TO: Randy Smith, Vice Provost for Academic Programs

FROM: Graduate School Curriculum Services

DATE: **12/18/2025**

RE: Proposal to **Establish a Master of Science in Medical Physics** in **The College of Medicine**

The **Department of Radiation Oncology** in the **College of Medicine** is proposing to **Establish a Master of Science in Medical Physics**.

The proposal was received by the Graduate School on **2/27/2025**. The combined GS/CAA subcommittee first reviewed the proposal on **3/28/2025** and requested revisions. Revisions were received on **8/14/2025** and were reviewed a second time by the GS/CAA subcommittee on **10/29/2025** where an additional round of revisions was requested. Final revisions were received on **12/17/2025**. It is supported for review by the Council on Academic Affairs.

THE OHIO STATE UNIVERSITY
COLLEGE OF MEDICINE

Daniel M. Clinchot, MD
Vice Dean for Education
Associate Vice President for Health Sciences Education

320L Hamilton Hall
1645 Neil Avenue
Columbus, OH 43210
614.688.3104 phone
Dan.Clinchot@osumc.edu

February 25, 2025

W. Randy Smith, Ph.D.
Vice Provost for Academic Programs
Office of Academic Affairs
University Square South
15 E. 15th Avenue
Columbus, OH 43201

Dear Dr. Smith,

The College of Medicine fully endorses the proposed new Master of Science in Medical Physics. This innovative program will address the workforce need in the areas of medical imaging and therapeutics. Graduates of this Master's program will address workforce needs in the fields of Radiology, Radiation Oncology and Nuclear Engineering. The growing clinical demand and facilities at OSU's Wexner Medical Center will provide students with ample experiences in clinical application and integration. Many units within the College and across the University have come together in a collaborative fashion to bring this important degree forward.

Please do not hesitate to contact me if I can provide further information in support of this proposal.

Sincerely,

Daniel M. Clinchot, M.D.
Vice Dean for Education
Associate Vice President for Health Sciences Education
Chair, Department of Biomedical Education and Anatomy
College of Medicine

DMC:sl

The James
THE OHIO STATE UNIVERSITY
COMPREHENSIVE CANCER CENTER

Arnab Chakravarti, MD, FASTRO, FACRO, FRSM
Chair and Professor, Department of Radiation Oncology
Chair, Ohio State-James-Nationwide Children's Proton Center
Chief, Radiation Oncology Services, Ohio State Wexner Medical Center
Chief, Radiation Oncology Services, Arthur G. James Cancer Hospital
Klotz Family Chair in Cancer Research
Director, Brain Tumor Program
The Ohio State University College of Medicine

460 W. 10th Avenue
Suite D252
Columbus, OH 43210
614/293-0222
614/293-0573

February 7th, 2025

I am writing to express my enthusiastic support for the establishment of a new medical physics graduate program at The Ohio State University sponsored by the Department of Radiation Oncology. The incorporation of such a program is both timely and essential in the current landscape of healthcare and medical research.

Medical physics, at its core, bridges the gap between physics and medicine, driving advancements in radiation therapy, diagnostic imaging, nuclear medicine, and other critical areas of healthcare. The need for highly trained medical physicists is growing, driven by technological innovations and the increasing complexity of medical treatments. A specialized graduate program in medical physics at The Ohio State University will not only meet this demand but also continue to elevate the university's standing as a leader in healthcare education and research.

The proposed program's curriculum, which includes rigorous coursework in radiation physics, imaging techniques, radiobiology, and clinical applications, will provide students with a solid foundation in both theoretical and practical aspects of medical physics. Moreover, the emphasis on hands-on training and research will equip graduates with the skills needed to excel in clinical, academic, and industry settings. This comprehensive approach ensures that students are well-prepared to tackle the challenges and opportunities of this dynamic field.

The faculty at The Ohio State University are exceptionally qualified and possess a wealth of experience in both teaching and research. Their dedication to fostering a collaborative and innovative learning environment will undoubtedly inspire and motivate students. Furthermore, the university's existing leaders from Radiology, Nuclear Engineering, and other disciplines will provide invaluable opportunities for students to gain practical experience and engage in groundbreaking research.

The establishment of a medical physics graduate program will also contribute to the broader goals of the university and the community. It will attract top-tier students and researchers, enhance interdisciplinary collaboration, and foster advancements in medical technologies that benefit patient care. Additionally, it will address the pressing need for qualified medical physicists, ensuring that healthcare providers have access to the expertise required to deliver cutting-edge treatments and improve patient outcomes.

In conclusion, the creation of a medical physics graduate program at The Ohio State University is a forward-thinking initiative that will have a profound and lasting impact on the university, the students, and the broader healthcare community. I wholeheartedly support this proposal and am confident that it will be a resounding success.

The James
THE OHIO STATE UNIVERSITY
COMPREHENSIVE CANCER CENTER

Arnab Chakravarti, MD, FASTRO, FACRO, FRSM
Chair and Professor, Department of Radiation Oncology
Chair, Ohio State-James-Nationwide Children's Proton Center
Chief, Radiation Oncology Services, Ohio State Wexner Medical Center
Chief, Radiation Oncology Services, Arthur G. James Cancer Hospital
Klotz Family Chair in Cancer Research
Director, Brain Tumor Program
The Ohio State University College of Medicine

460 W. 10th Avenue
Suite D252
Columbus, OH 43210
614/293-0222
614/293-0573

Thank you for considering this important initiative.

Sincerely,

Arnab Chakravarti, MD, FASTRO, FACRO, FRSM
Chair and Professor, Department of Radiation Oncology
Klotz Family Chair of Cancer Research
Director, Brain Tumor Program

THE OHIO STATE UNIVERSITY

Department of Physics
Office of the Chair

1040 Physics Research Building
191 West Woodruff Avenue
Columbus, Ohio 43210-1117

614-292-2653 Phone
614-292-7557 Fax

physics.osu.edu

Monday, February 10, 2025

Re: Medical Physics Graduate Program

On behalf of the Physics Department at The Ohio State University, I am pleased to express our full support for the establishment of a new Medical Physics Graduate Program. As a department, we recognize the growing importance and demand for highly trained medical physicists in the healthcare industry. The proposed program is designed to address this critical need for qualified medical physicists who can contribute to the advancement of medical technologies and improve patient care. By integrating theoretical knowledge with practical training, the program will equip students with the skills and expertise required to excel in the field. Additionally, the program will provide opportunities for research and innovation, fostering a collaborative environment where students and faculty can work together to push the boundaries of medical physics. We thus believe that the proposed program aligns with our university's mission and goals and will significantly enhance our academic offerings.

We believe that the Medical Physics Graduate Program will attract high-caliber students and faculty and will further elevate our university's reputation as a leader in scientific education and research. We also affirm that the nature of this Medical Physics Graduate Program with its specialized training is quite different from our existing graduate program in Physics and that thus there are no concerns of duplication or even of overlap in potential applicants.

In conclusion, the Physics Department fully endorses the establishment of the Medical Physics Graduate Program. We look forward to the positive impact it will have on our university, our students, and the broader scientific community.

Sincerely,

Ralf Bundschuh
Professor and Chair
Department of Physics

THE OHIO STATE UNIVERSITY

Nuclear Engineering Program
Department of Mechanical and Aerospace Engineering

427 Scott Laboratory
201 West 19th Avenue
Columbus, OH 43210

Phone (614) 292-4627
Fax (614) 292-3163
Email: aldemir.1@osu.edu

February 6, 2025

Professor Ashley Cetnar
The Ohio State University
Columbus, OH

Subject: Letter of Support for Planned Graduate Program in Medical Physics

Dear Professor Cetnar:

Based on discussions between yourself and faculty members of the Nuclear Engineering Program (NEP), it is my pleasure to provide this letter of support for the proposed Graduate Program leading to a new Master's (MS) degree and Doctoral (PhD) degree in Medical Physics. As we have discussed, this proposed program is fully consistent with our own plans to initiate an undergraduate degree in nuclear engineering in 2026. In addition to our existing graduate NEP, we currently have an undergraduate minor in nuclear engineering but do not have an undergraduate major in nuclear engineering. As we have examined the future opportunities for graduates from the planned undergraduate program, we have recognized the close relationship between radiation physics for nuclear engineering applications and radiation physics for medical applications. Graduates of the NEP would definitely be candidates for entry into the MS and PhD program that you are developing. Two of our current courses NUCLRENG 5606, "Radiation Protection and Shielding" and the laboratory course NUCLRENG 5742, "Nuclear Instrumentation, Radiation Sensor and Detection" would also fit well with your planned program.

Sincerely,

Tunc Aldemir

Professor and Program Chair

Cc Richard Denning
Raymond Cao

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

Pari V. Pandharipande, MD, MPH, FACR
Professor & Chair, Department of Radiology
Chief of Radiology Services
pari.pandharipande@osumc.edu

Faculty Office Tower
395 W. 12th Avenue, #450
Columbus, Ohio 43210
Office: 614.293.4456
Fax: 614.366.8257
www.radiology.osu.edu

February 20, 2025

Daniel Clinchot, MD
Vice Dean for Education
College of Medicine
Ohio State University Wexner Medical Center

Dear Dr. Clinchot,

I am writing to express my enthusiastic support for the establishment of a new Medical Physics Graduate Program within our institution. My understanding is that this proposed programmatic initiative has been shared with you by Radiation Oncology; I am writing on behalf of Radiology, in support of this collaborative effort. As the Chair of the Department of Radiology, I believe this program will be an invaluable addition to our academic offerings, providing significant benefits to our department, university, and the broader medical community.

