siam Careers in Applied Mathematics

"Applied mathematicians **believe** that new mathematical **ideas** and areas of study can **come from using mathematics to solve problems** in physics, chemistry, biology, medicine, engineering, and technology."

— "Mathematics," Microsoft® Encarta® Online Encyclopedia 2003 http://encarta.msn.com © 1997-2003 Microsoft Corporation. All Rights Reserved

In the following pages, you'll learn that a career in applied mathematics isn't just about crunching numbers. It's a career that uses mathematics to solve problems in the environment of your choice.

Industrial careers for those with a background in mathematics rarely carry a simple title like "mathematician." The very idea of a career in mathematics has evolved and diversified. Mathematics may stand alone as a science, but as a career, it's almost always coupled with a specialty or area of research interest. This guide was assembled to provide answers to the questions asked most frequently by people interested in the study of applied mathematics and computational science: What's out there for someone with my interests and background? Where can I work? How should I pursue my studies? Who are the people working in industry today?

What kind of problems do you want to solve?

The careers may differ, but one thing remains the same—problem solving. Listed below are some potential industrial problems that a mathematician or computational scientist would solve at his/her place of work. Take note of which of the following sample problems you find most intriguing, and why.

- A pharmaceutical company wants to search a very large database of proteins to find one that is similar in shape or activity to one they have discovered. What's the most efficient way to do so?
- How might disease spread in populated areas in the event of a bioterrorism incident?
- How do you cram enough data through a high-bandwidth communications network to deliver large data sets reliably?
- When we pick up a quarter, our brain sends complicated signals to our nerves and muscles. How do you design a mechanical hand to grip a coin and drop it in a slot?
- An automobile production plant is falling far short of the capacity for which it was designed. Why?
- How can you mathematically model the spread of a forest fire depending on weather, ground cover, and type of trees?
- How can you allocate an investment among various financial instruments to meet a risk/reward tradeoff?
- How does a protein, like an enzyme, fold into a molecular shape? Where are the active sites on the molecule?
- Computer chips are "printed," much like photographs, from a negative. But manufacturing the "negative" is too expensive to permit cut-and-try testing of proposed layouts and the corresponding "print." Are there accurate mathematical models of the exposure process? Can they be coupled with efficient computational implementations to obtain practical, low-cost simulations to guide chip design and manufacture?
- A chemical manufacturer must shift one of its product lines to a new family of compounds that will not harm the ozone layer. Since it cannot test possible new products by releasing them into the atmosphere, it must develop models of atmospheric chemistry that simulate the complex chemical reactions in the atmosphere, the action of the sun, etc. Can computational simulations show sufficient detail to capture the effects of the chemicals, but still be fast enough to permit studies of many different chemicals?

These problems are just a sample of what industry has to offer. Your career search should involve deciding how you'll parlay your interest in mathematics into your eventual career path.

Part of the preparation for your future is mathematical knowledge—tools like differential equations, probability, and matrices, as well as central skills like the art of abstraction, good communication skills and the ability to program computers. Another part of preparation is experience using these ideas in real applications, experience in finding the general patterns among specific problems in engineering, science, finance, medicine, and many other areas. With preparation in mathematics and a background in another field, you can enjoy the dual reward of applied mathematics: using your skills and seeing the results.

Where do you want to work?

Below is a list of real-life organizations that hire mathematicians and computer scientists. It's interesting to note the variety— from governmental research organizations to independent consultants. Experience gained through internships and work-study opportunities can help you determine your personal preferences in a workplace, such as organization size, the issue of non-profit vs. for-profit, and customer contact vs. no customer contact.

Learn more about these and other organizations and corporations by searching the web for additional information. You can learn things like company size, location, mission statement, history, and job requirements.

