same as PHY/RM 546.)	C	2	E
RAS	472G	Interactions of Radiation with Matter	Basic aspects of the interaction of ionizing radiation with matter. Bohr atom, atomic spectra, radioactivity, energetics of decay. Sources of radiation, penetration of charged particles, electromagnetic radiation, and neutrons through matter; excitation and ionization processes; elected nuclear reactions; basic radiation detection and dosimetry. Prereq: PHY 213 or 232; MA 114 (may be taken concurrently); or equivalent. (Same as PHY/RM 472G.)	C	3	E
RM	740	Radiobiology	Thephysical and biological sequelae of radiation effects will be discussed emphasizing human and mammalian responses and radiation health. Emphasis will be for health and medical workers. Prereq: Consent of instructor; BIO/RM 540 or RM 546 or equivalent background. (Same as BIO 740.)	C	2	E
RAS	647	Physics of Medical Imaging 1	Specialized and advanced topics in diagnostic imaging, including modulation transferfunction analysis, image processing algorithms, acceptance testing, CT, NMR, ultrasound, etc. Prereq: PHY/RM/RAS 546 or consentof instructor. (Same as RM 647.)	C	3	E
RAS	648	Physics of Medical Imaging 2	A continuation of RAS/RM 647. Specialized and advanced topics in nuclear medicine imaging physics, including positron emission tomographic procedures, emerging new modalities, and quality control. Prereq: RM/RAS 647 or consent of instructor. (Same as RM 648.)	C	3	E
RAS	601	Dosimetry Systems	Advanced aspects of the interaction of radiation with matter and specialized topics in the dosimetry of ionizing radiations. Modifications of Bragg-Gray theory for application to megavoltage sources. Beta dosimetry. Specialized calibration techniques. Relative response functions of various media. Non traditional techniques. Dosimetry of radiation fields including complex spectra. Prereq: PHY 472G, RM 546, or equivalent. (Same as RM 601.)	C	2	E
RAS	649	Physics of Radiation Therapy	Specialized external beam and brachytherapy treatment planning; advanced Bragg-Gray cavity applications, including Nguand TG- 21; calibration, acceptance testing, and quality control of therapy physics equipment. Prereq: RAS/RM/PHY 546 and RAS/RM 601, or consent of instructor. (Same as RM 649.)	C	3	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)	C	4	E
RAS	651	Imaging Physics Laboratory	Specialized experiments involving the use, calibration, and quality control of x-ray and other diagnostic imaging equipment, and the appropriate use of radiation detectors in diagnostic physics measurements. Laboratory, approximately 30 hours per credit. May be repeated to a maximum of three credits. Prereq: RM/PHY 472G, RAS/RM 546; and concurrent: RAS/RM 647, or equivalent, plus	C	2	E
RAS	710	Special Topics in Medical Physics	Topics of current interest relating to radiation and its applications in the areas of radiological medical physics and health physics. May be repeated to a maximum of four credit hours with consent of instructor. Prereq: Graduate standing in a radiation-related science.	C	1	E
RAS	711	Research Methods in Medical Physics	This course will introduce the student to, and give them practical experience in, writing research proposals, research reports and carrying out research work. The course will be jointly taught vy various medical physics faculty and guest lecturers. Students will be asked to present their own work to be critiqued by theclass. The goal is to give the student a hands-on experience of what is involved in doing funded clinical research on human subjects and getting it published in an academic journal.	C	1	N
RAS	767	Post Qualifier Residency (research)	Registration for this course recognizes that the student is conducting research toward fulfillment of their thesis requirements.	C	4	N
RAS	545	Radiation Hazards and Protection	An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Prereq: PHY/RM 472G or consent of instructor. (Same as PHY/RM 545.)	C	3	E
			Total Credit hours Required for Program Core (i.e., # of hours in degree program core) Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table		33	NA

Course electives for PhD in Radiation and Radiological Sciences

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)						
Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
RAS	650	Physics of Brachytherapy	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. Prereq: RAS/RM/ PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite). (Same as RM 650.)	P	0- 2	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)	P	0-12	E
RM or RAD	660	Clinical Practicum	Clinical Practicum		0-6	N
Variable		Related science/engineering/medicine Focus area courses 300/400 level or higher		P	6-18	E
			# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table		18	NA

Course descriptions:

RM 472G INTERACTIONS OF RADIATION WITH MATTER. (3)

Basic aspects of the interaction of ionizing radiation with matter. Bohr atom, atomic spectra, radioactivity, energetics of decay. Sources of radiation, penetration of charged particles, electromagnetic radiation, and neutrons through matter; excitation and ionization processes; selected nuclear reactions; basic radiation detection and dosimetry. Prereq: PHY 213 or 232; MA 114 (may be taken concurrently); or equivalent. (Same as PHY/RM 472G.)

RAS 545 RADIATION HAZARDS AND PROTECTION. (3)

An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Lecture, two hours; laboratory, two and one-half hours. Prereq: PHY/RM 472G or consent of instructor. (Same as PHY/RM 545.)

RAS 546 GENERAL MEDICAL RADIOLOGICAL PHYSICS. (3)

The uses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq or concur: RM/PHY 472G or consent of instructor. (Same as PHY/RM 546.)

RAS 601 ADVANCED RADIATION DOSIMETRY. (2)

Advanced aspects of the interaction of radiation with matter and specialized topics in the dosimetry of ionizing radiations. Modifications of Bragg-Gray theory for application to megavoltage sources. Beta dosimetry. Specialized calibration techniques. Relative response functions of various media. Nontraditional techniques. Dosimetry of radiation fields including complex spectra. Prereq: PHY 472G, RM 546, or equivalent. (Same as RM 601.)

RAS 647 PHYSICS OF DIAGNOSTIC IMAGING I. (3)

Specialized and advanced topics in diagnostic imaging, including modulation transfer function analysis, image processing algorithms, acceptance testing, CT, NMR, ultrasound, etc. Prereq: PHY/RM/RAS 546 or consent of instructor. (Same as RM 647.)

RAS 648 PHYSICS OF DIAGNOSTIC IMAGING II. (3)

A continuation of RAS/RM 647. Specialized and advanced topics in nuclear medicine imaging physics, including positron emission tomographic procedures, emerging new modalities, and quality control. Prereq: RM/RAS 647 or consent of instructor. (Same as RM 648.)

RAS 649 PHYSICS OF RADIATION THERAPY. (3)

Specialized external beam and brachytherapy treatment planning; advanced Bragg-Gray cavity applications, including Ngas and TG- 21; calibration, acceptance testing, and quality control of therapy physics equipment. Prereq: RAS/RM/PHY 546 and RAS/RM 601, or consent of instructor. (Same as RM 649.)

RAS 650 PHYSICS OF RADIATION THERAPY II: BRACHYTHERAPY PHYSICS. (2)

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. Prereq: RAS/RM/ PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite). (Same as RM 650.)

RAS 651 ADVANCED LABORATORY IN DIAGNOSTIC IMAGING PHYSICS. (1-3)

Specialized experiments involving the use, calibration, and quality control of x-ray and other diagnostic imaging equipment, and the appropriate use of radiation detectors in diagnostic physics measurements. Laboratory, approximately 30 hours per credit. May be repeated to a maximum of three credits. Prereq: RM/PHY 472G, RAS/RM 546; and concurrent: RAS/RM 647, or equivalent, plus standing in the radiation science program.

RM 660 GRADUATE PRACTICUM IN RADIATION MEDICINE. (1-6)

Applied field work at the graduate level in the sciences relating to radiation medicine. May be repeated to a maximum of six credits. Prereq: Graduate standing in a radiation-related science, plus consent of instructor.

RAS 695 RESEARCH IN THE HEALTH-RELATED RADIATION SCIENCES. (1-4)

Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)

RAS 710 RADIATION SCIENCE SEMINAR (1)

Topics of current interest relating to radiation and its applications in the areas of radiological medical physics and health physics. May be repeated to a maximum of four credit hours with consent of instructor. Prereq: Graduate standing in a radiation-related science.

RAS 711 RESEARCH METHODS IN MEDICAL PHYSICS (1)

This course will introduce the student to, and give them practical experience in, writing research proposals, research reports and carrying out research work. The course will be jointly taught by various

medical physics faculty and guest lecturers. Students will be asked to present their own work to be critiqued by the class. The goal is to give the student a hands-on experience of what is involved in doing funded clinical research on human subjects and getting it published in an academic journal.

RM 740 MAMMALIAN RADIATION BIOLOGY. (2)

The physical and biological sequelae of radiation effects will be discussed emphasizing human and mammalian responses and radiation health. Emphasis will be for health and medical workers. Prereq: Consent of instructor; BIO/RM 540 or RM 546 or equivalent background. (Same as BIO 740.)

RM 842 RADIATION ONCOLOGY. (1)

Use of radiation therapy in clinical treatment of malignancy. Staging, histology, spread, treatment techniques, acute and late effects of radiation therapy. Prereq: RM 740 and an introductory anatomy course, or equivalent, and consent of instructor

RAS 849 RADIATION SCIENCES PRACTICUM. (1-6)

Applied practicum experiences in the radiation sciences. Laboratory, 40 hours per week equals one credit hour. Prereq: Advanced graduate standing in radiation sciences.

Dear Brian and Margaret,

As we agreed in our meeting on November 4, 2016, I am writing to summarize the consensus that we reached regarding the establishment of a PhD program in Radiation and Radiological Sciences. Documentation already submitted describes that the program will consist of 33 credit hours of core course requirements and a minimum of 18 credit hours of guided electives.

