

Operational Plan for Physics Program

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Welcome to Physics Program

Physics deals with the underlying knowledge and principles of large areas of the natural world -- from the smallest to the largest, from the simplest to the most complex, and from the feeblest to the most energetic objects in the universe. Physics serves as the foundation of all the sciences and engineering. Our physics program has a long tradition of producing many excellent scientists, engineers, educators, and entrepreneurs. Equipped with a mechanics lab, an electronics lab, computer labs, a machine shop, a nanotech lab, and an optics and quantum information lab, we offer our students many research opportunities.

Program Mission Statement

The Greenville University Mission Statement is, “Greenville University empowers students for lives of character and service through a transforming Christ-centered education in the liberal arts, sciences, and professional studies.” Therefore, the Physics program strives to provide students with quality education in Physics in a caring Christian environment, to help them develop their Christian worldview in the context of Physics, and to provide opportunities for students to use their Physics knowledge and skills to serve humanity.

Programmatic Faith Integration

The Department of Engineering and Physics has three key goals in integrating the discipline and Christian faith. First, we want our students to see the created order beyond materialistic and naturalistic philosophies and to see it in light of a well-informed Christian worldview. Second, we want to help our students to see God's power and to understand the divine nature through the things God has created. Finally, we want to inspire our students to be humble, life-long seekers of God's truth. Physics not only looks into fundamental natural phenomena but also seeks to understand reasons behind those phenomena. As such, physics often touches upon the boundary issues such as the different interpretations of quantum physics, the limits of human knowledge, and worldviews that are larger than the observable world. For anyone seeking deeper truth through modern physics, particularly in quantum mechanics, cosmology, and complexity, these boundary issues are unavoidable. They naturally arise in courses such as PHYS220 University Physics III and PHYS324 Quantum Mechanics as part of homework problems as well as in essay assignments.

Section B

Program/Major Objectives: *Qualities and competencies expected in graduates from this program/major*

At the close of their degree, students should be able to:

1. explain various concepts in Physics (Knowledge)
2. comprehend key principles and theories in Physics (Comprehension)
3. solve problems using the laws and principles of Physics (Application)

4. use lab equipment and theories in labs to perform experiments, analyze their results, and communicate their findings (Analysis)
5. demonstrate an understanding of contemporary and unresolved issues in Physics (Synthesis)
6. appreciate God's creation and consider one's career calling through Physics (Evaluation)

Physics Program Fulfillment of the GU SLOs

Through our physics program, we are enabling students to fulfill the mission of GU through Christ-centered education. We do this by paying attention to students' individual needs as we help them recognize that God has created each of us uniquely with specific talents, interests, and calling.

The majority of the program objectives (POs) #1, 2, 3, and 5 are related to the SLO #2 as students need to master the scientific content of the major, for example, PHYS 200, PHYS 210, PHYS 220 and PHYS 324 are mainly focused on mastering the content of the major. PO #4 addresses SLOs #3 and 4, and it is covered by the lab sessions of PHYS 200, PHYS 210, PHYS 220 and PHYS 324. PO #4 also addresses SLO #5 since students work in lab groups, and often these groups consist of students from multiple cultures. The PO #6 addresses SLOs #1 and 6, and it is covered by the final exam of PHYS 220. The University's general education requirements mainly deal with POs #1, 3, and 5. Hence the Physics program POs and the general education program fully cover GU's student learning outcomes.

Physics Program Connections to Greenville University as a Whole

Physics is a science foundational to all other sciences and engineering. It also provides a basis for forming a scientifically informed Christian worldview. As such, the discipline is historically strongly related to philosophy and theology. Having a solid physics program is important to authentic Christian Liberal Arts higher education. Therefore, it makes an important contribution to encouraging students to use their education for lives of character and service. On the practical level, Physics also provides key support for our STEM programs that are essential to a prosperous future for GU.

The history of excellence in teaching in Physics, well-equipped labs, high-quality summer research, strong support from alumni, and the scholarships designated for Physics and Engineering majors serve as good outreach tools for the University.

