School of Natural Sciences and Mathematics

Physics (BA, BS)

The science of physics seeks understanding of the behavior of matter and energy at the most general and fundamental level. The physicist is trained to explore the physical universe in which people live and seeks interpretations of the natural phenomena found there. While much is known about the physical universe, many phenomena still remain to be investigated, understood, and exploited to the ultimate benefit of humankind. This is the challenge that a modern physicist faces.

The Degrees

The student majoring in Physics must meet the general University requirements for admission and for the specific degree the student is seeking. The Physics Program offers both the Bachelor of Arts and the Bachelor of Science degrees. A total of 120 semester credit hours is required for either degree. With the proper sequencing of courses, these degrees can be achieved in a four year period.

Bachelor of Arts

The Bachelor of Arts program provides an opportunity for a strong base in physics for students wishing to pursue graduate studies (non-physics) in, for example, business administration, economics, finance, oceanography, and patent or high technology law. Additionally, students seeking certification as high school teachers with physics as a major specialization and those seeking employment in industry, government service, and computer technology have the opportunity to obtain the necessary physics background through the BA program. The lower-division course requirements for the BA degree are the same as those for the BS degree. At the upper-division level, the physics core course are identical with the BS core courses, but the physics elective is replaced with PHYS 4398, Senior Research Project for BA degree and 15 semester credit hours of advanced physics courses are replaced with 15 semester credit hours of upper-division science electives.

Bachelor of Science

The Bachelor of Science is intended for students interested in a professional career in physics or closely related fields. It provides an excellent background for graduate programs in physics, biophysics, geophysics, engineering, medicine and other health related degree programs.

Graduate Studies Track

The recommended course of study toward a Bachelor of Science degree for those students who intend to pursue graduate studies in Physics begins with a two-semester Honors sequence of fundamentals of physics that gives the student a more extensive foundation in basic physics. The remainder of the program is the same as the regular BS program.

Algebra Based Physics

An algebra based general physics course (PHYS 1301, PHYS 1302) with lab (PHYS 2125, PHYS 2126) is offered for students interested in the health sciences and those curious about
the physical world in which we live. It stresses understanding the workings of nature and the physical processes and phenomena occurring therein.

Bachelor of Arts in Physics

Degree Requirements (120 semester credit hours)

View an Example of Degree Requirements by Semester

Faculty

Distinguished Chair in Natural Sciences and Mathematics: Roderick A. Heelis
Green Distinguished Chair in Academic Leadership: B. Hobson Wildenthal
Professors Emeritus: Austin J. Cunningham, Walter Heikkila, John H. Hoffman, Wolfgang A. Rindler, Myron B. Salamon, Brian A. Tinsley
Associate Professors: Lunjin Chen, Yuri Gartstein, Lindsay J. King, David J. Lary, Anton V. Malko, Fabiano Rodrigues, Jason D. Slinker
Assistant Professors: Michael Kesden, Michael Kolodrubetz, Lloyd Lumata, Bing Lv, Kaloyan Penev, Xiaoyan Shi, Russell Stoneback, Fan Zhang
Senior Lecturer: Paul MacAlevey, Kuei Sun
UT Dallas Affiliated Faculty: Yves J. Chabal, Kyeongjae (Kj) Cho, John P. Ferraris, Massimo V. Fischetti, Heather Hayenga, Christopher L. Hinkle, Julia W. P. Hsu, Wenchuang (Walter) Hu, Stephen D. Levene, Lawrence J. Overzet, A. Dean Sherry, Mary L. Urquhart, Duck Joo (D. J.) Yang

I. Core Curriculum Requirements: 42 semester credit hours

Communication: 6 semester credit hours

COMM 1311 Survey of Oral and Technology-based Communication
RHET 1302 Rhetoric

Mathematics: 3 semester credit hours

MATH 2413 Differential Calculus
MATH 2417 Calculus I

Life and Physical Sciences: 6 semester credit hours

PHYS 2325 Mechanics
PHYS 2421 Honors Physics I - Mechanics and Heat
PHYS 2326 Electromagnetism and Waves
PHYS 2422 Honors Physics II - Electromagnetism and Waves

Language, Philosophy and Culture: 3 semester credit hours
HUMA 1301  Exploration of the Humanities

Creative Arts: 3 semester credit hours
   ARTS 1301  Exploration of the Arts

American History: 6 semester credit hours
   Select any 6 semester credit hours from American History core courses (see advisor)

Government / Political Science: 6 semester credit hours
   GOVT 2305  American National Government
   GOVT 2306  State and Local Government

Social and Behavioral Sciences: 3 semester credit hours
   Select any 3 semester credit hours from Social and Behavioral Sciences core courses (see advisor)

Component Area Option: 6 semester credit hours
   CHEM 1311  General Chemistry I
   CHEM 1312  General Chemistry II
   CHEM 1315  Honors Freshman Chemistry I
   CHEM 1316  Honors Freshman Chemistry II
   CHEM 1315  Honors Freshman Chemistry I
   CHEM 1316  Honors Freshman Chemistry II