Admission and retention requirements are described in other documents previously submitted. However, further clarification is provided regarding three entrance and progression pathways through the program. These are summarized below*.

Traditional PhD: Students who complete this pathway will enter the program and be required to complete all didactic coursework, examinations and research as described in the program proposal. This includes 33 credit hours of core coursework, at least 18 credit hours of guided electives, both parts of the qualifying exam and successful defense of a dissertation. A subset of these requirements will be considered sufficient to have earned an MS degree 'en passant'. These are listed in the attached table. We formally request that this 'en passant' option be included in the PhD program application.

Legacy MS into PhD: Here we use the term 'legacy MS' in reference to the existing MS program in Radiation Sciences. This program currently falls under the non-thesis, plan B option and offers a terminal MS degree. In this proposed pathway into the PhD program, students will enroll in our legacy MS program with the expectation that they will use the first 2 semesters to consider whether to remain in the terminal MS program, (which is typically completed in 2 years), or to transfer to the PhD program. Note that the didactic course work in the first year of both programs is identical, and indeed these courses will be shared between the two programs. Students who choose to transfer to the PhD program must declare their intent no later than the end of the first spring semester. This request to transfer will be reviewed by the Program Director and Director of Graduate Studies, with input sought from relevant faculty. If the transfer is approved, the relevant course work accrued thus far will be counted towards the PhD course requirements. Progression in the PhD program will then be subject to the student's satisfactory completion of degree requirements as described elsewhere in the program documentation.

Other MS degree holder into PhD: Circumstances may arise in which applicants to the PhD program already possess a graduate degree, either in Medical Physics or a related science or engineering. In such circumstances, as per existing UK Graduate School policy, up to 18 credit hours from the previous degree may be used towards course credit in the PhD program. Such courses will be reviewed on a case-by-case basis by the Program Director and/or Director of Graduate Studies to determine their equivalence to any of the core course requirements of the PhD program.

** The nomenclature used to differentiate the programs is informal and should not be taken to imply adherence to any formal structures that may possess similar descriptions.*

Typical progression pathways for students in Radiation and Radiological Sciences PhD program

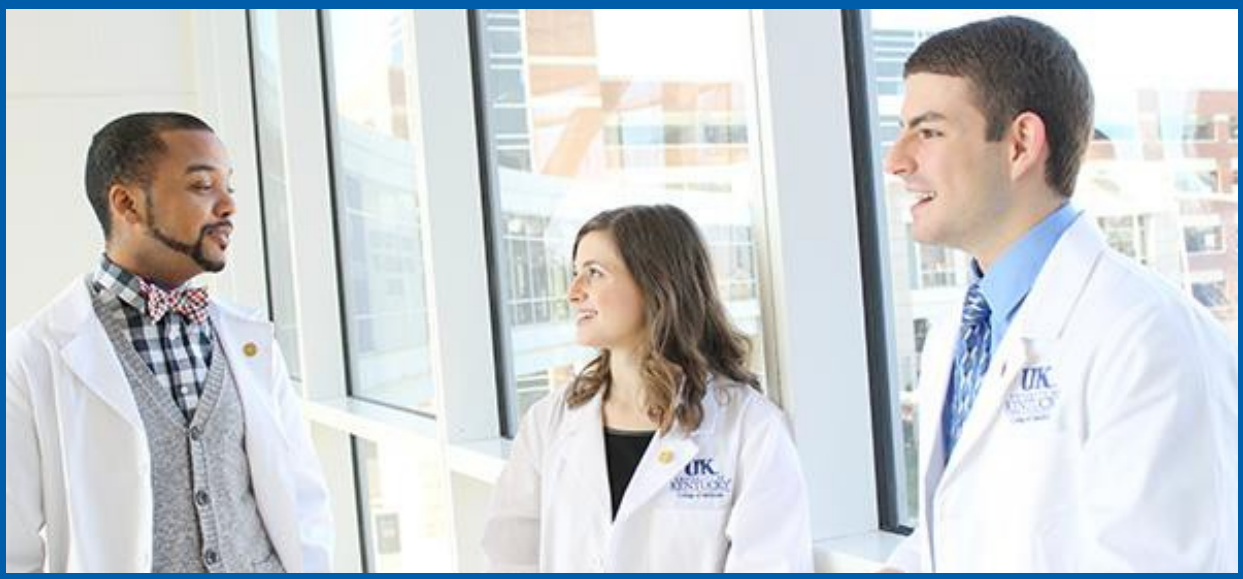
Semester	Course title or Activity	Course number	Credits	Core requirement PhD	Required for en-passant MS	Required for legacy MS	Total credit hours accrued	Comments
Fall 1	Introduction to Medical Physics	RAS 546	2	Y	Y	Y		
	Interactions of Radiation with Matter	RAS 472 G	3	Y	Y	Y		
	Radiobiology	RM 740	2	Y	Y	Y		
	Clinical Practicum	RM 660	1	N	N	N		Commonly taken and encouraged
	Other (variable, missing prerequisites)			N	N	N		
							8	
Spring 1	Physics of Medical Imaging 1	RAS 647	3	Y	Y	Y		
	Physics of Radiation Therapy	RAS 649	3	Y	Y	Y		
	Dosimetry Systems	RAS 601	2	Y	Y	Y		
	Clinical Practicum	RM 660	1	N	N	N		Commonly taken and encouraged
	Radiation Oncology	RM 842	na	N	N	N		Commonly taken and encouraged
	Deadline for students in legacy MS program to declare shift to PhD program						17	
Summer 1	Research in Medical Physics	RAS 695	1-2	Y	Y	Y		Legacy MS requires 2 total (min), PhD requires 4 total (min)
	Clinical Practicum	RM 660	1	N	N	N		Commonly taken and encouraged
							19	
Fall 2	Imaging Physics Laboratory	RAS 651	2	Y	Y	Y		
	Physics of Medical Imaging 2	RAS 648	3	Y	Y	Y		
	Research in Medical Physics	RAS 695	1-2	Y	Y	Y		Legacy MS requires 2 total (min), PhD requires 4 total (min)
	Clinical Practicum	RM 660	1	N	N	N		Commonly taken and encouraged
	Special Topics in Medical Physics	RAS 710	1	Y	Y	N		Commonly taken and encouraged
	Physics of Brachytherapy	RAS 650	2	N	N	N		Commonly taken and encouraged
	Qualifying exam, part 1, written		*0*	*Y*	*N*	*N*		*Requirement for progression in PhD program*
							29	
Spring 2	Research Methods in Medical Physics	RAS 711	1	Y	N	N		
	Radiation Hazards and Protection	RAS 545	3	Y	Y	Y		
	Clinical Practicum	RM 660	1	N	N	N		Commonly taken and encouraged
	Research in Medical Physics	RAS 695	1-2	Y	Y	Y		Legacy MS requires 2 total (min), PhD requires 4 total (min)
	Related science/engineering/medicine Focus area courses 300/400 level or higher	Variable	0-6	Y	N	N		Accrues to the 18 credit hours of guided electives for PhD program
	Final comprehensive oral exam		*0*	*Y*	*Y*	*Y*		*Same as exam used for legacy MS program*
	MS awarded 'en-passant'							
							38	
Summer 2	Related science/engineering/medicine Focus area courses 300/400 level or higher	Variable	0-6	Y	N	N		Accrues to the 18 credit hours of guided electives for PhD program
	Research in Medical Physics	RAS 695	1-2	N	NA	NA		Accrues to the 18 credit hours of guided electives for PhD program
							42	
Fall 3	Related science/engineering/medicine Focus area courses 300/400 level or higher	Variable	0-6	Y	N	N		Accrues to the 18 credit hours of guided electives for PhD program
	Research in Medical Physics	RAS 695	1-2	N	NA	NA		Accrues to the 18 credit hours of guided electives for PhD program
	Qualifying exam, part 2, oral research proposal defense						47	
Spring 3	Post qualifier residency	RAS 767	2	Y	NA	NA		As required by UK/Graduate School policy
Fall 4 and onward	Post qualifier residency	RAS 767	2	Y	NA	NA	51	As required by UK/Graduate School policy
Variable	Dissertation Defense		variable					2 credits per S and F semesters per UK policy
	PhD awarded							

RADIATION MEDICINE AND RADIOLOGY, PHD
PROGRAM ASSESSMENT PLAN

09.21.2015

Prepared By: Drs. Molloy, Hardy, Luo & Ms. Rachel Pendleton

UNIVERSITY OF KENTUCKY



1. Introduction

1.1. Mission Statement

The Medical Physics Ph.D. program of the Departments of Radiation Medicine and Radiology is dedicated to training students to become clinical Medical physicists who are able to work as a clinician, a teacher and an independent investigator carrying out basic clinical, and/or translational research.

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 Ph.D. program faculty.

2. Assessment Oversight, Resources

2.1. College Learning Outcomes Assessment Coordinator – Lana Spicer & Dr. Terry Stratton

2.2. Unit Assessment Coordinator – Drs. Malloy & Hardy

3. Program-Level Learning Outcomes

3.1. To prepare successful independent investigators, teachers, and/or clinicians, the program aims to instruct students so that they will:

a) Demonstrate a mastery of the fundamental principles of Medical Physics
   i. Raphex exam, yearly
   ii. ABR Part 1 exam, 1st year
   iii. Written qualifying exam,
   iv. Final MS oral

b) Identify problems, formulate new hypothesis about their cause and solve them through research in order to contribute new ideas and knowledge to the field of Medical Physics.
   i. Oral qualifying / thesis proposal defense
   ii. Final PhD oral defense
   iii. Annual student committee evaluation,
   iv. Papers / presentations at conferences

c) Communicate technical concepts in Medical Physics orally and in writing
   i. Final MS oral
   ii. Oral qualifying / thesis proposal defense
   iii. Final PhD oral defense
   iv. Other oral presentations, e.g. journal clubs,
   v. Papers / presentations at conferences

The Medical Physics Ph.D. curriculum is designed to allow flexibility in the choice of course work depending on an individual's research interests while providing a common knowledge base on which students will achieve the desired learning outcomes.

