Computational Science
In the College of Sciences

OFFICE: Geology/Mathematics/Computer Science 206H
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Faculty
Program Director: José E. Castillo (Mathematics and Statistics)
Associated Faculty: Bailey (Mathematics and Statistics), Baljon
(Physics), Blomgren (Mathematics and Statistics), Carretero
(Mathematics and Statistics), Cooksy (Chemistry and Biochemistry), Demasi (Aerospace Engineering), Edwards
(Computer Science), Fan (Mathematics and Statistics), Johnson
(Physics), Kuznetsova (Physics), Kumar (Electrical and
Computer Engineering), Levine (Mathematics and Statistics),
Love (Chemistry and Biochemistry), Mahaffy (Mathematics and
Statistics), Müller (Psychology), Olsen (Geological Sciences),
Palacios (Mathematics and Statistics), Paolini (Biology,
Emeritus), Roch (Computer Science), Rohwer (Biology), Salamon
(Mathematics and Statistics), Sandquist (Astronomy), Segall
(Biology), Shen (Mathematics and Statistics), Venkataraman
(Aerospace Engineering), Weber (Physics), Zeller (Biology),
Xie (Computer Science).

Offered by Computational Science
Doctor of Philosophy degree in computational science.
Concentration in statistics.
Master of Science degree in computational science.
Concentration in professional applications.
Certificate in professional computational science, advanced
(refer to the Graduate Bulletin).

Courses (COMP)
Refer to Courses and Curricula and University Policies sections of
this catalog for explanation of the course numbering system, unit or
credit hour, prerequisites, and related information.

UPPER DIVISION COURSES
(Also Acceptable for Advanced Degrees)

COMP 521. Introduction to Computational Science (3)
Prerequisite: Mathematics 151.
Matrices and linear equations, solving ordinary differential
equations (ODEs), vector spaces, closed form solutions, qualitative
theory, Eigenvalues, linear maps, linear differential equations, other
techniques, nonlinear systems, higher dimensional systems.

COMP 526. Computational Methods for Scientists (3)
Prerequisites: Mathematics 252 and 254.
Translating mathematical problem descriptions to computer
programs. Introduction to Unix system.

COMP 536. Computational Modeling for Scientists (3)
Prerequisite: Mathematics 151.
Models, computational tools, errors, system dynamics, growth,
stability, compartmental models, Euler, Runge-Kutta methods,
system dynamics, infectious disease, enzyme kinetics, environmental
cycles, cardiovascular system, metabolism, global warming,
empirical models, HIV, population distributions, diffusion, HPC.

COMP 589. Computational Imaging (3)
Prerequisites: Mathematics 150 and 254.
Mathematical techniques used for image processing and analysis.
Emphasis on variational techniques which lead to PDE based image
processing algorithms, most are known as diffusion filters, and
interface propagation techniques for which emphasis will be implicit
representation (level-set methods). Representation and properties
of curves and surfaces, statistical (PCA/ICA), and multi-resolution
image analysis techniques.

COMP 596. Advanced Topics in Computational Science (1-4)
Prerequisite: Consent of instructor.
Selected topics in computational science, may be repeated
with the approval of the instructor. See Class Schedule for specific
content. Limit of nine units of any combination of 596, 496, 596
courses applicable to a bachelor's degree. Maximum credit of six
units of 596 applicable to a bachelor's degree. Credit for 596 and 696
applicable to a master's degree with approval of the graduate adviser.

GRADUATE COURSES
Refer to the Graduate Bulletin.