

# MEDICAL PHYSICS, MASTER OF SCIENCE (M.S.)

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## Program accreditation

Commission on Accreditation of Medical Physics Educational Programs (<http://campep.org/>)

## Program goals

The Master of Science in Medical Physics offers students course work and practical clinical training in physics as it is applied to the diagnosis and treatment of human diseases. The mission of the master's program is to serve the commonwealth of Virginia and the nation by helping to meet the demand for competent medical physicists in the health care delivery setting. The program will prepare students for careers as qualified and independent clinical medical physicists. Required course work provides theoretical and practical training in radiation dosimetry, radiation biology, radiation therapy, medical imaging and health physics.

**Professional competency:** To develop professional competency in medical physics by providing a framework in which students progressively develop mastery of the current state of medical physics and an ability to synthesize this information and apply it in a clinical setting. Additionally, students in the program will develop skills in the various means of communicating the core of medical physics knowledge and clinical applications of that knowledge to a variety of potential audiences.

**Clinical competency:** To develop clinically competent medical physics graduates by providing a framework in which students progress from didactic knowledge to clinical knowledge and demonstrate application of clinical medical physics principles, practices and procedures.

## Student learning outcomes

- a. Clinical performance: The candidate should demonstrate an appropriate level of skill in the theoretical, practical and technical conduct of medical physics in the clinical setting. This includes demonstration of an appropriate level of competence in the ability to:
  - i. Design and quality assure radiation therapy treatment plans for both brachytherapy and external beam radiation therapy
  - ii. Quality assure radiation therapy delivery devices
  - iii. Quality assure radiation therapy treatment charts
  - iv. Perform calibration and/or beam delivery commissioning measurements as measured by instructor evaluation in compliance with accepted clinical standards
- b. Communication skills: The candidate should demonstrate that an appropriate level of oral, written and visual communication skills have been acquired. The candidate will demonstrate the achievement of an appropriate level of oral communication skills with respect to the content, organization, logical flow, presentation and appropriate use of language incorporating the use of visual aids, as measured by course work and the quality of the thesis. The candidate will demonstrate the achievement of an appropriate level of written communication skill with respect to grammar, syntax, spelling, chart notation and use of vocabulary to effectively present information including the use of figures, tables and citations as measured by course work and the quality of the thesis.
- c. Medical physics knowledge base: The candidate should demonstrate satisfactory knowledge of the base of scientific information required to practice clinical medical physics. This includes general knowledge

of medical physics scientific materials, clinical policies and procedures, and translational scientific literature. The student should demonstrate the ability to evaluate and integrate such knowledge into the solution of clinical problems as measured by course work and the quality of the thesis.

- d. Problem-solving: The candidate should demonstrate an appropriate level of skill in the identification of clinical medical physics problems and the design and implementation of appropriate problem-solving methods and solutions as measured by course work, annual review and the quality of the thesis.

## VCU Graduate Bulletin, VCU Graduate School and general academic policies and regulations for all graduate students in all graduate programs

The VCU Graduate Bulletin website documents the official admission and academic rules and regulations that govern graduate education for all graduate programs at the university. These policies are established by the graduate faculty of the university through their elected representatives to the University Graduate Council.

It is the responsibility of all graduate students, both on- and off-campus, to be familiar with the VCU Graduate Bulletin as well as the Graduate School website (<http://www.graduate.vcu.edu/>) and academic regulations in individual school and department publications and on program websites. However, in all cases, the official policies and procedures of the University Graduate Council, as published on the VCU Graduate Bulletin and Graduate School websites, take precedence over individual program policies and guidelines.

**Visit the academic regulations section for additional information on academic regulations for graduate students.** (<http://bulletin.vcu.edu/academic-regs/>)

## Degree candidacy requirements

A graduate student admitted to a program or concentration requiring a final research project, work of art, thesis or dissertation, must qualify for continuing master's or doctoral status according to the degree candidacy requirements of the student's graduate program. Admission to degree candidacy, if applicable, is a formal statement by the graduate student's faculty regarding the student's academic achievements and the student's readiness to proceed to the final research phase of the degree program.

Graduate students and program directors should refer to the following degree candidacy policy as published in the VCU Graduate Bulletin for complete information and instructions.

**Visit the academic regulations section for additional information on degree candidacy requirements.** (<http://bulletin.vcu.edu/academic-regs/grad/candidacy/>)

## Graduation requirements

As graduate students approach the end of their academic programs and the final semester of matriculation, they must make formal application to graduate. No degrees will be conferred until the application to graduate has been finalized.

