MEDICAL PHYSICS, PH.D.

One of the basic science departments of the UW–Madison School of Medicine and Public Health, the Department of Medical Physics offers comprehensive training in diagnostic and therapeutic medical physics and in health physics. Achievement of the Ph.D. degree in this department reflects strong scholarship and research skills in one of the top medical physics programs in North America. Graduates are prepared for teaching and/or research positions in universities, national laboratories, or in the medical and nuclear technology industries. Graduates are also prepared for admission into medical physics residency programs to become board eligible for clinical medical physics positions.

Medical physicists may participate professionally in the treatment of patients, in advanced medical imaging and diagnostic procedures, or in related areas of research and teaching. Health physicists may operate radiation protection programs at nuclear industrial facilities, hospitals, or laboratories, or may perform research on methods of measuring ionizing radiations (i.e., dosimetry).

A unique quality of the medical physics program is the broad range of expertise and research interests of the faculty. Students receive training in diagnostic x-ray physics, x-ray computerized tomography (CT), magnetic resonance imaging (MRI) and spectroscopy, nuclear medicine and positron emission tomography (PET) imaging, biomagnetism, medical ultrasound, elastography, radiation dosimetry, radiation treatment planning, and radiobiology.

The department also houses the Medical Radiation Research Center and the Accredited Dosimetry Calibration Laboratory, one of four in the US accredited by the American Association of Physicists in Medicine. In addition, the department provides clinical support services to the radiology and human oncology departments. It also operates a PET radiotracer production facility (with two cyclotrons available), a medical image analysis laboratory, and a small bore MRI scanner and photoacoustic ultrasound system in the Small Animal Imaging Facility. Each of these facilities provides unique training and support opportunities for graduate students. Access to state-of-the-art x-ray angiography, CT, MRI, and PET/CT and PET/MR systems is readily available.

The Ph.D. degree is primarily a research degree that extends the student's depth of knowledge in one of the specialty areas. Faculty positions at universities, research positions, and an increasing number of clinical physics positions require the Ph.D. degree. Medical physics faculty maintain close collaborative ties with faculty in other departments, including human oncology, radiology, cardiology, medicine, psychiatry, pharmacology, and biomedical engineering, broadening the scope of research opportunities open to medical physics students and providing access to sophisticated clinical facilities.

ADMISSIONS

Please consult the table below for key information about this degree program's admissions requirements. The program may have more detailed admissions requirements, which can be found below the table or on the program's website.

Graduate admissions is a two-step process between academic programs and the Graduate School. ***Applicants must meet*** the minimum requirements ***(***https://grad.wisc.edu/apply/requirements/***) of the Graduate School as well as the program(s).*** Once you have researched the graduate program(s) you are interested in, apply online (https://grad.wisc.edu/apply/).

Requirements	Detail
Fall Deadline	December 1
Spring Deadline	The program does not admit in the spring.
Summer Deadline	The program does not admit in the summer.
GRE (Graduate Record Examinations)	Not required.
English Proficiency Test	Every applicant whose native language is not English or whose undergraduate instruction was not in English must provide an English proficiency test score and meet the Graduate School minimum requirements (https://grad.wisc.edu/apply/requirements/#english-proficiency).
Other Test(s) (e.g., GMAT, MCAT)	n/a
Letters of Recommendation Required	3

About 80–90 applicants per year apply to the medical physics program. Each fall, the program admits 10–20 students. This results in an average enrollment of approximately 100 students each semester. Less than one-tenth of the students pursue the M.S. degree as a terminal degree, and the remainder continue on to the PhD.

A bachelor's degree in physics is considered the best preparation for graduate study in medical physics, but majors such as nuclear engineering, biomedical engineering, electrical engineering, or chemistry may also be acceptable. The student's math background should include calculus, differential equations, linear algebra, and Fourier analysis, such as might be learned in modern optics or undergraduate quantum theory. Some facility in computer programming and electronic instrumentation is desirable. One year of chemistry, a year of biology, and an introductory course in physiology are also advantageous.

Beginning graduate students should start their studies in the fall semester, as the course sequence is based on that assumption. Students applying for admission should submit an online application and all supporting documentation by December 1 to ensure consideration for admission and financial support to begin the following fall.

Admission to the graduate program is competitive. Applications are judged on the basis of a student's previous academic record, research experience, letters of recommendation, and personal statement of reasons for interest in graduate study in medical physics.

