

## College of Arts and Sciences – Departments

### 360 Philosophy of Religion

Western and non-Western philosophical arguments concerning the nature and justifying bases of religious belief, with special attention to the philosophical implications of religious pluralism.

Prerequisites: 115 and one other PHIL course

### 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.

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.

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 or 215 and 220

### 460 Philosophy of God

Systematic treatment of philosophical arguments concerning the existence and attributes of God.

Prerequisites: 220 and 390

### 475, 476 Experiential Learning

2 credits

### 477, 478 Experiential Learning

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

### 483, 484 Seminar

2 credits

### 485, 486 Seminar

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

### 487, 488 Topics

2 credits

### 489, 490 Topics

The subject matter of these courses will vary from year to year, but will not duplicate existing courses. Descriptions of these courses are available at [www.stthomas.edu/registrar/onlineschedule.html](http://www.stthomas.edu/registrar/onlineschedule.html).

### 491, 492 Research

2 credits

### 493, 494 Research

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

### 495, 496 Individual Study

2 credits

### 497, 498 Individual Study

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

## Physics (PHYS)

Johnston (chair), Green, Lane, Nollenberg, Ohmann, Tommet; Blilie, Koser

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.

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

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

**Graduation with Honors in Physics**

Students graduating with a B.A. or B.S. degree in physics may also qualify for departmental honors. Students interested in this designation must consult with the department chair one year or more before graduation. All requirements must be met one month before graduation.

1. Complete four credits in 400-level physics research
2. Prepare a written thesis in the format of primary literature
3. Defend the thesis before a panel composed of:
  - thesis director (chair of committee)
  - two additional UST physics faculty
  - one UST faculty member outside of physics
4. Achieve a final cumulative grade point average in physics department courses of 3.50 and 3.50 overall
5. Present their research at a scientific meeting beyond the St. Thomas community

**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
- 300 Physics Seminar I (1 credit)
- 301 Physics Seminar II (1 credit)
- 323 Methods of Experimental Physics
- 331 Theoretical Mechanics
- 341 Electricity and Magnetism
- 347 Optics
- 410 Statistical Mechanics and Thermodynamics
- 431 Quantum Mechanics

*Plus:*

four PHYS credits 104 or greater

**Allied requirements**

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

*Plus either:*

ENGR 350 Introduction to Electronics

*or*

ENGR 230 Digital Design and ENGR 240 Circuit analysis

*Plus one of:*

- QMCS 230 Software Design Using the JAVA Language
- QMCS 342 Computer Applications in Experimental Sciences

**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
- 300 Physics Seminar I (1 credit)
- 301 Physics Seminar II (1 credit)
- 323 Methods of Experimental Physics

*Plus:*

four PHYS credits 104 or greater

eight PHYS credits above 301

**Allied requirements**

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

*Plus either:*

ENGR 350 Introduction to Electronics

*or*

ENGR 230 Digital Design and ENGR 240 Circuit analysis

## College of Arts and Sciences – Departments

*Plus one of:*

- QMCS 230 Software Design Using the JAVA Language  
QMCS 342 Computer Applications in Experimental Sciences

### 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 School of Education Department of Teacher Education*

### Minor in Physics

*One of:*

- 109 General Physics I  
111 Introduction to Classical Physics I

*Plus one of:*

- 110 General Physics II  
112 Introduction to Classical Physics II

*Plus:*

twelve PHYS credits 104 or greater

#### 101 Physics as a Liberal Art I (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 Physics as a Liberal Art II (110, 112)

This course is intended for students who have completed PHYS 101 and wish to continue their study, or for those who have had high school physics. It is organized around a thematic approach and includes specifically studies of a) electric charges and related forces, b) commonly observed light behavior, and c) interactions of light and particles. The course consists of lecture, discussion, and laboratory.

