

**380 Epistemology**

This course considers various accounts of the nature, origin, and limits of human knowledge. Attention will be paid to the main figures in the western tradition as well as to contemporary authors. May satisfy a requirement in Philosophy through the Ages, depending on choice of materials.

Prerequisite: 220

**390 Metaphysics**

This course examines the possibility of, as well as the need for, a general study of reality beyond that pursued by the particular science. Possible topics include the appearance/reality distinction, substance, the self, universals and particulars, unity, truth, goodness, beauty, and God. Attention will be paid to both classical and contemporary authors. May satisfy a requirement in Philosophy through the Ages, depending on choice of materials.

Prerequisite: 220

**410 Colloquium: Philosophical Research**

An advanced course in philosophical research, writing, and presentation. On a topic chosen in consultation with the instructor, students will submit at least two drafts of a substantial paper on a major problem or debate in philosophy. Students will be expected to meet every other week as a group to discuss the progress of their projects and critique preliminary drafts of one another's work. An oral presentation of the final draft is required.

Prerequisites: 214 and 220

**475, 476, 477, 478 Experiential Learning**

See the description of these courses at the beginning of the "Departments and Curricula" section of this catalog.

**483, 484, 485, 486 Seminar**

See the description of these courses at the beginning of the "Departments and Curricula" section of this catalog.

**487, 488, 489, 490 Topics**

The subject matter of these courses, announced in the annual *Class Schedule*, will vary from year to year, but will not duplicate existing courses. See the description of these courses at the beginning of the "Departments and Curricula" section of this catalog.

**491, 492, 493, 494 Research**

See the description of these courses at the beginning of the "Departments and Curricula" section of this catalog.

**495, 496, 497, 498 Individual Study**

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**Physical Education****Physical Education Health Promotion****Physical Education Health Promotion – Science Emphasis**

*See Department of Health and Human Performance.*

**Physics (PHYS)**

Tommet (chair), Feng, Johnston, Lane; Blilie, Rada

Physics majors learn the fundamental laws that govern the physical universe, from the smallest subatomic particle to the largest galaxies to the very structure of space and time. Emphasis is placed on general understanding, problem solving, and the communication skills essential for success in a career grounded in science. In the laboratory, students use state-of-the-art instrumentation in applying physics to a wide variety of systems. Opportunities are available for students to participate in research projects during the school year and over the summer.

There are three educational options from which to choose: a Bachelor of Science (B.S.) degree; a Bachelor of Arts (B.A.) degree; or a minor in physics. The B.S. degree provides the necessary background for students interested in graduate school, engineering or industrial work; for students interested in professional programs such as medicine or patent law, or students double majoring in areas such as mathematics or chemistry, the Bachelor of Arts degree gives a solid background in physics with the flexibility to meet other needs.

Graduates with a major in physics will demonstrate an adequate understanding of the core areas of physics. They will have an ability to communicate well in technical areas. They will demonstrate adequate laboratory skills. They will possess an understanding of societal and ethical issues related to physics.

The Pre-Engineering Program sponsored by the Department of Physics allows students to combine a liberal arts education at the University of St. Thomas with an engineering program at another institution. See the description under Pre-Professional Programs in this catalog.

For students interested in teacher licensure, see the various combinations of science education in the Department of Teacher Education in this catalog.

## Departments

The department offers courses for non-majors to fulfill the laboratory science component of the core curriculum.

### Major in Physics (B.S.)

- 111 Introduction to Classical Physics I
- 112 Introduction to Classical Physics II
- 225 Introduction to Modern Physics I
- 226 Introduction to Modern Physics II
- 260 Introduction to Electronics
- 310 Statistical Mechanics and Thermodynamics
- 341 Electricity and Magnetism
- 399 Advanced Physics Laboratory I
- 400 Advanced Physics Laboratory II
- 411 Theoretical Mechanics
- 421 Quantum Mechanics

*Plus one of:*

- 342 Electromagnetic Waves
- 451 Introduction to Solid State Physics

*Allied requirements*

- CHEM 111 General Chemistry I
- CHEM 112 General Chemistry II
- MATH 113 Calculus I
- MATH 114 Calculus II
- MATH 200 Multi-Variable Calculus
- MATH 210 Linear Algebra and Differential Equations
- QMCS 230 Software Design Using the JAVA Language

### Major in Physics (B.A.)

- 111 Introduction to Classical Physics I
- 112 Introduction to Classical Physics II
- 225 Introduction to Modern Physics I
- 226 Introduction to Modern Physics II
- 260 Introduction to Electronics
- 341 Electricity and Magnetism
- 399 Advanced Physics Laboratory I
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*Plus one of:*