The application includes:

- The online application to the Graduate School
- Payment of the application fee
- Electronic copy of resume/CV (include awards, fellowships, and scholarships received, publications, volunteer activities, and research experience)
- Applicant data sheet

- Personal statement of reasons for interest in graduate study in medical physics. **The personal statement should include your reasons for graduate study, why medical physics, your future career goals as it relates to a PhD (or MS) in medical physics and your area(s) of research interest. It is advantageous to also research and include the faculty member(s) with whom you would like to work. The personal statement should be no more than 3 pages, single-spaced, 11 point font or larger**
- Transcripts from all academic institutions of study (scan and upload)
- Recommendation letters from people who can attest to your ability to be successful in the PhD program due to your experience, academics, etc.(submitted electronically through the online application)

FUNDING

GRADUATE SCHOOL RESOURCES

Resources to help you afford graduate study might include assistantships, fellowships, traineeships, and financial aid. Further funding information (https://grad.wisc.edu/funding/) is available from the Graduate School. Be sure to check with your program for individual policies and restrictions related to funding.

PROGRAM RESOURCES

The department typically supports 85–95 percent of students enrolled in the medical physics graduate program through department or university fellowships, research or teaching assistantships, or NIH NRSA training grant appointments. All awards include a comprehensive health insurance program and remission of tuition. The student is responsible for segregated fees.

REQUIREMENTS

MINIMUM GRADUATE SCHOOL REQUIREMENTS

Review the Graduate School minimum academic progress and degree requirements (http://guide.wisc.edu/graduate/#policiesandrequirementstext), in addition to the program requirements listed below.

MAJOR REQUIREMENTS

MODE OF INSTRUCTION

Face to Face	Evening/ Weekend	Online	Hybrid	Accelerated
Yes	No	No	No	No

Mode of Instruction Definitions

Accelerated: Accelerated programs are offered at a fast pace that condenses the time to completion. Students typically take enough credits aimed at completing the program in a year or two.

Evening/Weekend: Courses meet on the UW–Madison campus only in evenings and/or on weekends to accommodate typical business schedules. Students have the advantages of face-to-face courses with the flexibility to keep work and other life commitments.

Face-to-Face: Courses typically meet during weekdays on the UW-Madison Campus.

Hybrid: These programs combine face-to-face and online learning formats. Contact the program for more specific information.

Online: These programs are offered 100% online. Some programs may require an on-campus orientation or residency experience, but the courses will be facilitated in an online format.

CURRICULAR REQUIREMENTS

Requirement	Detail
Minimum Credit Requirement	54 credits
Minimum Residence Credit Requirement	42 credits
Minimum Graduate Coursework Requirement	40 credits must be graduate-level coursework. Details can be found in the Graduate School's Minimum Graduate Coursework (50%) policy (https://policy.wisc.edu/library/UW-1244 (https://policy.wisc.edu/library/UW-1244/)).
Overall Graduate GPA Requirement	3.00 GPA required. This program follows the Graduate School's policy: https://policy.wisc.edu/library/UW-1203 (https://policy.wisc.edu/library/UW-1203/).
Other Grade Requirements	n/a
Assessments and Examinations	Candidates are expected to take the Oral Qualifying Examination by the end of the 4th semester of study, and to take the PhD Preliminary Examination by the end of the third year of study. Permission of the Department Chair is required if the PhD Preliminary Examination must be taken after the end of the third year. Defense of a dissertation is required within five years of successful completion of the PhD Preliminary Examination.
Language Requirements	No language requirements.
Breadth Requirement	A doctoral minor or Graduate/Professional certificate is not required for students in the Medical Physics Graduate Program as graduate students enroll in sufficient breadth courses required for completing the "CAMPEP Track" in our graduate program (>98% of students). However, a student can complete a minor or certificate offered by another graduate program at UW-Madison, if desired and with the approval of his/her advisor. Please see the Medical Physics Graduate Student Handbook (https://www.medphysics.wisc.edu/wp/graduate-program (https://www.medphysics.wisc.edu/wp/graduate-program/)/) for more information.

REQUIRED COURSES

Code	Title	Credits
Required Courses		
MED PHYS/ B M E/H ONCOL/ PHYSICS 501	Radiation Physics and Dosimetry	3
MED PHYS/ B M E 566	Physics of Radiotherapy	3

