SCIENTIFIC COMPUTING, MSE

The MSE in Scientific Computing (SCMP) program at Penn provides multifaceted education in the fundamentals and applications of computational science. This education program provides a rigorous computational foundation for applications to a broad range of scientific disciplines. An education in SCMP combines a comprehensive set of core courses centered on numerical methods, algorithm development for high performance computational platforms, and the analysis of large data, and offers flexibility to specialize in different computational science application areas. Students may elect to pursue a thesis in computationally-oriented research within the School of Engineering and Applied Science.

We welcome applications from candidates who have a strong background in physical or theoretical sciences, engineering, math, or computer science. Some experience with computer programming is also strongly recommended.

For more information: https://pics.upenn.edu/masters-science-engineering-scientific-computing/

Curriculum

10 course units are required for the MSE in Scientific Computing.

Code	Title	Course Units
Foundations		
CIT 5900	Programming Languages and Techniques	1
or CIT 5910	Introduction to Software Development	
CIT 5960	Algorithms and Computation	1
Core Requirements		
ENM 5020	Numerical Methods and Modeling	1
CIS 5450	Big Data Analytics	1
Select 1 of the following:		1
CIS 5190	Applied Machine Learning	
or CIS 5200	Machine Learning	
or STAT 571(	Modern Data Mining	
Methods and Applications Electives		
Select 2 Methods for Natural Science/Engineering courses		2
Select Thesis/Independent Study or 2 Applications/ Engineering electives		2
Select 1 free elective. Any course in math, science and/or engineering. Subject to advisor approval		1
Total Course Units		**10**

Technical & Depth Area Electives

Code	Title	Course Units
Applications - Any graduate course which focuses on applications in natural science and engineering. Subject to advisor approval		
Thesis/Independent Study [1]		
Methods		
CIS 5800	Machine Perception	
CIS 5810	Computer Vision & Computational Photography	
MSE 5610	Atomic Modeling in Materials Science	
ESE 5030	Simulation Modeling and Analysis	
BE 5590	Multiscale Modeling of Chemical and Biological Systems	
CBE 5250	Molecular Modeling and Simulations	
CBE 5440	Computational Science of Energy and Chemical Transformations	
MEAM 5270	Finite Element Analysis	
MEAM 6460	Computational Mechanics	
ENM 5310	Data-driven Modeling and Probabilistic Scientific Computing	
BE 5370	Biomedical Image Analysis	
Modelling		
CIS 5370	Biomedical Image Analysis	
CIS 5350	Introduction to Bioinformatics	
ENM 5400	Topics In Computational Science and Engineering	
GCB 5350	Introduction to Bioinformatics	
MTR 5350		
CIS 5360	Fundamentals of Computational Biology	
BIOL 5536	Fundamentals of Computational Biology	
GCB 5360	Fundamentals of Computational Biology	
CIS 5370	Biomedical Image Analysis	
BE 5370	Biomedical Image Analysis	
ESE 5460	Priniples of Deep Learning	

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Select 2 course units of SCMP 5970 Thesis Research or SCMP 5990 Independent Study.

The degree and major requirements displayed are intended as a guide for students entering in the Fall of 2022 and later. Students should consult with their academic program regarding final certifications and requirements for graduation.