Medical physics is a rapidly evolving field, playing a crucial role in the diagnosis and treatment of various medical conditions through the application of physics principles in medicine. The integration of this graduate program will not only enhance the academic rigor and reputation of our institution but also foster interdisciplinary collaboration among departments, including radiology, oncology, and engineering.

Our department has already seen the transformative impact of medical physics in clinical practice. The advancements in imaging technologies are utilized broadly throughout our health care system, and there is an all-time high demand for medical physicists. Establishing a dedicated graduate program will enable us to train the next generation of experts to supply these needs and who will lead the way in innovative research and clinical applications.

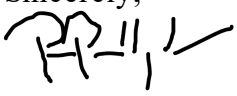
The proposed curriculum for the Medical Physics Graduate Program is comprehensive, aligns with the highest standards of education in the field and we plan national accreditation of the program (through CAMPEP). It includes advanced coursework, hands-on laboratory experience, and opportunities for clinical rotations and research. This holistic approach will ensure that our graduates are well-prepared to address the challenges and opportunities in medical physics, making meaningful contributions to patient care and medical science.

Additionally, our department is committed to providing the necessary resources and support to ensure the success of this program. We have a team of distinguished faculty members with expertise in medical physics who are eager to contribute to the program's development and delivery. Furthermore, our state-of-the-art facilities and access to cutting-edge technology will provide an ideal environment for students to thrive and excel.

In conclusion, I wholeheartedly endorse the establishment of the Medical Physics Graduate Program and believe it will significantly enhance our institution's academic and clinical landscape. I am confident that this program will attract talented students, foster groundbreaking research, and ultimately improve patient care through the application of advanced medical physics principles. This program has my strongest possible endorsement.

Please do not hesitate to reach out to me with any questions.

Sincerely,



Pari V. Pandharipande, M.D., M.P.H., F.A.C.R.
Professor and Chair, Department of Radiology
The Ohio State University College of Medicine

We are reaching out to let you know that on **10/29/2025** the combined Graduate School – Council on Academic Affairs (GS/CAA) reviewed the proposal from the **College of Medicine** to **Establish a New MS in Medical Physics**. GS/CAA supports this new program being reviewed at CAA, with the following revisions.

Thank you very much for your thoughtful review of the proposal for the new Master's Degree Program in Medical Physics. We sincerely appreciate the time and consideration the council has dedicated to evaluating our submission. Please find the updated proposal below, along with a summary of revisions made in response to the feedback provided.

1. The committee expressed concern that the course load combined with a practicum and culminating project that requires original scholarly research may be burdensome for students. Please provide additional information on student support for completing these requirements.

   The curriculum has been amended to reduce the number of seminar hours in the first year, move a course from the second year to the first year, and amend the research project to be conducted during the summer. This current balance reflects the coursework that would be required for accreditation and preparation for students to be prepared to sit for their board examination while balancing the credit hours required for full time graduate status. Both the curriculum committee and graduate studies committee believe that this would be an appropriate balance of rigor and preparation from course material, provide relative research experience, and clinical exposure for master's students.

2. Due to the implementation of SB 1 please remove or edit the language about Enrolling and Retaining Underrepresented Groups.

   The section for efforts to enroll and retain underrepresented groups has been removed from the proposal.

3. There is still a lack of clarity regarding the stated faculty FTE in the budget document. The proposal references 1.3-1.5 FTE but this is not accounted for in the budget section. Although no faculty will be hired, please explain how will their teaching time be reallocated and what are the costs associated with that.

   The following has been included for budget justification:

   The projected increase in number of faculty to support the new courses for the program is 1.3 FTE total which has been reallocated for support of the

educational program development by the Departments of Radiation Oncology and Radiology. In preparation for academic expansion, the Radiation Oncology physics faculty have tripled in the past four years. Formal teaching time for education has been introduced by our chair to support graduate and undergraduate education.

With the growth of medical physics faculty, the department has now incorporated 0.2 FTE release time for individual faculty members for the semester they are teaching.

4. The committee recommends disaggregating the market analysis data between the MS and PhD programs in order to distinguish the two degrees. In this way, the MS program is closer to move through the review process.

   The current market analysis relies on Classification of Instructional Programs (CIP) codes, which do not differentiate between Master's and PhD-level graduate degrees. To supplement this limitation, surrogate data sources were examined, including the educational backgrounds of current residents and the minimum degree requirements listed in job postings.

   An annual report compiled from self-reported data by residency program directors—hosted by CAMPEP and SDAMPP—indicates that, during the 2024–2025 reporting period, 49% of residents in CAMPEP-accredited programs hold a Master's degree in Medical Physics.

   Additionally, a 2024 survey conducted by the SDAMPP Education Practices Committee explored residency preparation and program director preferences. Preliminary findings (not yet published) show that 80% of respondents accept applications from both Master's and PhD candidates.

   As of November 14, 2025, a review of the AAPM Job Posting database identified 73 career position listings (excluding residency and training roles). Of these, 70% accept applicants with either a Master's or PhD qualification.

5. Please check the FTEs for students. This is not a measure of headcount, but more a measure of the credit hour allocation.

   All of the students for the program will be expected to be full time graduate students for 1.0 FTE per student in the program. We anticipate admitting 6 students per year.

   The values have been revised to the number of credit hours offered per year by the program normalized to the minimum number of credit hours for full time

status. Please let me know if there is a different definition and I am happy to amend this in the budget.

> ***Year 1 Fall and Spring: The minimum number of credits for full time status for graduate students is 8 credit hours. Students will be taking 10 credit hours, so 1.25 FTE per student for the first year. For six students this would sum to 7.5 FTE from first year students.***
>
> ***Year 2 Summer: The minimum number of credit hours for full time students would be 6 hours, and 6 hours is recommended for the summer for 1 FTE per student. This would total to 6 FTE for the cohort.***
>
> ***Year 2 Fall and Spring: The first year students would progress to the second year where they would be expected to enroll in 9 credit hours for 1.1 FTE per student for a total of 6.6 FTE. This would be added to the incoming students (7.5 FTE first year + 6.6 FTE second year) = 14.1 FTE for students for steady state for the program.***

Please send the updated proposal at your earliest convenience (please cc Miriti.1@osu.edu on the email) and *summarize revisions in a cover letter that indicates where these can be found in the revised proposal*. Upon receipt of the revision, **the Associate Dean for the Graduate School will review the revisions,** and if satisfied, will move it forward to CAA for further review. Please don't hesitate to contact us if you have any questions.

PROPOSAL FOR NEW GRADUATE DEGREE PROGRAM

Proposal for the Graduate Program for Medical Physics

Masters of Science – Medical Physics

Submitted by:

Ashley Cetnar, PhD, MS, MPAL, DABR

Department of Radiation Oncology

College of Medicine

The Ohio State University

On behalf of the Medical Physics Graduate Program

Graduate Studies Committee

Cover material

February 21, 2025

Dr. Daniel Clinchot

Vice Dean for Education – College of Medicine

Dear Dr. Clinchot,

The Medical Physics Graduate Education Committee in the Department of Radiation Oncology within the College of Medicine has developed a proposal for new graduate programs in medical physics.

Medical physicists are pivotal in the discovery, research and development, and translation of new technologies to clinical practice. The development of the next generation of professionals requires a commitment to the highest standards in quality, safety, and innovation for patient care in these domains. The need for properly trained medical physicists has never been greater as patient treatment and diagnosis become more technically advanced. The era of personalized healthcare brings new challenges to the medical system as we attempt to diagnose and treat patients as individuals. More medical physicists need to be trained to fill this need.

We request the review of the following two newly proposed medical physics graduate programs of the combined Graduate School and Council on Academic Affairs (ACC) subcommittee:

- Masters of Science – Medical Physics (Entry Level)
- Doctor of Philosophy – Medical Physics (Entry Level and Transitional)

The program is a collaborative effort including the Department of Radiology and Department of Nuclear Engineering. Courses will also be included in the required curriculum from the departments of Anatomy, Biomedical Sciences Graduate Program, Public Affairs, and Statistics.

The new program has been approved by the Department of Radiation Oncology's Curriculum Review Committee on 2/24/25 and reviewed and supported by the Department of Radiology, the Physics Department, and the Nuclear Engineering program within the University with letters of support attached for review.

Below is the new degree program proposal for review and letters of support for the program.

Thank You,

Ashley Cetnar, PhD, MS, MPAL, DABR

Associate Professor

Department of Radiation Oncology

Introductory material

Introduction to Medical Physics

The practice of medical physics combines the knowledge, concepts, and principles of physics to the diagnosis and treatment of human disease. Medical physicists primarily apply this understanding in radiation oncology, diagnostic imaging, nuclear medicine, and health physics. Medical physicists are pivotal in the discovery, research and development, and translation of new technologies to clinical practice. Excellence in the profession requires a commitment to the highest standards in quality, safety, and innovation for patient care in these domains. The need for properly trained medical physicists has never been greater as patient treatment and diagnosis become more technically advanced. The era of personalized healthcare brings new challenges to the medical system as we attempt to diagnose and treat patients as individuals. More medical physicists need to be trained to fill this need.

