

Plus Neuroscience Core Courses (4 courses, 16 credits):

Required courses:

BIOL 204 Cellular and Molecular Biology (4 credits)
 PSYC 212 Research Methods (4 credits)

Plus eight credits from the following:

BIOL 330 Animal Behavior (4 credits)
 BIOL 354 Neurobiology (4 credits)
 PSYC 401 Physiological Psychology (4 credits)

Plus Electives (6 courses, 24 credits):

Students should, in consultation with their adviser, choose six additional elective courses that reflect the students' academic or professional goals. Students must take at least two courses from each of the biology and psychology lists.

Biology Electives:

BIOL 330 Animal Behavior (4 credits)
 BIOL 349 Anatomy & Physiology I (4 credits)
 BIOL 354 Neurobiology (4 credits)
 BIOL 360 Genetics (4 credits)
 BIOL 371 Cell Biology (4 credits)
 BIOL 463 Immunology (4 credits)
 BIOL 462 Molecular Biology (4 credits)
 BIOL 486 Seminar in Physiology (4 credits)
 BIOL 497 Individual Study (4 credits)

Psychology Electives:

PSYC 206 The Brain and Human Behavior (4 credits)
 PSYC 207 Alcohol, Other Drugs and Behavior (4 credits)
 PSYC 301 Psychopathology (4 credits)
 PSYC 315 Cognition (4 credits)
 PSYC 322 Sensation and Perception (4 credits)
 PSYC 323 Learning and Memory (4 credits)
 PSYC 401 Physiological Psychology (4 credits)
 PSYC 407 Seminar in Behavioral Neuroscience (4 credits)
 PSYC 493 Research (4 credits)

Allied Electives:

CHEM 202 Organic Chemistry II (4 credits)
 CHEM 440 Biochemistry I (4 credits)
 CHEM 442 Biochemistry II (4 credits)
 CISC 230 Object-Oriented Design and Programming (4 credits)
 CISC 440 Artificial Intelligence and Robots (4 credits)
 MATH 114 Calculus II (4 credits)
 PHYS 109 General Physics I (4 credits) *or* PHYS 111 Introduction to Classical Physics I (4 credits)
 PHYS 110 General Physics II (4 credits) *or* PHYS 112 Introduction to Classical Physics II (4 credits)

Philosophy (PHIL)

College of Arts and Sciences, Department of Philosophy
 John Roach Center for the Liberal Arts (JRC) 241, (651) 962-5350
 Menssen (chair), Atkinson, Clemenson, Coulter, Deavel, Degnan, Feldmeier, Giebel, Grant, Heaney, Kemp, Kronen, Laumakis, Lemmons, Lu, McLean, Pawl, Rota, Stoltz, Sullivan, Toner, van Ingen, Wasserman, Winter

Philosophy engages questions such as:

- Is the human mind just a very complicated machine?
- Can we have free will if the mind is a machine?
- Must we have free will in order for life to be meaningful?

- What makes an act moral or immoral?
- When, if ever, can a government mandate moral acts or outlaw immoral acts?
- Is it ever permissible to start a war with a preemptive strike?

- Is the design in the world evidence that there is a God?
- Do the world's evils show that a good God cannot exist?
- What is the role of philosophy in dealing with questions about God?

Philosophy

- What is knowledge?
- Can we know anything with certainty?
- Are warrants for knowledge relative to particular cultures?

Philosophy considers these questions, and countless others, from the standpoint of human reason and experience. It emphasizes precise and careful argument, and sharpens your thinking skills.

The philosophy program at St. Thomas will introduce you to distinguished philosophical work over the centuries and into our own time. While attending carefully to philosophers whose works are foundational to the Catholic intellectual tradition, particularly Aristotle and Aquinas, the program is committed to broad integration of our understanding of reality. As you work to construct a philosophical worldview you will engage a variety of traditions, including non-Western, and confront questions prompted by the study of such subjects as the natural and social sciences, mathematics, medicine, business, law, theology, the fine arts, and literature.

Major in Philosophy

PHIL 115 Philosophy of the Human Person (4 credits)

PHIL 214 Introductory Ethics (4 credits)

PHIL 220 Logic (4 credits)

Plus eight credits in the history of philosophy

Four credits in classical Western philosophy

PHIL 200 Ancient Philosophy (4 credits)

PHIL 202 Medieval Philosophy (4 credits)

PHIL 340 Thought of Thomas Aquinas (4 credits)

or another course approved by the department

Four credits in an elective in the history of philosophy

PHIL 200 Ancient Philosophy (4 credits)

PHIL 202 Medieval Philosophy (4 credits)

PHIL 204 Modern Philosophy (4 credits)

PHIL 208 Indian Philosophy (4 credits)

PHIL 210 Chinese Philosophy (4 credits)

PHIL 306 Contemporary Philosophy (4 credits)

PHIL 340 Thought of Thomas Aquinas (4 credits)

PHIL 353 Machiavelli, Hobbes, and Nietzsche (4 credits)

or another course approved by the department

Plus:

Twelve credits at the 300-level or above, including four credits at the 400-level (all 400-level courses require public presentation of a paper)

Plus:

Additional coursework in Philosophy to bring the total number of credits in philosophy either to forty-four (for single majors) or thirty-six (for double or triple majors).