Some examples of organizations, corporations, and research institutions where mathematicians work:

- Government labs like Oak Ridge National Lab, Sandia, Pacific Northwest National Labs, and Los Alamos; and agencies like the National Security Agency, the Center for Communications Research, the Supercomputing Research Center, the Institute for Defense Analysis Center, and NASA's Institute for Computer Applications in Science and Engineering;
- A federally funded contractor like the Mitre Corporation and RAND;
- Engineering research organizations like AT&T Laboratories-Research, Telcordia Technologies, Exxon Research and Engineering, Schlumberger-Doll Research, and NEC Laboratories America, Inc.;
- Computer service and software firms like MSC.Software Corporation, The Mathworks, Palo Alto Research Center, Mentor Graphics, Adobe, and Microsoft;
- Energy systems firms like Lockheed-Martin Energy Research Corporation and the Schatz Energy Research Center (SERC)
- Electronics and computer manufacturers like IBM, SGI, Philips Research, Honeywell, Motorola, and Lucent Technologies;
- Consulting firms like Daniel H. Wagner Associates and McKinsey and Company;
- Aerospace and transportation equipment manufacturers like Boeing, General Motors, Aerospace Corporation, Ford, and United Technologies;
- Financial services firms like Citibank, Morgan Stanley, and Prudential;
- Communications services providers like AT&T, Verizon, and Qwest Communications;
- Chemical or pharmaceutical manufacturers like Kodak, DuPont, GlaxoSmithKline, and Merck & Co., Inc.;
- Producers of petroleum and petroleum products like Amoco and Exxon Research and Engineering;
- University-based research organizations like the Institute for Mathematics and Its Applications, the Institute for Advanced Study, and the Mathematical Sciences Research Institute.

What else is there? Emerging Fields to to Consider

Computational Biology and Genomics

By now, we've all heard of terms like "genetic sequencing" and "human genome." The mapping of the human genome depended on the use of sophisticated mathematical and computational tools. Now that sequencing is complete, the next challenge is to understand how genes interact, how they are switched on or off, and how they differ from individual to individual. The need for newer and better mathematical and computational tools will create new career opportunities in technology, medicine, and drug development and design.

Data Mining

If you're looking for a broad mathematical area with lots of applications, look no further—data mining is the answer. Data mining involves the discovery of patterns and previously unknown information in large data sets. Emerging career opportunities will be found in applications of data mining in, for example, security, forensics, e-commerce, and sciences, such as genomics, astrophysics, and chemical engineering.

Neuroscience

As described by organizers at the Mathematical Biosciences Institute (MBI), beginning with "the discovery of the fundamental Hodgkin-Huxley equations, which model electrical impulses and oscillations in neurons, mathematicians have been involved in developing models and computational schemes for systems of neurons." This mathematical and computational research provides tools for the study of the brain, the progression of neurological diseases, and the emerging treatments for such diseases.

Materials Science

Materials science is the study of the properties, processing and production of a broad range of existing and new materials, including metallic alloys, composites, liquid crystals, biological materials, and thin films. The rational design and analysis of materials depends on mathematical models and computational tools. Career opportunities abound in science, manufacturing, and materials design for applications in fields such as aerospace, engineering, electronics, and biology.

Computer Animation and Digital Imaging

To get an idea of what this field entails, consider the following description from the Fields Institute in Toronto. "Computer animation is an eclectic science that uniquely combines mathematics, computer science, fine art, classical animation, physics, biomechanics, and anatomy, to name but a few fields. Algorithms for computer animation rely heavily on techniques from scientific computation, statistics, signal processing, linear algebra, control theory, and computational geometry." With a diverse and exciting set of applications to such areas as entertainment (movies, video games), medical diagnostics, and fine arts (dancing, sculpture, painting), there are many avenues to explore.

Who are the applied mathematicians and computational scientists working in industry today?

An actuary, a librarian, a director of pharmaceutical research—mathematicians are involved in more fields than you may have thought possible. The following professionals with degrees in math-related fields will tell you that they were guided toward their career path by the first great math textbook they used, a crucial internship, or the advice of an enthusiastic professor. There are many choices to make and elements to consider when choosing a career. The following individuals share their educational background, interests, and experiences so that emerging mathematicians—such as you—will benefit.

Profiles

Alex Karavousanos

Senior Director, Business Development
Reuters
BS in Applied Mathematics and Statistics
State University of New York at Stony Brook

Alex's Background:

"From a young age I found mathematics interesting and challenging," recalls Alex, and when it came time to search for a job, his interest in math carried over. Alex naturally gravitated toward a career in which math skills were valued, if not required. He now works in business development and has found that "the analytical skills I developed through all of my courses gave me an excellent foundation that allows me to think creatively and structure interesting business relationships."