Prerequisite: 101 or high school physics

#### 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 PHYS 110 serve as a two-semester introduction to classical and modern physics. Applications are chosen that focus on the life-sciences. Topics include principles of classical mechanics: description of motion, force, torque and rotational motion, energy, momentum and their conservation, fluid mechanics; thermodynamics. The course meets three times a week for two consecutive periods consisting of integrated 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 oscillations, waves and sound, electricity and magnetism; light and optics; atomic, quantum and nuclear physics. The course meets three times a week for two consecutive periods consisting of integrated 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 serve as a two-semester introduction to classical physics. Applications are chosen that focus on engineering and the physical sciences. Topics include principles of classical mechanics: vectors, kinematics, particle and rigid body rotational dynamics and statics; conservation laws; and thermodynam-

ics. The course meets three times a week for two consecutive periods consisting of integrated lecture, discussion and laboratory.

Prerequisite: A minimum grade of C in MATH 113

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

Continuation of 111. Topics include waves and sound; electricity and magnetism; geometric and physical optics. The course meets three times a week for two consecutive periods consisting of integrated lecture, discussion and laboratory.

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: A minimum grade of C in 112 and in 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 either 110 or 112 and in Math 114

**295, 296 Topics**

**2 credits**

**297, 298 Topics**

The subject matter of these courses will vary from year to year, but will not duplicate existing courses. Descriptions of these courses are available at [www.stthomas.edu/registrar/onlineschedule.html](http://www.stthomas.edu/registrar/onlineschedule.html).

**300 Physics Seminar I**

**1 credit**

This course and 301 are a sequence of two courses taken during the spring semesters of the junior and senior years. The goal of the course is to provide an overview of physics, relating ideas and concepts presented in other physics classes as well as in research investigations within the department. Additionally, students will be exposed to topics presented by outside speakers and will learn about opportunities that a physics degree provides, smoothing the transition between being a physics student and becoming a physicist.

Prerequisite: A minimum grade of C in either 225 or 226

**301 Physics Seminar II**

**1 credit**

Continuation of 300

Prerequisite: A minimum grade of C in either 225 or 226

**323 Methods of Experimental Physics**

Introduction to some of the standard tools of experimental physics. Topics include: data acquisition and instrument control, data analysis, error analysis, electron optics, vacuum techniques, and experiment design. The course consists of lecture, discussion and laboratory.

Prerequisite: A minimum grade of C in either 225 or 226 and in either ENGR 240 or 350 and in Math 200

**331 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: A minimum grade of C in either 225 or 226 and in MATH 200 and MATH 210

**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: A minimum grade of C in either 225 or 226 and in MATH 200 and MATH 210

**342 Electromagnetic Waves (ENGR 342)**

A continuation of 341. An introduction to the practical applications of Maxwell's equations including propagation, reflection and absorption of electromagnetic waves. Applications include antennas, waveguides, transmission lines, and shielding from electromagnetic interference. Lecture and discussion.

Prerequisite: A minimum grade of C in 341

**347 Optics**

The nature of light. Geometrical optics, image formation, and optical instruments. Interference, diffraction, and polarization. Lasers, holography, and other aspects of physical optics. Lecture, discussion, and laboratory.

Prerequisite: A minimum grade of C in 225 and MATH 200

## College of Arts and Sciences – Departments

### 410 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: A minimum grade of C in 225, 226, and both MATH 200 and MATH 210

### 431 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: A minimum grade of C in 225, 226, and both MATH 200 and MATH 210

483, 484 Seminar

2 credits

485, 486 Seminar

See the description of these courses at the beginning of the “Curricula” section of this catalog.

487, 488 Topics

2 credits

489, 490 Topics

The subject matter of these courses will vary from year to year, but will not duplicate existing courses. Descriptions of these courses are available at [www.stthomas.edu/registrar/onlineschedule.html](http://www.stthomas.edu/registrar/onlineschedule.html).

491, 492 Research

2 credits

493, 494 Research

See the description of these courses at the beginning of the “Curricula” section of this catalog.

495, 496 Individual Study

2 credits

497, 498 Individual Study

See the description of these courses at the beginning of the “Curricula” section of this catalog.

## 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)