Minor in Philosophy

PHIL 115 Philosophy of the Human Person (4 credits)

PHIL 214 Introductory Ethics (4 credits)

Plus:

Twelve additional credits in philosophy. It is recommended that minors take PHIL 220 Logic (4 credits).

PHIL 115 Philosophy of the Human Person (4 credits)

An examination of fundamental conceptions of the human person in ancient, medieval and modern philosophy. Possible topics include: the existence and immortality of the human soul, free will and determinism, the immateriality of the intellect, the relationship between mind and body, and the relevance of different conceptions of the human person for ethics and religion. Attention is given to relevant issues of human diversity. The development of logical and critical thinking receives special attention. This course, with PHIL 214, fulfills the Moral and Philosophical Reasoning requirement in the core curriculum.

PHIL 200 Ancient Philosophy (4 credits)

A survey of the roots of philosophical inquiry in the classical period. The pre-Socratics, Plato, and Aristotle.

Prerequisite: PHIL 115

PHIL 202 Medieval Philosophy (4 credits)

An investigation of major philosophical problems in their medieval context. Possible topics include: faith and reason, free will, the role of authority, and the existence of God.

Prerequisite: PHIL 115

PHIL 204 Modern Philosophy (4 credits)

An examination of major philosophers of the early modern period from René Descartes to Immanuel Kant, with emphasis on methodology and claims to knowledge.

Prerequisite: PHIL 115

PHIL 208 Indian Philosophy (4 credits)

An examination of the primary texts and problems that form the basis of Hindu, Buddhist, or Zoroastrian thought. Metaphysical and ethical themes will be considered. This course fulfills the Human Diversity requirement in the core curriculum.

Prerequisite: PHIL 115

PHIL 210 Chinese Philosophy (4 credits)

An examination of the primary texts and problems that form the basis of Confucianism, Daoism, or Chinese Buddhism. Metaphysical and ethical themes will be considered. This course fulfills the Human Diversity requirement in the core curriculum.

Prerequisite: PHIL 115

PHIL 214 Introductory Ethics (4 credits) (PHIL 215)

An inquiry into the rational foundations and methods of ethics, with attention to the application of ethical principles to areas of personal conduct, institutional behavior and public policy, and diversity within and across cultures. This course, with PHIL 115, fulfills the Moral and Philosophical Reasoning requirement in the core curriculum.

Prerequisite: PHIL 115

NOTE: Students who receive credit for PHIL 214 may not receive credit for PHIL 215.

PHIL 215 Introductory Ethics (4 credits) (PHIL 214)

An inquiry into the rational foundations and methods of ethics, with attention to the application of ethical principles to areas of personal conduct, institutional behavior and public policy, and diversity within and across cultures. Special emphasis will be placed on the consideration of the similarities and differences found by comparing important Eastern (i.e., Confucian, Hindu, Buddhist, and Taoist accounts) and Western (i.e., Platonic, Aristotelian, Thomistic, Kantian, and Millian accounts) ethical theories. This course, taught at the University of Hawaii during J-term, with PHIL 115, fulfills the Moral and Philosophical Reasoning requirement in the core curriculum. This course fulfills the Human Diversity requirement in the core curriculum.

Prerequisite: PHIL 115

NOTE: Students who receive credit for PHIL 215 may not receive credit for PHIL 214.

PHIL 220 Logic (4 credits)

This course provides students with skills for identifying, analyzing, and evaluating the sorts of reasoning encountered in natural language. Emphasis will be placed on attaining facility with different formal systems for representing and evaluating arguments – including propositional logic, Aristotelian syllogistic, first-order predicate calculus, and some of their simple extensions – as well as on acquiring the ability to apply these systems in the analysis and evaluation of arguments in ordinary and philosophical discourse.

Prerequisite: PHIL 115

PHIL 234 Love, Sex and Friendship (4 credits) (equivalent to CATH 234)

A philosophical examination of the nature of human love. Possible topics include reciprocity and permanence, fidelity, romantic love, human sexuality, kinds of friendship. Special attention will be given to the thought of John Paul II.