4. Curriculum Map

Learning outcome	**RAS546** *Intro to Med Radiological Physics* **RM472G** *Interaction of Radiation with Matter,* **RM740** *Mammalian Radiation Biology*	**RAS 647 , 648** *Physics of Diagnostic Imaging I, II* **RAS 649** *Physics of Radiation Therapy* **RAS 651** *Lab in Diagnostic Imaging*	**RM 601** *Advance Radiation Dosimetry* **RAS 649** *Physics of Radiation Therapy* **RM 650** *Brachytherapy Physics* **RM 842** *Radiation Oncology*	**RAS 695** *Research* **RM 660** *Practicum in Radiation Therapy* **RAS545** *Radiation Hazards and Protection*	**RAS 710** *Student Seminar*	**RAS 711** *Research Methods in Medical Physics*	**RAS 767** *Dissertation Research*
Demonstrate a mastery of the fundamental principles of Medical Physics	I	I,R	I,R	E	E,A	E,A	A
Research Identify problems, formulate new hypothesis about their cause and solve them through research in order to contribute new ideas and knowledge to the field of medical physics.	I	I	I	R,E	E,A	E,A	A
Communicate technical concepts in medical physics both orally and in writing	I	I,R	I,R	R,E	E	E	A

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

Assessment for student growth (e.g. Raphex) test as taken yearly and will demonstrate growth.

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1. Baseline information will be acquired from students taking RAS 695, RAS710 and RAS711 for the first time using the attached rubrics. These data will be tabulated for each student and statistically analyzed for the entire class. This baseline information will encompass learning outcomes 1 -3.
2. Performance on every oral presentation (e.g. journal club), seminar presentation and oral exams will be used to assess learning outcome 3.
3. Students will be assessed yearly according to approved rubrics for quality of oral presentations given in RAS 695, RAS710 and RAS 711. An assessment of the presentations of the 2nd year students will be considered as a baseline and compared to the performance of these students during the 4th year in order to assess learning outcomes 1-3 over a two year period. Each student's oral presentation is judged by the Medical Physics faculty in attendance of these seminars.
4. All students will be evaluated by their Graduate advisory committees for learning outcomes 1, 2, and 3 during the written and oral qualifying exams and again at the final dissertation exam. The same rubric will be applied to these exams to compare improvement during the post-qualifying training period.

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

5.1. Direct Methods

5.1.1. Raphex exam, take yearly by all students.
5.1.2. ABR Part 1 exam, 1st year

5.1.3. Written qualifying exam,
5.1.4. Final MS oral exam.
5.1.5. Oral qualifying / thesis proposal defense
5.1.6. Final PhD oral defense
5.1.7. Other oral presentations, e.g. journal clubs,
5.1.8. Annual student committee evaluation,
5.1.9. Dissertation

5.2. **Indirect Methods**

5.2.1. The Number of manuscripts accepted in peer-reviewed journals for each year's student cohort will be tallied every 2 years. This is an indirect measure of learning outcomes 1, 2 and 3.

5.2.2. The Number of presentations at local, regional, national, and international conferences will be tallied for each year's cohort every 2 years. This is an indirect measure of learning outcomes 2 and 3.

5.2.3. Student graduation rates and time to graduation will be evaluated every year. These are indirect measures of learning outcomes 1, 2 and 3.

6. Data Collection and Review

6.1. Data Collection Process/Procedures

6.1.1. Students will be assessed at the following points. Data will be collected on an ongoing basis and reported annually.

	OUTCOMES			
	Demonstrate a mastery of the fundamental principles of Medical Physics	Identify problems, formulate new hypothesis about their cause and solve problems through research in order to contribute new ideas and knowledge to the field of medical physics.	Communicate technical concepts in medical physics both orally and in writing	
Raphex Exam	1st and 2nd years			
ABR Part 1 Exam	1st and 2nd years			
Oral presentation (Student Seminar)	2nd and 4th years		2nd and 4th years	
Written Qualifying exam	End of 2nd year	End of 2nd year	End of 2nd year	
Oral Proposal Defense	End of 3rd Year	End of 3rd year	End of 3rd year	
Final exam	Thesis defense	Thesis defense	Thesis defense	

6.1.2. Benchmarks for each assessment artifact:

6.1.2.1. Raphex – 80th Percentile

6.1.2.2. ABR Part 1 – Pass (ABR Part 1 is a Pass/Fail Examination)

6.1.2.3. Oral Presentation/Student Seminar – Student shall have an average score on their Oral Presentation Evaluation Rubric of a 3.0 or better in their last year.

6.1.2.4. Written Qualifying Exam – Absolute score: 50 %
6.1.2.5. Oral Proposal Defense – 3.0 or better on Research Oriented Oral Exam Assessment Rubric
6.1.2.6. Final Exam – 3.0 or better on Final Oral Exam Rubric

7. Assessment Cycle and Data Analysis

7.1 **Assessment Cycle**

We expect up to three students to enter the PhD program each year. In order to perform a meaningful evaluation of each outcome, we will review data for each learning outcome using data accumulated for 3 cohorts. Both indirect and direct measures of learning will be implemented in the first fall semester the program begins to matriculate students.

Assessment schedule

ASSESSMENT SCHEDULE		
ASSESSMENT CYCLE	**ACADEMIC YEAR**	**STUDENT LEARNING OUTCOMES ASSESSED**
1	2015-2016	N/A, program not yet approved/not active
1	2016-2017	Outcome #1
1	2017-2018	Outcome #2 and #3
2	2018-2019	Outcome #1
2	2019-2020	Outcome #2
2	2020-2021	Outcome #3

7.1.1. 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).

7.2. Data Analysis Process/Procedures

7.2.1. 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.

8. Teaching Effectiveness

8.1. 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).

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

9.1. Initial job placement records will serve as an indication of initial post-graduate performance. This is to be supplemented by anecdotal evidence from continued contacts with faculty and other current or former graduate students. Further opportunities will be explored by the Radiation Medicine and Radiology Graduate Program Committee.

10. Appendices

10.1. Student General Oral Presentation Faculty Evaluation Rubric
10.2. Research Oriented Oral Exam Assessment
10.3. Program Assessment by Graduates

10.1

Student General Oral Presentation Faculty Evaluation Rubric

Speaker: **Date:**

Skill Assessed	Excellent 4	Good 3	Adequate 2	Deficient 1	Score
Ability to introduce/explain background of topic	Speaker clearly described the general area of the topic.	Mostly excellent elements, some deficient elements	More excellent elements than deficient elements	Speaker did not clearly describe the general area of the topic.	
Ability to describe relevant details	Details of all technical designs and methodologies were clearly presented, with appropriate schematics.	Mostly excellent elements, some deficient elements	More excellent elements than deficient elements	Many technical designs were unclear, or key details of the methods were not provided or were incorrectly explained.	
Ability to interpret and discuss results	The Interpretations of all technical and clinical details were clearly described.	Mostly excellent elements, some deficient elements	More excellent elements than deficient elements	Speaker did not provide clear interpretations of technical and clinical details, or interpretations were incorrect.	
Able to respond to questions	The speaker repeated questions or paraphrased to clarify and sought to understand questions that were unclear. Questions were answered appropriately. The speaker demonstrated a depth of knowledge about the field.	Mostly excellent elements, some deficient elements	More excellent elements than deficient elements	Speaker answered questions inappropriately due to failure to understand the question or a failure to understand the larger context of the field. The speaker became flustered during questioning.	
Ability to communicate clearly and effectively use presentation technologies	Speaker spoke clearly, loudly enough, and with an appropriate tempo. No distracting movements or gestures, and maintained audience attention with eye contact, voice inflection, facial expression. Slides easy to read and not overcrowded, crucial slides presented long enough for viewing, no typos or slides out of order.	Mostly excellent elements, some deficient elements.	More excellent elements than deficient elements.	Speaker difficult to hear, spoke to only part of room, displayed numerous distracting movements/gestures, or tempo was consistently too fast/slow. Many slides difficult to read, had difficult-to-see color choices, speaker went through some slides too fast, had overcrowded slides, multiple typos.	
Overall quality of presentation	All of the elements of this talk were excellent.	Mostly excellent, some deficient elements.	More excellent than deficient elements.	Most of the elements of this talk were deficient.	

