Bachelor of Science with a Major in Physics

Selected Educational Outcomes

The program leading to the Bachelor of Science degree with a major in physics is designed to prepare students to enter graduate programs in physics or in astronomy, or to embark upon careers in government, industry, or education. Examples of these outcomes include the following:

1. students will demonstrate knowledge in the fundamental branches of physics: mechanics, electromagnetism, and quantum mechanics;
2. students will demonstrate knowledge in several elective areas within the field of physics, including (but not limited to) thermodynamics, electronics, optics, and computational physics;
3. students will apply the techniques of mathematical analysis (algebra, geometry, trigonometry, and calculus) to physical problems;
4. students will effectively use computers and calculators for scientific calculation, programming, and word processing.

Examples of Outcome Assessments

Assessment of the education outcomes for the physics major is primarily the responsibility of the departmental Physics Area Committee, comprised of faculty with expertise in physics and cognate disciplines. The Committee assesses the extent to which the program requirements create the desired outcomes by using a variety of techniques. Examples of these assessments include the following:

1. All student majors must make oral presentations of their research results to the departmental faculty and submit written copies of their research papers to the departmental office as part of the required Capstone Seminar (PHYS 4501).
2. Students must submit a departmental copy of their portfolios of undergraduate coursework, research projects, and professional activity at the end of their last semester of residence.
3. At the time of major coursework completion, students must complete an exit questionnaire to determine the students' perception of achievement of the major's educational outcomes.
4. Periodic surveys of alumni who have completed the physics program will be conducted to evaluate the relevancy of the major program to graduates' present employment, their perception of success, and their personal satisfaction with the program. The surveys will also solicit suggestions for improvement of the physics major program.

Requirements for the Bachelor of Science Degree with a Major in Physics

Code	Title	Hours
Core Curriculum		**60**
Core Curriculum Areas A-E (See VSU Core Curriculum)		42
Physics majors are required to take MATH 1113 in Area A and MATH 2261 in Area D2. They are advised to take PHYS 2211K, PHYS 2212K in Area D2.		
Core Curriculum Area F		
MATH 2261	Analytic Geometry and Calculus I (1 hour left over from Area D)	
MATH 2262 & MATH 2263	Analytic Geometry and Calculus II and Analytic Geometry and Calculus III	
PHYS 2700	Modern Physics	
PHYS 2211K & PHYS 2212K	Principles of Physics I and Principles of Physics II (if not taken in Area D2)	
Lab Sciences, if PHYS 2211K, PHYS 2212K are taken in Area D2		
Senior College Curriculum		**60**
Upper-Level Courses in Physics		
PHYS 3810	Mathematical Methods of Physics	3
PHYS 3820	Computational Physics I	4
PHYS 4111 & PHYS 4112	Theoretical Mechanics I and Theoretical Mechanics II	6
PHYS 4211 & PHYS 4212	Electromagnetism I and Electromagnetism II	6
PHYS 4310	Thermodynamics	3
PHYS 4411 & PHYS 4412	Quantum Mechanics I and Quantum Mechanics II	6
MATH 3340	Ordinary Differential Equations	3
or PHYS 3800	Differential Equations in Physical Systems	

Select two courses from the following:		8
PHYS 3040	Electronics	
PHYS 3100	Optics	
PHYS 4040	Experimental Physics	
Other Supporting Courses		6-9
MATH 2150	Introduction to Linear Algebra	3
Language Requirement (Students may choose to take CS 1301 and CS 1302 to satisfy the language requirement. The additional 2 hours from CS 1301 and CS 1302 can count as part of the guided electives)		3-6
Guided Electives [1]		12-15
Total hours required for the degree		**120**

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chosen from: any 3000- or 4000-level CS, ASTR, GEOL, CHEM, BIOL, or PHYS course or MATH 3040, MATH 3600, or any 4000-level MATH course except MATH 4161.

