STEPHEN F. AUSTIN STATE COLLEGE

GENERAL BULLETIN

1966-67

THE SCHOOL OF SCIENCES AND MATHEMATICS

The Science Building

The School of Sciences and Mathematics

The School of Sciences and Mathematics includes the Departments of Biology, Chemistry, Mathematics and Physics, and provides offerings in Geology.

A primary aim of the School is to contribute to the liberal education of all students through the presentation of fundamental concepts and methods of science and mathematics, so that students gain a better understanding of the complex cultural patterns of the economic and social forces influencing their lives. Another function is to provide the fundamental education required for professional studies and careers of a scientific or mathematical nature.

Undergraduate major programs in the School of Science and Mathematics lead to the Bachelor of Arts and the Bachelor of Science Degrees. Graduate major programs leading to the Master of Science are provided by the Department of Biology, Physics, and Mathematics. A graduate minor program is offered in Chemistry.

This School also provides preprofessional programs and counseling for students planning to enter Schools of Medicine, Dentistry, Physical Therapy, Medical Technology, Nursing, Veterinary Medicine, Osteopathy, Optometry, Pharmacy and Engineering. These Programs are the primary concern of two faculty committees. These committees and the Dean provide information, advice and assistance to students preparing themselves for professional studies in the health and engineering sciences.

Department of Physics

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Physics is an activity the goal of which is to understand and explain observed physical phenomena in a logical uniform system of thought. The objectives of the department are several: to prepare students for further study or for professional responsibilities in physics with industry or government; to provide students with the necessary physics background required for work in related sciences and medicine; to assist non-science majors in developing an insight into the physical aspects of their environment and the extensive scientific activity of our society.

The curriculum is designed to acquaint students with the general all-embracing principles which are the foundations of the present understanding in physics and to furnish experiences in lecture and laboratory which will develop scientific attitudes, insight, and techniques.

The graduate curriculum continues the broad coverage of classical and quantum physics. Teaching and research assistantships are usually available to provide financial assistance to qualified graduate students.

Definitions of Undergraduate Majors and Minors

The recommended courses for a major in physics are Physics 131, 132, 231, 233, 340, 357, 431, 457, plus two additional advanced courses. The minimum course requirements for the major are eight courses including twelve advanced hours. Students majoring in physics regularly minor in mathematics. Many elect to pursue a double major in physics and mathematics. Undergraduate students who intend to do graduate work are advised to take one or two languages selected from Russian, German, and French.

The courses required for a minor in physics are Physics 131, 132, 231, 233, 340 and 357.

The requirements for a teaching field in physics are listed in the department of education.

Suggested Curriculum for Majors

Students who are not prepared to begin their college mathematics with Mathematics 139 are encouraged either to enroll for preparatory mathematics during the summer prior to their beginning the programs outlined below or to complete one semester of calculus during the summer following the freshman year. Students desiring assistance in developing a proficiency with a slide rule may take Physics 108 as an elective.

Major in Physics: Bachelor of Science Degree

Freshman Year

Physics 131	4	Physics 132	4	
Mathematics 139	3	Mathematics 233	3	
English 131 or 133	3	English 132 or 134	3	
Elective	6	Elective	3	
Physical Education	1	Health	1	
	—	Physical Education	1	
	17		—	
			15	32

Sophomore Year

Physics 231	4	Physics 233	4	
Chemistry 133	4	Chemistry 134	4	
English 231 or 300 level Literature	3	English 232 or 300 level Literature	3	
History 233	3	History 234	3	
Mathematics 234	3	Elective	3	
Physical Education	1			
	—		—	
	18		17	35

Junior Year

Physics 357	3	Physics 340	3	
Physics 343	3	Political Science 241	3	
Mathematics 333	3	Mathematics 437	3	
Biology 131	4	Biology 133	4	
Elective or Minor	3	Elective or Minor	3	
			—	
	16		16	32

Senior Year

Physics 431	3	Physics 441	4	
Physics 457	3	Electives and Minor	12	
Electives and Minor	6		—	
Political Science 242	3		16	31
	—	130 Hours Total		
	15			