Program Need

Medical Physicists are currently in high demand in the United States. This is of great interest to our community to be able to support the needs of hospitals and universities across the country. Workforce surveys are periodically conducted for medical physics and as of 2022, it was estimated there are over 8,000 medical physicists working in the United States. While there have been increasing efforts to expand graduate program and clinical training for medical physics, there are still limited opportunities for students to enter the field. An example includes "in 2019, there were a total of 1914 applications, with only 677 offers of admission and 284 matriculations." (Newhauser et. al. 2022)

The need for medical physicists is projected to continue to grow. As many professionals reach retirement age and the aging population increases, there is a great need for professionals with expertise in radiation physics. (Kramer 2023)

> "Currently, approximately one medical physicist is needed for every 300 radiotherapy patients treated annually… The absolute cancer incidence in the United States is increasing by ~2% annually due to growth and aging of the population. Calculations using the domestic demographic workforce data from 2012 from Chen et al. suggest that retirement from the medical physics workforce comprises a 2.2% drain on supply per year." (Newhauser et. al. 2022)

While the projected need grows, there are currently not enough qualified medical physicists to meet the demand in healthcare today. In addition to many institutions and practices having job openings, there is an even more desperate need for medical physicists in rural and underserved communities. (Praeder et. al. 2024)

Consistent with its mission of providing for the health needs of the citizens of Ohio and, personalized medicine, The Ohio State University College of Medicine seeks approval to offer a Master's Degree Graduate Program in Medical Physics at its main campus in Columbus.

There are currently no medical physics graduate programs available for students in central Ohio, Western Pennsylvania, or West Virginia. While we expect applicants from around the nation and an international audience for the program, we will be positioned to serve the educational needs of our

local community. The Ohio State University currently has one of the largest physics undergraduate programs in the country with many interested applicants for continuing education in medical physics who must leave central Ohio to pursue this professional pathway.

The model for our proposed program would enroll 6 new students each autumn. With the two-year Master's program, after the first year there would be approximately 12 students in the program. These projected numbers have been used to develop a budget for a sustainable program over time.

There are currently many undergraduate students in central Ohio who are interested in pursuing graduate studies in medical physics. Qualified applicants could be from the physics, biomedical engineering, or nuclear engineering students from The Ohio State University and surrounding institutions in Ohio, Pennsylvania, and West Virginia to serve the local community. We anticipate applications nationwide and internationally for this new program. The Ohio State University currently offers residency training programs in both Radiation Oncology and Diagnostic Imaging for Medical Physics which offers a pathway to clinical practice upon graduation.

Current Programs in Ohio

Three accredited medical physics programs currently exist in the state of Ohio:

- The University of Toledo currently offers a Master's Degree in Medical Physics and PhD in Physics with a concentration in Medical Physics.
- The Case Western Reserve University Physics Department has recently partnered with Cleveland Clinic to obtain CAMPEP accreditation in 2025 for a medical physics track within a Master's Degree program.
- The University of Cincinnati offers a Masters and Doctor of Medical Physics option for students. However, this program is no longer accepting new students.

The proposed new graduate programs will provide the opportunity for students to learn at a large academic facility with advanced technology and passionate faculty educators.

Job Market

We analyzed the job market for roles applicable to graduates of the Medical Physics Master's program and identified current demand for these roles and the skills required to succeed in them. Lightcast's Job Posting Analytics aggregates publicly available job postings from more than 51,000 sources, including sites like LinkedIn andMonster.com for reviewing the projected job outlook.

There were 16,578 total job postings nationwide in the search ranging from January 2024 to January 2025, of which 4,209 were unique. This represented an 8.3% increase in demand for medical physics occupation.

Target Occupations

*Filtered by the proportion of the national workforce in these occupations with a Master's degree or Doctoral or professional degree

16,578	+8.3%	$74.94/hr $155.9K/yr	1,181
*Jobs (2024)**	*% Change (2024-2034)**	Median Earnings	*Annual Openings**

Occupation	2024 Jobs*	Annual Openings*	Median Earnings	Growth (2024 - 2034)*
Physicists	16,578	1,181	$74.94/hr	+8.26%

Job Postings Summary

4,209	3 : 1	852	27 days
Unique Postings 11,513 Total Postings	Posting Intensity Regional Average: 3 : 1	Employers Competing 1.00M Total Employers	Median Posting Duration Regional Average: 27 days

When the search was specific to the state of Ohio, we observed 564 jobs in the same range with 4.4% increase in demand within the state. Ohio was 4th in the total number of job posting by state, with the highest demand for medical physicists in central Ohio.

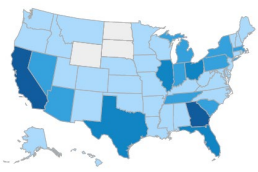
Target Occupations

*Filtered by the proportion of the national workforce in these occupations with a Master's degree or Doctoral or professional degree

564	+4.4%	$65.85/hr $137.0K/yr	38
*Jobs (2024)** *1% below National average**	*% Change (2024-2034)** *Nation: +8.3%**	Median Earnings Nation: $74.94/hr; $155.9K/yr	*Annual Openings**

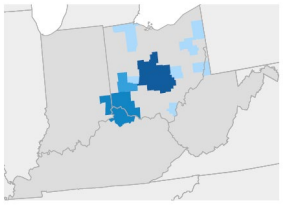
Occupation	2024 Jobs*	Annual Openings*	Median Earnings	Growth (2024 - 2034)*	Employment Concentration (2024)*
Physicists	564	38	$65.85/hr	+4.43%	0.99

Job Postings Regional Breakdown



State	Unique Postings (May 2024 - Apr 2025)
Georgia	149
California	133
Illinois	111
Ohio	99
Florida	96

Job Postings Regional Breakdown



MSA	Unique Postings (May 2024 - Apr 2025)
Columbus, OH	43
Cincinnati, OH-KY-IN	27
Dayton-Kettering-Beavercreek, OH	14
Findlay, OH	3
Gallipolis, OH	3

Graduate Program Market Demand

We assessed the demand for a graduate degree in medical physics. This research utilized IPEDS data (through CIP codes) to analyze trends in institutions and completions to understand the market demand and growth potential. Lightcast provides data on college enrollments and graduates, as reported in the National Center for Education Statistics (NCES) IPEDS dataset through CIP Codes to review degree completion trends.

We determined there are multiple potential CIP codes that are used by Medical Physics graduate programs. The challenge some of the more generalized codes that are currently used by programs include other degree programs outside of Medical Physics, for example, “Physics, General”, “Physics, Other”, or “Biophysics”. We identified CIP code, 51.2205 for Health/Medical Physics as the most closely aligned subset that we believe best represents the market. This was used to evaluate the demand in the market and growth patterns. A total of 27 programs were represented in this report as a representative sample of the educational landscape.

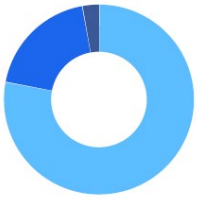
National Market Trends

Overall, this market is growing with an increase in completions of 58.8% over the last decade and 25% growth since 2019. When looking specifically at the defined market, it is a small market with 208 completions in 2023.

Program Overview

	Completions (2023)	% Completions	Institutions (2023)	% Institutions
All Programs	208	100%	27	100%
Distance Offered Programs	42	20%	2	7%
Non-Distance Offered Programs	166	80%	26	96%

Market Share by Institution Type



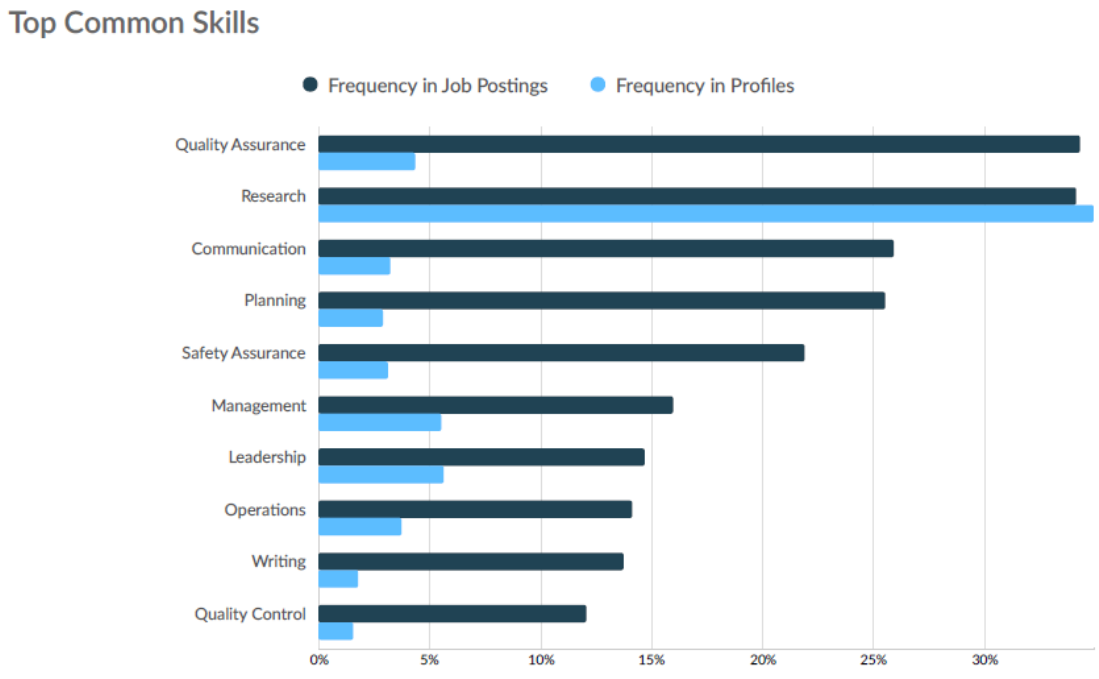
Institution Type	Completions (2023)	Market Share
Public, 4-year or above	162	77.9%
Private not-for-profit, 4-year or above	40	19.2%
Private for-profit, 4-year or above	6	2.9%

There are currently no medical physics graduate programs offered in central Ohio. Three programs currently exist in Ohio. The most recent program was accredited in 2025 in Cleveland, OH in response to the need and growing demand.

