APPLIED MATHEMATICS & STATISTICS, AND SCIENTIFIC COMPUTATION (AMSC)

Graduate Degree Program
College: Computer, Mathematical, and Natural Sciences

Abstract
The interdisciplinary program in Applied Mathematics & Statistics, and Scientific Computation (AMSC) offers graduate study leading to Master of Science and Doctor of Philosophy degrees with concentrations in applied mathematics, applied statistics, and scientific computation. It also offers a Certificate in Scientific Computation to graduate students enrolled in other university Ph.D. programs. The faculty is drawn from departments throughout the university. Possible areas of application include the physical, chemical, biological, and social sciences, and engineering. The program receives substantial support from the Department of Mathematics (MATH), the Center for Scientific Computation and Mathematical Modeling (CSCAMM), and the Institute for Physical Science and Technology (IPST). AMSC offers a spectrum of courses at the forefront of computation and applications, as well as state-of-the-art computational, visualization and networking facilities.

The Concentration in Applied Mathematics trains individuals who are able to enhance their understanding of a wide spectrum of scientific phenomena through the application of rigorous mathematical analysis. At least half of the required work is expected to be in courses with primarily mathematical content; the remaining courses must apply to a field outside of the usual mathematics curriculum in the student’s chosen area of application. Graduate students currently pursue studies in the applications areas such as meteorology, fluid dynamics, algorithm development, pattern recognition, operations research, mathematical finance, computational dynamics, structural mechanics, mathematical biology, and systems and control theory. Other areas of study are available through participating departments. All students must include numerical analysis or scientific computing courses in their program of study.

The Concentration in Applied Statistics emphasizes acquisition of advanced training in the area of statistical application along with statistical topics and development of mathematical and computing skills necessary for the modern applied statistician. Students are required to take a series of core statistical and computational courses with more emphasis on data analytics and presentation skills. In addition, students will take a minimum of six credits in an outside application area.

The Concentration in Scientific Computation emphasizes the application of computation to the physical sciences, life sciences, engineering, business, and social sciences. Students will receive training in the use of computational techniques and technology with correspondingly less emphasis on formal mathematical methods in comparison to the Concentration in Applied Mathematics. Every Scientific Computation student is required to apply the training in computation to a problem in a specific scientific discipline.

A master’s degree program in all concentrations with an emphasis on numerical analysis, computational methods, probability and statistics is excellent preparation for industrial or government employment.

Financial Assistance
The program offers teaching assistantships in the Department of Mathematics as a source of support for graduate students. These assistantships carry a stipend with remission of tuition of up to 10 credit hours each semester. Research assistantships are also available through participating departments and other sources, especially for students that have acquired advanced training. Assistantships are usually available only to incoming Ph.D. students; applications including letters of recommendation should be completed by January 10 for full consideration.

Contact
For more specific information, visit the program FAQ or email amsc@amsc.umd.edu.

Jessica Sadler
Program Coordinator
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Applied Mathematics & Statistics, and Scientific Computation Program
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Website: http://www.amsc.umd.edu

Courses: AMSC

Keywords: Interdisciplinary program in applied mathematics, statistics and scientific computation that includes over 25 departments, including: Math, Engineering, Physics, Meteorology, Computer Science, Operations Research, Economics, and Biology.

Engineering (ENME) (https://academiccatalog.umd.edu/graduate/programs/mechanical-engineering-enme), Physics (PHYS) (https://academiccatalog.umd.edu/graduate/programs/physics-phys)

Admissions

General Requirements

• Statement of Purpose
• Transcript(s)
• TOEFL/IELTS/PTE (international graduate students (https://gradschool.umd.edu/admissions/english-language-proficiency-requirements))

Program-Specific Requirements

• Letters of Recommendation (3)
• Graduate Record Examination (GRE)
• CV/Resume
• Publications/Presentations
• GRE Subject (strongly recommended/not required)
• Advanced Textbooks: Textbooks of Advanced Technical Courses taken are to be submitted in the Advanced Textbooks section of online application. Please see the AMSC website for further details.