Prerequisite: PHIL 115

PHIL 240 Faith and Doubt (4 credits) (equivalent to CATH 240)

Philosophical arguments for and against the possibility of divine revelation. Special attention will be given to the claim that the faith of the Catholic Church is revealed. Possible topics include tests of alleged revelations and miracles, evil as a barrier to belief in revelatory claims, the compatibility of science and religion, the role of reason and faith in religious commitment, and personal decision-making in a state of doubt about evidence.

Prerequisite: PHIL 115

PHIL 250 Christian Mysteries from a Philosophical Viewpoint (4 credits) (equivalent to CATH 250)

A consideration of philosophical problems associated with Catholicism. Possible topics include divine providence, creation, the soul, freedom of the will, faith, the Eucharist, the Incarnation, and the variety of religious beliefs.

Prerequisite: PHIL 115

PHIL 272 Evolution and Creation (4 credits) (equivalent to CATH 272)

A philosophical examination of the relation between the doctrine of creation and theories in the evolutionary sciences. The course will consider arguments concerning evolution and creation from a variety of disciplines (including philosophy, theology, and natural science). The course will also examine historical and philosophical aspects of the relation between science and religion on the origins of the material world and the human race.

Prerequisite: PHIL 115

Philosophy

PHIL 295, 296 Topics (2 credits)

PHIL 297, 298 Topics (4 credits)

The subject matter of these courses will vary from year to year, but will not duplicate existing courses. Descriptions of these courses are available in the Searchable Class Schedule on Murphy Online, <https://banner.stthomas.edu/pls/banner/prod/bwckschd>.

PHIL 306 Contemporary Philosophy (4 credits)

An investigation of major philosophical problems from the late nineteenth century to the present, with a focus on prominent philosophers and diverse traditions.

Prerequisite: PHIL 220

PHIL 320 Aristotelian Logic (4 credits)

A study of Aristotle's *Organon*, covering such topics as the categories, the nature of propositions, and forms of argument. Emphasis on demonstration (proof of necessary truths) and its distinction from dialectical reasoning. Applications to philosophical texts.

Prerequisite: PHIL 220

PHIL 325 Intermediate Symbolic Logic (4 credits)

A study of developments in twentieth-century symbolic logic. Possible topics include axiomatic systems, set theory, extensions of predicate logic (such as predicate logic with identity, quantified modal logic, relevance logic, deviant logics), and metatheorems (such as soundness and completeness theorems).

Prerequisite: PHIL 220

PHIL 330 Philosophy of Mind (4 credits)

A study of central issues in the philosophy of mind and soul. Possible topics include the relation between mind and body; the senses, emotions, intellect and will; and personal identity. Attention will be given to both the Aristotelian/Thomistic tradition and contemporary philosophy.

Prerequisites: PHIL 115; and 220 or permission of instructor

PHIL 335 Aesthetics (4 credits)

This course addresses philosophical questions that arise in connection with art and aesthetic experience. Possible topics include: the nature of beauty, artistic representation, aesthetic properties, and the relationship between art and insight, between art and emotion, between art and morality, and between art and religious experience.

Prerequisite: PHIL 115 and one other PHIL course

PHIL 340 Thought of Thomas Aquinas (4 credits)

An examination of some major topics in the philosophy of Thomas Aquinas's. Possible topics include: Aquinas' conception of philosophy and its relation to faith; God; and the destiny of the human being.

Prerequisite: PHIL 115 and one other PHIL course

PHIL 350 Advanced Ethical Theory (4 credits)

An advanced treatment of central aspects in ethical theory. Possible topics include metaethical issues (e.g. the is/ought problem, moral realism, naturalism) and the justification of normative theories (e.g., eudaimonism, deontology, consequentialism).

Prerequisite: PHIL 214 or 215

PHIL 353 Machiavelli, Hobbes, and Nietzsche (4 credits)

An examination of three central figures in the history of political theory, and the challenge each presents to the moral evaluation of the use of political power.

Prerequisite: PHIL 214 or 215

PHIL 354 Biomedical Ethics (4 credits)

An investigation of ethical problems in medicine and biological technology. Possible topics include: genetic engineering, experimentation with human subjects, the right to health care, and the concept of mental illness.

Prerequisite: PHIL 214 or 215

PHIL 356 Contemporary Social Issues (4 credits)

An investigation into conceptions of the human person, ethics, and the law related to current issues with public policy implications. Issues chosen at the discretion of the instructor.

Prerequisite: PHIL 214 or 215

PHIL 357 Political Philosophy (4 credits)

A study of the nature and justification of political authority. Possible topics include natural rights, liberty and equality, the common good and its relation to the individual good, the place of liberty and equality, and the common good in justifying state action. Attention is given to both classical and contemporary authors.