Top Market Needs

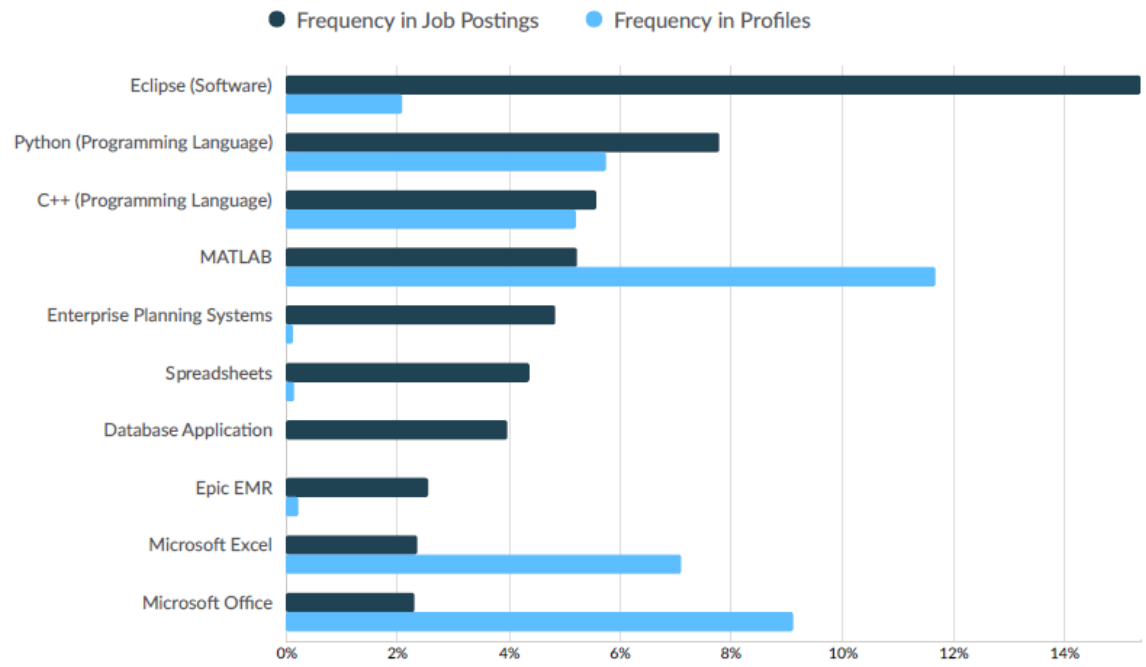
The top skills identified by current employers for medical physicists which are not indicated in profiles for those applying for related positions include competency in Quality/Safety Assurance, Communication/Writing, and Management/Leadership. Other specific software skills desired include Treatment Planning in Eclipse, programming (python, C++, MATLAB), and database application.

These skills were considered when developing the curriculum to include hands-on experiences through the student practicum to observe and participate in quality assurance and treatment planning using the latest software for clinical application. With the independent student project during their research experience, students will be encouraged to apply skills in computer programming. Assessments throughout the program will focus on skill development in communication, both written and orally to hone students' skills in preparation for the workforce. Additional topics such as leadership and management will be integrated into the program-long seminar series. These unique aspects will set the Ohio State University Medical Physics graduate program apart from the competitors in student preparation.



Skills	Postings	% of Total Postings	Profiles	% of Total Profiles	Projected Skill Growth	Skill Growth Relative to Market
Quality Assurance	1,446	34%	574	4%	+15.4%	Growing
Research	1,437	34%	4,618	35%	+17.2%	Growing
Communication	1,092	26%	425	3%	+3.6%	Lagging
Planning	1,075	26%	383	3%	+10.9%	Growing
Safety Assurance	922	22%	413	3%	+9.7%	Growing
Management	672	16%	735	6%	+5.3%	Stable
Leadership	620	15%	748	6%	+8.5%	Stable
Operations	595	14%	492	4%	+8.1%	Stable
Writing	580	14%	237	2%	+11.8%	Growing
Quality Control	508	12%	204	2%	+11.9%	Growing

Top Software Skills



Skills	Postings	% of Total Postings	Profiles	% of Total Profiles	Projected Skill Growth	Skill Growth Relative to Market
Eclipse (Software)	647	15%	276	2%	+10.2%	Growing
Python (Programming Language)	328	8%	761	6%	+24.5%	Rapidly Growing
C++ (Programming Language)	235	6%	690	5%	+10.0%	Growing
MATLAB	220	5%	1,543	12%	+16.0%	Growing
Enterprise Planning Systems	204	5%	17	0%	+5.7%	Stable
Spreadsheets	184	4%	19	0%	+22.2%	Rapidly Growing
Database Application	168	4%	0	0%	+15.0%	Growing
Epic EMR	108	3%	29	0%	+16.4%	Growing
Microsoft Excel	99	2%	939	7%	+17.7%	Growing
Microsoft Office	97	2%	1,205	9%	+18.5%	Growing

Top Qualifications

Qualification	Postings with Qualification
Board Certified In Radiology	1,474
Board Certified/Board Eligible	1,207

Limitations

Limitations include that not all programs currently use this CIP code and include programs that are not necessarily CAMPEP accredited or focus on Health Physics instead of Medical Physics.

Master's Degree Market Analysis

The current market analysis relies on Classification of Instructional Programs (CIP) codes, which do not differentiate between Master's and PhD-level graduate degrees. To supplement this limitation, surrogate data sources were examined, including the educational backgrounds of current residents and the minimum degree requirements listed in job postings.

An annual report compiled from self-reported data by residency program directors—hosted by CAMPEP and SDAMPP—indicates that, during the 2024–2025 reporting period, 49% of residents in CAMPEP-accredited programs hold a Master's degree in Medical Physics.

Additionally, a 2024 survey conducted by the SDAMPP Education Practices Committee explored residency preparation and program director preferences. Preliminary findings (not yet published) show that 80% of respondents accept applications from both Master's and PhD candidates.

As of November 14, 2025, a review of the AAPM Job Posting database identified 73 career position listings (excluding residency and training roles). Of these, 70% accept applicants with either a Master's or PhD qualification.

Summary

Based on market analysis and projected job growth, the development of a master's degree in medical physics at Ohio State University is strongly supported. National and state-level data indicate rising demand for clinically prepared professionals in this field. Programs aligned with clinical experience, research, and leadership are particularly well-positioned to succeed. The market, as defined by CIP code 51.2205 (Health/Medical Physics), shows consistent growth in both institutional offerings and degree completions, reflecting sustained interest and opportunity. To remain competitive, Ohio State's program should emphasize distinctive strengths in clinical readiness and innovation. This program represents a strategic and timely addition to Ohio State's graduate offerings.

History of Graduate Programs in Medical Physics

The first accredited graduate-level medical physics program began in 1988 at the University of Wisconsin and Wayne State University and there are now 64 CAMPEP-accredited graduate programs with 46 in the United States, 15 in Canada, 2 in Ireland, and 1 in Australia. These programs graduate approximately 300 students each year and applicant numbers are growing. In 2019, it was reported that there were a total of 1914 applications, with 677 offers of admission and 284 matriculations, showing great student interest in the field, but limited current graduate program opportunities.

Currently, within the profession, there are two primary educational pathways to becoming a board-certified medical physicist. The Master's degree is a pathway for strong didactic education and application of the knowledge in preparation for a clinical career. Most students then apply for a 2-year clinical residency program as the last component of their training to pursue board certification eligibility. Because of the great demand for medical physicists, employment is typically secured before the completion of residency and currently, there are more jobs available than there are graduates.

Proposal Development

The Radiation Oncology Medical Physics Graduate Program Committee was formed in the summer of 2023 with the goal of drafting the proposal for a new graduate program within the College of Medicine. These programs include a Master's of Science in Medical Physics and a PhD in Medical Physics.

There were 12 members of the committee consisting of board-certified medical physicists within the Department of Radiation Oncology. There was representation from physicists with backgrounds of different levels of education (MS, PhD, and certificate), types of graduate programs (CAMPEP accredited vs. non-accredited), and graduate education institutions (including Harvard, Vanderbilt University, University of Pennsylvania, University of Texas MD Anderson Cancer Center, Duke University, and more).

The committee developed recommendations for the programs including the mission, vision, and values of the new program, graduation objectives, and program curriculum. After development, the proposal was presented to the department chair of Radiation Oncology and leadership from other departments within the university with similar interest, Commission on Accreditation of Medical Physics Education Programs (CAMPEP) leadership, and American Association of Physicists in Medicine (AAPM) Education Council leadership for further discussion and feedback to revise the original proposal.

The Medical Physics Graduate Studies Committee (GSC) was approved on July 1, 2025. The charge of the committee is consistent with the graduate school requirements (Section 13.0) with the charge of program leadership and strategic planning, program assessment, curriculum review, review of graduate faculty appointments, and faculty development.

Proposed Graduate Programs

The departments of Radiation Oncology and Radiology at The Ohio State University are seeking to develop a robust graduate program of medical physics offering options for graduate student pathways into the field. While both departments currently have residency programs for medical physics graduates for clinical training, we believe developing complementary educational pathways is the next step for the University to be a leader in this field. The curriculum will not only prepare students for a clinical pathway, but also a strong background for medical physics careers in industry, government, education, and research pathways.