In addition to the Graduate School requirements, applicants are required to take the GRE general examination. The applicants are encouraged to take the GRE subject examination in either mathematics or another scientific topic. Applicants should have at least a "B" average (3.0 on a 4.0 scale) and should have completed an undergraduate program of study that includes a strong emphasis on rigorous mathematics, preferably through the level of advanced calculus and linear algebra.

Admission will be based on the applicant's ability to do graduate work in either applied mathematics, applied statistics, or scientific computation as demonstrated by the letters of recommendation, grades in coursework, and program of study. In some circumstances, a provisional admission may be given to applicants whose mathematical training is not sufficiently advanced. Previous education in an application area such as physics, biology, economics or one of the engineering disciplines, and a basic competence in computational techniques will be favorably considered in a student's application, although this is not a prerequisite.

When a student has decided upon an area of specialization, an advisory committee is formed and approved by the AMSC Graduate Committee. The advisory committee is responsible for formulating with the student a course of study that leads toward the degree sought. This course of study must constitute a unified, coherent program in an acceptable field of specialization of applied mathematics, applied statistics, or scientific computation.

For more admissions information, please visit http://www.amsc.umd.edu/join_us/index.html

To apply to the program, please visit our Graduate School website: https://gradschool.umd.edu/admissions

Application Deadlines

<table>
<thead>
<tr>
<th>Type of Applicant</th>
<th>Fall Deadline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic Applicants</td>
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</tr>
<tr>
<td>US Citizens and Permanent Residents</td>
<td>10 Jan</td>
</tr>
<tr>
<td>International Applicants</td>
<td></td>
</tr>
<tr>
<td>F (student) or J (exchange visitor) visas; A,E,G,H,I and L visas and immigrants</td>
<td>10 Jan</td>
</tr>
</tbody>
</table>

Other Deadlines: Please visit the program website at http://www.amsc.umd.edu

Requirements


Facilities and Special Resources

There are over 25 participating departments and institutes on the College Park campus, including units in the College of Computer, Mathematical, and Natural Sciences and the School of Engineering. The university has an engineering technical library as well as a network of high performance workstations for faculty and graduate students. In addition, there are collaborations with various area research institutes such as NASA Goddard Space Flight Center, National Institutes of Health, National Institute of Standards and Technology, Naval Research Laboratory, and National Oceanic and Atmospheric Administration.

Faculty

<table>
<thead>
<tr>
<th>Last Name</th>
<th>First/Middle Name</th>
<th>Graduate Faculty Status</th>
<th>Academic Credentials</th>
<th>Positions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agrawala</td>
<td>Ashok K.</td>
<td>Full Member</td>
<td>B.S., Agra University, 1960; B.E., Indian Institute of Science-Bangalore, 1963; M.Eng., 1965; Ph.D., Harvard University, 1970.</td>
<td>Professor, Applied Mathematics &amp; Statistics, and Scientific Computation Professor, Computer Science Affiliate Professor, Electrical and Computer Engineering</td>
</tr>
</tbody>
</table>
Akin David L. Full Member S.B., Massachusetts Institute of Technology, 1974; S.M., 1975; Sc.D., 1981. Associate Professor, Applied Mathematics & Statistics, and Scientific Computation Associate Professor, Aerospace Engineering


Alt Francis B. Full Member B.S.E., Johns Hopkins University, 1967; M.S., Georgia Institute of Technology, 1973; Ph.D., 1977. Associate Professor, Applied Mathematics & Statistics, and Scientific Computation

Antman Stuart S. Full Member B.S., Rensselaer Polytechnic Institute, 1961; M.S., University of Minnesota Twin Cities, 1963; Ph.D., 1965. Distinguished University Professor Emeritus, Mathematics

Austin Mark A. Full Member B.E., University of Canterbury, 1980; M.S., University of California-Berkeley, 1982; Ph.D., 1985. Distinguished University Professor Emeritus, Mathematics