- 310 Statistical Mechanics and Thermodynamics
- 342 Electromagnetic Waves
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*Allied requirements*

- MATH 113 Calculus I
- MATH 114 Calculus II
- MATH 200 Multi-variable Calculus
- MATH 210 Linear Algebra and Differential Equations

### Teacher Licensure

Elementary Education with a Co-major in Science and Mathematics for Elementary Education  
Elementary Education with a Specialty in Science (5-8)

Co-major in Science (5-8) – Physics (9-12) and a Co-major in Secondary Education

*See Department of Teacher Education*

**Minor in Physics**

111 *and* 112 Introduction to Classical Physics I *and* II

*or*

109 *and* 110 General Physics I *and* II

*Plus:*

225 Introduction to Modern Physics I

Eight credits in courses numbered 226 or above

**101 General Physics For Liberal Arts Students (109, 111)**

Intended for non-science majors; treats fundamental principles of physics and their application to familiar phenomena, stressing qualitative understanding. The course will survey topics from mechanics, fluids, temperature and heat, oscillations, waves and sound, light and optics, and properties of matter. The course consists of lecture, discussion and laboratory. This course is designed especially for elementary education majors. It is not intended for students who have had high school physics.

Prerequisite: Three years of high school mathematics

**102 Topical Introduction to Physics**

**2 credits**

This course will introduce students to physics by studying a specific but broad topic. The course will have laboratory experience and will fulfill one-half of the general education laboratory science requirement. The course may be repeated for credit under different topics. Examples of topics are: light and color, physics and the human body, science of hi-fidelity, electronics of a computing machine, modern physics, and biomechanics. Offered in January term.

Prerequisite: Three years of high school mathematics

**103 Physics of Energy**

Intended for non-science majors; treats fundamental principles of physics and their application to understanding energy. This is an introductory course in physics with the focus on energy; it will give the underlying science and a quantitative approach to energy. Topics included are mechanics, thermodynamics, electricity and magnetism, atomic and nuclear concepts and radiation theory. The course consists of lecture, discussion and laboratory.

Prerequisite: Three years of high school mathematics

**104 Astronomy**

Introduction to physical principles and their application to astronomy for non-science majors. Emphasis is on comprehension of ideas and principles. Topics include the motions of the sun, moon, stars and planets; properties of the solar system; the stars including giants, dwarfs, pulsars and black holes; nebulae, galaxies and quasars; cosmology and life. The course consists of lecture, discussion and laboratory.

Prerequisite: Three years of high school mathematics

**105 Musical Acoustics**

An introductory course intended for non-science majors; treats fundamental principles of physics and acoustics as they relate to musical sounds and musical instruments. The course consists of lecture, discussion and laboratory. This course fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisites: High school algebra and a music background (one year practice, instrument or voice, or one course)

**109 General Physics I (111)**

This course and its continuation 110 are a two-semester sequence of introductory physics, both classical and modern. Topics include principles of classical mechanics: description of motion, force, torque and rotational motion, energy, momentum and their conservation, fluid mechanics; thermal phenomena; oscillations, waves and sound. Appropriate topics and applications are chosen for the life-science student. The course consists of lecture, discussion and laboratory.

Prerequisite: Math placement at a level of MATH 111 or above.

**110 General Physics II (112)**

Continuation of 109. Topics include electricity; magnetism; light and optics; atomic, quantum and nuclear physics. The course consists of lecture, discussion and laboratory.

Prerequisite: A minimum grade of C- in 109 or 111

**111 Introduction to Classical Physics I (109)**

This course and its continuation 112 are intended for physical science, mathematics and pre-engineering students. The principles of classical mechanics: vectors, kinematics, particle and rigid body rotational dynamics and statics; conservation laws; fluid mechanics. The course consists of lecture, discussion and laboratory. This course fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisite: A minimum grade of C- in MATH 113

## Departments

### 112 Introduction to Classical Physics II (110)

Continuation of 111. The principles of thermal, wave, optical and electromagnetic phenomena. The course consists of lecture, discussion and laboratory. This course fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisites: A minimum grade of C- in both 111 and MATH 114

### 225 Introduction to Modern Physics I

This course and its continuation 226 serve as an introduction to modern physics. The topics of this first course are quantum theory of light, particle nature of matter, wave aspects of particles, quantum mechanics in one-dimension, statistical physics, lasers, solid state physics. The course consists of lecture, discussion and laboratory. This course fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisites: 110 or 112 and MATH 200

### 226 Introduction to Modern Physics II

Continuation of 225. Topics include atomic structure, molecular structure, relativity, nuclear physics, elementary particles, other topics of contemporary interest. The course consists of lecture, discussion and laboratory. This course fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisite: A minimum grade of C- in 225

### 260 Introduction to Electronics (ENGR 350)

This course provides scientists and engineers with a background in electronics and electronic instrumentation. Topics include DC and AC circuit analysis, frequency response, filters, feedback, operational amplifiers, semiconductor devices, power supplies, oscillators, logic gates, codes for numbers and symbols, combinational and sequential digital logic design, timing, transducers, and analog-digital conversion. The course consists of lecture, demonstration, discussion, and laboratory.

