KING UNIVERSITY
ESTABLISHED IN 1867

Physics
Bachelor of Science
Bachelor of Arts
Arts & Sciences

Program Coordinator: K. Kothapalli

The Physics major is offered as either a Bachelor of Science or Bachelor of Arts degree. The laws of physics established by our Creator make the discipline of physics relevant to all the natural sciences and bring understanding of nature as well as faith issues.

Student Learning Outcomes

1. Students will be able to solve quantitative physics problems.
2. Students will have a basic knowledge of key areas of physics: mechanics, electricity and magnetism, modern physics, optics, nuclear and atomic physics.
3. Students will demonstrate the ability to communicate scientific content orally and in writing.
4. Students will have command of basic experimental techniques, including data analysis.

At the end of the program of study, all students majoring in Physics will be required to pass a comprehensive assessment administered during PHYS 4900.

Bachelor of Science Degree in Physics with a Minor in Mathematics

The Bachelor of Science Degree in Physics prepares students for graduate study in physics and related fields, such as medical physics, astrophysics, applied mathematics, and engineering. It also prepares students for any career field that requires rigorous analytical and mathematical thinking. Students will be able to solve quantitative problems, have a basic knowledge of the major areas of physics, be able to express themselves in a professional manner, and understand experimental techniques and data analysis.

Physics is the study of the physical world, including all matter and energy. The Bachelor of Science degree is a rigorous program, consisting of 50 semester hours of science and mathematics in addition to Core Curriculum courses. It includes enough hours in in Mathematics for a minor and leaves 32 elective hours available to the student for another major or minor. Alternatively, the student can double major in Physics and Mathematics. Students are encouraged to spend one summer doing research and may be published authors before graduation. Academic credit is usually available for internship or research efforts.

Core Curriculum Requirements

Physics majors should fulfill specified categories of the King Core Curriculum by taking the courses indicated below. See the "The Core Curriculum" section of the catalog for additional details.

Science

CHEM 1110
General Chemistry I.....4 s.h.

Quantitative Literacy

MATH 2350
Calculus I ..... 4 s.h.

Physics BS Major Requirements

PHYS 2210
General Physics I ..... 4 s.h.
PHYS 2220
General Physics II ..... 4 s.h.
PHYS 3010
Theoretical Mechanics ..... 4 s.h.
PHYS 3030
Electricity and Magnetism ..... 4 s.h.
PHYS 3060
Introduction to Modern Physics ..... 4 s.h.
PHYS 3502
Experimental Methods ..... 2 s.h.
PHYS 4201
Advanced Topics ..... 2 s.h.
PHYS 4080
Introductory Quantum Mechanics ..... 4 s.h.

Choose from the following courses ..... 4 s.h.
CHEM 4000
Physical Chemistry I (5 s.h.)
PHYS 3052
Optics (4 s.h.)
PHYS 3072
Heat and Thermodynamics (4 s.h.)
PHYS 3401
Medical Physics (4 s.h.)
PHYS 3500
Computational Physics (4 s.h.)

MATH 2360
Calculus II ..... 4 s.h.
MATH 2370
Vector Calculus ..... 4 s.h.
MATH 3430
Differential Equations ..... 4 s.h.

Choose from the following courses ..... 4 s.h.
MATH 2450
Linear Algebra (4 s.h.)
MATH Elective
3000 or 4000 level (4 s.h.)

IDST 4500
Interdepartmental Math and Science Seminar ..... 2 s.h.
PHYS 4990
Comprehensive Assessment ..... 0 s.h.

Summary of Total Credits

Core Curriculum ..... 42 s.h.
Major Requirements*..... 50 s.h.
Electives/Minor/2nd Major** ..... 32 s.h.
Minimum to Earn Bachelor of Science ..... **124 s.h.**

* This includes the minor in Mathematics.
** A double major in Physics and Mathematics allows for 16 s.h. of electives or another minor.

Bachelor of Arts Degree in Physics

The Bachelor of Arts Degree in Physics is ideal preparation for many technical careers, especially those that require rigorous analytical and quantitative thinking. It is also appropriate for a student desiring to become a teacher at the middle and senior high school level (with licensure). Students will be able to solve quantitative problems, have a basic knowledge of the major areas of physics, be able to express themselves in a professional major, and understand experimental techniques and data analysis.

Students frequently spend one summer doing research or internships and may be published authors before graduation. Academic credit is usually available for research and internship efforts.

Physics is the study of the physical world, including all matter and energy. The Bachelor of Arts degree is a rigorous program consisting of 46 semester hours of science and mathematics beyond the core requirements.

Students frequently spend one summer doing research or internships and may be published authors before graduation. Academic credit is usually available for research and internship efforts.

Physics BA Major Requirements

PHYS 2210
General Physics I ..... 4 s.h.
PHYS 2220
General Physics II ..... 4 s.h.
PHYS 3010 (Co-Requisite MATH 3430 Differential Equations)
Theoretical Mechanics ..... 4 s.h.
PHYS 3030 (Co-Requisite MATH 2370 Vector Calculus)
Electricity and Magnetism ..... 4 s.h.
PHYS 3060
Introduction to Modern Physics ..... 4 s.h
PHYS 3502
Experimental Methods ..... 2 s.h.
PHYS 4201
Advanced Topics ..... 2 s.h.

Choose from the following courses ..... 4 s.h.
MATH 1500
Cryptology: The Science of Secret Writing (4 s.h.)
MATH 2100
Programming with Graphics, Symbols, and Text (2 s.h.)
MATH 2480
History of Mathematics (2 s.h.)

MATH 3120
Number Theory (2 s.h.)