MED PHYS/N E 569	Health Physics and Biological Effects	3
MED PHYS/ B M E 573	Mathematical Methods in Medical Physics	3
MED PHYS/ B M E 574	Data Science in Medical Physics	3
MED PHYS/ B M E 578	Non-Ionizing Diagnostic Imaging	4
MED PHYS/ B M E 580	The Physics of Medical Imaging with Ionizing Radiation	4
MED PHYS 581	Laboratory for Medical Imaging with Ionizing Radiation	1
MED PHYS/ PHYSICS 588	Radiation Production and Detection	4
MED PHYS 510	Fundamentals of Cellular, Molecular, and Radiation Biology	3
MED PHYS 671	Selected Topics in Medical Physics (Topic: Anatomy and Physiology)	2
MED PHYS 701	Ethics and the responsible conduct of research and practice of Medical Physics	1
MED PHYS 900	Journal Club and Seminar [1]	4
Advanced Coursework - In consultation with their advisor/ committee, students select nine credits of advanced coursework at the 600 level or above. Three credits must be in MED PHYS. [2]		*9*
Students take MED PHYS 990 credits to reach the minimum credit requirement.		8+
Total Credits		**54**

1

Students will take MED PHYS 900 Journal Club and Seminar four semesters for 1 credit each semester for a total of 4 credits.

2

Students may use one credit of MED PHYS 662, MED PHYS 663, MED PHYS 664, MED PHYS 665, or MED PHYS 666.
MED PHYS 701, MED PHYS 900, and MED PHYS 990 do not count toward this requirement.

Health Physics Pathway [1]

In addition to the above requirements, students completing the Health Physics emphasis must take the following courses:

Code	Title	Credits
Required Courses for Health Physics Emphasis		
N E 427	Nuclear Instrumentation Laboratory	2
N E 571	Economic and Environmental Aspects of Nuclear Energy	3
MED PHYS 699	Independent Reading or Research	1
One (1) credit of an independent reading course (699) on Health Physics Rules and Regulations.		

An exemption from the Core Curriculum requirement requires the approval of the chair of the graduate committee. If the entirety of the Core Curriculum is not taken, the student will not satisfy the CAMPEP Core Curriculum requirement.

1

These pathways are internal to the program and represent different curricular paths a student can follow to earn this degree. Pathway names do not appear in the Graduate School admissions application, and they will not appear on the transcript.

POLICIES

GRADUATE SCHOOL POLICIES

The Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/acadpolicy/) provide essential information regarding general university policies. Program authority to set degree policies beyond the minimum required by the Graduate School lies with the degree program faculty. Policies set by the academic degree program can be found below.

MAJOR-SPECIFIC POLICIES

PRIOR COURSEWORK

Graduate Work from Other Institutions

With program approval, students are allowed to count no more than 12 credits of medical physics graduate coursework from other institutions. Coursework earned five years or more prior to admission to the doctoral degree program is not allowed to satisfy requirements.

UW–Madison Undergraduate

With program approval, 7 credits in medical physics courses from a UW–Madison undergraduate degree above the undergraduate graduation requirements are allowed to count toward the degree.

UW–Madison University Special

With program approval, students are allowed to count no more than 15 credits of coursework numbered 500 or above taken as a UW–Madison Special student. Coursework earned five years or more prior to admission to the doctoral degree program is not allowed to satisfy requirements.

PROBATION

For a graduate student in the Medical Physics Department who is a research assistant, fellow or trainee to be making satisfactory progress, they must:

1. Obtain at least a 3.0 GPA in the most recent semester. Grades in all research courses and courses with grades of P, F, S or U are excluded from the average. A student who fails to make satisfactory progress will be dropped from the department. In exceptional cases, the chairperson may grant permission to continue for a specified probationary period.
2. Maintain a minimum cumulative GPA of 3.0 for all courses taken while in the Medical Physics program and for all Department of Medical Physics courses. All research courses and all courses with grades of P, F, S or U are excluded from the average.
3. Have taken the qualifier examination by the end of the 2nd semester of study. If a basic (low level) pass is not obtained on the first attempt, the second (and last) attempt to pass the qualifier examination must be made no later than the 4th semester.

Any student, who fails to meet the requirements of 1-3 above, will be placed on probation. Failure in the first semester of probation to obtain a 3.0 average for the semester and a cumulative GPA of at least 3.0 will result in termination unless the student's advisor requests and the

department and the Graduate School approves, continued enrollment. The particular courses which count toward the GPA in any probation semester must be approved in writing by the student's advisor and the Medical Physics Graduate Committee Chairman in order for the work to count toward returning the student to good standing.

ADVISOR / COMMITTEE

Candidates must acquire a major professor/advisor by the beginning of the second semester of study.

CREDITS PER TERM ALLOWED

15 credits

TIME LIMITS

The oral PhD qualifying examination should be taken by the end of the 4th semester, and the PhD preliminary examination should be taken by the end of the third year of study. Permission of the graduate committee is required if the PhD preliminary examination must be taken after the end of the third year. Defense of a dissertation is required within five years of successful completion of the PhD preliminary examination.