Major in Physics: Bachelor of Arts Degree

Freshman Year

Physics 131	4	Physics 132	4	
Elective	6	Mathematics 233	3	
English 131 or 133	3	English 132 or 134	3	
Mathematics 139	3	Minor and Electives	3	
Physical Education	1	Health 100	1	
	—	Physical Education	1	
	17		—	
			15	32

Sophomore Year

Physics 231	4	Physics 233	4	
Mathematics 234	3	Elective	4	
Modern Language	4	Modern Language	4	
History 233	3	History 234	3	
English 231 or 300 level Literature	3	English 232 or 300 level Literature	3	
Physical Education	1		—	
	—		18	36
	18			

Junior Year

Physics 357	3	Physics 340	3	
Physics 343	3	Modern Language	3	
Modern Language	3	Political Science 241	3	
Mathematics 333	3	Mathematics 437	3	
Minor or Elective	3	Minor or Elective	3	
	—		—	
	15		15	30

Senior Year

Physics 431	3	Physics 441	4	
Physics 457	3	Minor and Electives	11	
Minor and Electives	8		—	
Political Science 242	3		15	32
	—	130 Hours Total		
	17			

Some recommended electives are:

Philosophy 263—Logic and Language
Speech 101—Fundamentals of Speech
Speech 111—Beginning Public Speaking
Economics 231-232—Principles of Economics
Economics 331—Money and Banking
Economics 449—Statistics
Forestry 105—Engineering Drawing
Geography 443—Introductory Meteorology

Mathematics 461—Numerical Analysis
Business Administration 231-232—Principles of Accounting
Business Administration 335-336—Business Law
Business Administration 371—Industrial Management

Graduate Programs

The graduate major in physics is expected to complete at least 18 hours of physics beyond the bachelors' degree. A graduate student planning to do further graduate work, or go into industry should write a thesis, while those planning to enter the teaching profession are allowed to take 6 additional hours of physics.

A graduate minor in physics is required to take at least 6 semester hours of physics which may be the senior level courses.

Courses in Physics

101. **General Physics I**—4 semester hours, 3 hours lecture, 2 hours lab per week. A presentation with a minimum of mathematics of the basic concepts of mechanics and heat. The concept of science and its historical development are emphasized and an introduction to astronomy is included. This course may not be applied toward certification for high school teachers of physics or toward the major or minor in physics and is not recommended for science majors. Prerequisite: 1 year of high school algebra. Lab fee $2.00.

102. **General Physics II** 4 semester hours, 3 hours lecture, 2 hours lab per week. A continuation of Physics 101 presenting with a minimum of mathematics the basic concepts of light, electricity, magnetism, and certain aspects of modern physics. This course may not be applied toward certification for high school teachers of physics or toward the major or minor in physics and is not recommended for science majors. Prerequisite: Physics 101. Lab fee $2.00.

108. **Physics Problems** 3 semester hours, 3 hours lecture per week. The use of the slide rule, preparation and interpretation of graphical data. Problems from physics and engineering are used as exercises. For students majoring in the physical sciences or engineering.

131. **Mechanics and Heat** 4 semester hours, 3 hours lecture, 3 hours lab per week. Fundamental principles of mechanics and heat. Prerequisite: High school trigonometry. Lab Fee $2.00.

132. **Electricity, Sound and Light** 4 semester hours, 3 hours lecture, 3 hours lab per week. Basic electrical and magnetic phenomena, wave motion, sound and light. Prerequisite: Physics 131. Lab Fee $2.00.

231. **Electricity and Magnetism**—4 semester hours, 3 hours lecture, 3 hours lab per week. Direct current and alternating current circuits. Series, parallel circuits, Kirchoff's Laws, Thevenin's Theorem, network theorems, impedance matching and coupled circuits with an introduction to electronics. Prerequisites: Physics 132 and Differential Calculus. Lab Fee $2.00.

233. **Introduction to Modern Physics**—4 semester hours, 3 hours lecture, 3 hours lab per week. Particle aspects of continuous media, wave nature of particles, special relativity, the hydrocarbon and many-electron atom, natural radioactivity, and nuclear structure. A brief survey of molecular and solid state physics. Prerequisites: Physics 132 and Integral Calculus. Lab Fee $2.00.