Comments/Suggestions:

Areas for Improvement:

Positive Aspects of Presentation:

Name of Evaluator:_____

10.2

Research Oriented Oral Exam Assessment Date of Exam:

Student:

Committee Members:

Skill Assessed	Excellent 4	Good 3	Adequate 2	Deficient 1	Score
Ability to master and critically analyze literature related to the project.	Demonstrates a thorough understanding of knowledge in the project area, and the ability to consistently discern the meaning and relative validity of data in scientific research publications.	Demonstrates a good understanding of knowledge in the project area, and displays many examples of the ability to discern the meaning and relative validity of data in scientific research publications.	Demonstrates some understanding of knowledge in project area, and some ability to discern the meaning and relative validity of data in scientific research publications.	Demonstrates minimal understanding of knowledge in the project area, and is unable in many cases to discern the meaning and relative validity of data in scientific research publications.	
Ability to formulate relevant, testable hypotheses, devise clear experiments for addressing hypotheses, and analyze and interpret data appropriately.	Demonstrates thorough understanding of the scientific method, clear ability to generate hypotheses, understand and design complex experimental protocols, and analyze data with a clear and proper interpretation.	Demonstrates good understanding of scientific method, generating hypotheses, designing experiments appropriate for testing hypotheses, presenting data in an appropriate context.	Demonstrates some understanding of scientific method, needs assistance with complex experimental design and analyzing data, can present and interpret data with some help from PI.	Demonstrates little understanding of scientific method, limited ability to conceive experimental designs to address hypotheses, needs significant faculty input for data analysis and interpretation.	
Ability to orally communicate data and interpretation effectively with scientific peers, answer questions, and communicate ideas.	Articulates intimate understanding of project, is able to orally communicate and defend new ideas, thinks effectively on his/her feet, is consistently able to integrate knowledge from multiple disciplines and experience to answer questions or solve problems.	Has appropriate understanding of project, able to articulate ideas but lacks creativity, can think through basic problems when questioned, and in many cases can integrate knowledge appropriately to answer questions or solve problems.	Has a basic understanding of project but lacks depth, answers basic questions but has difficulty thinking on his/her feet, and is sometimes able to integrate knowledge to answer questions or solve problems.	Lacks understanding of project and is not able to communicate rationale for interpretation of data or direction of the project, and is unable to draw from different areas or experiences to answer questions or solve problems.	
Ability to communicate effectively through scientific writing.	Demonstrates thorough understanding of context, audience, and purpose of the proposal; uses appropriate, relevant, and compelling content to convey contribution to the scientific discipline; pays detailed attention to and successful execution of grant-writing conventions including organization, content presentation, formatting, and style; uses relevant and credible references appropriately, uses skilled language that conveys meaning with clarity and fluency, and is nearly error free.	Demonstrates adequate consideration of context, audience and purpose of proposal; many examples of appropriate, relevant and compelling content to convey the contribution to the scientific discipline; consistently uses grant-writing conventions including organization, content, presentation, and style; consistently uses appropriate references to support ideas; uses clear language that generally conveys meaning to readers, with few errors.	Demonstrates awareness of context, audience, and purpose of the proposal; has some examples of appropriate, relevant, and compelling content; follows expectations appropriate to grant writing for basic organization, content, and presentation; attempts to use credible and/or relevant references to support ideas; uses language that generally conveys meaning with clarity, though with errors	Demonstrates minimal attention to context, audience, purpose of the proposal; uses appropriate and relevant content to develop simple ideas in parts of the work; attempts to use a consistent system for basic organization and presentation; attempts to use sources to support ideas; uses language that sometimes impedes meaning because of errors in usage.	

Note: Non integer scores can b given (e.g. 2.8, 3.5, etc.) Comments/Suggestions for Improvement:

10.3

Departments of Radiation Medicine and Radiology
Program Assessment by Graduates

Name:
Date of Graduation:
Current position:

Please score the following program elements in terms of whether they have been important in preparing you for your current position.

Learning outcomes	Well prepared/ Used every day 4	Mostly prepared/ Used regularly 3	Some preparation/ Used occasionally 2	Not prepared/ Never used 1	Score
Knowledge obtained from courses outside the department					
Knowledge obtained from courses taught by the department					
Scientific skills learned by working in a lab such as ability to read scientific literature and creatively apply it to current research projects, ability to develop hypotheses and design experiments to address these, ability to analyze and interpret data					
Public speaking skills obtained from giving seminars, journals club presentations, class room presentation, presentations at conferences					
Writing skills learned from writing papers for courses, manuscripts for publication, fellowship applications, qualifying exam, dissertation					
Teaching skills obtained from putting together presentations in classes and journals clubs, working as a teaching assistant, and/or giving oral presentations					

What are your perceived strengths of the Medical Physics program?

What are your perceived weaknesses of the Medical Physics program?

Radiological Sciences (51.2205)

Degree Program Core Courses (i.e., Courses required by ALL students in the Major--includes Premajor or Preprofessional courses)

Course Prefix	Course #	Course Title	Course Description	Type of Course: program core (C) or pre-major/ pre-professional (P)	Credit Hours	Existing (E) or New (N) Course
RAS	546	Introduction to Medical Physics	The uses and dosimetric aspects of radiation in medicine will be analyzed, including many basic applications in the fields of diagnostic radiology physics, therapy physics, and nuclear medical physics. Prereq or concur: RM/PHY 472G or consent of instructor. (Same as PHY/RM 546.)	C	2	E
RAS	472 G	Interactions of Radiation with Matter	Basic aspects of the interaction of ionizing radiation with matter. Bohr atom, atomic spectra, radioactivity, energetics of decay. Sources of radiation, penetration of charged particles, electromagnetic radiation, and neutrons through matter; excitation and ionization processes; slected nuclear reactions; basic radiation detection and dosimetry. Prereq: PHY 213 or 232; MA 114 (may be taken concurrently); or equivalent. (Same as PHY/RM 472G.)	C	3	E
RM	740	Radiobiology	The physical and biological sequelae of radiation effects will be discussed emphasizing human and mammalian responses and radiation health. Emphasis will be for health and medical workers. Prereq: Consent of instructor; BIO/RM 540 or RM 546 or equivalent background. (Same as BIO 740.)	C	2	E
RAS	647	Physics of Medical Imaging 1	Specialized and advanced topics in diagnostic imaging, including modulation transfer function analysis, image processing algorithms, acceptance testing, CT, NMR, ultrasound, etc. Prereq: PHY/RM/RAS 546 or consent of instructor. (Same as RM 647.)	C	3	E
RAS	648	Physics of Medical Imaging 2	A continuation of RAS/RM 647. Specialized and advanced topics in nuclear medicine imaging physics, including positron emission tomographic procedures, emerging new modalities, and quality control. Prereq: RM/RAS 647 or consent of instructor. (Same as RM 648.)	C	3	E
RAS	601	Dosimetry Systems	Advanced aspects of the interaction of radiation with matter and specialized topics in the dosimetry of ionizing radiations. Modifications of Bragg-Gray theory for application to megavoltage sources. Beta dosimetry. Specialized calibration techniques. Relative response functions of various media. Nontraditional techniques. Dosimetry of radiation fields including complex spectra. Prereq: PHY 472G, RM 546, or equivalent. (Same as RM 601.)	C	2	E
RAS	649	Physics of Radiation Therapy	Specialized external beam and brachytherapy treatment planning; advanced Bragg-Gray cavity applications, including Ngas and TG- 21; calibration, acceptance testing, and quality control of therapy physics equipment. Prereq: RAS/RM/PHY 546 and RAS/RM 601, or consent of instructor. (Same as RM 649.)	C	3	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the radiation-related sciences, plus consent of instructor. (Same as RM 695.)	C	4	E
RAS	651	Imaging Physics Laboratory	Specialized experiments involving the use, calibration, and quality control of x-ray and other diagnostic imaging equipment, and the appropriate use of radiation detectors in diagnostic physics measurements. Laboratory, approximately 30 hours per credit. May be repeated to a maximum of three credits. Prereq: RM/PHY 472G, RAS/RM 546; and concurrent: RAS/RM 647, or equivalent, plus	C	2	E
RAS	710	Special Topics in Medical Physics	Topics of current interest relating to radiation and its applications in the areas of radiological medical physics and health physics. May be repeated to a maximum of four credit hours with consent of instructor. Prereq: Graduate standing in a radiation-related science.	C	1	E
RAS	711	Research Methods in Medical Physics	This course will introduce the student to, and give them practical experience in, writing research proposals, research reports and carrying out research work. The course will be jointly taught vy various medical physics faculty and guest lecturers. Students will be asked to present their own work to be critiqued by the class. The goal is to give the student a hands-on experience of what is involved in doing funded clinical research on human subjects and getting it published in an academic journal.	C	1	N
RAS	767	Post Qualifier Residency (research)	Registration for this course recognizes that the student is conducting research toward fulfillment of their thesis requirements.	C	4	N
RAS	545	Radiation Hazards and Protection	An analysis of common radiation hazards encountered in medicine, research, industry, and the environment. Regulations and procedures for the safe use of ionizing and nonionizing radiations. Prereq: PHY/RM 472G or consent of instructor. (Same as PHY/RM 545.)	C	3	E
Total Credit hours Required for Program Core (i.e., # of hours in degree program core) Note: number recorded will automatically populate Core Hours in "Summary of Total Program Hours" table					33	NA

Core Courses Required for Track(s), Concentration(s), or Speciality(s) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Track	Credit Hours	Existing (E) or
Total Credit hours Required for Program Options (Track(s), Concentration(s), or Speciality) (if applicable) Note: number recorded will automatically populate Program Option hours in "Summary of Total Program Hours" table					0	NA

GUIDED Elective Courses (i.e., Specified list of Program Electives AND/OR Electives focused on a specific track/concentration/or speciality) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T), Concentration (C) or Specialty (S)	Credit Hours	Existing (E) or New (N) Course
RAS	650	Physics of Brachytherapy	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. Prereq: RAS/RM/ PHY 546; RM/PHY 472G; RAS/RM 649 (may be co-requisite). (Same as RM 650.)	P	0- 2	E
RAS	695	Research in Medical Physics	Independent directed research on theoretical and practical problems in the health-related radiation sciences. May be repeated to a maximum of eight credits. Prereq: Graduate standing in one of the	P	0-12	E
RM or RAD	660	Clinical Practicum	Clinical Practicum		0-6	N
Variable		Related science/engineering/medicine Focus area courses 300/400 level or higher		P	6-18	E
# of REQUIRED Credit hours in Guided Electives (i.e., electives for a focused or track/concentration/speciality are). If 9 hours is required and there are 15 hours to choose from, then only 9 hours are required) Note: number recorded will automatically populate Guided Elective hours in "Summary of Total Program Hours" table					18	NA

