PHYSICS WITH COMPUTER SCIENCE (BS)

Physics is understood in terms of many mathematical relationships that are much easier to state than solve, and computer science has become a major part of many physicists' work to solve enormous problems. This major is preparation for graduate study in physics, applied physics, computer science, and especially in the burgeoning research field of computational physics, as well as in many branches of engineering. Employment opportunities are in the industries of R&D and manufacturing, research and teaching in academic institutions, and research in government and private laboratories.

Curriculum

This program is similar to the theoretical physics/applied mathematics option, except that some of the mathematics courses are replaced by computer science courses. The list of physics, mathematics and computer science courses needed to complete this degree as of the 2022-2023 Academic Year is:

A minimum grade of C- must be earned to satisfy a course requirement and a 2.0 minimum overall GPA is required for each major or minor. Final confirmation of degree requirements is subject to department, school, and university approval.

Code	Title	Hours
Required Physics		
PHYS 121	College Physics I Lec/Dis	3
PHYS 111L	College Physics Laboratory I	1
PHYS 122	College Physics II Lec/Dis	3
PHYS 112L	College Physics Lab II	1
PHYS 126F	Freshman Projects	1
PHYS 235	Modern Physics	3
PHYS 235L	Modern Physics Laboratory	1
PHYS 301	Mathematical Methods in Physics	3
PHYS 303	Electronics I	3
PHYS 303L	Electronics Laboratory	1
PHYS 310	Optics	3
PHYS 310L	Optics Lab	1
PHYS 314	Theoretical Mechanics I	3
PHYS 351	Electricity and Magnetism I	3
PHYS 361	Quantum Mechanics I	3
Required Mathematics		
MATH 161	Calculus I	4
MATH 162	Calculus II	4
MATH 263	Multivariable Calculus	4
MATH 264	Ordinary Differential Equations	3
Required Computer Science		
COMP 141	Introduction to Computing Tools and Techniques	3
COMP 170	Introduction to Object-Oriented Programming	3
COMP 264	Introduction to Computer Systems	3
COMP 271	Data Structures I	3
COMP 272	Data Structures II	3
Discrete Mathematics Choice		
COMP 163	Discrete Structures	3
or MATH 201	Introduction to Discrete Mathematics & Number Theory	
Computer Science Choice		
COMP 313	Object-Oriented Design	3
or COMP 363	Design and Analysis Computer Algorithms	
300-Level COMP Electives or Equivalent		
Select two of the following:		6
BIOL 388	Bioinformatics	
BIOL 392	Metagenomics	
Any 300-Level COMP Courses		
MATH 309	Numerical Methods	
MATH 328	Algebraic Coding Theory	
MATH 331	Cryptography	
PHYS 328	Thermal Physical & Statistical Mechanics	
PHYS 338	Advanced Physics Laboratory	
STAT 321	Computational Aspects of Modeling and Simulation	
Total Hours		**75**

This Academic Requirements Outline lists the approved courses for the plan of study during the indicated Catalog Year and is intended for use by prospective students. A current Loyola student's requirements are based on when the major or minor was officially declared, and may differ from what is shown here. Loyola students should refer to My Academic Requirements in LOCUS for their individualized lists of approved courses. Final confirmation of all degree requirements is subject to department, school, and university approval.

Learning Outcomes

- Demonstrate foundational knowledge in the physical sciences and the acquisition of new knowledge via the scientific method.
- Use mathematical techniques to model physical systems and extract both quantitative and qualitative descriptions of their behavior.
- Acquire specific knowledge in the computational sciences.
- Gain an understanding and appreciation of interdisciplinary approach in the physical and computational sciences.
- Learn effective and ethical methods for collaborating with others on scientific and technical projects.