Physics & Astrophysics
PhD

The Department of Physics and Astrophysics offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. Current research in the department emphasizes solid-state physics, materials science, astrophysics, and health physics. Departmental facilities permit both theoretical and experimental research investigations.

Goal 1: Students will acquire competency in graduate level physics including mechanics, electromagnetism, quantum mechanics, statistical physics, and theoretical methods.
Goal 2: Students will acquire skills to carry out programs of independent research at a research laboratory or as a university faculty member.
Goal 3: Students will acquire skills in oral presentations and acquire experience in writing research papers.
Goal 4: Students will develop analytical skills needed as a professional physicist.

Admission Requirements

The applicant must meet the School of Graduate Studies’ current minimum general admission requirements as published in the graduate catalog.

Applicants who are seeking admission to School of Graduate Studies must meet all of the minimum general School of Graduate Studies admission requirements identified in the graduate catalog. In addition, prospective students must fulfill the requirements for admission to the graduate program in Physics and Astrophysics.

1. Successful completion of a master’s degree (Some programs permit bypassing the master’s degree and allow for direct admission to the Ph.D. degree. Check specific department requirements for admission.)
2. An overall GPA of 3.0 for all graduate work.
3. Completed all undergraduate preparation.
4. Presentation of scores on the GRE General Test and advanced physics test is recommended.
5. Be recommended for doctoral work by the department.

Degree Requirements

Students seeking the Doctor of Philosophy degree at the University of North Dakota must satisfy all general requirements set forth by the School of Graduate Studies as well as particular requirements set forth by the Physics and Astrophysics Department.

The degree is a research degree and is conferred only in recognition of high achievement in independent scientific research and scholarship.

1. Completion of 90 semester credits beyond the baccalaureate degree.
2. Maintenance of at least a 3.0 GPA for all classes completed as a graduate.
3. With approval of a student’s Faculty Advisory Committee, up to one-half of the work beyond a master’s degree (maximum of 30 semester credit hours) may be transferred from another institution that offers post-master’s degrees in the discipline.
4. In addition to PHYS 590 Research, the coursework will amount to approximately 36 hours.
5. Completion of a regular core of courses which includes:

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6. Completion of several specialized graduate level courses in physics in order to obtain the in-depth training essential for the development of their research interest.
7. Completion of at least nine semester hours of graduate work, (400 level or above) in a single related field.
8. After successful completion of the first two semesters of coursework, students who entered the program with a bachelor's degree will take a written qualifying examination, which covers undergraduate and first-year graduate level courses. Students with a master's degree will take this examination in the second semester of enrollment.
9. A student who fails to perform satisfactorily in this examination may be re-examined after waiting one semester. In general, no student will be allowed to take the qualifying examination more than twice.
10. No student may proceed formally toward the Ph.D. degree until this examination has been passed.
11. Written doctoral comprehensive examination in physics will normally be taken in the fifth semester of graduate enrollment. This must be completed before advancement to candidacy is granted.
12. Candidates for the Ph.D. must complete a research investigation. Upon satisfactory completion of the research investigation, the student is required to prepare a dissertation covering the research.

At the final oral examination, the candidate presents and defends the dissertation.

Faculty and Areas of Expertise

- Wayne Barkhouse, Ph.D. Globular clusters, properties of galaxy clusters, galaxy cluster detection methods, multiwavelength surveys, dark energy
- Graeme A. Dewar, Ph.D. Negative index of refraction materials, Ferromagnetic resonance and antiresonance. Magneto-acoustics
- Ju H. Kim, Ph.D. Condensed matter theory, superconductivity, superconducting nanoelectronic devices, and quantum computing
- Yen Lee Loh, Ph.D. Theory of condensed matter and cold atoms
- Kanishka Marasinghe, Ph.D. Atomic structure-property relationships of complex novel materials, magnetic interactions at the atomic scale
- Nuri Oncel, Ph.D. Fabrication and Characterization of Nanostructured Materials
- William A. Schwalm, Ph.D. Condensed matter theory, nonlinearity and disorder, mathematical and computational physics
- Li-Chun Tung, Ph. D. Experimental condensed matter physics and infrared optics
- Timothy R. Young, Ph.D. Astrophysics, supernovae and supernovae remnants, multidimensional hydrodynamics, numerical simulation, radiation and neutrino transport

Contact Information
Dr. Kanishka Marasinghe, Graduate Director
Physics & Astrophysics Department
University of North Dakota
Witmer Hall Room 213
101 Cornell Street Stop 7129
Grand Forks, ND 58202-7129
P: 701-777-3560
F: 701-777-3523
E: kanishka.marasinghe@und.edu

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