FREE Elective Courses (i.e, general program electives, open to the students to choose) (if applicable)

Course Prefix	Course #	Course Title	Course Description	Course Required for Program (P), Track (T),	Credit Hours	Existing (E) or New (N) Course
Total # of Credit Hours in Free Electives (i.e., general program electives) (if applicable) Note:					0	NA

Summary of Total Program Hours	Required Core Hours (i.e., # of hours in degree program core)	33	NA
	Required Program Options - Track/Concentration/Specialty Hours (if applicable)	[illegible]	[illegible]
	Guided Elective Hours (e.g. focused or track/concentration/speciality area specific electives) (if applicable)	[illegible]	[illegible]
	Free Elective Hours (i.e., general program electives) (if applicable)	[illegible]	NA
	Total # of credit hours required for Program	[illegible]	NA
Information to be completed by PIE Office			
	# of new courses	[illegible]	NA
	Total # of Courses (includes new and existing)	[illegible]	[illegible]
	Precentage of new courses (more than 25% may require SACS Substantive Change)	[illegible]	NA

Faculty Roster Form
Qualifications of Full-Time and Part-Time Faculty

Name of Institution: University of Kentucky

Name of Primary Department, Academic Program, or Discipline: PhD_Radiological Sciences
Academic Term(s) Included: Fall 2016 - Fall 2019

Date Form Completed: April 7, 2016

1 Course Instructor Name NAME (F, P)	2 COURSES TAUGHT Including Term, Course Number & Title, Credit Hours (D, UN, UT, G)	3 ACADEMIC DEGREES& COURSEWORK Relevant to Courses Taught, Including Institution & Major List specific graduate coursework, if needed	4 OTHER QUALIFICATIONS & COMMENTS Related to Courses Taught	5 NEW Courses (Includes Course Prefix, #, & title)
Janelle Molloy, (F) Professor, Radiation Medicine/Medical Physics, Director of Medical Physics clinical and academic programs	*RAS 546: Intro. Med. Physics, F 2016-2019, 2 cr, (G)* *RAS 695: Research in Med. Physics, F/S 2016-2019 variable cr (G)* *RAS 710: Special Topics in Med. Physics, F 2016-2019, 1 cr, (G)* *RM 660: Graduate Practicum in Radiation Medicine, variable cr, F/Sp/Summer 2016-2019 (G)*	** Ph.D., Physics, University of Virginia, 1990* ** Fellow, American Association of Physicists in Medicine*	*Certified/Diplomat, American Board of Radiology, Therapy Physics*	*RAS 711: Research Methods in Medical Physics, F 2016-2019, 1 cr, (G)*
Peter Hardy, (F) Assistant Professor,	*RAS 647:Physics of Diagnostic Imaging 1,S 2016-*	*Ph.D. Medical Physics, University of Toronto, 1991.*	*Certified/Diplomat, American Board of*	*RAS 711: Research Methods in Medical Physics, F 2016-2019, 1*

Radiology/Division of Medical Physics	***2019, 3cr, (G) RAS 648: Physics of Diagnostic Imaging 2, F 2016-2019, 3cr, (G) RAS 711: Research Methods in Medical Physics, 1cr (G)***	***Member the ISMRM, AAPM***.	***Radiology, Diagnostic Physics***	***cr, (G)***
Wei Luo, (F) Associate Professor, Radiation Medicine/Medical Physics, Associate Program Director for International Collaborations	***RM 650: Brachytherapy Physics, S 2016-2019, 2cr (G) RM 660, Graduate Practicum Radiation Medicine, F/S 2016-2019, 6cr (G) RM 710, Radiation Science Seminar, F 2016-2019, 1 cr (G) RM 740, Mammalian Radiation Biology, F 2016-2019, 2cr (G)***	****Ph.D., Physics, University of Oklahoma, 2002***	***Certified/Diplomat, American Board of Radiology, Therapy Physics***	***RAS 711: Research Methods in Medical Physics, F 2016-2019, 1 cr, (G)***
Ellis L. Johnson, (F) Professor, Radiation Medicine/Medical Physics, Director of Medical Physics Graduate Studies Program	***RAS 546, General Medical Physics, F 2016-2019, 3cr, (G) RAS 601, Advanced Radiation Dosimetry, S 2016-2019, 2cr (G) RAS 649,Radiation Therapy Physics, S 2016-2019, 3cr, (G) RAS 695, Research in Medical Physics (Mentor), 2 cr (G) RM 660, Graduate Practicum (Mentor in Treatment Planning) F/S/Sum 2016-2019 Variable cr, (G)***	****PhD, Nuclear Chemistry, University of Kentucky, 1993 *Post-Doctoral Scholar, Nuclear Medicine Imaging, Duke University Medical Center, 1993-1995 *Residency in Radiation Therapy Physics, University of Kentucky Medical Center, 1995-1997***	***Certified/Diplomat, American Board of Radiology, Therapy Physics***	
Dennis Cheek, (F) Adjunct Professor, Radiation Medicine/Medical Physics	***RAS 545: Radiation Hazards and Protection, S 2016-2019, 3cr (G) RM 660: Practicum in Radiation Medicine, S 2016-2019, 3 cr, (G)***	**** Ph.D., University of Texas Health Science Center of San Antonio, 2005***	***Certified/Diplomat, American Board of Radiology, Therapy Physics***	
Michael Sanders, (F) Adjunct Professor, Radiation Medicine/Medical Physics	***RM 472G, Interaction of Radiation with Matter, F 2016-2019, 3 cr, (G)***	***M.S., University of Kentucky Radiological Medical Physics 1992 B.S. Physics (with honors), University of Louisville, 1970***	***Authorized Medical Physicist per Nuclear Regulatory Commission, Gamma Knife***	
Travis Painter, (P) Assistant Professor, Radiation Medicine/Medical Physics	***RAS 651, Laboratory in Diagnostic Imaging, F 2016-2019, 1-3 cr, (G)***	***M.S University of Kentucky, 1999***	***Certified/Diplomat, American Board of Radiology, Diagnostic Physics***	

Jie Zhang, (F) Associate Professor, Radiology/Chief, Division of Medical Physics	*RAS 647, Physics of Diagnostic Imaging I, S 2016-2019, 3 cr (G) RAS 648, Physics of Diagnostic Imaging II, F 2016-2019, 3cr (G)*	*M.S., Nanjing University of Science and Technology, China Biomechanics,1996 PhD, Tianjin University, China, Biomedical Engineering, 1999 PhD, University of Minnesota, Twin Cities, Biophysical Sciences and Medical Physics, 2004*	*Certified/Diplomat, American Board of Radiology, Diagnostic Physics*	
William St. Clair, (F) Professor, Radiation Medicine/Oncology	*RM 740, Mammalian Radiation Biology, F 2016 – 2019, 2 cr, (G) RM 842, Radiation Oncology, S 2016-2019, 1 cr (G)*	*PhD, University of Iowa, Radiation Biology, 1985 M.D., University of Kentucky, Radiation Oncology, 1995*	*Certified/Diplomat, American Board of Radiology, Radiation Oncology*	

F, P: Full-time or Part-time; D, UN, UT, G: Developmental, Undergraduate Nontransferable, Undergraduate Transferable, Graduate

Molloy, Janelle

From: Hardy, Peter A
Sent: Friday, November 13, 2015 9:43 AM
To: Jackson, Brian A
Cc: Molloy, Janelle; Luo, Wei
Subject: RE: PhD proposal for Radiation & Radiological Sciences

Dr. Jackson

Thank you very much. I'm happy to hear that consensus.

Peter Hardy

From: Jackson, Brian A
Sent: Friday, November 13, 2015 9:30 AM
To: Hardy, Peter A
Subject: RE: PhD proposal for Radiation & Radiological Sciences

Hi Peter:

The consensus is that HCCC doesn't need to review this Graduate Program proposal. The work-flow diagram on Mia's web-site appears to support this also.

Best,

Brian

From: Hardy, Peter A
Sent: Tuesday, November 10, 2015 4:43 PM
To: Jackson, Brian A
Cc: Molloy, Janelle; Luo, Wei
Subject: PhD proposal for Radiation & Radiological Sciences

Dr. Jackson

We understand that our application for a new PhD in Radiological Sciences has progressed out of the COM committees and is currently under review in the graduate council. Looking on the flow chart for the approval of new graduate programs it appears that applications are simultaneously reviewed by the graduate council and HCCC. Speaking with Dr. Mia Alexander-Snow we were unclear if our application needed to be reviewed by HCCC. Can you give us any guidance about this.

Peter Hardy

Quarterly Medical Physics Education Meeting: January 14, 2015

Attendance: J. Molloy, W. Luo, L Johnson, M. Sanders, P. Aryal, J Zhang, P Hardy, R Pendelton

Absent: S Gerring

Agenda:

To discuss and approve proposal for PhD track for graduate program.

Minutes:

The attached power point presentation was presented and discussed at length. Ultimately, the proposal to move forward with a PhD track for our Medical Physics graduate program (Radiation Sciences) was approved unanimously.