The Career:

Initially Alex used his mathematics background to pass the National Association of Securities Dealer's series 7 exam in order to become a registered representative. "I enjoyed selling stocks but was interested in learning more about financial planning and stock selection." Alex eventually took a position as a research analyst with Market Guide, a small publicly traded company on Long Island that collected financial information on all publicly traded companies. After a series of acquisitions, this position became Alex's current position at Reuters. "My role here has a few different functions," says Alex, including managing and growing the revenue for an existing client base, structuring strategic partnerships with companies that will redistribute fundamental and estimates financial data, and facilitating the sale of data through existing channel partners. Alex told us that he "ended up in business development because of the creative and analytical nature of the job." Daily responsibilities include anything from responding to client inquiries to projecting and/or forecasting revenue models for various strategic partners. Alex believes that the future of financial mathematics careers is stable. "The financial services industry relies heavily on math and will continue to do so. The industry continues to evolve, but everything revolves around numbers—offering math folks many interesting opportunities."

Alex offers this advice: "I would suggest that someone majoring in math be open minded as to a career path. An analytical type of degree can be applied to many different roles and careers. I would recommend that students intern at a few different companies in order to get a good understanding of the different jobs with which a math degree could be associated."

Skills required for this position:
(5 = most important; 0-1= hardly at all)

- Communication.....5
- Teamwork 5
- Computer.....4
- Analytical.....4
- Sales.....4
- Math.....3
- Computation 3
- Engineering 2

John Parkinson

ACTUARY, VICE PRESIDENT
The Savitz Organization
BA Mathematics, BA Economics
East Stroudsburg University

John's Background:
The fear of math is not uncommon, even for math majors. John was an economics major when he discovered his mathematics interest and ability. "I came to learn that the foundation of some key economic principles was rooted in the application of calculus to those principles." John became fascinated and wanted to learn more. He ended up taking more mathematics courses, "this after fearing math for most of my life." In addition to economics, philosophy contributed to John's interest in math. "I noticed how many of the great philosophers were mathematicians. The two subjects have an interesting and natural connection."

In college, John found a subject that specifically sparked his interest—Econometrics. "This course really influenced my decision to pursue a career in the field of applied mathematics. I found applying regression analysis techniques to economic problems and theory to try to determine explanatory variables and forecasting to be truly interesting." From there, the actuarial profession was a natural fit. "Embarrassing as it is to admit, I wasn't very informed about the actuarial profession in college. I stumbled onto the profession at a job fair my senior year and was quickly intrigued." After passing the rigorous professional exams, John entered "a field where I would deal with assessing the financial and economic impact of contingent events."

The Career:
John is currently a consulting actuary for an employee benefits company. "We help companies determine their plan's financial liabilities." Determining these liabilities is dependent on quantifying expectations of future events, including how long the employee will live, when and how the employee will leave employment (termination, disability), and how much money the employee will make during his/her career.

The future of financial mathematics careers is a bright one. John told us that while current actuarial science takes a deterministic approach to valuing financial liabilities, in the future, stochastic modeling should become more prevalent. "As financial analysis and modeling becomes more complex, the opportunities for mathematicians in business and consulting should increase greatly."

John recommends that students spend some time investigating what mathematicians are doing in other fields—but start early!

Skills required for this position:
(5 = most important; 0-1= hardly at all)

- Computation 5
- Communication.....4
- Computer.....4
- Math.....3
- Programming.....3
- Teamwork 3
- Statistics- 1
- Engineering 0

Leslie Lahr

DEVELOPMENTAL EDITOR, MATHEMATICS
Brooks/Cole Publishers
BA, MS in Mathematics,
Cleveland State University

Leslie's Background:
Leslie taught at the undergraduate level prior to her career in publishing. When asked what lead her to her current job, she said, "I know that a great book is priceless to a student. Of course having a good teacher is a plus too!" Leslie said that it was her first calculus course, and later a course in Abstract Algebra, that spawned her lasting interest in mathematics. "The subjects seemed so beautiful. They were interesting and challenging. I think it helped that I got to use two exceptional books for these courses. They were clearly written for the student: friendly but not condescending, concise but not terse, filled with illustrative examples that don't 'give away the store' but guide the user through the challenges of the material. These books made a huge difference. For me, they provided stepping-stones to go beyond the course-work assigned in each class. I started reading other math books on my own, and I went on from there."