Requirements for the Bachelor of Science Degree with a Major in Physics--Applied Physics Track

Code	Title	Hours
Core Curriculum		**60**
Core Curriculum Areas A-E (See VSU Core Curriculum)		42
Physics majors are required to take MATH 1113 in Area A and MATH 2261 in Area D.2. They are advised to take PHYS 2211K and PHYS 2212K in Area D.2.		
Core Curriculum Area F [1]		
PHYS 2700	Modern Physics	1
CS 1301	Principles of Programming I	4
MATH 2262	Analytic Geometry and Calculus II	4
MATH 2263	Analytic Geometry and Calculus III	4
MATH 2261	Analytic Geometry and Calculus I (1 hour left over from Area D)	4
Select one of the following sequences:		4
CHEM 1211 & 1211L	Principles of Chemistry I and Principles of Chemistry Laboratory I	
BIOL 1107 & 1107L	Principles of Biology I and Principles of Biology Laboratory I	
Senior College Curriculum		**60**
Required Courses [2]		33
CS 1302	Principles of Programming II	4
Select one of the following sequences:		4
CHEM 1212 & 1212L	Principles of Chemistry II and Principles of Chemistry Laboratory II	
BIOL 1108 & 1108L	Principles of Biology II and Principles of Biology Laboratory II	
PHYS 3040	Electronics	4
PHYS 3100	Optics	4
PHYS 3820	Computational Physics I	4
PHYS 4040	Experimental Physics	4
PHYS 4111	Theoretical Mechanics I	3
PHYS 4211	Electromagnetism I	3
PHYS 4411	Quantum Mechanics I	3
Supporting Courses and Electives		27
MATH Electives: Select two from the following courses:		6
MATH 2150	Introduction to Linear Algebra	
MATH 3040	Set Theory	
MATH 3340	Ordinary Differential Equations	
MATH 3600	Probability and Statistics	

MATH 4150	Linear Algebra	
MATH 4260	Mathematical Analysis	
MATH 4300	Functions of a Complex Variable	
MATH 4540	Topology	
Modern Foreign Language (3 hours may be taken in Area C)		3-6
Other Guided Electives		15-18
BIOL 3200	Introductory Genetics	
BIOL 3250	Ecology and Evolution	
BIOL 3350	Environmental Science	
BIOL 3450	Animal Physiology	
BIOL 3460	Human Physiology	
BIOL 3610	Dendrology	
BIOL 3650	Plant Systematics	
BIOL 3680	Plant Pathology	
BIOL 3700	Neuroscience	
BIOL 3810	Introduction to Biogeography	
BIOL 4100	Morphology of Land Plants	
BIOL 4250	Human Anatomy	
BIOL 4450	Theory and Practice of Scanning Electron Microscopy	
BIOL 4850	Biology Internship	
BIOL 4950	Directed Study	
CHEM 2210	Sophomore Seminar	
CHEM 2310	Quantitative Analysis	
CHEM 3320	Environmental Chemistry	
CHEM 3401	Organic Chemistry I	
CHEM 3402	Organic Chemistry II	
CHEM 3510	Inorganic Chemistry	
CHEM 3601 & 3601L	Biochemistry I and Laboratory Techniques in Biochemistry	
CHEM 3602	Biochemistry II	
CHEM 3801	Physical Chemistry I	
CHEM 3802	Physical Chemistry II	
CHEM 4210	Seminar	
CHEM 4310	Instrumental Analysis	
CHEM 4420	Physical Organic Chemistry	
CHEM 4810	Computational Chemistry	
CHEM 4920	Special Topics	
CS 1010	Algorithmic Problem Solving	
CS 3101	Computer Organization	
CS 3102	Assembly Language	
CS 3300	UNIX Programming	
CS 3335	The C Programming Language	
CS 3340	Web Programming	
CS 3410	Data Structures	
CS 3520	Algorithms	
CS 4121	Data Communications and Networks I	
CS 4122	Data Communications and Networks II	
CS 4321	Software Engineering I	
CS 4322	Software Engineering II	
CS 4340	Systems Programming	
CS 4721	Database Design I	
CS 4722	Database Design II	

CS 4990	Topics in Computer Science	
Total hours required for the degree		**120**

1

All core science and math courses must be completed with a grade of "C" or better.