RADIATION SCIENCES (RAS) PHD TRACK PROPOSAL AND STRUCTURE

- Core decision points
- Informational
- Integration / funding / tertiary issues

CORE DECISION POINTS

- Required coursework
- Language / skills requirements
- Qualifying exam
- Provisions for monitoring progress

CORE

Course requirements for PhD

Abbreviation	Program	Name	Number of credit hours	Comments
RAS 546	Radiation Sciences	Introduction to Medical Physics	2	NC
RAS 472G	Radiation Sciences	Interactions of Radiation with Matter	3	NC
RM 740	Radiation Sciences	Radiobiology	2	NC
RAS 647	Radiation Sciences	Physics of Medical Imaging 1	3	NC
RAS 648	Radiation Sciences	Physics of Medical Imaging 2	3	NC
RAS 601	Radiation Sciences	Dosimetry Systems	2	NC
RAS 649	Radiation Sciences	Physics of Radiation Therapy	3	NC
RAS 695	Radiation Sciences	Research in Medical Physics	4	2 additional
RAS 651	Radiation Sciences	Imaging Physics Laboratory	2	NC
RAS 710	Radiation Sciences	Special Topics in Medical Physics	1	NC
RAS 545	Radiation Sciences	Radiation Hazards and Protection	3	NC
RAS 650	Radiation Sciences	Physics of Brachytherapy	2	Currently elective
RM 842	Radiation Sciences	Clinical Radiation Oncology	1	NC
RAS 767	Radiation Sciences	Post Qualifier Residency (research)	4	Dissertation residency required by UK.
RAS 711	Radiation Sciences	Research methods in Medical Physics	1	New course to be developed
RM 66x or RAD 66x	Radiation Sciences	Clinical Practicum	13	?? Require or keep elective??
Variable	Other science/engineering	Minor / focus area courses	6	Must be 300 level or above
		Total	55	

NC = no change from current MS program

CORE

Language(s) and/or skill(s) required: Proficiency in research methods in Medical Physics. This will be demonstrated by completion of the course “Research Methods in Medical Physics” with a grade of ‘B’ or higher. Successful completion of this course will demonstrate advanced skill in computer programming, hypothesis development, research proposal development and technical writing.

CORE

Qualifying examination requirements:
The qualifying exam will be a written, problem based exam, consisting of 4 parts. These are;
Radiological Physics and Dosimetry
Physics of Medical Imaging
Physics of Radiation Therapy
Elective topic (select one)
- Advanced Radiation Therapy Physics
- Advanced Medical Imaging Physics

The exam will be administered in the second year of the program and a score of 50% or greater will be required in order to pass. Students who do not pass on the first attempt will be allowed a second attempt. If the second attempt is unsuccessful then the student will not be allowed to proceed in the PhD track of the program.

CORE:
PROVISIONS FOR MONITORING PROGRESS AND TERMINATION CRITERIA

All students must engage in and complete most of the core didactic requirements of our existing MS in Medical Physics program. This typically requires 4 semesters to complete. In addition, most students participate in the elective clinical practicum (RM 660), which consists of 5 core rotations. The practicum typically starts in the first spring semester, and extends over the summer and both semesters in the second year.

Candidates wishing to pursue the PhD option will take the qualifying exam in the second year. Students who successfully pass the qualifying exam will be permitted to proceed in the PhD track. Students who opt out of the qualifying exam, or who do not pass it, will have the opportunity to complete remaining requirements for the MS degree.

CORE:
PROVISIONS FOR MONITORING PROGRESS AND TERMINATION CRITERIA

Candidates who pass the qualifying exam and opt to pursue the PhD track, will be encouraged to complete the requirements for the existing MS in Medical Physics degree, as well as complete all components of the clinical practicum. This includes the existing culminating oral exam and will typically be complete in the spring or summer of the second year.

CORE:
PROVISIONS FOR MONITORING PROGRESS AND TERMINATION CRITERIA

The program is designed to train clinician/investigators and is intended to result in the acquisition of a PhD degree and Medical Physics Residency certificate. As such, the third year may be spent completing what is now primarily the first year of our Medical Physics Residency. This consists of 4 rotations, each lasting 3 months in duration. Three of these rotations are clinical and one is research-oriented. The research rotation will serve towards the research requirement of the PhD degree. Acceptable progress during this third year will be determined primarily by the successful completion of the 3 clinical rotations, currently evidenced by passing an oral exam, and defense of a research dissertation proposal.

CORE:
PROVISIONS FOR MONITORING PROGRESS AND TERMINATION CRITERIA

In addition, the student must orally defend a proposal for the selected dissertation topic. The proposal defense will be delivered to the student's dissertation advisory committee.

CORE:
PROVISIONS FOR MONITORING PROGRESS AND TERMINATION CRITERIA

Following the third year, the student will focus on the selected research topic. This phase is expected to last 2-3 years. Progress will be monitored annually by the student's dissertation committee.

The PhD will be granted following completion of an acceptable dissertation and defense following standard University of Kentucky procedures and guidelines.

INFORMATIONAL

Residence requirement: A student must complete a minimum of 36 hours of residency before the qualifying exam and 2 semesters of residency after qualifying exams.

INFORMATIONAL

Post-Qualifying Residency: Students first enrolled in a doctoral program in the fall 2005 semester and beyond are required to enroll in a 2 credit hour course, XXX-767; Dissertation Residency Credit, after successfully completing the qualifying examination. This constitutes full-time enrollment. They will be charged at the in-state tuition rate plus mandatory fees. Students must remain continuously enrolled in this course every fall and spring semester until they have completed and defended the dissertation. The student need not be physically present on campus while enrolled for credit after the qualifying examination.
Students are required to complete a minimum of two semesters of 767 before they can graduate. Continuous enrollment in 767 also applies to students whose programs of study or certification standards require an extended practicum or field experience.

INFORMATIONAL

Number of transfer credits allowed: 9 hours of relevant graduate course credit may be transferred from another institution or another program. If the student has an MS from another institution or program, up to 18 hours from course credits from the MS may be credited toward the pre-qualifying exam residency requirement.

INFORMATIONAL

SURVEY OF RADIATION SCIENCES DOCTORAL PROGRAMS

Jan 2015

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COURSE WORK REQUIREMENTS (MS/PHD # CREDIT HOURS)

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	Wisconsin	VCU	Duke
55	30/90*	34/48	~48β	30(cr)+24(th)	32+22%	30+12	40/+0

* it seems that a lot of the additional credits at UF derived from supervised teaching and research rather than actual courses

β 3 or 4 credits / semester are given for research; 1 credit/semester is given for supervised teaching.

% at UW of additional 22 credits must include 9 at level ≥300 constituting a minor

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TIME TO TAKE QUALIFYING EXAM

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	Wisconsin	VCU	Duke
Second program year	Within 24 mo of starting grad study	at start of summer semester of 2nd year.	PhD given in Jan of student's second year in program.	End of 1st year.	Taken after 3rd semester	Beginning of spring semester of 2nd year.	At the beginning of the 2nd year.

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CONTENT OF QUALIFYING EXAM

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	U Wisconsin	VCU	Duke
Written	Written: 4 hrs covering all medical physics	written, + submission of one paper to a journal, + passing thesis proposal.	MS exam: 4hr multiple choice covering material in core courses. PhD exam: oral / write a "NIH-F" grant.	Oral defense of thesis proposal.	Written 3hrs; 5 question sets taken from core courses	Written and oral covering basic Med Phys , Phys, Chem material	written

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TIME TO DEFEND THESIS PROPOSAL

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	Wisconsin	VCU	Duke
End of third year typically		Proposal consists of 10-15 NIH-style grant application.	Usually after 3rd year.	By Oct of 3rd year of full time registration.	Before end of 3rd year in program.	Some time in fall semester of 3rd year.	

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PROGRAM SIZE (# STUDENTS MS/PHD)

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	Wisconsin	VCU	Duke
?	20/20	41	10/18		/26		35/26

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WHERE DOCTORAL PROGRAM HOUSED

UK Radiation Sciences	U Florida	MD Anderson	UT San Antonio	U Minnesota	Wisconsin	VCU	Duke
College of Medicine **(Radiation Medicine + Radiology)**	Department of Biomedical Engineering	Grad School of Biomedical Sciences		Radiation Oncology	School of Medicine		

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POSSIBLE AREAS OF STUDY FOR A MINOR

ADDITIONAL COURSES TO TAKE FOR MINOR

Radiobiology

Soft Tissue Mechanics

- ME641 “Foundations of Solid Mechanics”
- BME641 “Biosolid Mechanics”

ADDITIONAL COURSES TO TAKE FOR MINOR

Instrumentation

- BME530 Biomedical Instrumentation
- ECEXXX

Image Analysis

- BME605 Biomedical Signal Processing
- Image Processing

RESEARCH METHODS IN MEDICAL PHYSICS RAS711

Good Clinical Practice
Research ethics and clinical governance
Research method including:
o Qualitative
o Quantitative
o Bio-statistics
o Systematic review and critical appraisal of the literature
o Epidemiological research methods
Study design
Hypothesis generation and testing
Literature searching and referencing
Critical Appraisal
Evidence-Based Practice
Application and interpretation of statistical techniques
Dissemination of research/audit findings
Development of Clinical Guidelines
Quality Assurance applied to research
Cost-benefit of research
Sources of Research Funding

