

The MathWorks in Academia

Accelerating the pace of engineering and science

About The MathWorks

The MathWorks is the leading developer of mathematical computing software. MATLAB, "the language of technical computing," is a programming environment for algorithm development, data analysis, visualization, and numeric computation. Simulink is a graphical environment for simulation and Model-Based Design of multidomain dynamic and embedded systems.

Engineers and scientists worldwide rely on these product families to accelerate the pace of discovery, innovation, and development in automotive, aerospace, electronics, financial services, biotech-pharmaceutical, and other industries. MathWorks products are also fundamental teaching and research tools at more than 3500 of the world's universities and learning institutions. Founded in 1984, The MathWorks employs more than 2000 people in 15 countries, with headquarters in Natick, Massachusetts, USA.

Since its founding, The MathWorks has worked closely with academic institutions, including its first customer, the Massachusetts Institute of Technology. We maintain a strong collaborative relationship with the academic community to create a wide range of products, resources, and programs that enhance learning, teaching, and research.

The MathWorks invests in the next generation of innovators by:

- Providing software, training, and mentors for design competitions that challenge students to solve the same problems faced by engineers and scientists in a variety of disciplines, including automotive, aerospace, systems biology, communications, and robotics
- Collaborating with book authors, publishers, and other vendors to develop course materials and supplemental tools that facilitate integration of MathWorks software into curricula
- Sponsoring professional organizations, such as International Federation of Automatic Control, Society for Industrial and Applied Mathematics, American Society of Engineering Education, and Society of Instrument and Control Engineers, to promote education in engineering, science, and math worldwide

Global Impact of MathWorks Products

Around the world, engineers and scientists are making a difference by using MATLAB and Simulink to:

- Advance our knowledge of the earth, the environment, and the universe
- Develop more fuel-efficient and safer cars, airplanes, and trains
- Make advances in life science research and diagnostic techniques
- Search for new sources of energy
- Educate the next generation of engineers and scientists

One Software Environment, Infinite Possibilities

Faculty, students, and researchers use MathWorks products across departments and applications in engineering, science, and math. Because MathWorks tools are widely adopted in industry, government, and academia, they enable communication and collaboration among researchers.

MATLAB and Simulink can be extended and customized with more than 100 add-on products for specific applications:

Technical Computing

Explore and develop technical algorithms and complete applications; easily deploy them to colleagues to facilitate collaboration

Math and Optimization

Perform numeric and symbolic computation, and apply large-scale optimization techniques to a broad range of technical problems

Statistics and Data Analysis

Apply fundamental and advanced techniques for statistics, curve-fitting, and visual data analysis

Control Systems

Perform linear system analysis, design robust control algorithms, simulate systems including controllers and plants, and automatically generate code for embedded microcontrollers

Signal Processing and Communications

Design and simulate a broad range of systems, from signal processing algorithms to communication protocols, and automatically generate code for DSP chips and FPGAs

Image Processing

Analyze images and develop algorithms to deploy to DSP chips and other embedded systems

Test and Measurement

Acquire data and generate signals in real time using MATLAB and Simulink, from data acquisition boards, test instruments, and digital imaging systems

Computational Biology

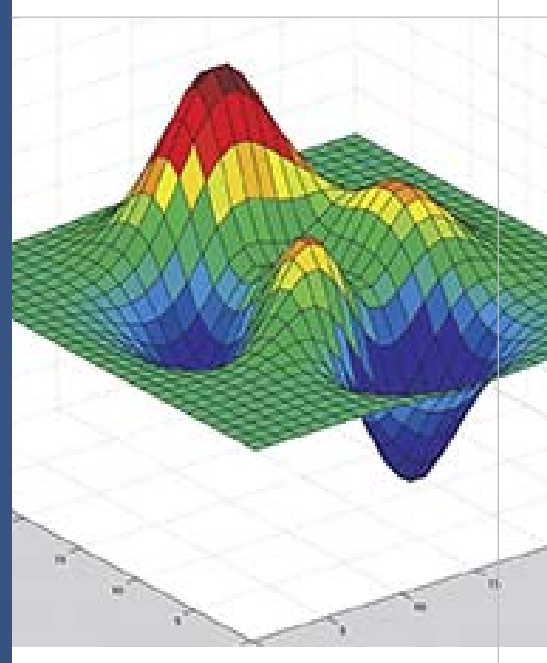
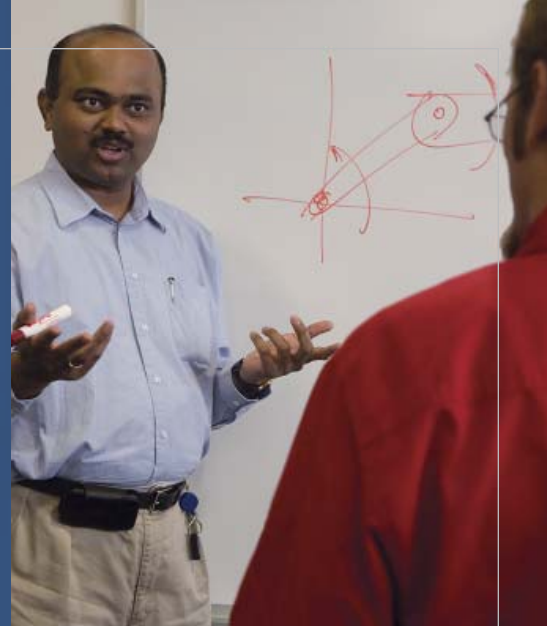
Apply bioinformatics techniques to life science data and use leading-edge systems biology to simulate biochemical pathways and other systems

Financial Modeling and Analysis

Build and deploy models of econometric and financial systems, with real-time access to financial data-feeds and relational databases

Parallel Computing

Execute MATLAB applications and Simulink simulations on high-performance architectures, from multicore desktops and laptops to multiprocessor clusters, grids, and clouds





View of a Martian landscape from the Mars Exploration Rover. Engineers at NASA's Jet Propulsion Laboratory used MATLAB and Simulink for numerous phases of the Mars Exploration Rover mission, including navigation, data analysis, and entry, descent, and landing system design.