We are seeking approval for a Master's Degree (MS) in Medical Physics.

Curricular information

Mission, Vision, and Values

Master's of Science – Medical Physics

- **Mission** - To inspire the next generation of medical physics leaders to advance healthcare by providing a strong didactic foundation and comprehensive clinical experience.
- **Vision** - Provide an excellent educational program that trains professionals who are highly valued based on their preparation and adaptability for leading in the evolving healthcare environment.
- **Values** - Integrity, Professionalism, and Curiosity

Program Description

The objective of the program is to train medical physicists by providing comprehensive course work, technical skills, and a variety of supervised clinical experiences. Our program is distinctive for its interdisciplinary and experiential educational approach to graduate training. Students will benefit from our outstanding faculty who conduct high quality patient care and cutting-edge research to provide a stimulating training environment.

The program instructors will seek to educate individuals capable of conducting independent research and gain hands-on experience in one or more areas in medical physics. Therefore, the

curriculum is designed to provide a solid educational, technical, and experiential foundation for graduate students entering their choice of academic, industrial, regulatory, or other work forces. Program leadership will seek to provide an environment that nurtures and stimulates the research interests and the intellectual advancement of both students and faculty by providing a forum for scientific and professional discourse. The proposed curriculum for the medical physics graduate program is designed to provide a foundation in physics in medicine through a selection of core courses.

The MS curriculum has been designed to integrate scientific knowledge, technical skills, and clinical experience. The curriculum proposed is a 5-semester Master's of Science in Medical Physics curriculum. The total number of credit hours expected for the completion of the program is 44 credit hours. It is expected that the MS curriculum will be completed in 2-years for full-time students (or 5 semesters).

The program will seek accreditation with the Commission on Accreditation of Medical Physics Education Programs (CAMPEP). The courses include the core medical physics courses required by CAMPEP and would qualify students for eligibility for American Board of Radiology (ABR) board certification in Medical Physics. While there would not be official designations of specializations between specialties in the program, after the first two semesters, students would be able to specialize practicum experiences related to therapy or imaging.

We propose the initial date for implementation of the program is Autumn 2026.

Proposed Master's of Science in Medical Physics Curriculum

The following recommended curriculum is included such that the first year is the same for all students while specialization in practicum for radiation therapy or diagnostic imaging can be completed in the second year.

Year 1 Autumn (10 Credits)

- NUCLREN 5606* – Radiation Protection and Shielding (3)
- RADONC 6006* - Radiological Physics and Dosimetry (3)
- RADIOLG 6010* - Fundamental Physics of Medical Imaging (3)
- RADIOLG 6011 – Lab (1)

Year 1 Spring (10 Credits)

- RADSCI 3672*^ – Radiologic Sectional Anatomy (3)
- NUCLREN 5742 – Nuclear Instrumentation, Radiation Sensor, and Detection (3)
- RADONC 6020* - Fundamental Physics of Radiation Therapy (3)
- RADONC 6021 – Lab (1)

Year 2 Summer (6 Credits)

- RADONC 6007* – Radiation Biology (2)
- RADONC 7070 - Practicum (2) or RADIOLG 7070 - Practicum (2)
- RADONC 7998 – Research (2) or RADIOLG 7998 (2)

Year 2 Autumn (9 Credits) –

- RADONC 7020 - Advanced Physics of Radiation Therapy (3)

- Elective (3)
- RADONC 7070 - Practicum (2) or RADIOLG 7070 Practicum (2)
- RADONC 7090* – Seminar (1)

Year 2 Spring (9 Credits) –

- RADIOLG 7020 - Advanced Physics of Medical Imaging (3)
- Elective (3)
- RADONC 7070 - Practicum (2) or RADIOLG 7070 - Practicum (2)
- RADONC 7090* – Seminar (1)

*Required course for CAMPEP Accreditation

^A graduate level course is currently being developed for cross sectional anatomy through the school of health and rehabilitation science. If admitted students do not have an undergraduate course completed in anatomy, they will enroll in ANATOMY 2300 – Human Anatomy as a prerequisite before enrolling in Cross Sectional Anatomy.

Elective courses are to be reviewed and approved by the program director.

Culminating Learning Experiences

Students will complete a 3-semeter series of practicum and research credits which will result in the completion of an independent scholarly product in terms of investigation, analysis, and written report as a culminating learning experience. Students will be assigned an advisor for their culminating learning experience.

Master's students are required to complete an end-of-program oral examination assessing the student's understanding of the theoretical and applied fundamentals of medical physics and the student's readiness to engage in a sustained clinical or professional experience. The Medical Physics Graduate Education Curriculum committee will oversee the development and administration of the examination. Successful completion of this examination is necessary for graduation from the Master's program.

Program Graduation Requirements

To fulfill the Master's Program requirements, students must:

- Demonstrate mastery of foundational knowledge and understanding of medical physics by the completion of all required courses, completing concept inventories to demonstrate learning progression, and passing oral examinations throughout the program.

- Exhibit clinical expertise by the successful completion of clinical application examinations for core topics, clinical practicum, and competency in routine quality assurance and routine clinical workflow testing for selected track.

- Complete an independent scholarly product in terms of investigation, analysis, and written report as a culminating learning experience from the longitudinal practicum and research experience.

Course Descriptions

Courses with * is a proposed new course for the program.

Course	Title	Description	Credits	Modality
NUCLREN 5606	**Radiation Protection and Shielding**	This course on radiation protection and safety will be structured by providing the answers to these major questions: Why does radiation need to be managed? What can you do to manage radiation exposure? How can you detect radiation? How much exposure can you safely receive? For whom is this important? How can you develop a safety culture? By posing these questions, a broad spectrum of topics can be discussed, including fundamental physics interactions, biological effects of radiation, and basic principles of radiation protection.	**3**	**P**
ANATOMY 2300	**Human Anatomy**	Anatomy and physiology underpin the entirety of medical physics. Familiarity with normal anatomy is fundamental to radiotherapy treatment planning and medical imaging optimization. *This undergraduate course material is an appropriate anatomy requirements for graduate studies for medical physicists. This would be required as a prerequisite if students do not already have anatomy from their undergraduate coursework*	**4**	**P**
RADIOLG 6010*	**Fundamental Physics of Medical Imaging**	The core competencies presented in this section include concepts of image processing, image display and image quality; image reconstruction from projections; and the key hardware, software, and operational details of each imaging modality. These modalities are projection X-ray imaging (radiography, mammography, and fluoroscopy), volumetric X-ray imaging (computed tomography [CT], cone-beam CT, and tomosynthesis), nuclear imaging (scintigraphy, single-photon emission CT, and positron emission tomography [PET]), ultrasound imaging (echo 2D and 3D imaging, and Doppler imaging), and magnetic resonance imaging (MRI).	**3**	**P**

RADIOLG 6011*	**Medical Imaging Lab**	In this course, students will be able to explore the clinical application of physics in medicine in radiation oncology. Students will be able to recognize clinical workflows, observe the role of physicist in the clinic, and complete non-clinical cases and simulations.	**1**	**P**
RADONC 6006*	**Radiological Physics and Dosimetry**	The primary learning objectives include an understanding of individual interaction mechanisms, including both the physics involved in describing the probability for each interaction and the way in which energy is dissipated in the interaction.	**3**	**P**
RADSCI 3672	**Radiologic Sectional Anatomy**** *Curriculum director plans to include a graduate level option in 2026*	After student have completed anatomy and physiology, this course will be an opportunity to apply the theoretical knowledge to the practical application of interpreting cross-sectional anatomy from CT and MRI for clinical applications.	**3**	**P**
RADONC 6020*	**Fundamental Physics of Radiation Therapy**	The core elements of radiation therapy are presented here, including clinical and radiobiological principles, equipment and technology used for radiation therapy, specific treatment techniques and principles of radiation protection and quality management.	**3**	**P**
RADONC 6021*	**Radiation Therapy Lab**	The one credit hour lab component will be complementary to the Fundamental Physics of Radiation Therapy curriculum providing hands-on experiences and examples of applications using clinical equipment and protocols.	**1**	**P**
RADONC 6007*	**Radiation Biology**	Radiobiology provides the basic connection between microscopic and molecular interactions of radiation with cellular and tissue responses. This material provides a solid biological and physiological background for understanding the effects of radiation on human tissues and cancers and the	**2**	**P**

		resulting safety policies and therapy regimens.		
NUCLREN 5742	**Nuclear Instrumentation, Radiation Sensor, and Detection**	Being able to detect and measure radiation is a vital skill for medical physicists. Students will learn methods of radiation detection, instrumentation, and applications in medical physics for therapy and imaging.	**3**	**P**
RADONC 7020*	**Advanced Physics of Radiation Therapy**	Students interested in pursuing specialization in radiation oncology will be able to learn advanced topics in radiation therapy.	**3**	**P**
RADIOLG 7020*	**Advanced Physics of Medical Imaging**	Students interested in pursuing specialization in radiology will be able to learn advanced topics in diagnostic imaging.	**3**	**P**
RADONC 7070*	**Practicum – Therapy**	In this course, students will be able to explore the clinical application of physics in medicine in radiation oncology. Students will be able to recognize clinical workflows, observe the role of physicist in the clinic, and complete non-clinical cases and simulations. Students will be responsible for an independent scholarly project during this course.	**2-3**	**P**
RADONC 7060*	**Practicum – Imaging**	In this course, students will be able to explore the clinical application of physics in medicine in radiology. Students will be able to recognize clinical workflows, observe the role of physicist in the clinic, and complete non-clinical cases and simulations. Students will be responsible for an independent scholarly project during this course.	**2-3**	**P**
RADONC 7090*	**Seminar**	In the seminar series, topics on advances in medical physics, clinical case-studies, professionalism, and ethics will be presented and discussed.	**1**	**P**

RADONC 7998*	**Research**	Students will work on a research project related to physics in medicine with a research mentor.	**1-3**	**P**
RADIOLG 7998*	**Research**	Students will work on a research project related to physics in medicine with a research mentor.	**1-3**	**P**

Courses with * is a proposed new course for the program.

