***California State University, Long Beach***

Policy Statement

Policy Number: 21-08

Date: April 12th, 2021

**Master of Science in Physics, Option in Computational Physics**

This new state-supported program option was recommended by the Academic Senate on March 18,

2021, approved by the President on March 24, 2021 and approved by California State University Chancellor’s Office on April 12, 2021.

# Master of Science in Physics, Option in Computational Physics (34 units)

The Option in Computational Physics provides a master’s degree program that emphasizes the use of computers to solve problems in physics. It is primarily intended for students who engage in theoretical and applied physics and aims at developing their problem-solving skills with a computer. The option is for graduate students who enter PhD programs in all fields of physics or the workforce in the sciences and engineering.

# Admission Requirements

1. A bachelor's degree with a major in physics; or
2. A bachelor's degree with at least 24 units of upper division physics. Students deficient in undergraduate preparation must take courses to remove these deficiencies without credit toward the degree at the discretion of the graduate advisor.

# Course Requirements

*Take all of the following:*

* PHYS 510 - Graduate Mechanics (3 units)
* PHYS 522 - Statistical Physics (3 units)
* PHYS 540A - Graduate Electrodynamics (3 units)
* PHYS 550A - Quantum Mechanics I (3 units)
* PHYS 550B - Quantum Mechanics II (3 units)
* PHYS 560A - Mathematical Methods in Physics (3 units)
* PHYS 562 - Advanced Computational Methods in Physics (3 units) or PHYS 590 – Introduction to Data Science (3 units)
* PHYS 697C – Directed Research in Computational Physics (3 units)
* PHYS 595 - Colloquium (1 unit)

*Take one of the following:*

* PHYS 545 - Advanced Experimental Methods in Material Science (3 units)
* PHYS 546 - Advanced Experimental Methods in Physical and Electronic Properties (3 units)
* PHYS 547 - Advanced Experimental Methods in Nanoscale Physics (3 units)
* PHYS 548 – Advanced Experimental Methods in Soft Condensed Matter Physics (3 units)
* PHYS 575 - Modern Optics (3 units)
* PHYS 580 - Computer Interfacing in Experimental Physics (3 units)

*Take 6 units of the following:*

* PHYS 698 - Thesis (6 units)

A written thesis in computational physics approved by the student's thesis committee consisting of a thesis chair (a Physics & Astronomy faculty member) and at least two more members, one of which must be a member of the Department.

An oral defense of the thesis research.

(Students must be advanced to candidacy before enrolling in PHYS 698)

# Culminating Experience

The required culminating experience is a research-based thesis in computational physics. The research is performed in one of the theoretical computational physics groups of the department led by tenure and tenure track faculty members; about half of the faculty in the department have an expertise in computational physics. Students engage in a research project that aims at solving a physics problem and mainly uses the computer as a tool to achieve this goal. The completed research work culminates in the writing of a thesis that is followed by a public oral defense.

# Effective: Fall 2022

Campus Code: PHYSMS04PB

College: 65, College of Natural Sciences and Mathematics

Career: GR

CIP Code: 40.0801

CSU Code: 19021

Department: Physics and Astronomy

Major Pathway: STEM (Physics, General)