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Azarm Shapour Full Member B.S., University of Tehran, 1977; M.S., George Washington University, 1979; Ph.D., University of Michigan-Ann Arbor, 1984. Professor, Applied Mathematics & Statistics, and Scientific Computation

Baeder James D. Full Member B.S., Rice University, 1983; M.S., Stanford University, 1984; Ph.D., 1989. Professor, Aerospace Engineering
Balachandran Balakumar  Full Member  

Balakumar Chair, Mechanical Engineering Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Mechanical Engineering

Balan Radu  Full Member  
B.S., Polytechnic Institute of Bucharest, Romania 1992; B.S., University of Bucharest, Romania 1994; Ph.D., Princeton University, 1998

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Barnes  Sean  Full Member  
Ph.D., Scientific Computation, University of Maryland, College Park 2012; M.S., Aerospace Engineering, Georgia Institute of Technology 2006

Bi  Assistant Professor, Computer Science

Ball Michael O.  Full Member  
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Bedrossian  Jacob  Full Member  
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Barg  Alexander  Full Member  
Ph.D., Moscow Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Systems Engineering Affiliate Professor, Computer Science

Baras John S.  Full Member  

Baras  Professor, Electrical and Computer Engineering Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Systems Engineering

Barnes  Assistant Professor, Computer Science
<table>
<thead>
<tr>
<th>Full Member</th>
<th>B.A., Boston College, 1960</th>
<th>Full Member</th>
<th>B.S., Oberlin College, 1994</th>
<th>Full Member</th>
<th>B.S., University of South Carolina-Columbia, 1988</th>
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</table>
Carton James A. Full Member  B.S.E., Princeton University, 1976; M.S., University of Washington, 1979; M.A., Princeton University, 1980; Ph.D., 1983.

Chair, Atmospheric and Oceanic Science Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Chemical Physics Professor, Mathematical Statistics Professor, Mathematics Chair, Electrical and Computer Engineering Distinguished University Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Electrical and Computer Engineering Affiliate Professor, Computer Science Professor, Applied Mathematics & Statistics, and Scientific Computation Professor, Computer Science Associate Professor, Computer Science Affiliate Professor, Physics


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<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elman</td>
<td>Howard C.</td>
<td>Full Member, B.A., Columbia University, 1975; M.A., 1977; M.S., Yale University, 1979; Ph.D., 1982.</td>
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<tr>
<td>Ephremides</td>
<td>Anthony</td>
<td>Full Member, B.S., National Technical University of Athens, 1967; M.A., 1969; Ph.D., Princeton University, 1971.</td>
</tr>
<tr>
<td>Evans</td>
<td>Michael N.</td>
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<tr>
<td>Fitzpatrick</td>
<td>Patrick M.</td>
<td>Full Member, B.A., Rutgers University-New Brunswick, 1966; Ph.D., 1971.</td>
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<tr>
<td>Forni</td>
<td>Giovanni</td>
<td>Full Member, Universita di Bologna, Italy, 1988; Ph.D., Princeton University, 1993.</td>
</tr>
<tr>
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<td>Michael</td>
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<td>Freidlin</td>
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<td>Steven A.</td>
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</tr>
<tr>
<td>Name</td>
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<td>Last Name</td>
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<tr>
<td>Gates</td>
<td>Sylvester</td>
<td>James, Jr.</td>
</tr>
<tr>
<td>Girvan</td>
<td>Michelle</td>
<td>Full Member</td>
</tr>
<tr>
<td>Glaz</td>
<td>Harland M.</td>
<td>Full Member</td>
</tr>
<tr>
<td>Golden</td>
<td>Bruce L.</td>
<td>Full Member</td>
</tr>
<tr>
<td>Gumerov</td>
<td>Nail A.</td>
<td>Non-Member</td>
</tr>
<tr>
<td>Hadley</td>
<td>Nicholas</td>
<td>John</td>
</tr>
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Jank  Wolfgang  Full Member  M.S., University of Aachen, 1996; Ph.D., University of Florida, 2001.