Applicant Review

Recruitment and admissions will be managed by the Office of Graduate Education and overseen by the Medical Physics Graduate Admissions Committee. The application process requires the following qualifications:

For Master's Degree in Medical Physics:

- Bachelor's Degree (or higher) in the majors of physics or related Bachelor's Degree (biomedical engineering, nuclear engineering, etc.) with at least the equivalent of a physics minor.
- Minimum GPA required is 3.0 on 4.0 scale.
- GRE test scores for verbal, quantitative, and analytical exams.
- Personal Statement
- 3 Letters of Recommendation
- All international applicants whose native language is not English will be required to take the Test of English as a Foreign Language (TOEFL) and have an official score report sent directly to the Associate Dean for Graduate Studies from Educational Testing Service. The recommended minimum TOEFL scores are 560 (written) or 220 (electronic) or 89 (internet based).

Evaluation of applicants for admission to the program will adhere to the principles of individualized holistic review. Therefore, each test score will be considered as but one metric in the admissions process, with no test score to be considered a sole criterion for admission into the program.

Institutional Planning for Program Change

The Departments of Radiation Oncology and Radiology have an excellent infrastructure to support the development of a quality Medical Physics graduate degree program. The institution's faculty are willing to collaborate in instruction in medical physics, research, and clinical education. The Department of Radiation Oncology is primarily located at the James Cancer Hospital but also provide opportunities for educational experiences throughout campus including the breast center, proton center, and veterinary school.

James Cancer Hospital

The Ohio State University is an ideal educational institution for medical physics training based on resources, infrastructure, and educational mission. The Ohio State University Comprehensive Cancer Center (OSUCCC) is one of the nation's premier centers for the prevention, detection, and treatment of cancer. It is the only cancer program in the United States that features an National Cancer Institute (NCI) designated comprehensive cancer center aligned with a nationally ranked

academic medical center and a freestanding cancer hospital on the campus of one of the nation's largest public universities. The Arthur G. James Cancer Hospital and Richard J. Solove Research Institute is the world's most advanced cancer hospital and provides the patient care component of the OSUCCC (OSUCCC-James). The James incorporates patient care, teaching, and research space on all floors. The hospital staff includes nationally and internationally known physicians, physician-researchers, nurses, and staff who provide compassionate, state-of-the-art care. Research, education, and patient care form the three-pronged mission of the OSUCCC-James. The OSUCCC tightly intertwines the three mission components to focus on one goal: Creating a Cancer-Free World.

The focal point of the research activities of the OSUCCC is The James Cancer Hospital, a free-standing 308-bed facility for adult cancer clinical inpatient and outpatient activities, clinical laboratory support services, and dry research space. The James opened in December 2014. In addition to The James Cancer Hospital sites on the main medical center campus, there are several important off-campus clinical facilities associated with the OSUCCC-James. The 38,000 sf Stephanie Spielman Comprehensive Breast Center provides the full range of screening, diagnostic, treatment, quality-of-life and rehabilitation needs for ambulatory breast cancer patients.

Department of Radiation Oncology

The Radiation Oncology Department has had a strong track record of supporting teaching and education at all levels since its inception as a division. This includes both faculty and staff who have always exhibited a passion for teaching along with the department setting such expectations.

We currently have 28 medical physics faculty and staff members in the Department of Radiation Oncology to teach and mentor in the proposed program. There are always innovative ideas and opportunities for research projects and development within the departments for supporting novel projects for students.

Our Radiation Therapy Training program and our Radiation Oncology residency program dates to the start of the Division. The Medical Physics faculty have been very involved with curriculum development and teaching for both the programs as well as graduate courses offered within the Department of Radiology. Educational programs continued to advance as the Medical Physics Residency program was created in 2003.

The James Cancer Hospital and Solove Research Institute leadership not only account for teaching time for all staff, but they have also made significant investments in providing a training infrastructure. These include the investment in a state-of-the-art linear accelerator (linac) for training, education and research – a very unique resource that is not available in any other academic institution. This investment, along with investments in learning environments dedicated to teaching treatment planning and other radiation oncology software has allowed our learners to receive unique educational opportunities. These investments have also allowed the creation of the Radiation Oncology International Training Center, which has led to numerous national and international trainees receiving high-quality professional education.

Radiology Department

The Department of Radiology provides a broad spectrum of imaging services, education and support to a variety of disciplines throughout the Ohio State University. The Medical Physics and

Research Divisions of the Department include enthusiastic faculty who are eager to provide graduate training in the specialized field of Medical Physics. The Medical Physics Division provides clinical support to a wide variety of Departments throughout the health care system and includes 8 PhD faculty members. The Research Division includes physics-oriented PhD faculty who are tenure track faculty with growing research programs.

The faculty members participate in a range of educational activities including didactic training for undergraduates in the Radiological Sciences program, Graduate Medical Education (Diagnostic Radiology and Interventional Radiology) and clinical and didactic training as part of the Imaging Physics Residency Program. All faculty maintain active scholarly activities and are involved with research programs spanning the range from basic, bench research to translational clinical research. Faculty members frequently have collaborate with faculty from other Departments and Colleges, and a broad range of clinical and dedicated research equipment is available to support graduate training and research.

Specific Department and College Resources

Department of Radiation Oncology Faculty and Staff

- 25 Clinical Faculty Physicians, including 1 Outreach Physician
- 28 Faculty & Staff Physicists, 16 Dosimetrists, 5 Radiation Oncology IT staff, 2 Linac Engineers
- 2 Clinical Radiobiologists
- 50+ Radiation Therapists
- Residency Programs –Radiation Oncology & Medical Physics
- Therapist Training Program
- 12 Laboratory Based Principal Investigators

Department of Radiology Faculty

- 8 Clinical Faculty Board Certified Physicists
- 5 Research Faculty Physicists (4 tenure track)
- 90 Clinical Faculty Physicians
- Residency Programs in Diagnostic Radiology, Interventional Radiology and Imaging Physics

Department of Radiation Oncology Equipment and Technology

80,000 sq ft department (~180-200 patients External Beam Treatments per day)

- 6 TrueBeam Linear Accelerators (3 Edge, 3 Short Stand Standard)
- 1 Halcyon with ETHOS Adaptive Package
- 1 Gamma Knife Espirit
- 1 Brachytherapy suite with MR integration
- 3 CT Simulators and 1 MRI Simulator
- IntraOpertive Radiation Therapy – Mobetron 2nd Generation

Stephanie Spielman Comprehensive Breast Center Equipment and Technology

- 2 TrueBeam Linear Accelerators
- 1 CT Simulator

Proton Center Equipment and Technology

- Varian Multiroom ProBeam 360 (2x 360° gantries and 1 fixed beam room)
- 1 TrueBeam Edge Linear Accelerator
- 2 CT Simulators

International Training Center and Research Suite Equipment and Technology

- 1 TrueBeam Linear Accelerator
- 1 Clinac iX Linear Accelerator – FLASH-RT
- IntraOpertive Radiation Therapy – Mobetron – FLASH-RT
- Training classroom equipped with workstations

Department of Radiology Resources and Technology

- A dedicated imaging research facility, the Center for Imaging Excellence (CIE) which has dedicated research faculty and imaging systems including;
    - Nuclear Medicine PET/CT Imaging
    - 4 MRI systems
- 27 clinical imaging locations encompassing 400 imaging systems throughout central Ohio
- 4 in-patient hospitals including a new Hospital Tower that will open in early 2026.
- Hospital Imaging system that will be utilized for graduate education and research include;
    - Digital Radiography
    - Fluoroscopy
    - Interventional Radiology Labs
    - Cardiac Catheterization and Electrophysiology Laboratories
    - Computed Tomography (including Dual Energy and Photon Counting)
    - Mammography
    - Magnetic Resonance Imaging
    - Ultrasound Imaging
    - Nuclear Medicine (including SPECT and PET)
    - Radiation Oncology Imaging that includes CT Simulators, MR Simulators, and OBI/CBCT.
- 23 Ambulatory imaging locations that typically includes all major imaging modalities including x-ray, CT, Ultrasound, MRI, and Mammography.
- Support to Nationwide Children's Hospital in Columbus, providing a pediatric-focused environment, and Veterinary Medicine.

OSU Health Science Library

The Prior Health Sciences Library, located adjacent to the OSU Wexner Medical Center, contains all major and most minor journals relevant to cancer and other biomedical research. Computerized research sources are available. In addition, access to interlibrary loans is facilitated by trained library staff. Additional library resources are available throughout campus.

Opportunities for inter-institutional collaboration

The American Association of Physicists in Medicine (AAPM) has a regional chapter, the Ohio River Valley Chapter, in which several graduate and residency programs actively participate. We have

strong existing relationships with these local programs, and we look forward to increased collaboration for educational opportunities for students in our region.

