Mathematical and Physical Sciences

[College of Letters and Science]
Louise H. Kellogg, Ph.D., Program Director

Program Office. 118 Everson Hall

Committee in Charge
Andreas J. Albrecht, Ph.D. (Physics)
Sheila David, Ph.D. (Chemistry)
Joel Hass, Ph.D. (Mathematics)
Isabel P. Montañez, Ph.D. (Earth and Planetary Sciences)

Makoto Hiro, Ph.D. (Mathematics)
Academic Senate Distinguished Teaching Award

Xiangdong Zhu, Ph.D. (Physics)

The Program of Study

The Division of Mathematical and Physical Sciences teaches not only the experimental sciences and theoretical analyses to find solutions to real-world problems. Students learn to address issues such as cleaning up the environment, preserving natural resources and creating innovative materials for the future. From the study of atoms to the examination of distant galaxies, from abstract number theory to the development of new chemical compounds, the division provides students with the skills to build the world of tomorrow.

The program in Mathematical and Physical Sciences provides an organizational structure within the College of Letters and Science for facilitating the development of innovative curricular initiatives across the mathematical and physical sciences, including offering broadly conceived, integrative undergraduate- and graduate-level courses. The program also may house resident faculty pursuing interdepartmental research and teaching in this area of inquiry.

Courses in Mathematical and Physical Sciences (MPS)

Lower Division

1. General Science: Science in the News (4)
   Lecture—3 hours; laboratory/discussion—1 hour.
   Prerequisite: lower division standing. Basic principles in science including numeracy, scale, energy, and time; the scientific method; and good and bad science. Emphasis on scientific topics recently in the news. GE credit: SciEng.—III.

11A-11B. Mathematical and Physical Sciences Seminar (2-2)
   Lecture—2 hours. Prerequisite: mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members.—II. (Hi.)

Mathematics

See Mathematics; and Applied Mathematics (A Graduate Group), on page 165.

Mathematics

[College of Letters and Science]
Joel Hass, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg. 530-752-0827; studentservices@math.ucdavis.edu; http://www.math.ucdavis.edu

Faculty

Eric Babson, Ph.D. Professor
Zhaojun Bai, Ph.D., Professor (Computer Science)
Craig Benenh, Ph.D. Professor
Joseph Bello, Ph.D., Associate Professor
James Bremer, Ph.D., Assistant Associate Professor
Angela Y. Cheer, Ph.D., Professor
Jesus De Loera, Ph.D., Professor
C. Albert Fannjiang, Ph.D., Professor
Roland Freud, Ph.D., Professor
Dmitry B. Fuchs, Ph.D., Professor
Janko Gravner, Ph.D., Professor
Robert Guy, Ph.D., Associate Professor
Joel Hass, Ph.D., Professor
John K. Hunter, Ph.D., Professor
Michael Kapovich, Ph.D., Professor
Mathias Koepp, Ph.D., Professor
Gregory J. Kuperberg, Ph.D., Professor
Timothy Lewis, Ph.D., Associate Professor
Fu Liu, Ph.D., Professor
Kevin Lui, Ph.D., Assistant Professor
Alexander I. Mogilner, Ph.D., Professor
Ben Morris, Ph.D., Professor
Janko Gravner, Ph.D., Professor
Malgorzata Miculek, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Bruno L. Nachtergaele, Ph.D., Professor
Brian Osserman, Ph.D., Associate Professor
Alessandro Pizzaro, Ph.D., Associate Professor
E. Gerry Puckett, Ph.D., Professor
Dan Romik, Ph.D., Associate Professor
Naoki Saito, Ph.D., Professor
Anne Schilling, Ph.D., Professor
Jennifer Schultens, Ph.D., Professor
Albert Schwarz, Ph.D., Professor
Steve Shkoller, Ph.D., Professor
Alexander Soshnikov, Ph.D., Professor
Thomas Strohmer, Ph.D., Professor
J. Blake Temple, Ph.D., Professor
UC Davis Distinguished Professor 2012
Becca Thomsos, Ph.D., Assistant Associate Professor
Abigail Thompson, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Craig A. Tracy, Ph.D., Associate Professor
Monica Vazirani, Ph.D., Professor
Samuel Walcott, Ph.D., Assistant Professor
Andrew Waldron, Ph.D., Professor
Qinglong Xia, Ph.D., Assistant Associate Professor