2

Students must complete at least 39 credit hours of upper-level (3000-4999) courses.

Requirements for the Bachelor of Science Degree with a Major in Physics--Medical Physics Track

Code	Title	Hours
Core Curriculum		**60**
Core Curriculum Areas A-E (See VSU Core Curriculum)		42
Physics majors are required to take MATH 1113 in Area A and MATH 2261 in Area D.2. They are advised to take PHYS 2211K and PHYS 2212K in Area D.2.		
Core Curriculum Area F [1]		
PHYS 2700	Modern Physics	1
CHEM 1211 & 1211L	Principles of Chemistry I and Principles of Chemistry Laboratory I	4
CHEM 1212 & 1212L	Principles of Chemistry II and Principles of Chemistry Laboratory II	4
MATH 2262	Analytic Geometry and Calculus II	4
MATH 2263	Analytic Geometry and Calculus III	4
MATH 2261	Analytic Geometry and Calculus I (1 hour left over from Area D.2)	1
Senior College Curriculum		**60**
Required Courses [2]		33
BIOL 1107 & 1107L	Principles of Biology I and Principles of Biology Laboratory I	4
BIOL 1108 & 1108L	Principles of Biology II and Principles of Biology Laboratory II	4
BIOL 2251K	Human Anatomy and Physiology I	4
BIOL 2252K	Human Anatomy and Physiology II	4
BIOL 3200	Introductory Genetics	3
BIOL 3700	Neuroscience	3
PHYS 3100	Optics	4
PHYS 3810	Mathematical Methods of Physics	3
PHYS 4310	Thermodynamics	3
Select two of the following:		6
PHYS 4111	Theoretical Mechanics I	
PHYS 4211	Electromagnetism I	
PHYS 4411	Quantum Mechanics I	
Supporting Courses and Electives		21
MATH 3340	Ordinary Differential Equations	3
Modern Foreign Language (3 hours may be taken in Area C)		3-6
Other Guided Electives		13-16
BIOL 1200	History of the Life Sciences	
BIOL 3250	Ecology and Evolution	
BIOL 4500	Cell Biology	
BIOL 4520	Molecular Biophysics	
BIOL 4580	Molecular Genetics	
BIOL 4800	Protein Biochemistry	
BIOL 4850	Biology Internship	
CHEM 3401	Organic Chemistry I	

CHEM 3402	Organic Chemistry II	
CHEM 3510	Inorganic Chemistry	
CHEM 3601 & 3601L	Biochemistry I and Laboratory Techniques in Biochemistry	
CHEM 3602	Biochemistry II	
CHEM 3801	Physical Chemistry I	
CHEM 3802	Physical Chemistry II	
CHEM 4210	Seminar	
CHEM 4920	Special Topics	
PHYS 3820	Computational Physics I	
PHYS 4040	Experimental Physics	
PHYS 4112	Theoretical Mechanics II	
PHYS 4212	Electromagnetism II	
PHYS 4412	Quantum Mechanics II	
PHYS 4800	Internship in Physics	
PHYS 4950	Directed Study in Physics	
MATH 1112	Trigonometry	
MATH 3040	Set Theory	
MATH 3600	Probability and Statistics	
MATH 4081	Modern Algebra I	
MATH 4260	Mathematical Analysis	
MATH 4621	Mathematical Statistics I	
MATH 4990	Special Topics in Mathematics	
Total hours required for the degree		**120**

1

All science and math courses must be completed with a grade of "C" or better.

2

Students must complete at least 39 credit hours of upper-level (3000-4999) courses.