INTEGRATION / FUNDING / TERTIARY ISSUES

INTEGRATION / FUNDING / TERTIARY ISSUES

PhD / MPR track progression

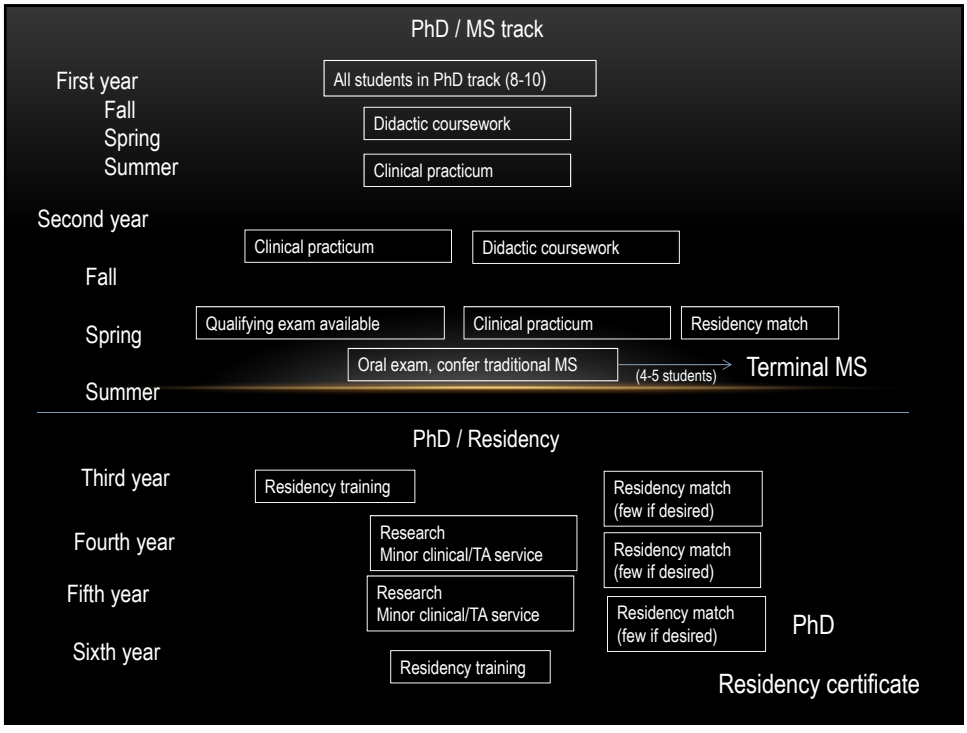
Cohort (Year)	Track			Possessed degree	Degree in progress	Funding	Status	Revenue	Expenses (Direct student)	Comments
	MS (terminal)	PhD	Certificate/didactic							
	Students (credits)	Students (credits)	Students (credits)							
1	4 (18)	4 (18)	2 (16)	BS (primarily)	MS/PhD	Self	PreQR	165722	0	
2	4 (18)	4 (18)	0	BS	MS/PhD	Self	PreQR	146256	0	
3		***4 (18)***		***MS***	***PhD/QMP /MPR***	***Self (tuition) /GA (4)***	***PreQR /PoQR***	***58264***	***60000***	***
4		4 (6)		MS/QMP	PhD	TA (4)	PoQR	0	60000	Teach RM660 and RAS 545 labs
5		4 (6)		MS/QMP	PhD	RA (4)	PoQR	16800	60000	
6		2 (6)		MS/QMP	PhD/MPR	GA (2)	PoQR	8400	30000	Most students finish
Trainee possesses: • **MS (CAMPEP accredited)** • **PhD** • **AMP (NRC) / KY Registered "Qualified expert"** • **Radiation Therapy Residency (CAMPEP accredited)**								391242 (260,000 current)	210000 (= current residency cost)	Total cost of instruction 340,000 to 290,000
Incremental Net Annual Revenue / Expense • 180,000								130,000	0	50,000

QUESTION: DO WE WANT TO ACCOMMODATE TRADITIONAL MS/RESIDENCY PATHWAY?

QUESTION: SHOULD THE MS COMPONENT BE THE SAME AS IS NOW FOR THE PHD STUDENTS?

- Rational…..May be going to more lab based clinical training….PhDs have time in residency to learn clinic and need to have TA-ships…..

QUESTION: DO WE WANT TO ACCOMMODATE TRADITIONAL MS/RESIDENCY PATHWAY?



Molloy, Janelle

From: Springer, Joe E
Sent: Tuesday, October 13, 2015 11:04 AM
To: Molloy, Janelle
Subject: Re: Radiation Sciences PhD proposal

Hi Janelle,

It went through Faculty Council without a hitch and should now be in the hands of Graduate Council. The last time I checked, Roshan Nikou is the contact person and she may be reached at roshan.nikou@uky.edu.

Just an FYI, Brett Spear and Tim McClintock are the COM council members…

Good luck!

Best,
Joe

From: "Molloy, Janelle" <janelle.molloy@uky.edu>
Date: Tuesday, October 13, 2015 10:56 AM
To: joe springer <jspring@uky.edu>
Subject: Radiation Sciences PhD proposal

Hi Joe,
I am reaching out to you as I know you are serving on the COM faculty council. I heard that our Radiation Sciences PhD proposal has been approved by COM and moved onto campus. Do you know whether this is the case? Should I be following up on anything?
Thanks

Janelle A.Molloy, PhD, FAAPM
Professor and Director, Medical Physics
Department of Radiation Medicine
Markey Cancer Center, Room CC061
800 Rose St
Lexington, KY 40536
jmo222@email.uky.edu
859-257-7612 (w)
859-330-6293 (pager)
https://radiationmedicine.med.uky.edu/radiation-sciences-graduate-program

Molloy, Janelle

From: Beatty, Dorcas D
Sent: Wednesday, March 23, 2016 10:02 AM
To: Molloy, Janelle
Subject: Course Proposal for RAS 711

Dr. Molloy:

RAS 711 has now been approved and forwarded via eCATS to the Graduate School.

Thanks, Dorcas

Dorcas D. Beatty | Office of Medical Education | Curriculum
800 Rose Street, MN 104 UKMC Room #109
Lexington, KY 40536-0298
P: 859-257-5286
E: ddbeat1@uky.edu

Molloy, Janelle

From: de Beer, Frederick C
Sent: Tuesday, September 16, 2014 10:19 AM
To: Molloy, Janelle
Subject: RE: Medical Physics Graduate Program

Janelle: I approve of your proposal. Please proceed as you indicate. Your leadership is greatly appreciated. Best wishes. Fred de Beer

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From: Molloy, Janelle
Sent: Tuesday, September 16, 2014 10:06 AM
To: de Beer, Frederick C
Subject: FW: Medical Physics Graduate Program

Dr de Beer,
Here is the note we discussed. Thank you very much for your support.

Janelle A.Molloy, PhD, FAAPM
Professor and Director, Medical Physics
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Markey Cancer Center, Room CC061
800 Rose St
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jmo222@email.uky.edu
859-257-7612 (w)
859-330-6293 (pager)

From: Molloy, Janelle
Sent: Friday, September 05, 2014 4:04 PM
To: de Beer, Frederick C
Cc: Randall, Marcus E; Molloy, Janelle
Subject: Medical Physics Graduate Program

Dear Dr de Beer;
As we discussed recently, I would like to restructure the Medical Physics Graduate Program to include the option for a PhD track. This track would be similar to an MD/PhD program, in that trainees who complete the track in its entirety would obtain both MS and PhD degrees in Medical Physics, as well as a residency certificate rendering them eligible to sit for the certification exam.
In our existing training structure, 2 trainees are chosen from our graduating class in the MS program for entry into our residency. The existing medical physics residency is 2 years in duration and as such we support a total complement of 4 residents at a time. The administrative structure of this residency is supported via the College of Medicine's (COM) Office of Graduate Medical Education (GME). The resident stipends follow PGY1 and PGY2 levels.
I am writing to secure your support for redirecting the monetary equivalent of 2 PGY 1 and 2 PGY 2 stipends (and benefits) towards trainee support in the revised Medical Physics Educational program. At present, this would represent

approximately $220,000 in trainee support per year. These funds would be distributed towards Graduate, Research and Teaching Assistantships. The graduate assistantships would be applied for trainees while they are focusing on their clinical training and providing assistance with clinical physics services. This training and service would be conducted in a manner similar to those of our existing residency training.
Assuming that our application for the addition of the PhD track is successful, I expect that this trainee support model would begin a phased implementation starting in the 2015-2016 academic year. As such, I need the recruiting and compensation for our next cohort of Medical Physics residents (matriculation date of July 1, 2015) to proceed using our existing processes, and that we be allowed appropriate discretion and flexibility during the transition to the new model.
If you can indicate your support for this plan, I will include it in my application for the creation of a PhD program track and will communicate with the COM GME leadership.
Thank you very much for your support and confidence.

Regards,
Janelle

Janelle A.Molloy, PhD, FAAPM
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jmo222@email.uky.edu
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859-330-6293 (pager)

Molloy, Janelle

From: Nikou, Roshan
Sent: Friday, December 11, 2015 10:41 AM
To: Brothers, Sheila C; Carvalho, Susan E; Ellis, Janie; Ett, Joanie M; Hippisley, Andrew R; Jackson, Brian A; Lindsay, Jim D.; Nikou, Roshan; Price, Cleo; Timoney, David M
Cc: Molloy, Janelle; Parker, Steve; Perkins, Andrea L; Harmon, Camille; Clymer, Jeffory A; McCuddy, Jacqueline R; Ivanov, Bobi
Subject: Transmittal
Attachments: Masters in KHP Sport Leadership w sig-signed.pdf; Ph.D.Radiation Sciences-signed.pdf; ENG, University Scholars Program, 10_20, 2015-signed.pdf; Masters Program CHANGE Form 2015-HB-MPH.pdf; MHA Program Change 2015 Form.pdf; HA-CPH Course Change Table_TOGC-signed.pdf

TO: Andrew Hippisley, Chair and Sheila Brothers, Coordinator
Senate Council

FROM: Susan Carvalho, Chair and Roshan Nikou, Coordinator
Graduate Council

The Graduate Council approved the following proposals and is now forwarding them to the Senate Council to approve. All the courses listed below, are accessible via E-Cats' workflow.