The Career:
Developmental Editors perform many of the duties that make a book ready for production. They shepherd the project through the editorial process, working closely with the author. Leslie told us that "As a developmental editor for math text books, I read manuscripts and use the skills associated with both an English major and a mathematician. I look at content on two levels: Does the material make sense from a mathematics perspective? Does it also clearly express the concept?" Leslie also works with reviewers during the editorial process. "For example, I send out the manuscript with a questionnaire that I develop and the reviewers are asked to answer questions regarding content and pedagogy. Their feedback is invaluable."

Leslie's math background is important during this review process. "I consider my background in mathematics to be a huge asset to my position. I am able to have discussions based on the subject matter. I also like this material and I'm genuinely interested in it. I think it really makes a difference that I can share this interest with the author and reviewers."

Leslie feels that the primary responsibilities of a D.E. won't change significantly, even with the advent of things like "books on demand" and other emerging electronic formats. "The actual format of the book may vary, but we still need to develop the content. I think that the way I do my job will change, naturally, with advancements in technology. I perform a large portion of my job using e-mail as communication, sending out things electronically. The speed of communication has accelerated the rate at which a developmental editor is expected to produce the end product. I have to stay on top of changes in publishing software and other PC developments." We asked Leslie for some general advice for students and other emerging mathematicians, "As early as you can, start talking to your professors about what you can do with a math degree. Get internships. Foster an appreciation of other subjects as well. A good general background comes into play when interviewing for a job, and performing that job. You might be a brilliant mathematician, but can you express your ideas clearly and effectively?"

Other jobs with related responsibilities:
Acquisitions Editor, Book Editor for elementary and secondary mathematics textbooks, Educational Software Developer

Skills required for this position:
(5 = most important; 0-1= hardly at all)

Mathematics	5
Communication	5
Statistics	3
Business	3
Computer know-how	4
Engineering	1
Computer Science	1

Barbara Hamilton

MANAGER, INFORMATION SUPPORT SERVICES
Institute for Defense Analyses
BS, MA Mathematics
Central Michigan University
Masters in Library Science
Rutgers University

Barbara's Background:
As a child, Barbara Hamilton helped her older brother with his math homework. She considered this to be one of the early signs that she had a knack for mathematics. Barbara remembers her sixth and seventh grade teachers as being particularly pivotal. "My math teachers realized that the kids at that age are at all sorts of different levels mathematically." In college she chose mathematics, even though she was faced with other options. "I found the more 'practical' majors (like accounting) really boring. I liked chemistry and physics also; I even worked in the chemical lab during the summers doing quality assurance (where I was hounded by the chemists to change my major from mathematics to chemistry, but I liked mathematics better.)" After college, Barbara worked as a cryptologic mathematician for the Department of Defense. She also worked for Renaissance Technologies, where she wrote documentation that would describe the software used for modeling the commodities market. RenTech used mathematical models to forecast the market, and thus trade accordingly.

The Career:
Barbara is currently in charge of the mathematics library for the Institute for Defense Analyses; Center for Communications Research Division in Princeton, New Jersey. IDA is an FFRDC (Federally Funded Research and Development Center). "We do research work for agencies in the Department of Defense." The IDA's library of books, journals, and electronic materials has been in existence for nearly forty years. As fate would have it, Barbara was looking for something new when the position opened up. "I was offered a temporary research job, but wasn't sure I wanted to do that anymore. While we were negotiating

this position the librarian retired (with rather short notice) and they offered the job to me. I took it and then got a Master's in Library Science." Barbara uses her math skills everyday in the library. "I sort of live in both worlds. Because of my MS in Mathematics, I can understand what my clients are trying to ask me. And with my MLS, I can understand what librarians mean." Daily responsibilities include buying books for the library. "I complain to publishers about high prices," she jokes. She makes sure the library is getting what it needs. She also supervises typists who prepare reports for their sponsor on the work that their research staff is doing, and corresponds with the research staff to make sure they have the appropriate research materials.