340. **Introduction to Electricity and Magnetism**—3 semester hours, 3 hours lecture per week. Extension of electric and magnetic field theory with an emphasis on vector analysis. Properties of dielectrics and magnetic materials. Electric and electronic circuits for physical measurements. Prerequisites: Physics 231 and Integral Calculus.

343. **Electronics**—3 semester hours (lab only), 9 hours lab per week. A study of the vacuum tube and solid state devices and their application to radio, television, opera-

tional amplifiers, digital circuits, and control-problems. Rectifiers, voltage amplifiers, power amplifiers, oscillators, wave shaping circuits, switching and digital counting systems. Prerequisites: Physics 231 or its equivalent established by examination. Lab Fee $2.00.

357. **Analytic Mechanics I** 3 semester hours, 3 hours lecture per week. The physical principles of mechanics. Newton's laws of motion, dynamics of a particle, dynamics of rigid bodies, rotation, work and energy, momentum and impulse. Prerequisites: Integral Calculus, Physics 131.

398. **Honors Problems and Research**—1 to 3 semester hours lecture and/or laboratory. Independent investigations by honor students guided through individual conferences with the professor in charge. Introduction to methods and techniques of research, problem solving and report writing. May be repeated one time. Prerequisite: Two advanced courses in Physics.

430. **Heat and Thermodynamics**—3 semester hours, 3 hours lecture per week. The fundamentals of heat, with an introduction to thermodynamics. Thermometers, expansion of solids, and liquids, calorimetry, mechanical equivalent of heat, heat transfer, kinetic theory and thermodynamics. Prerequisite: one year of physics and integral calculus.

431. **Modern Physics**—3 semester hours, 3 hours lecture per week. The kinetic theory of gases, special relativity, Bohr's theory of atomic spectra, and introduction to quantum mechanics. Prerequisite: Physics 233 or equivalent.

441. **Light**—4 semester hours, 3 hours lecture, 3 hours lab per week. Geometrical optics, optical instruments, dispersion, scattering, interference, diffraction, and polarization. Prerequisites: Physics 132 and 2 semesters of calculus. Lab Fee $2.00.

457. **Analytic Mechanics II**—3 semester hours, 3 hours per week. Dynamics of systems of particles, compound pendulum, accelerated coordinate systems, the vibrating string, and introduction to the Lagrangian formulation. Prerequisite: Physics 357.

511. **Nuclear Physics** 3 semester hours, 3 hours lecture per week. Relativity, quantum theory, wave mechanics and nuclear phenomena. Prerequisite: Physics 431 or equivalent.

512. **Atomic Structure**—3 semester hours, 3 hours lecture per week. The atom and atomic spectra from the theoretical point of view. Prerequisite: Physics 431 or equivalent.

531. **Classical Mechanics**—3 semester hours, 3 hours lecture per week. Lagrange's equations, Hamilton's principle, dynamics of particles and of rigid bodies, gyrodynamics, the Hamilton equations of motion, and canonical transformations. Prerequisite: Physics 457 or equivalent. Formerly, Physics 531, Theoretical Physics.

532. **Electromagnetic Waves** 3 semester hours, 3 hours lecture per week. Theory of electromagnetism, static and time varying fields, propagation, reflection and refraction of electromagnetic waves. Prerequisites: Physics 340 and differential equations.

533. **Theoretical physics**—3 semester hours, 3 hours lecture per week. Theoretical topics from classical and quantum physics selected in accordance with the interest and areas of specialization of the graduate students. Prerequisites: Physics 340, 431, and 457.

575. **Advanced Graduate Studies**—3 semester hours, 1 hour lecture, 6 hours lab per week. Individual studies consisting of conferences and laboratory studies in the fields of Quantum Mechanics, Statistical Mechanics, Thermodynamics, Electromagnetic Theory, Classical Mechanics, Special Electronic Circuits, Electrical Vibrations, and Special Problems not related to the thesis. Prerequisite: 4 semesters of physics or equivalent and consent of major professor.

589. **Graduate Research** 3 semester hours, 9 hours lab per week. Research for the thesis. Should be planned and initiated at least two semesters before the thesis is to be completed.

590. **Thesis**—3 semester hours. Writing of the thesis. The research project in this course must be initiated at least one semester before registration in order that the thesis research be carried out over a period of not less than two semesters.