Section C

Program Learning Objectives	Required Courses / Learning Opportunities													Elective Courses/Learning Opportunities		
	ENGR 101 Intro to Engineering	200 University Physics I	210 University Physics II	220 University Physics III	ENGR230 Electrical circuits	ENGR250 Statics	318 or ENGR 260	311 Electricity and Magnetism	321 Statistical Mechanics	324 Quantum Mechanics	403 Advanced Lab	405 (BS only) Practicum	409 Seminar in Physics	ENGR 401 Senior Design 1	PHYS325 Quant Info & Comm	Other
1		I *	I	D *	D	D	D	D	D	M *						
2		I *	I	D	D	D	D	D *	D	M *					D	
3		I *	I	D	D	D	D	D *	D	M *		M		D	D	
4		I *	I	D *	D						M *	M			D	
5			I *	D *			D		D	M *		M			D	
6	I *			D *									M *			
Key: *Assessed I = Introduced D = Developed M = Mastered																

Section D

SLO	Program Objective	Level of Mastery (IDM)	Term	Course number	Learning Activity	Benchmark	Assessment method
Year One							
SLO 2	1, 2, 3	I	Fall	200	Exam scores	>70%	Test Score
		D	Fall	220	Exam scores	>70%	Test Score
		D	Spring	311	Exam scores	>70%	Test Score
		M	Spring	324	Exam scores	>70%	Test Score
Year Two							
SLO 1, 2, 3, 4, 6	4, 5, 6	I	Fall	200	Exam scores	>70%	Test Score
		D	Fall	220, 210, ENGR101	Exam scores	>70%	Test Score
		M	Fall	403, 409	Exam scores	>70%	Test Score
		M	Spring	324, 409	Exam scores	>70%	Test Score
Year Three = Year 1							
SLO 2	1, 2, 3	I	Fall	200	Exam scores	>70%	Test Score
		D	Fall	220	Exam scores	>70%	Test Score
		D	Spring	311	Exam scores	>70%	Test Score
		M	Spring	324	Exam scores	>70%	Test Score
Year Four = Year 2							
SLO 1, 2, 3, 4, 6	4, 5, 6	I	Fall	200	Exam scores	>70%	Test Score
		D	Fall	220, 210, ENGR101	Exam scores	>70%	Test Score
		M	Fall	403, 409	Exam scores	>70%	Test Score
		M	Spring	324, 409	Exam scores	>70%	Test Score
Annual Indirect Assessment Methods							

Description of Assessment Processes

The Physics program has established the following multilayer formative and summative assessment processes:

1. Monthly Departmental Meeting in which the faculty discusses any issue related to the academic and personal wellbeing of the students. (Formative)
2. University-wide early-warning system for individual students. (Formative)
3. University-wide mid-term reviews for individual students. (Formative)
4. End-of-semester Faculty Course Assessment Reports (FCAR) faculty course evaluation (Summative/Formative)
5. End-of-semester Assessment Report (Summative)
6. End-of-semester Faculty Assessment and Continuous Improvement Team (FACT) meeting in which the faculty convene a two-hour meeting in which all of the outcome data from the program's courses are discussed and decisions are made on how to make improvements.
7. End-of-academic-year Assessment Report (Summative)
8. End-of-academic-year FACT meeting in which all of the outcome data from the program's courses are discussed and decisions are made on how to make improvements. (Summative/Formative). At this meeting, the faculty also review what data should be obtained from what courses for fair assessments. (Summative/Formative)
9. 4-Year Cycle Departmental Review in preparation for HLC review. (Summative)

Assessment Timetable

1. Monthly Departmental Meeting.
2. FCAR faculty course evaluation: December, May each year
3. End-of-academic-year Assessment Report: May each year
4. End-of-academic-year FACT meeting: May each year – follows University-wide schedule
5. 4-Year Cycle HLC review: Every four years – follows the University-wide schedule