

# High-Performance Computing for Scientific Applications PSM

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COLLEGE OF SCIENCE AND TECHNOLOGY

Learn more about the Professional Science Master's in High-Performance Computing for Scientific Applications.

## About the Program

Computation, in tandem with theory and experiment, is highly regarded in the advance of scientific knowledge and engineering practice. In recognition of a growing need for experts cross-trained in relevant computational sciences, applied mathematics, statistics and traditional scientific fields such as chemistry and physics, the Professional Science Master's (PSM) program in High-Performance Computing for Scientific Applications is targeted toward STEM graduates seeking to use high-performance computation as their primary research instrument in the physical sciences, life sciences and engineering.

The core curriculum for the High-Performance Computing for Scientific Applications PSM introduces students to the architecture of high-performance computing systems, mathematical techniques employed in high-performance computing, the software tools used in parallel calculations, and computational methods used in the sciences and engineering. A distinguishing feature of the program is its paired emphasis on the algorithms and technology of high-performance computing in applications to problems in science and engineering. Cross-disciplinary techniques are emphasized, and learning through applications and individually designed projects are prioritized over theory.

**Time Limit for Degree Completion:** 2 years

**Campus Location:** Main

**Full-Time/Part-Time Status:** The degree program can be completed on a full- or part-time basis. Most of the classes are offered in the evenings or on weekends to enable full-time working professionals to enroll in the program. International students are required to register as full-time students.

**Interdisciplinary Study:** The program is interdisciplinary by nature.

**Accreditation:** Temple University is fully accredited by the Middle States Commission on Higher Education.

**Job Prospects:** Students in the program are connected to internships in industry and government laboratories by the PSM Scientific Advisory Committee. Graduates are then well prepared to compete for high-quality positions in industry, government laboratories and academia.

**Non-Matriculated Student Policy:** Non-matriculated students may enroll in a total of three courses (9 credits) with permission of the instructor and the Department of Mathematics.

**Financing Opportunities:** Financial assistance in the form of Research or Teaching Assistantships is not offered.

## Admission Requirements and Deadlines

**Application Deadline:**

*Fall Priority Deadline:* March 1; December 15 international

*Spring Priority Deadline:* October 30, but open only to non-matriculated students who successfully completed PSM coursework in the Fall term

Applications submitted after the priority deadline will be considered for admission on a rolling basis.

*APPLY ONLINE to this graduate program.*

**Letters of Reference:**

*Number Required:* 2

*From Whom:* Letters should be obtained from college/university faculty or faculty who are familiar with the applicant's competency. If the applicant has an established career in the field, the applicant's immediate supervisor should provide one of the letters.

**Coursework Required for Admission Consideration:** Applicants should have a strong background in one or more STEM fields: science, technology, engineering and mathematics.

**Bachelor's Degree in Discipline/Related Discipline:** The PSM program has been designed for recent graduates and professionals who have a bachelor's degree or equivalent in a STEM field.

**Statement of Goals:** In up to 500 words, explain your interest in this specific program and what career goals you have. Describe your work and academic experiences with specific mentions of internships, course projects, or research. Share any other relevant information that you feel should be taken into consideration.

**Transcripts:** Unofficial transcripts are considered at the time of applying. Official transcripts are required when accepting the offer at the time of deposit. Official transcripts can be sent to [cst.gi@temple.edu](mailto:cst.gi@temple.edu)

**Standardized Test Scores:**

GRE: Optional

Applicants who earned their baccalaureate degree from an institution where the language of instruction was other than English, with the exception of those who subsequently earned a master's degree at a U.S. institution, must report scores for a standardized test of English that meet these minimums:

- TOEFL iBT: 85
- IELTS Academic: 6.5
- PTE Academic: 58
- Duolingo: 110

**Resume:** Current resume required.

**Interview:** May be required on a case-by-case basis.

**Transfer Credit:** Graduate credits from an accredited institution may be transferred into the PSM program. The credits must be equivalent to coursework offered by the Department of Mathematics at Temple University. A grade of "B" or better must have been earned for the credits to transfer. The PSM Steering Committee makes recommendations to the Department Chair for transferring credit on an individual basis. The maximum number of credits a student may transfer is 6.

## Program Requirements

**General Program Requirements:**

*Number of Credits Required Beyond the Baccalaureate:* 30

*Required Courses:*

Code	Title	Credit Hours
<b>Core Courses</b>		
MATH 5003	Professional Development Seminar <sup>1</sup>	1
MATH 5005	Ethics in Computing <sup>2</sup>	2
MATH 5061	Fundamentals of Computer Programming for Scientists and Engineers	4
MATH 5062	High Performance Computer Programming for Scientific Modeling	3
MATH 5063	Introduction to High-Performance Computing Technology for Scientists	4
MATH 5066	Mathematical Methods for High Performance Computing	3
<b>Electives</b> <b>9</b>		
Select three from the following: <sup>3</sup>		
BIOL 5411	Structural Bioinformatics I	
CHEM 5301	Quantum Chemistry	
CHEM 5302	Statistical Thermodynamics	
CIS 5524	Analysis and Modeling of Social and Information Networks	
CIS 5525	Neural Computation	
CIS 5526	Machine Learning	
CIS 9669	Distributed and Parallel Computer Systems	
MATH 8013	Numerical Linear Algebra I	
MATH 8014	Numerical Linear Algebra II	
MATH 8023	Numerical Differential Equations I	
MATH 8024	Numerical Differential Equations II	
MATH 8107	Mathematical Modeling for Science, Engineering, and Industry	
MATH 8700	Topics Computer Program	
MATH 8710	Topics Computer Program	

MATH 9200	Topics in Numerical Analysis
MATH 9210	Topics in Numerical Analysis
PHYS 5001	Introduction to Quantum Computing
PHYS 8102	Statistical Mechanics

**Capstone Course**

MATH 9995	Capstone Project <sup>4</sup>	4
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**Total Credit Hours****30**

- <sup>1</sup> BIOL 5506 Professional Development Seminar (PSM) serves as an approved alternative to MATH 5003.
- <sup>2</sup> BIOL 5511 Ethics in Bioinformatics serves as an approved alternative for MATH 5005.
- <sup>3</sup> Alternately, other elective courses may be taken at the 5000 level or higher, as approved by the program director.
- <sup>4</sup> With approval from their academic advisor, students may complete capstone credits over multiple academic terms.

**Culminating Event:***Capstone Research Project:*

The capstone research project (MATH 9995) provides students with the opportunity to develop, apply and demonstrate their skills in a professional high-performance computing environment. The project must be approved in advance by the PSM Steering Committee and requires a supervisor from either the Temple faculty or the PSM Scientific Advisory Committee. Students can undertake their research projects in whole or in part during student internships.

**Contacts****Program Web Address:**

<https://www.temple.edu/academics/degree-programs/high-performance-computing-for-scientific-applications-psm-st-hpc-psm>

**Department Information:**

Dept. of Mathematics  
 638 Wachman Hall  
 1805 N. Broad Street  
 Philadelphia, PA 19122-6094  
 cst.psm@temple.edu  
 215-204-7842

**Submission Address for Application Materials:**

<https://cst.temple.edu/academics/graduate-programs/apply-now>

**Department Contacts:***Program Co-Directors:*

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