As far as advice goes, Barbara suggests that students take classes that they're interested in. "You'll learn more," she says. She suggests getting an early start. "If I could do it over again, I would start looking at potential careers earlier. I waited until my senior year before I started thinking about a career."

Barbara feels that in general, mathematics and research have a very bright future. Barbara told us that, "research into mathematical theories and ideas is not shrinking. Over the past few years, the IDA has started looking into new areas of mathematics that we were not interested in before. I think there will always be new things to discover in mathematics, as long as people keep looking."

"I think there will always be new things to discover in mathematics, as long as people keep looking."

– Barbara Hamilton, Institute for Defense Analysis

Skills required for this position:

(5 = most important; 0-1= hardly at all)

Mathematics	5
Communication skills	5
Statistic	5
Computer Skills	4
Computation	2
Teamwork	4
Engineering	0

Dr. Jeff Sachs

Director and Senior Investigator

Applied Computer Science and Mathematics Department
Merck Research Labs, Merck & Co. Inc.
Sc.B. & Sc. M. Applied Mathematics, *Brown University*
Ph.D. Mathematics, *Massachutes Institute of Technology*

Jeff's Background:

When Jeff was a small child he always wanted to be a doctor. He told people that he wanted to be a neurosurgeon. "But I was always surrounded by and enjoyed science and mathematics, largely because my father was a physics professor. Also, I was lucky enough to go to the University of Chicago Laboratory Schools elementary school where the science curriculum (and teachers!) were inspiring, and I lived only about four blocks from the Museum of Science and Industry in Chicago." When he was 11 he learned Fortran, a scientific and mathematical programming language. "I remember thinking 'well, that's it for medicine, I think I want to do this science and math stuff instead… It'll be fun to use computers to do that."

Jeff entered college as a physics major, then changed to mathematics, and then to applied math. "My switch to applied math was partly due to the great teachers I had, like H. Thomas Banks, Wendell Flemming, Russel Calflish, (the late) A. C. Pipkin, and Harold Kushner. Another part was feeling that I didn't think like a physicist when I solved physics problems, yet wanted to feel a connection between what I studied and its practical application."

"Certainly the style of research and analysis in applying continuum electromechanochemistry taught by my thesis advisor Alan Grozinsky and his advisor Jim Melcher had and continues to have a profound influence on my thinking. One of the most important skills I learned from Alan was scientific writing. I still hope to someday be as clear and concise as I was after he edited my work!" Specifically, some of the courses Jeff mentioned that made a difference in applying Jeff's course of study to his career are: Differential Equations (Tom Banks), Stochastic Processes (Harold Kushner), Partial Differential Equations (Phil Davis, K. K.Tung), Asymptotic Methods (Steven Orszag), Fluid Mechanics (Andrew Fowler, Alar Toomre, Harvey Greenspan), and Numerical Analysis. "Also my non-math graduate courses in mechanical engineering, chemical engineering, and physiology have had a large influence on my ability to collaborate effectively in multi-disciplinary environments."

Jeff worked in academic labs during his summers in high school and as an undergraduate, mostly doing computer programming (software engineering), but also some lab work repairing instrumentation and building things. After graduate school he worked first in academia in applied physics at University of Tokyo, in math and computer science at Clarkson University, biomedical engineering

at Northwestern University, and at NIST in the biotechnology division. He then went into industry, working for a mathematics consulting firm. "This was a great educational experience, as I had an excuse to learn many new subjects, including signal processing, pattern recognition, and biotechnology basics. It also gave me a lot of practice in presenting very technical work to non-technical audiences. This is a key skill for scientists and mathematicians in industry!"