Prerequisite: A minimum grade of C- in Physics 112

### 295, 296, 297, 298 Topics

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### 310 Statistical Mechanics and Thermodynamics

Concepts and laws of thermodynamics and of statistical mechanics. Applications of these to various systems, including gases, liquids, solids and chemical systems. Lecture and discussion.

Prerequisite: 226 or permission of the instructor

### 341 Electricity and Magnetism

Electrostatic and magnetostatic fields in vacuum and material media; energy and force relations; methods for the solution of static problems; fields and currents in conducting media; Maxwell's equations and time-dependent fields. Lecture and discussion.

Prerequisites: 110 or 112 and MATH 210 or permission of the instructor

### 342 Electromagnetic Waves

A continuation of electricity and magnetism with a view of Maxwell's equations and the resulting wave equation, traveling wave solutions and applications, radiation, interference and diffraction, optics, wave guides. Lecture and discussion.

Prerequisite: 34

### 399 Advanced Physics Laboratory I

2 credits

Advanced physics experiments in a number of areas including nuclear, atomic, optical and solid state physics. Some lectures and library research will be included. Four hours per week. This course partially fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisites: 226, 260 and concurrent registration in an upper-division physics course

### 400 Advanced Physics Laboratory II

2 credits

Conduct a rigorous experimental physics project proposed by the student and approved by the instructor. This course partially fulfills the second-level Computer Competency requirement in the core curriculum.

Prerequisite: 399

### 411 Theoretical Mechanics

Newtonian dynamics of particles and systems of particles; conservation laws; moving coordinate systems; central-force motion; collisions and scattering; plane and general motion of rigid bodies; free, forced and coupled oscillations; Lagrangian dynamics. Lecture and discussion.

Prerequisites: 112 and MATH 200 or permission of the instructor

**421 Quantum Mechanics**

Application of quantum mechanics to advanced problems in modern physics; perturbation theory; spin and its effects; identical particles; many-electron atoms; topics in scattering theory and nuclear physics. Lecture and discussion.

Prerequisite: 226 or permission of the instructor

**451 Introduction to Solid-State Physics**

Theory and applications of mechanical, thermal, electric, and magnetic properties of solids; band theory; semiconductors. Lecture and discussion.

Prerequisite: 226 or permission of instructor

**483, 484, 485, 486 Seminar**

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**Political Science (POL)**

Farlow (chair), Hatting, High-Pippert, Hoffman, Toffolo

The program of courses offered by the Political Science Department is designed to enable students to acquire an understanding of political processes, governmental institutions, and theories of politics.

As one of the liberal arts, political science enables students to develop skills in communication and analytic problem solving that are useful in a wide variety of careers, including business. More specifically, the major in political science prepares students for the study of law, graduate programs in political science or public administration or for careers in government, politics, the non-profit sector, or teaching.

Students graduating with a major in political science will have a broad overview of the discipline, as well as substantive familiarity with at least two of the four political science sub-fields: American politics, comparative and international politics, law and judicial politics, and political thought. At various points in their study of political science, majors will develop a wide variety of skills, including skills related to the carrying out of research projects, the interpretation of empirical data, and the presentation of their work to a wider audience.

Students majoring in Political Science must take a minimum of sixteen credits in political science at St. Thomas.

The department also offers courses for non-majors to fulfill the Social Analysis component of the core curriculum.

**Political Science Honor Society**

Pi Sigma Alpha, the national political science honor society, established the Chi Theta chapter at St. Thomas in 1999. The purpose of Pi Sigma Alpha is to acknowledge superior performance in the study of political science, to forge closer links between faculty and political science majors and minors, and to stimulate political interest in the St. Thomas community.

Pi Sigma Alpha is open to juniors and seniors who meet the following qualifications for membership. Students must have completed at least three political science courses and be currently enrolled in or have taken a fourth. Two of the four courses must be UST political science courses, and one of the four must be at least a 300-level course. Additionally, students must have a grade point average of at least 3.00 in political science courses and be within the top third of their graduating class.

**Major in Political Science**

- 105 Politics and Government in Comparative Perspective
- 205 Introduction to the American Public Policy Process
- 225 Introduction to World Politics
- 275 Introduction to Political Thought

*Plus:*

Sixteen credits in 300-level courses  
(completed in at least two of the four sub-fields)