BIOL 2110
General Biology I ..... 4 s.h.
MATH 2360
Calculus II ..... 4 s.h.
MATH 2370
Vector Calculus ..... 4 s.h.
MATH 3430
Differential Equations ..... 4 s.h.
IDST 4500
Interdepartmental Science and Math Seminar ..... 2 s.h.
PHYS 4990
Comprehensive Assessment ..... 0 s.h.

Summary of Total Credits
Core Curriculum ..... 42 s.h.
Major Requirements ..... 46 s.h.
Second Major/minors/Electives ..... 36 s.h.
Minimum to Earn Bachelor of Arts in Physics ..... 124 s.h.

Teacher Education – PHYSICS
The B.S. in Physics with Tennessee teaching licensure (Grades 6-12) is available with modifications to the BA in Physics and the King Core Curriculum, as well as successful completion of the Secondary Education minor. Licensed teachers in secondary education are in great demand in all fifty states, and the areas of science and mathematics are considered critical need areas in K-12 public education by all states.

Declaration of the Education minor and early and frequent advisement is essential to timely completion of degree and licensure requirements. Students seeking secondary teacher licensure will be assigned a secondary education advisor in the Department of Teacher Education, in addition to their major advisor. See the "Admission to the Teacher Education Program" section of this catalog or contact the Administrative Assistant in School of Education for eligibility criteria, admissions procedures, and timelines.

Student Learning Outcomes for Teacher Education
In addition to the discipline specific student learning outcomes for Physics, teacher candidates will demonstrate mastery of the following Student Learning Outcomes, which are aligned with the both Tennessee Teacher Licensure Standards: Professional Education and InTASC Standards: Interstate Teacher Assessment and Support Consortium.

1. The pre-service teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and creates learning experiences that make the discipline(s) accessible and meaningful for learners to assure mastery of the content.
2. The pre-service teacher uses understanding of individual differences and diverse cultures and communities to ensure inclusive learning environments that enable each learner to meet high standards.
3. The pre-service teacher understands and uses a variety of instructional strategies to encourage learners to develop deep understanding of content areas and their connections and to build skills to apply knowledge in meaningful ways.

Core Curriculum Requirements
Physics majors seeking teaching licensure should fulfill specified categories of the King Core Curriculum by taking the courses indicated below. See the "The Core Curriculum" section of the catalog for additional details on fulfilling other categories in the Core.

Science
CHEM 1110
General Chemistry I ..... 4 s.h.

Quantitative Literacy
MATH 2350
Calculus I ..... 4 s.h.

BA in Physics Major Requirements for Teaching Licensure
PHYS 2210 and 2220
General Physics I ..... 4 s.h.
PHYS 2220
General Physics II ..... 4 s.h.
PHYS 3010 (Co-Requisite MATH 3430 Differential Equations)
Theoretical Mechanics ..... 4 s.h.
PHYS 3030 (Co-Requisite MATH 2370 Vector Calculus)
Electricity and Magnetism ..... 4 s.h.
PHYS 3060
Introduction to Modern Physics ..... 4 s.h.
PHYS 3502
Experimental Methods ..... 2 s.h.
PHYS 4201
Advanced Topics ..... 2 s.h.

Choose from the following courses ..... 4 s.h.
BIOL 2110
General Biology I (4 s.h.)
BIOL 2120
General Biology II (4 s.h.)

Choose from the following courses ..... 4 s.h.
ITEC 2010
Programming for STEM (4 s.h.)
MATH 1500
Cryptology: The Science of Secret Writing (4 s.h.)
MATH 2100
Programming with Graphics, Symbols, & Text (2 s.h.)
MATH 2480
History of Mathematics (2 s.h.)
MATH 3120
Number Theory (2 s.h.)

MATH 2360
Calculus II ..... 4 s.h.
MATH 2370
Vector Calculus ..... 4 s.h.
MATH 3430
Differential Equations ..... 4 s.h.

IDST 4500
Interdepartmental Science and Math seminar..... 2 s.h.

Total Science Credits Required .....**46 s.h.**

Secondary Education Minor

EDUC 2030
Introduction to Teaching: Grades K-12 .....2 s.h.
EDUC 2031
Introduction to Teaching Practicum: Grades PreK-12 .....1 s.h.
EDUC 2100
Survey of Exceptional Children .....4 s.h.
EDUC 2370
Reflective Teaching: Planning for Classroom Instruction.....3 s.h.
EDUC 2900
Foundations of Education.....3 s.h.
EDUC 2950
Technology for Teachers .....2 s.h.
EDUC 3390*
Secondary Curriculum and Methods .....3 s.h.
EDUC 3590*
Content Area Reading .....3 s.h.
EDUC 3600*
Assessment and Evaluation .....3 s.h.
EDUC 4490*
Student Teaching: Grades 6-10 .....5 s.h.
EDUC 4500*
Student Teaching: Grades 9-12 .....5 s.h.
EDUC 4940
Introduction to edTPA.....1 s.h.
EDUC 4950*
Capstone Seminar: Grades K-12 .....2 s.h.
PSCI 2120
Cultural Diversity in America .....0-4 s.h.
PSYC 3320
Adolescent Development.....4 s.h.
EDUC 4990*
Comprehensive Assessment (passing state-required Praxis II exams, successful portfolio completion, successful portfolio defense).....0 s.h.

*Requires admittance to the Teacher Education Program

Summary of Total Credits for BA in Physics with Licensure

Core Curriculum .....42 s.h.
Major Requirements.....46 s.h.
Secondary Education Minor..... 45 s.h.
Minimum to Complete 6-12 Licensure Program in Physics .....**133 s.h.**