The Career:

Jeff's current position at Merck draws on his past experience, and presents some new challenges. "In close collaboration with my colleagues, I perform scientific research. I also design technologies and experimental and data analysis protocols that help other scientists do their work. I design and (usually with support from others) implement algorithms and user interfaces to help make it easy for colleagues to use the methods that we invent." Jeff leads others in doing similar work and in implementing the software, helps evaluate technologies brought to Merck by other companies, and contributes to strategic technology planning. Jeff was introduced to his job at Merck by participating in a meeting held by one of many professional organizations. "I gave a technical talk at a SIAM conference that my current supervisor [at Merck] attended. He was just starting to build the department and asked me to have lunch, then an interview, … then to join." Jeff joined the Applied Computer Science and Mathematics team at Merck because "I had always most enjoyed applications of math to biotechnology and healthcare. I felt that this position would be my best opportunity to learn new things and to have a real impact on improving human health."

"The most important thing is to find something you really love to do and would enjoy doing all day for a few years."

– Jeff Sachs
Merck Research Labs

Daily tasks for Jeff are similar to many other office jobs, "I read and send email, talk on the phone, and meet with people. The difference from most jobs, though, is the subject matter for all these interactions. Typically, I speak with scientists about their goals for a class of data analyses, scientific questions of interest to them, or results of analyzing a particular data set. I meet with my colleagues to review a version of software in terms of either its algorithm or user interface. I meet with members of my team to make sure I am informed about their activities, to coach them (when needed), and to make sure they have the resources and training needed to get their work done and to continue to grow technically and professionally. When I get really lucky I get time to read scientific literature or analyze data or write some software."

"Study software engineering, writing and public speaking, statistics and probability, and at least two fields of application of mathematics. The rigor of the thought process we learn in math is extremely valuable even in non-technical fields. But if you want to use math in industry (and in many arenas in academia) you will need to put some of your ideas into an acceptable format through software, or at least to understand what that process involves. I don't know any employers of 'mathematicians as mathematicians' (outside pure math academic departments) who don't require some knowledge of the software engineering process. Writing and public speaking are two critical communication skills that will have at least as much impact on your career as the technical content of your work. Statistics and probability will be useful in almost any technical career, and necessary for most. And understanding applications, even if they are different than anything you do in a job, will be critical to learning how to understand different perspectives on problem solving and the necessity of understanding the vocabulary relevant to people working on that application."

Jeff thinks that applications of math in biology and biotechnology will be an exciting and productive field for a very long time. He also believes that there will always be positions available for those who enjoy applying math to very practical problems. However, the requirements for those positions will continue to be very competitive, due to hiring rates being limited by economic conditions, and because of an increasing number of people aware of and qualified for such positions. Those applicants with excellent scholastic records who can demonstrate successful experiences in obtaining and communicating results will have the best advantage.

Jeff offers some inspiring thoughts: "The most important thing is to find something you really love to do and would enjoy doing all day for a few years. It is such a joy to have a job that is fun and feels like it contributes to society. If you can do this, then you are very likely to feel fulfilled in your life and to do well in your career."

Skills required for this position:
(5 = most important; 0-1= hardly at all)

Communication skills	5
Teamwork	5
Computer skills	4
Statistics	4
Math	4
Biology, chemistry, physical chemistry, biochemistry	3
Engineering	3

1 How do I get there?

The preceding profiles show the wide-range of possibilities available to individuals studying applied mathematics or computer science. Now, here are a few suggestions for mapping out the future…

Use your school's resources. How do you find such a career opportunity? Your school's career center will help you find a job in your area of interest. At the very least, services like assessment tests can help you narrow your search to suit your personality and ability. There are many resources available through a career services venue such as resume help, interview preparation, and job opening announcements.

Arnie Kohen is a career counselor at Drexel University's Steinbright Career Development Center. Arnie's position provides an interesting set of services for students—services that are not always utilized. "I help students with a career assessment through the administration of personality and interest inventories. Interpretations are individualized and are gratis to the student. These assessments and subsequent interpretation will enable a student to look at the elements of a program or major and say, ' I know I want to research or pursue these options '. They can come to me and learn about other available career center and university services, that will help them determine their field of interest."