Prerequisite: PHIL 214 or 215

PHIL 358 Environmental Ethics (4 credits) (equivalent to ENVR 301)

Consideration of the ethical issues arising from human interaction with the environment, including population pressure, pollution, conservation and preservation. Focus is on the grounds of our obligation to resolve such issues; the

question of what persons and things are worthy of moral consideration; and the respective roles of individuals, organizations and government in addressing environmental problems. Case studies will be used to trace the implications of various ethical and political theories.

Prerequisites: PHIL 214 or 215; and ENVR 151 (ENVR 151 is waived for philosophy majors and minors)

PHIL 359 Philosophy of Law (4 credits)

A study of philosophical problems connected with human law and legal institutions. Possible topics include the nature and kinds of law, the relation of law and morality, analysis of legal concepts, the nature and justification of punishment, and the principles of legal interpretation and reasoning. Attention will be given to both classical and contemporary authors.

Prerequisite: PHIL 214 or 215

PHIL 360 Philosophy of Religion (4 credits)

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: PHIL 115 and one other PHIL course

PHIL 365 Natural Philosophy and Metaphysics (4 credits)

This course examines central topics in the philosophy of nature and in metaphysics. Possible topics include substance and accident, change and the conditions of substantial generation, matter and form, causality, necessity and possibility, time and persistence through time, universals and particulars, essence and existence, and the transcendentals (unity, truth, goodness, beauty). Attention will be paid both to classical and to contemporary authors.

Prerequisite: PHIL 220 and one other PHIL course

PHIL 380 Epistemology (4 credits)

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: PHIL 220

PHIL 385 Philosophy of Science (4 credits)

This course examines central topics in the philosophy of science. Possible topics include scientific explanation, realism and the nature of scientific theories, reductionism in science, and the nature of scientific change.

Prerequisite: PHIL 115; and PHIL 220 or consent of instructor. The prerequisite of PHIL 220 may be waived for science or math majors or minors.

PHIL 398 Topics (4 credits)

The subject matter of the courses taught under PHIL 398 will vary from year to year, but will not duplicate existing courses. Descriptions of the courses are available from the philosophy department, and in the Searchable Class Schedule on Murphy Online, <https://banner.stthomas.edu/pls/banner/prod/bwckschd>.

Prerequisite: at least two philosophy courses (prerequisites may be further specified; see individual course descriptions).

PHIL 410 Colloquium: Philosophical Research (4 credits)

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: PHIL 214 or 215; and 220

PHIL 460 Philosophy of God (4 credits)

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

Prerequisites: PHIL 220 and 365

PHIL 475, 476 Experiential Learning (2 credits)

PHIL 477, 478 Experiential Learning (4 credits)

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

PHIL 483, 484 Seminar (2 credits)

PHIL 485, 486 Seminar (4 credits)

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

PHIL 487, 488 Topics (2 credits)

PHIL 489, 490 Topics (4 credits)

The subject matter of these courses will vary from year to year, but will not duplicate existing courses. Descriptions of these courses are available in the Searchable Class Schedule on Murphy Online,

<https://banner.stthomas.edu/pls/banner/prod/bwckschd>.

PHIL 491, 492 Research (2 credits)

PHIL 493, 494 Research (4 credits)

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

Physics

PHIL 495, 496 Individual Study (2 credits)

PHIL 497, 498 Individual Study (4 credits)

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

Physical Education

See Health and Human Performance

Physics (PHYS)

College of Arts and Sciences, Department of Physics

Owens Science Hall (OWS) 153, (651) 962-5214

Johnston (chair), Green, Jalkio, Lopez del Puerto, Ohmann, Ruch; Blilie, Koser, Thomas

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 or the equivalent research experience
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.)

PHYS 111 Introduction to Classical Physics I (4 credits)

PHYS 112 Introduction to Classical Physics II (4 credits)

PHYS 215 Foundations of Modern Physics: From the Atom to the Big Bang (4 credits)

PHYS 225 Applications of Modern Physics: From the Atom to the Diode (4 credits)

PHYS 323 Methods of Experimental Physics (4 credits)

PHYS 331 Theoretical Mechanics (4 credits)

PHYS 341 Electricity and Magnetism (4 credits)

PHYS 347 Optics (4 credits)

PHYS 410 Statistical Mechanics and Thermodynamics (4 credits)

PHYS 431 Quantum Mechanics (4 credits)

Plus:

four PHYS credits 104 or greater

Allied requirements

MATH 113 Calculus I (4 credits)

MATH 114 Calculus II (4 credits)

MATH 200 Multi-Variable Calculus (4 credits)

MATH 210 Introduction to Differential Equations and Systems (4 credits)

MATH 240 Linear Algebra (4 credits)

Plus:

ENGR 350 Introduction to Electronics (4 credits)

or

ENGR 230 Digital Design (4 credits) *and* ENGR 240 Circuit Analysis (4 credits)