Emeriti Faculty

David B. Acheson, Ph.D., Professor Emeritus
Ronald C. Berson, Ph.D., Professor Emeritus
Carlos R. Borges, Ph.D., Professor Emeritus
Robert J. Buett, Professor Emeritus
Guilbaud B. Chakravarthy, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Doyle O. Cutler, Ph.D., Professor Emeritus
James R. Diederich, Ph.D., Professor Emeritus
Allan E. Edelson, Ph.D., Professor Emeritus
Robert E. Glazier, Ph.D., Professor Emeritus
Kurt Kreith, Ph.D., Professor Emeritus
Arthur J. Krener, Ph.D., Professor
Melvin R. Kranz, Ph.D., Professor Emeritus
Gary J. Kurowski, Ph.D., Professor Emeritus
Ali Dad-del, Ph.D., Lecturer

Academic Senate Distinguished Teaching Award
E. O. Milton, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
A. O. Norton, Ph.D., Professor Emeritus
Wasile F. Pfeffer, Ph.D., Professor Emeritus
G. Thomas Sallee, Ph.D., Professor Emeritus

Sherman K. Stein, Jr., D. (Hon.), Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Howard J. Weiner, Ph.D., Professor Emeritus
Roger Wets, Ph.D., Professor Emeritus

Affiliated Faculty

John Chuahel, Ph.D., Lecturer
Ali Dad-del, Ph.D., Lecturer
Academic Senate Distinguished Teaching Award
Duane Koub, Ph.D., Lecturer
Lawrence Marx, Ph.D., Lecturer

The Program

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program.

Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty adviser. The upper division course offering is grouped into entry level, core, and enrichment courses. Entry level courses are designed to serve as a bridge between the core mathematics of the lower divisions, and the more abstract concepts taught in upper division courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment courses allow study of further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It also can reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some science field.

Career Alternatives.

A degree in mathematics provides entry to many careers in addition to teaching. For instance, operations research, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

A.B. Major Requirements:

<table>
<thead>
<tr>
<th>Preparatory Subject Matter</th>
<th>43-50</th>
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<tbody>
<tr>
<td>Mathematics 12 (or high school equivalent)</td>
<td>0-3</td>
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<tr>
<td>One of the following two options: (a) Mathematics 22A and 108 OR (b) Mathematics 67</td>
<td>4-7</td>
</tr>
<tr>
<td>Computer Science 30 or Engineering 6</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics 22AL or equivalent MATLAB knowledge</td>
<td>0-1</td>
</tr>
<tr>
<td>Additional non-Mathematics courses chosen from natural sciences</td>
<td>12</td>
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<tr>
<td>NOTE: Basic knowledge of MATLAB is required for both Mathematics 67 and 22A. Students can learn it on their own, enroll in Engineering 6, Mechanical Engineering 5 or in the one unit course Mathematics 22AL (can be taken concurrently).</td>
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Depth Subject Matter | 37-42 |
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<tr>
<td>A. Entry Level (Optional)</td>
<td>0-4</td>
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<tr>
<td>Suggested choice; one course from: Mathematics 108, 114, 115A, 141, 145</td>
<td>16</td>
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<tr>
<td>Mathematics 125A</td>
<td>4</td>
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<tr>
<td>Mathematics 125B</td>
<td>4</td>
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<tr>
<td>Mathematics 135A</td>
<td>4</td>
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<tr>
<td>Mathematics 150A</td>
<td>4</td>
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<tr>
<td>Choose one Plan from the following two: up to 4 of these 18 units may be approved upper division courses outside of the Department of Mathematics with extensive use of mathematics</td>
<td>18</td>
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