Growth of the Program

As the program launches and matures, we expect a transitional time of growth as students begin to matriculate into the program.

- Year 1 - We plan to enroll our first 6 students in the Fall of 2026. During this time, we will offer the first year's curriculum.
- Year 2 – We plan to enroll our second class of 6 students in the Autumn of 2027. During this time, we will repeat the first-year curriculum and start the 2nd year curriculum. It would be estimated that there will be a total of 12 students in the program at this point. Our Master's students would graduate in the Spring semester of Year 2.
- Year 3 – We would plan to continue the steady-state cycle of enrolling 6 students each year for a total of 12 Master's students in the graduate program.

Over time, the number of students in each program will be optimized, but it would not be expected to exceed a total of 10 incoming students per year.

Institutional Staffing, Faculty, and Student Support

Faculty

There are currently 9 full-time medical physics faculty in the Department of Radiation Oncology and 13 in Radiology. We have an active and enthusiastic engagement from both faculty and staff members passionate about education, and currently have faculty within these departments to support the needs of the proposed graduate program. The success of the program will be enhanced by the involvement of individuals from other departments, and we will continue to incorporate additional faculty and staff members.

Program Administration

The Medical Physics graduate program will be hosted by The Ohio State University College of Medicine School of Medicine and supported by the Department of Radiation Oncology, the Department of Radiology, and Nuclear Engineering Graduate Studies program in the Department of Mechanical and Aerospace Engineering.

An ABR-certified medical physicist with clinical experience as well as teaching, research, and administrative capabilities has been selected to function as the Director of the Graduate Program. The Director of the Medical Physics Graduate Program will report to the Dean of the College of Medicine. The Director will also meet on a regularly with the Graduate Studies Committee/Graduate Steering Committee to evaluate program structure, content, function, and strategic direction.

We currently have two educational program managers who support our residency programs in Radiation Oncology. Upon approval of the new program, we propose the inclusion of an additional

member of the program management team to help support the administrative aspects of the proposed medical physics graduate program.

Program Implementation

Describe how students will be informed of the program?

A graduate program website will be developed with information about the new program and contact information. Students will be informed of the new graduate program by the development of a communications plan to potentially eligible students for the program including students with physics majors and minors at OSU and colleges and universities in the state of Ohio.

The program director will reach out to all schools with an undergraduate program in the state of Ohio via email, provide availability to share program information for physics departments within the state, and present new information at the local American Association of Physics Teachers (AAPT) and American Association of Physicists in Medicine (AAPM) chapter meetings.

Information will be shared with the Society of Physics Students (SPS) through social media about the new program and announcement will be posted on the Commission on Accreditation of Medical Physics Education Programs (CAMPEP) website when accredited.

Describe how students will be advised regarding the opportunities and challenges associated with the option?

Detailed information about the program requirements will be included and publicly available on the program website. Questions regarding opportunities and challenges will be individually answered via email or video conference with potential student by the program director or designee.

Describe how the success of the program will be assessed?

Success of the program will be evaluated in terms of value to society in the development of medical physicists.

- Program accreditation will be externally evaluated and assessed by CAMPEP.
- Student preparation will be evaluated in terms of employment placement.
    - Those pursuing clinical pathways will be evaluated in terms of residency placement percentage and ABR pass rates.
- Value of the continuation of the program will be assessed by the number of qualified applications each enrollment cycle with the goal of having at least four times as many applicants as available enrollment positions each year.

Specific actions and any corollary issues (positive and negative) that will arise from implementation. Frequently addressed issues include but are not limited to the following:

How the proposal will affect specific groups/constituencies (faculty, graduate/undergraduate students, staff, alumni, accrediting organizations, etc)?

The new program will provide the opportunity for medical physics faculty members to teach and train the next generation of medical physicists supporting its academic mission. Medical physics faculty members are currently engaged in the teaching of radiation therapy, radiation technology,

medical dosimetry, medical physics residency, and medical resident programs, so this opportunity is a natural progression to be able to teach medical physics graduate students. Medical physics faculty members will be expected to teach courses, mentor student clinical practicum, and advise research in the new program.

The addition of new learners will provide additional colleagues for the current ecosystem of students and residents within the Departments of Radiation Oncology and Radiology. Many of the educational resources are already available within these learning communities and the advancement of medical physics curriculum will strengthen the available resources for all learners by the development of this program.

CAMPEP is the accrediting organization for medical physicists and welcomes new applications for programs that will develop and train future medical physicists. With the current workforce need for well-trained clinicians, creating high quality educational programs is of great interest to our profession.

What programmatic changes will take place internally?
Internal changes that will take place prior to the enrollment of the first students include:

A. Course evaluation by graduate studies committee and approval for new courses to be offered.
B. Designated time for faculty teaching related to offered courses.

After the start of the new graduate program, program quality review will be monitored by the graduate studies committee to maintain high quality for education and value for society.

How the program will affect students, faculty, and staff outside the proposing unit?
This new program will provide new opportunities for students throughout the university completing a physics major or minor. The program will provide additional students for existing courses in other departments for core topics.

Does the content of the proposal overlap in scope or substance with the interests of other units? <u>If so, the concurrence of those units must be sought.</u>
While there is not direct overlap for the new program in scope of the degree, medical physics is multidisciplinary and collaborative. Letters of support or concurrence have been obtained from the following departments:

- Radiation Oncology
- Radiology
- Physics
- Nuclear Engineering

9. A summary of the adequacy and availability of resources including but not limited to fiscal impact statements, commitments of funding from any sources, and memoranda of understanding between collaborating units.

Budget for New Graduate Degree Programs

	Year 1	Year 2	Year 3	Year 4

Projected Enrollment				
Head-count full time	6	12	12	12
Head-count part time				
Full Time Equivalent (FTE) enrollment	7.5	14.1	14.1	14.1
Projected Program Income				
Tuition (paid by student or sponsor)	$113,276	$226,552	$226,552	$226,552
Externally funded stipends, as applicable				
Expected state subsidy				
Other income (if applicable, describe in narrative section below)				
TOTAL PROJECTED PROGRAM INCOME:				
Program Expenses				
New Personnel • Faculty (e.g. tenure-track, clinical, professional) Full __0__ Part Time _0__ • Non-instruction (indicate role(s) in narrative section below) Full __1___ Part time _0__	$68,512	$70,567	$72,684	$74,865
New facilities/building/space renovation (if applicable, describe in narrative section below)				
Tuition Scholarship Support (if applicable, describe in narrative section below)				
Stipend Support (if applicable, describe in narrative section below)				
Additional library resources (if applicable, describe in narrative section below)				
Additional technology or equipment needs (if applicable, describe in narrative section below)				

Other expenses (e.g., Waived Tuition and Fees, travel, office supplies, accreditation costs) (if applicable, describe in narrative section below)	$29,000	$24,000	$24,000	$29,000
TOTAL PROJECTED EXPENSE:	$97,512	$94,567	$96,684	$103,865
NET	$15,764	$131,985	$129,868	$122,687

Budget Narrative: The estimated tuition and fees are based on the cost of attendance for graduate students for the 2024-2025 academic year assuming 1/3 of the students are non-residents for the Master's program and ¼ of the students are non-residents for the PhD program for an estimate. We propose the addition of 1 FTE for administrative support with 3% annual cost of living adjustment. The projected increase in number of faculty to support the new courses for the program is 1.3 FTE total which has been reallocated for support of the educational program development by the Departments of Radiation Oncology and Radiology. In preparation for academic expansion, the Radiation Oncology Physics Faculty have tripled in the past four years. Formal teaching time for education has been introduced by our chair to support graduate and undergraduate education. With the growth of medical physics faculty, the department has now incorporated 0.2 FTE release time for individual faculty members for the semester they are teaching.

Other expenses include travel for student presentations ($12,000), student recruitment ($10,000), educational materials ($2,000), and CAMPEP Accreditation is $5,000 for initial accreditation and the 3-year review.

Entry Level Graduate Programs

1. For entry level graduate degree programs (See Appendix C for definitions), academic quality assessment will focus on the adequacy of the answers provided in response to the following questions:

    a. How is the program distinctly different, both conceptually and qualitatively, from the undergraduate degree programs in the same or related disciplines? If so, is there a detailed listing of the specific differences?

    There are currently no known undergraduate programs that would prepare students for the professional pathway to becoming a medical physicist. Based on the requirements for board certification from the American Board of Radiology, students must successfully complete a graduate program from an accredited program. While most undergraduate students have earned a degree or at least a minor in physics, the course work for medical physics in a graduate program builds on the fundamental physics principles to advanced topics of the application of

physics in medicine including radiation therapy, diagnostic imaging, nuclear medicine, and health physics which are beyond the scope of undergraduate curricula. The graduate program proposed will also include clinical aspects which would not be available to undergraduate students.

b. How does the program emphasize the theoretical basis of the discipline as expressed in the methods of inquiry and ways of knowing in the discipline?

The foundational principles of medical physics will be taught in the core coursework including radiological physics and dosimetry, radiation protection and safety, fundamentals of medical imaging, radiobiology, radiation therapy physics, and anatomy and physiology. To demonstrate mastery of these disciplinary topics a variety of summative and formative assessments will be included in each of the courses to assess student mastery of these topics. Traditional summative assessments will be used for the assessment of content knowledge in these domains including examinations and written papers. However additional project-based learning, case studies, and discussion will be incorporated into the curriculum as ways to demonstrate the methods of inquiry valued by the medical physics profession.

c. How does the program place emphasis on professional decision making and teach the use of critical analysis in problem solving?