This program follows the Graduate School's Time Limits policy (https://policy.wisc.edu/library/UW-1221/).

GRIEVANCES AND APPEALS

These resources may be helpful in addressing your concerns:

- Bias or Hate Reporting (https://doso.students.wisc.edu/bias-or-hate-reporting/)
- Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/#grievance-procedure)
- Hostile and Intimidating Behavior Policies and Procedures (https://hr.wisc.edu/hib/)
  - Office of the Provost for Faculty and Staff Affairs (https://facstaff.provost.wisc.edu/)
- Dean of Students Office (https://doso.students.wisc.edu/) (for all students to seek grievance assistance and support)
- Employee Assistance (http://www.eao.wisc.edu/) (for personal counseling and workplace consultation around communication and conflict involving graduate assistants and other employees, post-doctoral students, faculty and staff)
- Employee Disability Resource Office (https://employeedisabilities.wisc.edu/) (for qualified employees or applicants with disabilities to have equal employment opportunities)
- Graduate School (https://grad.wisc.edu/) (for informal advice at any level of review and for official appeals of program/departmental or school/college grievance decisions)
- Office of Compliance (https://compliance.wisc.edu/) (for class harassment and discrimination, including sexual harassment and sexual violence)
- Office of Student Conduct and Community Standards (https://conduct.students.wisc.edu/) (for conflicts involving students)
- Ombuds Office for Faculty and Staff (http://www.ombuds.wisc.edu/) (for employed graduate students and post-docs, as well as faculty and staff)
- Title IX (https://compliance.wisc.edu/titleix/) (for concerns about discrimination)

Grievance Policy for Graduate Programs in the School of Medicine and Public Health

Any student in a School of Medicine and Public Health graduate program who feels that they have been treated unfairly in regards to educational decisions and/or outcomes or issues specific to the graduate program, including academic standing, progress to degree, professional activities, appropriate advising, and a program's community standards by a faculty member, staff member, postdoc, or student has the right to complain about the treatment and to receive a prompt hearing of the grievance following these grievance procedures. Any student who discusses, inquiries about, or participates in the grievance procedure may do so openly and shall not be subject to intimidation, discipline, or retaliation because of such activity. Each program's grievance advisor is listed on the "Research" tab of the SMPH intranet (https://intranet.med.wisc.edu/).

Exclusions

This policy does not apply to employment-related issues for Graduate Assistants in TA, PA and/or RA appointments. Graduate Assistants will utilize the Graduate Assistantship Policies and Procedures (https://hr.wisc.edu/policies/gapp/) (GAPP) grievance process to resolve employment-related issues.

This policy does not apply to instances when a graduate student wishes to report research misconduct. For such reports refer to the UW-Madison Policy for Reporting Research Misconduct for Graduate Students and Postdoctoral Research Associates (https://research.wisc.edu/kb-article/?id=84924).

Requirements for Programs

The School of Medicine and Public Health Office of Basic Research, Biotechnology and Graduate Studies requires that each graduate program designate a grievance advisor, who should be a tenured faculty member, and will request the name of the grievance advisor annually. The program director will serve as the alternate grievance advisor in the event that the grievance advisor is named in the grievance. The program must notify students of the grievance advisor, including posting the grievance advisor's name on the program's Guide page and handbook.

The grievance advisor or program director may be approached for possible grievances of all types. They will spearhead the grievance response process described below for issues specific to the graduate program, including but not limited to academic standing, progress to degree, professional activities, appropriate advising, and a program's community standards. They will ensure students are advised on reporting procedures for other types of possible grievances and are supported throughout the reporting process. Resources (https://grad.wisc.edu/current-students/#reporting-incidents) on identifying and reporting other issues have been compiled by the Graduate School.

Procedures

1. The student is advised to initiate a written record containing dates, times, persons, and description of activities, and to update this record while completing the procedures described below.
2. If the student is comfortable doing so, efforts should be made to resolve complaints informally between individuals before pursuing a formal grievance.
3. Should a satisfactory resolution not be achieved, the student should contact the program's grievance advisor or program director to discuss the complaint. The student may approach the grievance advisor or program director alone or with a UW-Madison faculty or staff member. The grievance advisor or

program director should keep a record of contacts with regards to possible grievances. The first attempt is to help the student informally address the complaint prior to pursuing a formal grievance. The student is also encouraged to talk with their faculty advisor regarding concerns or difficulties.