II. Major Requirements: 67-69 semester credit hours

Major Preparatory Courses: 25-27 semester credit hours beyond core curriculum
   CHEM 1111  General Chemistry Laboratory I
   CHEM 1112  General Chemistry Laboratory II
   CHEM 1115  Honors Freshman Chemistry Laboratory I
   CHEM 1116  Honors Freshman Chemistry Laboratory II
   CHEM 1311  General Chemistry I
   CHEM 1312  General Chemistry II
   CHEM 1315  Honors Freshman Chemistry I
   CHEM 1316  Honors Freshman Chemistry II
   MATH 2413  Differential Calculus
   MATH 2414  Integral Calculus
   MATH 2417  Calculus I
   MATH 2419  Calculus II
MATH 2415  Calculus of Several Variables
or  MATH 2451  Multivariable Calculus with Applications
MATH 2418  Linear Algebra
MATH 2420  Differential Equations with Applications
PHYS 1100  The Fun of Physics
PHYS 2303  Contemporary Physics
PHYS 2325  Mechanics
and  PHYS 2125  Physics Laboratory I

Or
PHYS 2421  Honors Physics I - Mechanics and Heat
and  PHYS 2121  Honors Physics Lab I
or  PHYS 2125  Physics Laboratory I
PHYS 2326  Electromagnetism and Waves
and  PHYS 2126  Physics Laboratory II

Or
PHYS 2422  Honors Physics II - Electromagnetism and Waves
and  PHYS 2126  Physics Laboratory II

Major Core Courses: 30 semester credit hours
PHYS 3312  Classical Mechanics
PHYS 3427  Electronics with Laboratory
PHYS 3330  Numerical Methods in Physics and Computational Techniques
PHYS 3411  Theoretical Physics
PHYS 3416  Electricity and Magnetism
PHYS 4311  Thermodynamics and Statistical Mechanics
PHYS 4373  Physical Measurements Laboratory
PHYS 4398  Research Project for the B. A. degree

Choose one Physics Elective course from the following:
PHYS 3317  Physics of the Human Body
PHYS 3380  Astronomy
PHYS 4301  Quantum Mechanics I
PHYS 4302  Quantum Mechanics II
PHYS 4335  Remote Sensing of the Earth

Major Related Courses: 12 semester credit hours

12 semester credit hours of upper-division Science Electives

III. Elective Requirements: 9-11 semester credit hours

Both lower- and upper-division courses may count as electives, but the student must complete at least 51 semester credit hours of upper-division courses to qualify for graduation.

Bachelor of Science in Physics

Degree Requirements [120 semester credit hours]

View an Example of Degree Requirements by Semester

Faculty

Distinguished Chair in Natural Sciences and Mathematics: Roderick A. Heelis

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I. Core Curriculum Requirements: 42 semester credit hours

Communication: 6 semester credit hours

COMM 1311 Survey of Oral and Technology-based Communication
RHET 1302 Rhetoric

Mathematics: 3 semester credit hours

MATH 2413 Differential Calculus\textsuperscript{3, 4}

or MATH 2417 Calculus I\textsuperscript{3, 4}

Life and Physical Sciences: 6 semester credit hours

PHYS 2325 Mechanics\textsuperscript{5}

or PHYS 2421 Honors Physics I - Mechanics and Heat\textsuperscript{5, 6}
PHYS 2326 Electromagnetism and Waves\textsuperscript{5}

or PHYS 2422 Honors Physics II - Electromagnetism and Waves\textsuperscript{5, 6}

Language, Philosophy and Culture: 3 semester credit hours

HUMA 1301 Exploration of the Humanities

Creative Arts: 3 semester credit hours

ARTS 1301 Exploration of the Arts

American History: 6 semester credit hours

Select any 6 semester credit hours from American History core courses (see advisor)

Government / Political Science: 6 semester credit hours

GOVT 2305 American National Government
GOVT 2306 State and Local Government

Social and Behavioral Sciences: 3 semester credit hours

Select any 3 semester credit hours from Social and Behavioral Sciences core courses (see advisor)

Component Area Option: 6 semester credit hours

CHEM 1311 General Chemistry I\textsuperscript{5}

or CHEM 1315 Honors Freshman Chemistry I\textsuperscript{5}
CHEM 1312 General Chemistry II\textsuperscript{5}

or CHEM 1316 Honors Freshman Chemistry II\textsuperscript{5}
II. Major Requirements: 67-69 semester credit hours

