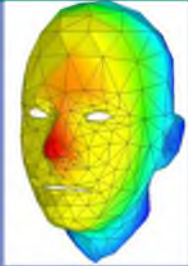


Scientific Computing

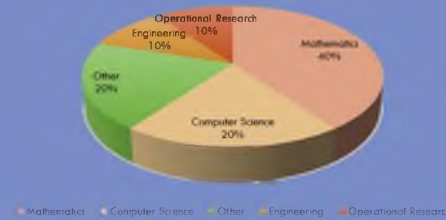
Scientific computing is an interdisciplinary mathematical field where realistic models are employed to study - usually through computer simulation and modeling - systems of real-world scientific, engineering or societal interest. Since computing technology has become increasingly powerful and increasingly available, and since the basic sciences and engineering have advanced, computer modeling and simulation have become progressively more recognized as engines of economic growth and scientific advancement. Consequently, computer-supported simulation and modeling are nowadays used in every field of science, of engineering and social sciences, of business world and economy.



Interdisciplinary Education:

- Student profile: 50% Mathematics, 20% Economics, 20% Engineering, and 10% Statistics
- Number of Students: 210 (%10 International)
- Faculty are 25% from home departments other than Mathematics
- ERASMUS: 12 agreements for faculty, student exchange and research collaboration
- Home to SIAM (Society for Industrial and Applied Mathematics) student chapter
- Number of Graduates: 37 Ph.D. , 119 M.Sc. (thesis), 106 M.Sc. (non-thesis)

IAM Publications by Subject between 2004-2013



Mathematics Computer Science Other Engineering Operational Research



Institute of Applied Mathematics

<http://iam.metu.edu.tr>

Mathematics is everywhere!

It is not possible to secure information exchange, weather forecast, financial and insurance risk assesment without mathematics as key technology of the applied sciences and for preparing a better world of tomorrow! The Institute of Applied Mathematics (IAM) is the first and unique interdisciplinary graduate institute in mathematics in Turkey. A major aim of IAM is to co-ordinate mathematics-based research at METU and to initiate and undertake collaborative research with the industry.



Current research areas of the program are: development of new optimization algorithms in operational research and data mining; optimal control of partial differential equations; adaptive discontinuous finite element methods; application of boundary and finite element methods in computational fluid dynamics; applications of inverse problems in medicine and electrodynamics; model order reduction for large scale systems.

Graduates are working in the universities, software companies and in the industry as researchers.

Interdisciplinary Research:

- Number of Publications: 260 (195 Journal Publications, 65 Conference Publications)
- Interdisciplinary Projects: The Morbidity Tables for Turkey, Undersecretariat Treasury, Insurance Information Center
- Thesis advisors and co-advisors: IAM and METU, affiliated faculty from other universities in Turkey and Abroad
- Thesis advisors: 40% IAM, 30% Mathematics, 30% Management, Economy, Statistics, and Engineering

Since the establishment of the IAM, many conferences and workshops are organized with the industry and international partners. Industrial projects in cryptography and financial mathematics were carried with TUBITAK (Turkish Scientific Technological Research Council), Aselsan (Turkish Armed Forces Company), METU Technology Park, Undersecretary of Treasury , COST. International scientific projects were conducted in Scientific Computing and Cryptography by NSF, DAAD, BMBF, Volkswagen.

Besides of its faculty and friendly staff, IAM has a rich affiliated faculty, which also includes scholars from all over the world. IAM is a Center-of-Excellence in Science and Supporting the Youth!

In our family of IAM, the youth, our students, are in the center: a driving force in togetherness and enthusiasm.

Cryptography

Cryptography is an interdisciplinary science based on mathematics with collaboration in electrical and electronics engineering, computer science/engineering, statistics and physics, which focuses on design and security analysis of the crypto hardware with the algorithms inside them.

