

# Department of Physics and Astronomy

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The Department of Physics and Astronomy offers students the opportunity to study the fundamental principles and methodologies of theoretical, experimental, and computational physics. The physics core curriculum forms the framework for the Physics major. Each student then completes the rest of the program of study with a variety of electives according to his or her interests and career objectives. The core curriculum, coupled with upper-level electives, provides strong preparation for advanced study in physics or astronomy or a career in industrial physics or engineering or simply lays the foundation for a rigorous undergraduate education, regardless of one's desired field of employment after the baccalaureate degree.

The departmental program of study leads to a Bachelor of Science degree in Physics. Concentrations in Medical Physics and Astronomy are available. Minors in Physics, Electro-Acoustics, and Astronomy are also available.

**Curricular listings include General Education requirements in Communication, History, Humanities and/or Fine Arts, Mathematics, Natural Sciences, and Social/Behavioral Sciences categories as outlined on pages 64–67.**

## Major in Physics

The major in Physics consists of 27 semester hours of required core courses, plus 9 hours of upper-division electives in physics and astronomy. The core curriculum consists of PHYS 2110/2111, 2120/2121 (or 2010/2011, 2020/2021), 3100, 3110, 3150, 3610, 3800, 3900, 3910, 4850, and 4900. Also required are CHEM 1110/1111, 1120/1121 and MATH 1910, 1920. The following program is suggested for the first two years. For the third and fourth years, each student should work closely with his/her advisor to tailor a program which will meet individual requirements. A minimum of 12 semester hours in the Physics major must be taken at MTSU.

**Recommended Sequence****FRESHMAN**

ENGL 1010, 1020 (Comm)	6
PHYS 2110/2111 (Nat Sci)	4
and 2120/2121 OR	4
PHYS 2010/2011 (Nat Sci)	(4)
and 2020/2021	(4)
MATH 1910 (Math)	4
MATH 1920	4
CHEM 1110/1111 (Nat Sci)	4
CHEM 1120/1121	4

**30****SOPHOMORE**

COMM 2200 (Comm)	3
HIST 2010, 2020, or 2030	3
PHYS 3100, 3110	6
PHYS 3150, 3160	6
CSCI 1170	4
Electives	9

**31**

Credit may be received for PHYS 2110-2121 or 2010-2021, but not for both series.

Courses satisfying the remaining areas of General Education are to be taken during the junior and senior years.

**Concentration: Medical Physics**

The Medical Physics concentration is designed to prepare students for graduate work in medical physics and radiation oncology physics, eventually leading to a career as a medical physicist in a clinical or academic setting. In addition to the chemistry, math, and 27-hour core curriculum requirements for the Physics degree, the following courses are also required:

PHYS 3111	Modern Physics Laboratory
PHYS 3160	Topics and Methods of Theoretical Physics II
PHYS 3600	Radiation Oncology Physics
PHYS 4310	Electricity and Magnetism
PHYS 4330	Electricity and Magnetism II
PHYS 4380	Introduction to Quantum Mechanics
PHYS 4600	Topics in Medical Physics
BIOL 2010/2011	Human Anatomy and Physiology I
BIOL 2020/2021	Human Anatomy and Physiology II

**Concentration: Astronomy**

The Astronomy concentration is designed to prepare students for graduate work in astronomy or astrophysics. In addition to the chemistry, math, and 27-hour core curriculum requirements for the Physics degree, the following courses are also required:

ASTR 1031	Observing the Universe
ASTR 2030	Solar System Astronomy
ASTR 2040	Stars, Galaxies, and Cosmology
ASTR 3400	Fundamentals of Astrophysics
ASTR 3401	Experimental Astronomy
ASTR 4850	Astronomy Research
ASTR 4900	Astronomy Senior Thesis

**Teacher Licensure in Physics**

Students seeking a license to teach physics in secondary schools (grades 7-12) must complete (1) a major in Physics, (2) a minor in Secondary Education, and (3) additional teacher licensure requirements. Students can also become licensed to teach physics under the Science major (see page 118).

**Additional Teacher Licensure Requirements**

In addition to the General Education requirements (see pages 64-67) the following courses are required for teacher licensure in physics:

MATH through 1920

BIOL 1110/1111, 1120/1121 General Biology

CHEM 1110/1111, 1120/1121 General Chemistry I and II

ASTR 1030 Exploring the Universe

PHYS 2010-2021 Non-Calculus-Based Physics I/Laboratory OR

PHYS 2110-2121 Calculus-Based Physics I/Laboratory

GEOL 1040/1041 Physical Geology

**Secondary Education Minor Requirements**

Students must contact their Secondary Education minor advisors for approval of appropriate courses.

**NOTE:** See Department of Educational Leadership on page 166 for Secondary Education minor requirements.

**Major Requirements**

Students who want to teach secondary physics must complete the Physics major in the following manner:

PHYS 2010/2011, 2020/2021 Non-Calculus-Based Physics I OR

PHYS 2110/2111, 2120/2121 Calculus-Based Physics I

PHYS 3100, 3110 Modern Physics I and II

PHYS 3150 Topics and Methods of Theoretical Physics I

PHYS 3310 Concepts and Applications of Digital Electronics

PHYS 3350 Concepts and Applications of Analog Electronics

PHYS 3610 Thermodynamics

PHYS 3800 Physics Seminar

PHYS 3900 Physics Practicum

PHYS 3910 Advanced Physics Laboratory

**Minor in Electro-Acoustics**

The minor in Electro-Acoustics consists of at least 21 semester hours, 18 of which are required: MATH 1910; PHYS 1600, 3310, and 3350; and ET 3610. Remaining elective may be chosen from PHYS 3000, ET 3620, or ET 3660.

**Minor in Physics**

The minor in Physics consists of 19 semester hours in physics and astronomy including PHYS 2110/2111, 2120/2121 (2010/2011, 2020/2021). Students minoring in Physics should work closely with their Physics advisor to tailor a program which meets their needs. At least four upper-division hours must be taken at MTSU.

**Minor in Astronomy**

The minor in Astronomy consists of 19 semester hours in astronomy and physics, 10 of which are required: ASTR 1031, 3401, and PHYS 2010/2011, 2020/2021 (or PHYS 2110/2111, 2120/2121). The remaining 9 credits of electives may be chosen from ASTR 1030, 2030, 2040, 3050, and 3400. At least four upper-division hours must be taken at MTSU.

**Courses in Astronomy [ASTR]**

See back of catalog for course descriptions

**Courses in Physics [PHYS]**

See back of catalog for course descriptions.

**Honors College**

The Department of Physics and Astronomy offers the following courses in Honors: ASTR 1030 and 1031. See online class schedule and Honors information in this catalog.