Arnie told us that quite often students don't realize that the Career Center offers many additional services. The career center has "several events throughout the year at which students can make contacts and network with employers: they can receive resume critiques by employers; attend job and career fairs; participate in on-campus recruiting; and come to various networking functions and information sessions. If a student doesn't take advantage of these services, they are probably missing out on understanding the current job market."
As far as non-academic careers in the applied sciences, he explained that universities make up a small portion of the potential co-op and post-grad employers in those fields. "Recently, we've seen increased recruiting efforts by government agencies, and especially in the Philadelphia area, we've seen a variety of scientific positions available from pharmaceutical companies."

Overall, a visit to your university's career center could only help your search for a career that best suits your interests. That's what they're there for— to make sure that students are well equipped in making the transition from school to career, and to make that transition as smooth as possible.

2 Experiment with internships, summer jobs, work-study, etc.

What better way to determine the range of opportunities and explore possible areas of interest than to actually be in the workplace? Internships allow you to get a realistic feel for the field in which you're interested. Most importantly, you can make connections for future opportunities. Many internships turn into permanent positions, and even if they don't, the experience will broaden your perspective and help narrow your career search.

3 Do your research.

There are mountains of information available on the web, in libraries, and in bookstores. This may sound like simple advice—but while you're obtaining your degree, be aware of the career options that correspond to your studies. Too often, students emerge without a point of reference or general direction. Listed below are specific resources that offer support, information, and more professional profiles.

www.siam.org/careers
Check the web for the most up-to-date information and additions to these lists.

Links!!!

SIAM corporate members and sponsors have shown their support for the applied math and computational science community through their interest in SIAM. We recommend that students look at the company home pages listed on our website at *http://www.siam.org/careers/corpmem.htm.*

Search for career opportunities, explore the job descriptions for keywords and catch phrases, and get acquainted with the type of opportunities available!

Professional Societies for Mathematical Sciences, Computational Science, and Statistics…

American Mathematical Society (AMS)
201 Charles Street
Providence, RI 02904-2213
(401) 455-4000
Toll free: 800-321-4AMS (4267)
fax: (401) 331-3842
ams@ams.org • http://www.ams.org

American Statistical Association (ASA)
1429 Duke Street
Alexandria, VA 22314-3415
(703) 684-1221
Toll free: 888-231-3473
fax: (703) 684-2037
asainfo@amstat.org • http://www.amstat.org

Association for Computing Machinery (ACM)
1515 Broadway
New York, NY 10036
(212) 626-0500
Toll free: 800-342-6626
fax: 212-944-1318
webmaster@acm.org • http://www.acm.org

Association for Women in Mathematics (AWM)
4114 Computer & Space Sciences Building
University of Maryland
College Park, MD 20742-2461
(301) 405-7892
fax: 301-314-9363
awm@math.umd.edu

Computing Research Association (CRA)
1100 Seventeenth Street NW, Suite 507
Washington, DC 20036-4632
(202) 234-2111
fax: (202) 667-1066
info@cra.org • http://www.cra.org

Institute for Operations Research and the Management Sciences (INFORMS)
901 Elkridge Landing Road, Suite 400
Linthicum, MD 21090-2909
(410) 850-0300
Toll Free: 800-4INFORMS
fax: (410) 684-2963
informs@jhuvms.hcf.jhu.edu • http://www.informs.org

Mathematical Association of America (MAA)
1529 Eighteenth Street, N.W.
Washington, DC 20036-1358
(202) 387-5200
fax: (202) 265-2384
maahq@maa.org • http://www.maa.org

Society for Industrial and Applied Mathematics (SIAM)
3600 University City Science Center
Philadelphia, PA 19104-2688
(215) 382-9800
fax: (215) 386-7999
siam@siam.org • http://www.siam.org

Books…

101 Careers in Mathematics, Second Edition
Andrew Sterrett, Editor, The Mathematical Association of America; 2nd edition (January 3, 2003)

Great Careers for People Interested in Math and Computers (Career Connections, Vol 1)
Peter Richardson, Bob Richardson, U*X*L; (June 1993)

Prentice Hall Guide to Scholarships and Fellowships for Math and Science Students: A Resource for Students Pursuing Careers in Mathematics, Science
Mark Kantrowitz, Joann P. Digennaro (Contributor), Prentice Hall Trade; (March 1999)