The common intersection of algorithms and methods used in cryptography is advanced mathematics. Besides, it is crucial to make a collaborative research on the design, test and production of secure algorithms.

To research and supply mathematical methods in information security and cryptography, to support this research with M.Sc. and Ph.D. thesis, to be a part of the international research community, to make projects under the collaboration of



private/public sectors, are the aims of cryptography department. In this framework, the cryptography department has given many seminars to the private/public sectors. Moreover, international and national conferences have been organized to share the knowledge on information security and cryptography. Many projects have been completed for a diverse variety of corporations. Projects resulted in national algorithms on information security and cryptography, satisfying the emerging need in private/public sectors. In addition, projects enables our students to apply their theoretical knowledge in real world applications and encourages them to make an active research. These features show that the cryptography department is an independent organization making research on information security and cryptography, and sharing its knowledge with private/public sectors.

The graduates mainly work and take part in Turkish Armed Forces, TUBITAK-BİLGEM, ULAKBİM, OSYM, Aselsan, Havelsan, National Intelligence Service, universities and software corporations.

Actuarial Sciences

Actuarial Science is a discipline, which employs mathematics and statistics in modeling of the financial impacts of risk and uncertainty in various sectors and in designing solutions for risk management. Actuaries use probability, mathematics, statistics, finance, economics, financial economics and computer programming to study uncertain future events. Actuarial Science is a newly emerging field of science in Turkey with full of potential for career growth and plenty of promises for high profile career opportunities. It is one of the top five potential job fields in USA. In Turkey, there is a high demand in producing scientific knowledge basis for actuarial analysis and actuaries. Master of Science Program offered at Institute of Applied Mathematics serves for this purpose. The curriculum follows the standards of the international institutes and also aims its students to get prepared for the universal actuary



examinations. The insurance industry cannot function without actuaries. Private corporations needs actuaries that they should rely on risk evaluations to frame their strategic management decisions. Moreover; actuaries could be employed as consultants and can also work for government by helping manage its programs and overseeing public companies to ensure compliance for regulatory laws. Our graduates are employed by the universities, banks and investment firms, insurance and reinsurance companies, labor unions, brokers and rating bureaus. Even though its young history at the IAM, the graduates of Actuarial Sciences Program are highly demanded by insurance sector in Turkey. Almost 60% of the students receive job offers from insurance and reinsurance companies before they graduate. Research areas of our program are; Catastrophe Insurance, Agricultural Insurance, Pension Funds, Risk Modeling and Management. AvivaSa, Groupama, Tower Watson, Turkish Insurance Association, ERGO are some of the companies employing our students and graduates.

Financial Mathematics

Financial Mathematics is an interdisciplinary area that draws from the fields of mathematics, statistics, economics, business management and industrial engineering to provide models and derive relationships between fundamental variables of finance such as asset prices, market movements and interest rates. In our country, especially following the emergence of Istanbul as an international financial center, the financial sector has enjoyed unparalleled expansion in the last decades. Therefore, mathematical foundations of finance has become excessively important and more sophisticated financial instruments are expected to be introduced into the sector in the forthcoming periods. These developments will lead to a demand for talented people trained in the field of financial mathematics.



The IAM is responding to this new trend in the Turkish finance industry by developing an interdisciplinary program that will introduce students models and mathematical techniques used in option pricing, pricing of other complex financial products, and to some aspects of financial econometrics. The program combines the strengths of many disciplines at METU and offers degrees in M.Sc. and Ph.D. having close academic cooperation with national and international universities. The program aims to provide students with the knowledge and skills necessary for comprehending and applying existing techniques of Financial Mathematics as well as cultivating their ability in creating new, innovative techniques. Graduates of the program can analyze financial markets and conduct research in areas such as risk modeling and management, interest rate models, pricing and hedging and portfolio optimization. The graduates are acknowledged in the areas of theory and application and are employed by the banks, insurance companies, Turkish Central Bank, Borsa Istanbul, international finance companies.