4. If the issue is not resolved to the student's satisfaction, the student may submit a formal grievance to the grievance advisor or program director in writing, within 60 calendar days from the date the grievant first became aware of, or should have become aware of with the exercise of reasonable diligence, the cause of the grievance. To the fullest extent possible, a grievance shall contain a clear and concise statement of the grievance and indicate the issue(s) involved, the relief sought, the date(s) the incident or violation took place, and any specific policy involved.
5. On receipt of a written grievance, the following steps will occur. The final step must be completed within 30 business days from the date the grievance was received. The program must store documentation of the grievance for seven years. Significant grievances that set a precedent may be stored indefinitely.
    a. The grievance advisor or program director will convene a faculty committee composed of at least three members to manage the grievance. Any faculty member involved in the grievance or who feels that they cannot be impartial may not participate in the committee. Committee composition should reflect diverse viewpoints within the program.
    b. The faculty committee, through the grievance advisor or program director, will obtain a written response from the person or persons toward whom the grievance is directed. The grievance advisor or program director will inform this person that their response will be shared with the student filing the grievance.
    c. The grievance advisor or program director will share the response with the student filing the grievance.
    d. The faculty committee will make a decision regarding the grievance. The committee's review shall be fair, impartial, and timely. The grievance advisor or program director will report on the action taken by the committee in writing to both the student and the person toward whom the grievance was directed.
6. If either party (the student or the person or persons toward whom the grievance is directed) is unsatisfied with the decision of the program's faculty committee, the party may file a written appeal to the SMPH senior associate dean for basic research, biotechnology and graduate studies within 10 business days from the date of notification of the program's faculty committee. The following steps will occur:
    a. The grievant will be notified in writing, within 5 business days of the written appeal, acknowledging receipt of the formal appeal and establishing a timeline for the review to be completed.
    b. The senior associate dean or their designee may request additional materials and/or arrange meetings with the grievant and/or others. If meetings occur, the senior associate dean or their designee will meet with both the grievant and the person or persons toward whom the grievance is directed.
    c. The senior associate dean or their designee will assemble an ad hoc committee of faculty from outside of the student's graduate program and ask them to prepare a written recommendation on whether to uphold or reverse the decision of the program on the student's initial grievance. The committee may request additional materials and/or arrange meetings with the grievant and/or others. If meetings occur, the committee will meet with both the grievant and the person or persons toward whom the grievance is directed.
    d. The senior associate dean or their designee will make a final decision within 20 business days of receipt of the committee's recommendation.
    e. The SMPH Office of Basic Research, Biotechnology, and Graduate Studies must store documentation of the grievance for seven years. Grievances that set a precedent may be stored indefinitely.
7. The student may file an appeal of the School of Medicine and Public Health decision with the Graduate School. See the Grievances and Appeals section of the Graduate School's Academic Policies and Procedures (https://grad.wisc.edu/documents/grievances-and-appeals/).

Time Limits

Steps in the grievance procedures must be initiated and completed within the designated time periods except when modified by mutual consent. If the student fails to initiate the next step in the grievance procedure within the designated time period, the grievance will be considered resolved by the decision at the last completed step.

OTHER

Most students are funded with research assistantships through the research programs of their advisors. A limited number of traineeships are available to advanced students in the UW Radiological Sciences Training Program for career training in cancer research. Other fellowships are also available to qualified students (e.g., AAPM, Cardiovascular and Neurological Sciences Training Programs, Advanced Opportunity Fellowship Program).

PROFESSIONAL DEVELOPMENT

GRADUATE SCHOOL RESOURCES

Take advantage of the Graduate School's professional development resources (https://grad.wisc.edu/pd/) to build skills, thrive academically, and launch your career.

LEARNING OUTCOMES

1. Articulates research problems, potentials, and limits with respect to theory, knowledge, or practice within the field of medical physics.
2. Formulates ideas, concepts, designs, and/or techniques beyond the current boundaries of knowledge within the field of medical physics.
3. Creates research, scholarship, or performance that makes a substantive scientific contribution.
4. Demonstrates breadth and depth within their learning experiences.
5. Advances contributions of the field of medical physics to society through peer-reviewed journal publications.

6. Communicates complex ideas in a clear and understandable manner in both oral and written formats.
7. Demonstrates ethical research and professional conduct.

PEOPLE

Faculty: Please see a comprehensive list of our faculty (https://www.medphysics.wisc.edu/faculty/) on the department website.

ACCREDITATION

ACCREDITATION

Commission on Accreditation of Medical Physics Education Programs (http://www.campep.org)

Accreditation status: Accredited through December 31, 2026. Next accreditation review: Spring 2026.