Great Jobs for Math Majors
Stephen E. Lambert, Julie Ann Degalan, Ruth J. Decotis, McGraw-Hill/Contemporary Books; (November 11, 1998)

Young Women of Achievement: A Resource for Girls in Science, Math, and Technology
Frances A. Karnes, Kristen R. Stephens, Prometheus Books; (March 2002)

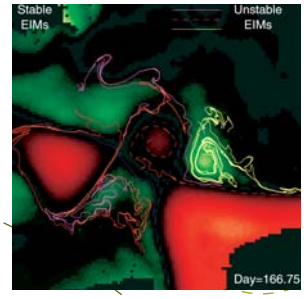
Video and CD: "Careers in Mathematics"
-Part of the Sloan Career Cornerstone Series, available from SIAM.

4 Network!

Join a professional organization, such as SIAM or AMS. Attend meetings. Connect with other individuals in your field.

Terry Herdman, Director at the Interdisciplinary Center for Applied Mathematics and member of SIAM, had this to say about the benefits of networking: "Through networking, one has the opportunity to gain knowledge from the experiences of others, learn of the various environments and opportunities of the applied mathematician and computational scientist and thus have a solid basis for making career decisions."

research



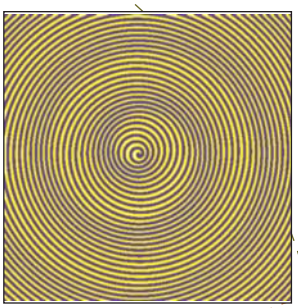
About SIAM

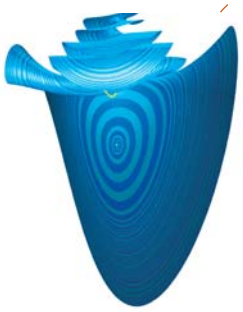
www.siam.org

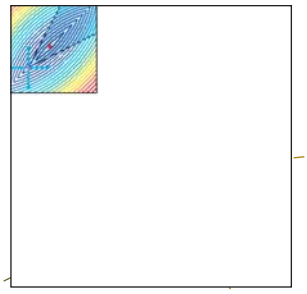
Inspired by the vision that applied mathematics should play an important role in advancing science and technology in industry, a small group of professionals from academe and industry met in Philadelphia in 1951 to start an organization whose members would meet periodically to exchange ideas about the uses of mathematics in industry. This meeting led to the organization of the Society for Industrial and Applied Mathematics (SIAM).

The goals of SIAM are to advance the application of mathematics to science and industry, promote mathematical research that could lead to effective new methods and techniques for science and industry, and provide media for the exchange of information and ideas among mathematicians, engineers, and scientists.

Today, SIAM publishes both books and journals, and our monthly periodical *SIAM News*. There are roughly 12 SIAM conferences per year, along with various networking opportunities. Academically, we look forward to the continued development and growth of SIAM student chapters, student membership, and our Visiting Lecture Program. Please see our website for more information!







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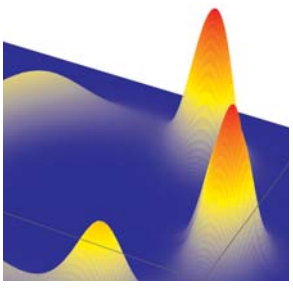
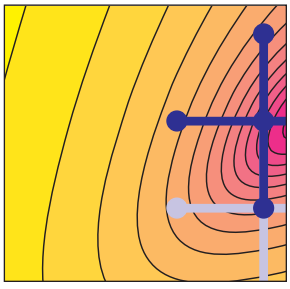
Works Cited, Contributors:

- Bill Kolata, Technical Director at SIAM
- *SIAM News*
- *101 Careers in Mathematics, Second Edition*
  Andrew Sterrett, Editor, The Mathematical Association of America; 2nd edition (January 3, 2003)
- The Fields Institute for Research in Mathematical Sciences, Workshop on the Mathematics of Computer Animation, *http://www.fields.utoronto.ca/programs/scientific/02-03/numerical/computer_animation*





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