Computational and Data Science

Are you interested in advancing your career in Computational and Data Science?

Developing mathematical models, employing numerical methods and using data visualization has become increasingly important for a variety of business and industries. The Computational and Data Science Track incorporates coursework from different mathematical disciplines to reflect the breadth of computational and data science employed to solve real world problems.
Curriculum

The Professional Master of Science and Technology Program consists of four parts, totaling 36 credit hours. Core Science courses are defined based on the focus area chosen; courses that develop Advanced Quantitative Skills and Transferable (Business) Skills complete the required course work. The program incorporates a Professional Experience (3 credits as an internship project) for students to demonstrate their knowledge and skills.

**Advanced Quantitative Skills**
(9 credits)

- MST 6500  Scientific Reasoning
- MST 6600  Applied Statistical Techniques

AND one of the following courses:
- MATH 5010  Probability
- MATH 5600  Survey of Numerical Analysis
- MATH 5710  Introduction to Applied Mathematics
- MATH 5740  Mathematical Modeling
- CS 5010  Software Practice

**Transferable Skills**
(9 credits)

- MST 6010  Effective Communication
- MST 6011  Sustainable Business Practices
- MST 6012  Accounting and Finance
- MST 6020  Leadership and Management
- MST 6021  Strategic Planning and Marketing
- MST 6022  Production & Operations Management

Electives: 3 credits of graduate coursework from the David Eccles School of Business (contact program director for a list of transferable skills electives)
Computational and Data Science Track
(14 or 15 credits)

The Computational and Data Science Track is offered through the College of Science. There are two focus areas within the Track:

• Applied Mathematics
• Scientific Computing

Graduate Students the Computational and Data Science Track take advanced science courses within these two focus areas and choose electives based on their professional goals.
These areas of study include:

Statistics
Applied Math
Computational Math, Biology
Financial Math
Computer Graphics and Visualization
Digital VLSI Design and Computer Aided Design
Computer Architecture and High Performance Computing
Artificial Intelligence and Robotics

Course availability is subject to change. For a comprehensive list of courses and additional information about our program, please visit our website: http://pmst.utah.edu
Statistics
Core courses:
MATH 5010 Probability
MATH 5080 Statistical Inference I
MATH 5090 Statistical Inference II

Electives:
MATH 5030 Actuarial Mathematics
MATH 5040 Stochastic Processes and Simulation I
MATH 5050 Stochastic Processes and Simulation II
MATH 5610 Introduction to Numerical Analysis I
MATH 5620 Introduction to Numerical Analysis II
MATH 5075 Time Series Analysis
MATH 6010 Linear Models
MATH 6020 Multilinear Models
MATH 6070 Mathematical Statistics

Applied Math
Core courses:
MATH 5610 Introduction to Numerical Analysis I
MATH 5620 Introduction to Numerical Analysis II
MATH 5710 Introduction to Applied Mathematics
MATH 5600 Survey of Numerical Analysis
MATH 6610 Analysis of Numerical Methods I
MATH 6620 Analysis of Numerical Methods II

Electives:
MATH 5440 Introduction to Partial Differential Equations
MATH 5410 Introduction to Ordinary Differential Equations
MATH 5470 Chaos and Nonlinear Systems
MATH 5500 Calculus of Variations with Applications
MATH 5750 Optimization
MATH 6790 Case Studies in CES

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Computational Math, Biology

Core courses:
MATH 5010 Probability
MATH 5110 Mathematical Biology I
MATH 5120 Mathematical Biology II

Electives:
MATH 5470 Chaos and Nonlinear Systems
MATH 5040 Stochastic Processes and Simulation I
MATH 5050 Stochastic Processes and Simulation II
MATH 5080 Statistical Inference I
MATH 5090 Statistical Inference II
MATH 6770 Mathematical Biology I
MATH 6780 Mathematical Biology II

Financial Math

Core courses:
MATH 5010 Probability
MATH 5760 Introduction to Mathematical Finance I
MATH 5765 Introduction to Mathematical Finance II

Electives:
MATH 5030 Actuarial Mathematics
MATH 5040 Stochastic Processes and Simulation I
MATH 5050 Stochastic Processes and Simulation II
MATH 5075 Time Series Analysis
MATH 5080 Statistical Inference I
MATH 5090 Statistical Inference II
MATH 6010 Linear Models
ECON 5969 Special Topics in Economics

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Scientific Computing
Core Courses:
CS 6210  Advanced Scientific Computing I
CS 6220  Advanced Scientific Computing II
Electives:
CS 6610  Interactive Computer Graphics
CS 6630  Scientific Visualization
CS 6640  Introduction to Digital Image Processing
CS 6660  Physics-based Animation
CS 6665  Character Animation

Graphics and Visualization
Core Courses:
CS 5600  Introduction to Computer Graphics
CS 6600  Mathematical Foundations of Computer Graphics and Visualization
Electives:
CS 6610  Interactive Computer Graphics
CS 6630  Scientific Visualization
CS 6640  Introduction to Digital Image Processing
CS 6660  Physics-based Animation
CS 6665  Character Animation

Artificial intelligence and Robotics
Core Courses:
CS 6300  Artificial Intelligence
CS 6310  Robotics
Electives:
CS 6320  Computer Vision
CS 6340  Natural Language Processing
CS 6350  Machine Learning
CS 6366  Virtual Reality

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The Professional Science Master (PSM) program affiliation is administered by the PSM National Office. The national office implements a peer-review, external review committee process to ensure that the guidelines are met and affiliated programs maintain professional standards. This quality assurance mechanism is sustained by a revolving group of volunteer experts. Reviewers are PSM program directors, industry representatives, and PSM administrators.

Professional Science Master's are designed for students who are seeking a graduate degree in science or mathematics and understand the need for developing workplace skills valued by top employers.

A perfect fit for professionals because it allows you to pursue advanced training and excel in science or math without a Ph.D., while simultaneously developing highly-valued business skills.

The Sloan Foundation PSM initiative began in 1997 with grants to 14 research universities to support the founding of programs in the natural sciences and mathematics, followed by a targeted bioinformatics set of programs at another 12 research institutions. Concurrent with the effort by Sloan, Henry Riggs, the outgoing president of Harvey Mudd College, convinced the Keck Foundation to build an all-new master's-only graduate school designed to educate leaders for the biotechnology, pharmaceutical, healthcare product and bioagricultural (biosciences) industries. The resulting Keck Graduate Institute (KGI), associated with the Claremont Colleges in California, enrolled its first class of twenty-eight students in August 2000.

In 2001, a Sloan grant to the Council of Graduate Schools (CGS) extended the PSM initiative to master's-focused institutions, which award 40% of science/math master's degrees and where faculty are heavily invested in master's education. In 2002 CGS conducted a survey for the Ford Foundation that indicated a trend toward professionalization of master's degrees offered by social sciences and humanities departments at both doctoral-focused and master's-focused institutions. As a result, the Ford Foundation funded a CGS proposal to promote the development of Professional Masters (PMA) programs in the humanities and social sciences.

In January 2006, the Council of Graduate Schools assumed primary responsibility for supporting and expanding the Sloan Professional Science Master's (PSM) Initiative, with the goal of making it a regular feature of U.S. graduate education. Learn about the CGS initiative to institutionalize the PSM Degree.