PHYSICS, PH.D.

A minimum of seventy-eight hours is required for the Ph.D. in physics. As part of this requirement, the student must receive course credit for the physics Ph.D. core (PHY 5320 Classical Mechanics I, PHY 5330 Electromagnetic Theory I, PHY 5331 Electromagnetic Theory II, PHY 5340 Statistical Mechanics, PHY 5360 Mathematical Physics I, PHY 5370 Quantum Mechanics I, and PHY 5371 Quantum Mechanics II) along with credit for four semester hours of 5180 (colloquium) which must be completed in residence. The remaining hours will consist of a combination of advanced courses as required by the student's supervisory committee, electives, and twelve hours of dissertation with its associated research. In order to carry out the dissertation research, a student must declare the Ph.D. Candidacy by passing the Ph.D. qualifying examination. The Physics department does not have a foreign language requirement for the Ph.D. degree.

The research required for the Ph.D. degree will be conducted in one of the active research areas within the department. Currently, this includes theoretical and experimental fields of astrophysics and space science, plasma physics, classical and quantum gravitation, cosmology, elementary particle physics, non-linear dynamics, quantum optics, condensed matter, and surface chemical physics.

The experimental labs include the Spectroscopy and Imaging laboratory equipped with optical, chemical, and physical scanning probe microscopes (SPMs), LSAM (Laboratory for Surface Analysis and Modification) with an XSAM 800 Surface analysis system, quantum optics laboratory with advance laser spectroscopies, semiconductor laser optics lab with a Nd: YAG laser and optical parametric oscillator, the HIDPL (Hypervelocity Impacts and Dusty Plasma Lab) equipped with two GEC rf reference cells, a larger, custom complex plasma cell, the PK-4 BU (an analogue to the PK-4 device currently on the International Space Station), a Zyvex S100 nanomanipulator, two Nd: YAG (Coherent VERDI) laser systems, a femtosecond Ti:Sapphire laser system, a light gas accelerator, an Inductively Coupled Plasma generator and a 1.6 second Drop Tower, and BLMEE (Baylor Laboratory for Materials in Extreme Environments equipped with an ultrafast magnetospectroscopy laboratory equipped with an amplified titanium:sapphire laser, a femtosecond optical parametric amplifier, a femtosecond optical parametric oscillator. All of the physics labs are supported by on-site machine and electronics shops. The department is also active in experimental High Energy Physics at the CERN Large Hadron Collider near Geneva, Switzerland, the Fermi National Accelerator Laboratory in Batavia, Illinois, and at the National High Magnetic Field Laboratory in Tallahassee, Florida. Researchers also utilize Baylor's high performance computing cluster, Kodiak, with 64 compute nodes with 36 cores each, five additional nodes equipped with NVIDIA GPUs, as well as the computing resources at the national and international research laboratories.