Graduate students and program directors should refer to the following graduation requirements as published in the Graduate Bulletin for a complete list of instructions and a graduation checklist.

Visit the [academic regulations section](http://bulletin.vcu.edu/academic-regs/grad/graduation-info/) for additional information on graduation requirements. (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>)

## Other information

### School of Medicine graduate program policies

The School of Medicine provides policies applicable to all programs administratively housed in the school. Information on **master's programs** is available elsewhere in this chapter of the Graduate Bulletin.

Apply online today. (<https://www.vcu.edu/admissions/apply/graduate/>)

## Admission requirements

Degree:	Semester(s) of entry:	Deadline dates:	Test requirements:
M.S.	Fall	Jan 15	

In addition to the general admission requirements of the VCU Graduate School (<http://bulletin.vcu.edu/graduate/study/admission-graduate-study/admission-requirements/>) and the School of Medicine, students are expected to satisfy the following minimum standards for admission.

- Students must have a minimum of 30 credit hours in undergraduate physics, physical science or engineering, of which at least 18 credit hours must be at the upper level. Background courses should include calculus one and two, linear algebra, differential equations, modern physics, and electricity and magnetism.
- Applicants must present a minimum GPA of 3.0 on a 4-point scale for the undergraduate degree or most recently completed graduate degree.

Provisional admission may be granted where deficiencies exist. These deficiencies must be removed by the end of the first year of residence, or its part-time equivalent, when the student's application will be re-examined. Courses that are designed to remove deficiencies will not be accepted for credit hours toward the graduate degree.

## Degree requirements

In addition to the general VCU Graduate School graduation requirements (<http://bulletin.vcu.edu/academic-regs/grad/graduation-info/>), students entering the program with an undergraduate degree are required to earn a minimum of 30 credit hours of graduate medical physics course work. At least 22 credit hours must be earned at the 600 level or higher. Detailed degree requirements are listed below and in the medical physics graduate handbook.

All new M.S. students entering the program will be assigned an adviser. The student and adviser will develop a graduate advisory committee, which will direct the student in his/her research. Advisers will report once each semester of student enrollment to the program director on the academic progress of their students and will administer oral thesis defense examinations.

The student must conduct an original investigation under the supervision of his/her adviser and committee, and then must prepare a thesis reporting the results of the research in the context of existing scientific knowledge. After the thesis has been completed and unanimously approved for defense by the committee, the candidate will appear before the committee for an oral thesis defense examination. The oral thesis defense examines the candidate's research, thesis documentation and

underlying fundamental knowledge. Successful completion of the thesis and its defense is required for degree completion.

## Course requirements

Course	Title	Hours
<b>Required core courses</b>		
MEDP 561	Topographical Anatomy and Physiology	1
MEDP 563	Radiological Physics and Radiation Dosimetry	3
MEDP 564	Radiological Physics and Radiation Dosimetry Lab	1
MEDP 567	Introduction to Radiation Therapy Physics	3
MEDP 601	Health Physics	3
MEDP 630	Radiobiology for the Medical Physicist	3
MEDP 635	Physics of Diagnostic Imaging	3
MEDP 636	Physics of MRI	3
MEDP 637	Physics of Nuclear Medicine	2
MEDP 682	Clinical Rotations in Medical Physics (repeated for six credit hours) <sup>1</sup>	6
MEDP 689	Medical Physics Literature Review	1
<b>Additional required courses</b>		
OVPR 602	Responsible Scientific Conduct	
or OVPR 601	Scientific Integrity	
or OVPR 603	Responsible Conduct of Research	
<b>Total Hours</b>		<b>30</b>

<sup>1</sup>

Students will complete two consecutive semesters of clinical rotations (three credit hours each) for a total of six credit hours.

**The minimum total of graduate credit hours required for this degree is 30.**

## Typical plan of study

Many students often end up taking more than the minimum number of hours required for a degree program. The total number of hours may vary depending upon the program, nature of research being conducted by a study, or in the enrollment or funding status of the student. Students should refer to their program websites and talk with their graduate program directors or advisers for information about typical plans of study and registration requirements.

### Contact

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### Additional contact

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**Program website:** [radonc.vcu.edu/education/graduate-education](http://radonc.vcu.edu/education/graduate-education)  
(<https://radonc.vcu.edu/education/graduate-education/>)