Major Preparatory Courses: 25-27 semester credit hours beyond core curriculum

**CHEM 1111** General Chemistry Laboratory I
or **CHEM 1115** Honors Freshman Chemistry Laboratory I
**CHEM 1112** General Chemistry Laboratory II
or **CHEM 1116** Honors Freshman Chemistry Laboratory II
**CHEM 1311** General Chemistry I⁵
or **CHEM 1315** Honors Freshman Chemistry I⁵
**CHEM 1312** General Chemistry II⁵
or **CHEM 1316** Honors Freshman Chemistry II⁵
**MATH 2413** Differential Calculus³, ⁴
or **MATH 2417** Calculus I³, ⁴
**MATH 2414** Integral Calculus⁴
or **MATH 2419** Calculus II⁴
**MATH 2415** Calculus of Several Variables⁴
or **MATH 2451** Multivariable Calculus with Applications⁴, ⁷
**MATH 2418** Linear Algebra⁷
**MATH 2420** Differential Equations with Applications⁷
**PHYS 1100** The Fun of Physics
**PHYS 2303** Contemporary Physics⁷
**PHYS 2325** Mechanics⁵
and **PHYS 2125** Physics Laboratory I⁷

Or

**PHYS 2421** Honors Physics I - Mechanics and Heat⁵, ⁶
and **PHYS 2121** Honors Physics Lab I
or **PHYS 2125** Physics Laboratory I
**PHYS 2326** Electromagnetism and Waves⁵
and **PHYS 2126** Physics Laboratory II⁷

Or

**PHYS 2422** Honors Physics II - Electromagnetism and Waves⁵, ⁶
and **PHYS 2126** Physics Laboratory II⁷
Major Core Courses: 24 semester credit hours

- PHYS 3312  Classical Mechanics
- PHYS 3427  Electronics with Laboratory
- PHYS 3330  Numerical Methods in Physics and Computational Techniques
- PHYS 3411  Theoretical Physics
- PHYS 3416  Electricity and Magnetism
- PHYS 4311  Thermodynamics and Statistical Mechanics
- PHYS 4373  Physical Measurements Laboratory

Major Related Courses: 18 semester credit hours

- PHYS 4301  Quantum Mechanics I
- PHYS 4302  Quantum Mechanics II
- PHYS 4328  Optics
- PHYS 4352  Concepts of Modern Physics

Choose two Physics Elective courses from the following:

- PHYS 3317  Physics of the Human Body
- PHYS 3380  Astronomy
- PHYS 4335  Remote Sensing of the Earth
- PHYS 4371  Solid State Physics
- PHYS 4381  Space Science
- PHYS 4383  Plasma Physics
- PHYS 4386  Elementary Particle Physics
- PHYS 4392  Extragalactic Astrophysics
- PHYS 4395  Cosmology
- PHYS 4V07  Senior Research Projects
- PHYS 4V10  Special Topics in Physics
- PHYS 4V11  Topics in Physics

III. Elective Requirements: 9-11 semester credit hours

Both lower- and upper-division courses may count as electives, but the student must complete at least 51 semester credit hours of upper-division courses to qualify for graduation.

UTeach Option

The UTeach option may be added to either the BA or BS degree. UTeach Dallas Option
degree plans are streamlined to allow students to complete both a rigorous Bachelor of Science or Bachelor of Arts degree and all coursework for middle or high school teacher certification in four years. Teaching Option degrees require deep content knowledge combined with courses grounded in the latest research on math and science education. While most graduates go on to classroom teaching, UTeach alums are also prepared to enter graduate school and to work in discipline related industry.

Fast Track Baccalaureate/Master’s Degrees

For students interested in pursuing graduate studies in physics, the Physics Department offers an accelerated BS / MS Fast Track that involves taking graduate courses in lieu of several advanced undergraduate courses. Acceptance into the Fast Track is based on the student's attaining a GPA (grade point average) of at least 3.200 on a minimum of 30 semester credit hours of upper-division courses that include PHYS 3411, PHYS 3312, PHYS 3330, PHYS 3416, PHYS 4301 and PHYS 4311. Eligible students may take up to 15 semester credit hours of selected graduate courses that may be used to complete the baccalaureate degree and also satisfy requirements for the master's degree. These credits will partially satisfy the UT Dallas MS degree requirements when the student completes the BS degree. Interested students should contact their advisor during their junior year to apply to the Fast Track program.

1. Incoming freshmen must enroll and complete requirements of UNIV 1010 and the corresponding school-related freshman seminar course. Students, including transfer students, who complete their core curriculum at UT Dallas must take UNIV 2020.

2. Curriculum Requirements can be fulfilled by other approved courses from institutions of higher education. The courses listed are recommended as the most efficient way to satisfy both Core Curriculum and Major Requirements at UT Dallas.

3. One semester credit hour of Calculus is counted as Major Preparatory credit; three semester credit hours are counted in Core Curriculum.

4. Students may choose either calculus sequence MATH 2413, MATH 2414, and MATH 2415 or MATH 2417, MATH 2419 and MATH 2451.

5. A required Major preparatory course that also fulfills a Core Curriculum requirement. Semester credit hours are counted in Core Curriculum.

6. If Honors Physics is taken, three hours are counted under the sciences core and one hour is counted under Physics Major Preparatory Courses.

7. Indicates a prerequisite class to be completed before enrolling for upper-division classes.

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