

# Program Learning Outcomes

I= Introduced  
R= Reinforced  
M= Mastered

Program Name: Physics

Date: 8/16/2021

Program Learning Outcomes  Knowledge, skill, or behavior students can demonstrate upon program completion		Courses Mapped to Outcomes													
		Phys 105 Coll Phys	Phys 106 Coll Phys	Phys 121 Gen Phys	Phys 122 Gen Phys	Phys 141 Intro lab	Phys 142 Intro lab	Phys 270 Mod Phys	Phys 280 Math Phys	Phys 281 Inter lab	Phys 342 E&M	Phys 352 Optic	Phys 361 Mech	Phys 362 Stat Mech	Phys 372 Q.M.
1	Graduates will be able to demonstrate an understanding of the essence of physics laws and concepts without mathematics	I	I	I	I			R			M	M	M	M	M
2	Graduates will be able to apply broad concepts in physics to specific problems in order to come to numerical, analytical, and approximate solutions	I	I	I	I			R			M	M	M	M	M
3	Graduates will be able to write a report, discuss the content, and describe the conclusions to a variety of audiences					I	I			R					
4	Graduates will be able to identify and implement appropriate computational tools (software, coding, programming, and/or scripting) to solve a variety of problems both in the context of the classroom and in research projects					I	I	R	R	R	M	M	M	M	M
5	Graduates will know how to identify relevant existing works in literature that inform or support their own scholarly work and provide accurate citations and recognition where appropriate when presenting their own work					I	I			R					



# Program Learning Outcomes: Assessment Tools

Program Name: Physics

Date: 8/16/2021

Program Learning Outcomes  Knowledge, skill, or behavior students can demonstrate upon program completion		Measurement Tool	Timeline/Frequency of Assessment	Target	Review
<b>1</b>	Graduates will be able to demonstrate an understanding of the essence of physics laws and concepts without mathematics	Force concept inventory/CSEM	FCI at the beginning and end of Phys121.* CSEM at the beginning and end of Phys122.* Additionally, end of Phys361 for FCI and end of Phys342 for CSEM.	Average score of 75% on FCI and 60% on CSEM	Results are reviewed at the end of every other (even) academic year at May department meeting.
<b>2</b>	Graduates will be able to apply broad concepts in physics to specific problems in order to come to numerical, analytical, and approximate solutions	One problem from a test, the final exam, or homework in Phys342, 361, 362, and 372 graded against a 1-5 rubric by other than instructor.	End of each semester	Average score of 75% on chosen questions	Results are reviewed at the end of every other (even) academic year at May department meeting.
<b>3</b>	Graduates will be able to write a report, discuss the content, and describe the conclusions	Writing rubric applied to reports written in Phys281 and 382 by the instructor. Presentation rubric applied to presentations in both classes by different physics faculty member.	Best report from Phys281 or 382 will be archived for review each semester the class is offered. Best score sheet from presentation will be archived in each semester.	Average evaluation of 80% on defined rubrics.	Results are reviewed at the end of every other (even) academic year at May department meeting.
<b>4</b>	Graduates will be able to identify and implement appropriate computational tools (software, coding, programming, and/or scripting) to solve a variety of problems both in the context of the classroom and in research projects	Programming portfolio (either from CSCI 225 or Engineering Computing) evaluated against a defined standard and an open-ended question about the various computational approaches in Phys280 (not part of the course grade).	Portfolio submitted by graduation, open-ended question by end of class.	Average evaluation of 80% on defined rubrics for question and portfolio.	Results are reviewed at the end of every other (even) academic year at May department meeting.

<b>5</b>	Graduates will know how to identify relevant existing works in literature that inform or support their own scholarly work and provide accurate citations and recognition where appropriate when presenting their own work	Citation rubric applied to reports written in Phys281 and 382 by instructor. Assessment by mentor(s) against a rubric.	Citation rubric done in connection with writing evaluation (#3). Done after each term (including summer) in which research is done.	Average of 70%	Results are reviewed at the end of every other (even) academic year at May department meeting.
<b>6</b>	Graduates will be able to conduct effective research which will include computer use, problem solving, hypothesis testing, and analysis of uncertainties	Assessment by mentor(s) against a rubric during the student's final semester. Assessment by mentor(s) or a department seminar presentation.	Done after each presentation and after each term in which research is done.	Average of 80% of best evaluation of work and best evaluation of presentation.	Results are reviewed at the end of every other (even) academic year at May department meeting.

\*The instruments will be administered in Phys141 and 142. This will allow a measure gains in just the algebra and calculus intro sequence for all intro students. Ultimately the results for majors will be extracted from the larger pool.