The program leadership values the development of students in professional decision making and problem solving. In each course there will be opportunities for students to engage in case-studies and projects related to each of the core topics to build these skills. A seminar series is also an important aspect for development of professionalism and ethics within the discipline and assessment of the longitudinal growth of the students throughout the program.

d. How is the program designed to educate students broadly so that they have an understanding of the major issues and concerns in the discipline or professional area?

While each course will incorporate topical-related aspects to new science in medical physics and professional concerns will be included in the seminar series to address the major issues and concerns in medical physics. Sessions will include scientific and technical advances, changes within the profession, and potential opportunities and disruptors to engage students in current events. The students will also be encouraged to be actively involved professionally at the regionally and nationally to gain a broader understanding of medical physics beyond our institution.

e. Please describe the required culminating experience.

Master's degree students' culminating experience is the successful completion of required courses and year-long practicum which includes clinical experience and research experience for scholarly contribution.

f. Does the proposed program identify faculty resources appropriate for the research component of the program?

Yes, medical physics faculty are enthusiastic about the development of the new program and are supported by department leadership for a successful and sustainable graduate program. Research opportunities and mentorship will be supported by the department for students enrolled in the graduate program.

g. Does the program curriculum offer what students need to know for competence at the expected level of professional expertise?

The curriculum is based on the requirements from the medical physics accreditation body, CAMPEP, for the expected level of professional expertise. The recommendations from AAPM for graduate degrees in medical physics (AAPM Task Group 365, 2022) have also been reviewed and incorporated into the curricular development. To pursue board certification, the ABR Content Guide for the Part 1 Medical Physics examinations were also reviewed for concurrence of the program development.

h. What plans have been made to address standards and guidelines for professional accreditation, if applicable? What are the core courses required for the program?

Upon approval of the graduate program proposal, we will apply for accreditation with CAMPEP for the graduate program. The program is designed to meet all the standards for accreditation. Core curricula include radiological physics and dosimetry, radiation protection and safety, fundamentals of medical imaging, radiobiology, radiation therapy physics, and anatomy and physiology, and professionalism and ethics.

2. For professional graduate degree programs (See Appendix C for definitions), academic quality assessment will also focus on the adequacy of the answers provided in response to the following questions:
   a. What admission criteria, in addition to the traditionally required transcripts, standardized test scores, letter of recommendation, and personal statements of purpose, are relevant to assess the potential for academic and professional success of prospective students? Will there be special consideration of student experience and extant practical skills within the admission process? If so, please elaborate.

No additional admissions criteria will be required for this graduate program.

b. Is field/clinical experience subsumed within the academic experience? If so, how does that experience relate to the academic goals of the professional graduate degree program? Provide a description of the involvement of supervisory personnel. Describe the nature of the oversight of the field/clinical experience by the academic department. Provide an outline of the anticipated student activities as well as student requirements.

Students will be required to complete practicum experiences that involve understanding of clinical workflows and quality assurance. Students will have opportunities to observe clinical procedures and workflows under the supervision of a faculty member. Students will be expected to complete relevant clinical assignments as part of the practicum which will not directly influence patient care within the graduate program.

c. Are the faculty qualifications associated with the professional graduate degree program appropriate for such faculty? Provide the specific qualifications for such faculty.

Faculty members instructing courses or mentors for practicum may be board-certified by the American Board of Radiology (ABR). The ABR designation is DABR or diplomate of the American Board of Radiology in Medical Physics.

d. How does accreditation by the appropriate professional organization relate to the academic curriculum and experience outlined in the program plan? Describe the specific aspects of the program plan, if any, that are necessary to achieve professional accreditation. Is completion of the degree program required for professional accreditation in the field?

CAMPEP mandates "students shall have access to appropriate clinical and research facilities and the program shall demonstrate that clinical facilities and equipment are used in the teaching of practical aspects of core topics in imaging physics and radiation oncology physics." Necessary facilities will be provided by the Departments of Radiation Oncology and Radiology for graduate program support. Completion of a Master's degree program is one of the required educational pathways for professional accreditation in the field.

e. How are theory and practice integrated within the curriculum?

Theory and practice will be incorporated in each of the courses so that the theory can inform the practice. Courses are designed such that theory is presented with practical applications in the clinic. These opportunities for connection will be available in each of the courses and then reinforced through practicum experiences. The second year of advanced courses are designed to allow students an introduction to the theory, experience with practical experience, and advanced theory to reinforce understanding.

f. What is the national credit hour norm for this degree program in your field? How was this norm derived? Is the number of credit hours required for graduation influenced by mandated professional experiences? If so, how?

Based on curriculum from medical physics program websites that have been accredited by CAMPEP, the average number of credit hours required for Master's programs is 33 hours with a maximum of 53 credit hours.

The Ohio State University requires at least 30 credit hours for a Master's program. The required credit hours for the Medical Physics Master's Program at Ohio State University is 44 credit hours including professional experiences through practicum strengthening student's graduate study experience.

g. Describe the required culminating academic experience and how it will contribute to the enhancement of the student's professional preparation.

Master's degree students' culminating experience is the successful completion of required course work and practicum which includes clinical experience and scholarly contribution through research. Students will participate in supervised clinical rotations within accredited medical facilities. They will apply theoretical knowledge to real-world scenarios—conducting quality assurance tests, calibrating equipment, and assisting in treatment planning. This hands-on experience builds clinical competence and confidence, essential for board certification and professional practice. Within the year-long practicum experience, students will engage in original research under faculty mentorship, exploring topics such as radiation therapy optimization, imaging system calibration, or dosimetry techniques. This experience will help students hone critical thinking, scientific writing, and problem-solving skills.

3. The Special Case of Professional Science Master's Programs (PSMs)

a) There is a special category of professional graduate degree programs recognized by the Council of Graduate Schools and the National Professional Science Master's Association. Such programs can be granted the designation "Professional Science Master's" or "PSMs."

b) The criteria for obtaining such a designation can be found at: https://www.professionalsciencemasters.org/

c) For informational purposes only, do you contemplate seeking such recognition as a PSM from the National Professional Science Master's Association? Is the program going to be seeking such recognition?

No, we do not contemplate seeking this recognition as a special professional graduate degree.

Medical Physics – Advising Guide

Masters of Science – Therapy Concentration

Name: _____ Start of Program: _____

Advisor: _____ Expected Graduation Semester: _____

Prerequisite:

ANATOMY 2300 – Human Anatomy (4) or Undergraduate Credit

Fall 20___

- □ NUCLREN 5606 – Radiation Protection and Shielding (3)
- □ RADONC 6006 – Radiological Physics and Dosimetry (3)
- □ RADIOLG 6010 – Fundamental Physics of Medical Imaging (3)
- □ RADIOLG 6011 – Imaging Lab (1)

Spring 20___

- □ RADSCI 3672* - Radiologic Sectional Anatomy (3)
- □ NUCLREN 5742 – Nuclear Instrumentation, Radiation Sensor, and Detection (3)
- □ RADONC 6020 – Fundamental Physics of Radiation Therapy (3)
- □ RADONC 6021 – Therapy Lab (1)
- □ Submit Expected Practicum Topic to Advisor

Summer 20__

- □ RADONC 6007 – Radiation Biology (2)
- □ RADONC 7070 – Practicum (2)
- □ RADONC 7998 – Research (2)

Fall 20___

- □ RADONC 7020 – Advanced Physics of Radiation Therapy (3)
- □ Elective (3)
- □ RADONC 7070 – Practicum (2)
- □ RADONC 7090 – Seminar (1)

Spring 20___

- □ RADIOLG 7020 – Advanced Physics of Medical Imaging (3)
- □ Elective (3)
- □ RADONC 7070 – Practicum (2)
- □ RADONC 7090 – Seminar (1)

☐ End of Program Oral Examination

Medical Physics – Advising Guide

Masters of Science – Imaging Concentration

Name: _____ Start of Program: _____

Advisor: _____ Expected Graduation Semester: _____

Prerequisite:

ANATOMY 2300 – Human Anatomy (4) or Undergraduate Credit

Fall 20___

- □ NUCLREN 5606 – Radiation Protection and Shielding (3)
- □ RADONC 6006 – Radiological Physics and Dosimetry (3)
- □ RADIOLG 6010 – Fundamental Physics of Medical Imaging (3)
- □ RADIOLG 6011 – Imaging Lab (1)

Spring 20___

- □ RADSCI 3672* - Radiologic Sectional Anatomy (3)
- □ NUCLREN 5742 – Nuclear Instrumentation, Radiation Sensor, and Detection (3)
- □ RADONC 6020 – Fundamental Physics of Radiation Therapy (3)
- □ RADONC 6021 – Therapy Lab (1)
- □ Submit Expected Practicum Topic to Advisor

Summer 20__

- □ RADONC 6007 – Radiation Biology (2)
- □ RADIOLG 7070 – Practicum (2)
- □ RADIOLG 7998 – Research (2)

Fall 20___

- □ RADONC 7020 – Advanced Physics of Radiation Therapy (3)
- □ Elective (3)
- □ RADIOLG 7070 – Practicum (2)
- □ RADONC 7090 – Seminar (1)

Spring 20___

- □ RADIOLG 7020 – Advanced Physics of Medical Imaging (3)
- □ Elective (3)
- □ RADIOLG 7070 – Practicum (3)
- □ RADONC 7090 – Seminar (1)

- □ End of Program Oral Examination