Professor, Applied Mathematics & Statistics, and Scientific Computation
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Degree Details</th>
</tr>
</thead>
</table>
| Kalnay     | Eugenia E            | Full Member  
B.A., Lenguas  
avs Buenos  
Aires, 1970;  
M.A.,Licenciatura  
en Ciencias  
Meteorologicas,  
1972;  
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1978.  
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Montesi  Laurent G. J.  Full Member  B.S., Pierre et Marie Curie University, 1994; M.S., Paris-Sud University, 1996; Ph.D., Massachusetts Institute of Technology, 2002.


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<table>
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<tr>
<th>Name</th>
<th>Title</th>
<th>Institution(s)</th>
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<tr>
<td>Mount David M.</td>
<td>Full Member</td>
<td>B.S., Purdue University, 1977; Ph.D., 1983.</td>
</tr>
<tr>
<td>Nava-Tudela Alfredo</td>
<td>Adjunct Member</td>
<td></td>
</tr>
<tr>
<td>Neustadtl Alan</td>
<td>Full Member</td>
<td>B.A., Bates College, 1979; M.A., University of Massachusetts Amherst, 1982; Ph.D., 1987.</td>
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<tr>
<td>Newcomb Robert W.</td>
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<td>Nochetto Ricardo H.</td>
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<td>Licenciado, University of Rosario-Argentina, 1976; Ingeniero Electricista, University of Buenos Aires, 1983.</td>
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<td>Oard Douglas William</td>
<td>Adjunct Professor</td>
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<tr>
<td>Neustadtl Alan</td>
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<td>Newcomb Robert W.</td>
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</table>
Okoudjou Kasso A.  Full Member  Maîtrise, Université Nationale du Bénin, 1996; M.S., Georgia Institute of Technology, 2003; Ph.D., Georgia Institute of Technology, 2003.

Associate Chair, Mathematics & Statistics, and Scientific Computation Professor, Mathematics


Distinguished University Professor, Electrical and Computer Engineering Distinguished University Professor, Applied Mathematics & Statistics, and Scientific Computation Distinguished University Professor, Physics Distinguished University Professor, Chemical Physics


Assistant Professor, Applied Mathematics & Statistics, and Scientific Computation Assistant Professor, Aerospace Engineering Assistant Professor, Neurosciences and Cognitive Science

Penny Stephen  Full Member  B.S., James Madison University, 2002; M.S., University of Maryland-College Park, 2008; Ph.D., University of Maryland-College Park, 2011.

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Professor, Neurosciences and Cognitive Science
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Professor, Neurosciences and Cognitive Science
Professor, Systems Engineering

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Affiliate Professor, Materials Science and Engineering

Rosenberg Jonathan M. Full Member
Professor, Applied Mathematics & Statistics, and Scientific Computation
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>University/Academic background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shayman</td>
<td>Full Member</td>
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</tr>
<tr>
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</tr>
<tr>
<td>Smith</td>
<td>Full Member</td>
<td>B.S., Drexel, 1965; M.S., Case Western Reserve, 1967; Ph.D., Case Western Reserve U., 1969. Professor, Electrical and Computer Engineering Professor, Applied Mathematics &amp; Statistics, and Scientific Computation Professor, Animal Sciences Associate Professor, Mathematics</td>
</tr>
<tr>
<td>Srinivasan</td>
<td>Full Member</td>
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<td>Tadmor</td>
<td>Full Member</td>
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<td>Tits</td>
<td>Full Member</td>
<td>B.S., University of Liege, 1974; M.S., University of California-Berkeley, 1979; Ph.D., 1980. Professor, Electrical and Computer Engineering Professor, Applied Mathematics &amp; Statistics, and Scientific Computation Professor, Systems Engineering Affiliate Professor, Computer Science</td>
</tr>
</tbody>
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Director, Applied Mathematics & Statistics, and Scientific Computation


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<tr>
<th>Name</th>
<th>First Name</th>
<th>Last Name</th>
<th>Title</th>
<th>Degree Details</th>
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<tr>
<td>Zachariah</td>
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