Programs
Ph.D. in Radiation Science
University Scholars English
Master of Public Health
Master of Health Administration
Master in KHP

Courses
PA 695 Data and Revenue Forecasting
PA 696 Legal Issues in Public Financial Management
PA 697 Special Topics in Public Financial Management
BAE 535 Environmental Control System Design and Reclamation
CHE 516 Inorganic Materials Chemistry
CPH 716 Proseminar in Occupational Health and Safety
CPH 746 Research Methods and Program Evaluation
LIN 615 Advanced Phonology
LIN 622 Advanced Syntax
LIN 640 Advanced Laboratory in Linguistics
LIN 709 Advanced Seminar in Semantics and Pragmatics

PA 694 Public Pensions and Insurance
EDP 545 Psychology of the Black Experience
LIN 611 Quantitative Methods in Linguistics
LIN 705 Advanced Method in Morphology
MFS 609 Leadership for Lean System
MNG 591 Mine Design Project
MFS 507 Design for manufacturing
FAM 787 Supervised Practice of Couple/Family Therapy
CJT 764 Advanced Topics in Qualitative Research
CJT 765 Advanced Seminar in Communication Research Methods
CJT 771 Seminar in Health Communication
CJT 780 Special Topics in Communication
ME 556 Introduction to Composite Materials
DHN 800 Nutrition in the Life Cycle
DHN 808 Community Nutrition
DHN 810 Medical Nutrition Therapy I
DHN 812 Food Service Systems Management I
DHN 814 Food Service Systems Management II
DHN 816 Medical Nutrition Therapy II
HA prefixes change to CPH

Roshan Nikou
The Graduate School
The University of Kentucky
105 Gillis Building - 0033
Phone: (859) 257-1457
Fax: (859) 323-1928
Roshan.Nikou@uky.edu

Molloy, Janelle

From: Alexander-Snow, Mia
Sent: Friday, August 19, 2016 10:12 AM
To: Molloy, Janelle
Subject: RE: Radiation sciences PhD

Dear Janelle,

Thank you for following-up with me today. I will hold off any review and updates to the CPE full-proposal until you notify me that the proposed program has been approved by the Senate. It is after Senate approval that you and I will go through the CPE full-proposal to be sure it mirrors the Senate approved proposal.

Please let me know if I missed anything.

Best,
Mia

Mia Alexander-Snow, PhD
Director, Planning and Institutional Effectiveness
Phone: 859-257-2873
Fax: 859-323-8688

Visit the Institutional Effectiveness Website: http://www.uky.edu/ie

Follow us at: https://www.facebook.com/universityofky

The University of Kentucky

From: Molloy, Janelle
Sent: Monday, August 15, 2016 11:22 AM
To: Alexander-Snow, Mia
Cc: Molloy, Janelle
Subject: Radiation sciences PhD

Hi Mia,
I am finally getting around to reviewing the latest version of the CPE full proposal and associated documents. In an earlier communication, I provided a corrected version of the full proposal (see attached word document). I compared this to the version you sent (see .pdf file attached) and noted that some, but not all of my recommended changes were included.

I am quite frankly, losing track of the sequence and changes. I know that the CPE full proposal needs to match certain items in previous submissions and be consistent with versions that are moving through the senate process. Would you mind comparing the changes proposed in the word document to the version in the pdf and let me know whether those changes were intentionally omitted or just an oversight. They are not critical, but some of them are more than 'minor'. Thank you. I have my head wrapped around this again now so will be able to respond in a more timely manner going forward.

Thank you for all your help.

Janelle A.Molloy, PhD, FAAPM
Professor and Director, Medical Physics
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https://radiationmedicine.med.uky.edu/radiation-sciences-graduate-program

UNIVERSITY OF KENTUCKY

Schroeder, Margaret <mmohr2@g.uky.edu>

Radiation and Radiological Sciences PhD

Jackson, Brian A <Brian.Jackson@uky.edu> Wed, Nov 23, 2016 at 7:13 PM
To: "Molloy, Janelle" <janelle.molloy@uky.edu>, "Margaret Schroeder (mmohr2@g.uky.edu)" <mmohr2@g.uky.edu>

Hi Janelle:

This works for me.

Happy Thanksgiving!

Brian

Brian A. Jackson, Ph.D.
Interim Dean
The Graduate School
University of Kentucky
Lexington, KY 40506-0033
Tel: 859.257.7126
E-Mail: brian.jackson@uky.edu
Web: www.gradschool.uky.edu

From: Molloy, Janelle
Sent: Wednesday, November 23, 2016 2:36:15 PM
To: Jackson, Brian A; Margaret Schroeder (mmohr2@g.uky.edu)
Cc: Molloy, Janelle
Subject: RE: Radiation and Radiological Sciences PhD

Attached are the following regarding our discussion of the RAS PhD program.

Letter of support from Dean DiPaolo

Letter of clarification regarding pathways into and through the PhD program.

Revised forms “Request to Classify Proposed program” and “Doctoral NEW Radiation Sciences…” to remove or clarify references to existing MS program.

I believe this completes the tasks that were on my ‘to do ‘ list.

Brian, if you could reply affirmatively to the following verbiage then we can include that in the proposal.

“The Graduate School will permit students in the Radiation Sciences MS program to transfer into the PhD program prior to completion of the first spring semester. In such circumstances, coursework taken up to that point will accrue towards the PhD program. “

Janelle A.Molloy, PhD, FAAPM

Professor and Director, Medical Physics

Department of Radiation Medicine

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From: Jackson, Brian A
Sent: Saturday, November 12, 2016 6:25 PM
To: Molloy, Janelle; Margaret Schroeder (mmohr2@g.uky.edu)
Subject: Re: Radiation and Radiological Sciences PhD

Hi Janelle:

Many thanks for the attached document. One suggestion regarding the legacy MS transfer pathway, I would recommend that you add verbiage to the effect that this is subject to approval (for example of your Graduate Affairs Committee or equivalent), perhaps adding set criteria (graduate GPA, performance in specific courses etc.); it currently reads as if the transfer would be automatic if the student so-wishes.

Best,

University of Kentucky
College of Medicine
Office of the Dean

To Whom It May Concern,

I am pleased to confirm my support for the proposed PhD program in Radiation and Radiological Sciences. I understand that the program will be housed in the Department of Radiation Medicine and will be provided via collaboration with the Department of Radiology. It will share much of the didactic coursework with the existing MS in Radiological Sciences program.

In support of this initiative, we have created, and are actively recruiting for, an additional faculty member to join the existing Medical Physics faculty in the Department of Radiation Medicine. This position will provide leadership, mentoring and instruction for the PhD program, in addition to providing clinical support services.

The proposed PhD program represents an important evolution in fulfilling our academic and clinical missions. The financial and staffing resources required for this program were reviewed in detail by the College of Medicine financial leadership and we are fully supportive of its creation.

Respectfully,

Robert S. DiPaola, M.D.
Dean, College of Medicine
Vice President for Clinical Academic Affairs

Molloy, Janelle

From: Randall, Marcus E
Sent: Wednesday, November 16, 2016 11:19 AM
To: Songer, Cheryl A; Huddleston, Alyssa A
Cc: Molloy, Janelle
Subject: RE: letter from Dean

Yes, fine. Tx much.

From: Songer, Cheryl A
Sent: Wednesday, November 16, 2016 11:18 AM
To: Randall, Marcus E; Huddleston, Alyssa A
Subject: RE: letter from Dean

Dr. Randall,

I was finally able to speak with Dean DiPaola regarding this. If the verbiage below is what you want I will go ahead and place on letterhead and have him sign. Is that ok?

Thank you,

Cheryl Songer
Admin Services Assistant Senior
COM Dean's Office
800 Rose Street, MN 150
859-257-3861

From: Randall, Marcus E
Sent: Thursday, November 10, 2016 8:25 AM
To: Huddleston, Alyssa A <alyssa.huddleston@uky.edu>; Songer, Cheryl A <cheryl.songer@uky.edu>
Cc: DiPaola, Robert S <RSDiPaola@uky.edu>
Subject: FW: letter from Dean

Alyssa and Cheryl,
I know that the Dean is out until next week. Please see below, and if he is OK with it, provide a letter of support for the PhD physics program.
Regards, Marc

From: Molloy, Janelle
Sent: Thursday, November 10, 2016 8:23 AM
To: Randall, Marcus E
Subject: letter from Dean

Marc,
If you agree with the content, would you mind forwarding this verbiage to Dean DiPaola and request that he place it on his letterhead and sign. I or Rachel can pick it up from his office.

Thanks

To Whom It May Concern,
I am pleased to confirm my support for the proposed PhD program in Radiation and Radiological Sciences. I understand that the program will be housed in the Department of Radiation Medicine and will be provided via collaboration with the Department of Radiology. It will share much of the didactic coursework with the existing MS in Radiological Sciences program.
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Respectfully,

Robert S. DiPaola, M.D.

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