The MATLAB Enabled Campus

Educators command a powerful and flexible environment for teaching, applying algorithms and models, and exploring data.

“The MATLAB programming language and visualization capabilities engage our students and help them see results instantly. The toolboxes help them solve problems more easily than with C or Fortran.”

— HEIDI DIEFES-DUX, ASSISTANT PROFESSOR OF ENGINEERING EDUCATION, PURDUE UNIVERSITY, UNITED STATES

Students gain knowledge of fundamental theories and their applications while becoming skilled in using industry-standard tools.

“Hanyang University and the Automotive Control and Electronics Laboratory (ACE Lab) recognize the importance of delivering a practical set of skills to Korea’s future engineers. Incorporating MathWorks tools into class assignments and exercises at our graduate and undergraduate levels has helped us to prepare students for professions in the automotive industry.”

— PROFESSOR MYOUNGHO SUNWOO, PROFESSOR OF AUTOMOTIVE ENGINEERING AND MANAGER OF THE ACE LAB, HANYANG UNIVERSITY, KOREA

Researchers use a rich set of tools to accelerate discovery and provide insight into complex system behavior.

“This is software as it should be; highly specialized, easy to use, and with obvious functionality. Such tools allow us to step beyond technical details and focus our attention on the pharmacological and physiological part of the experiment.”

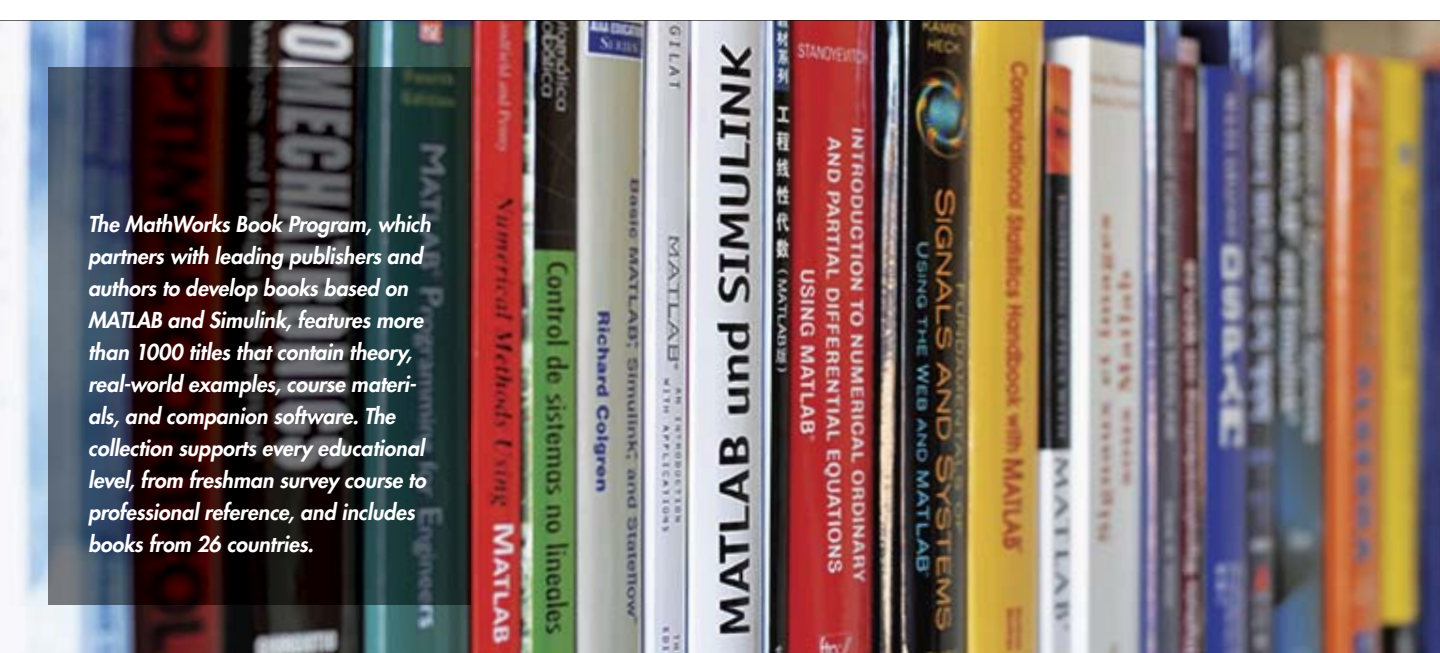
— DR. ALBRECHT WENDEL, PROFESSOR OF BIOLOGY, UNIVERSITY OF KONSTANZ, GERMANY

**MATLAB[®]
& SIMULINK[®]**

MathWorks Products in the Classroom and Laboratory

Connecting theory with practice

TEACHING WITH MATLAB AND SIMULINK BASED CURRICULA helps you engage your students by connecting theory with practice. You can establish a foundation for learning that serves students throughout their university years and prepares them for careers in engineering, science, finance, and math.



The MathWorks Book Program, which partners with leading publishers and authors to develop books based on MATLAB and Simulink, features more than 1000 titles that contain theory, real-world examples, course materials, and companion software. The collection supports every educational level, from freshman survey course to professional reference, and includes books from 26 countries.

Learning with Industry-Standard Tools

With their rich modeling and computational capabilities, MATLAB and Simulink help students jumpstart learning by enabling them to work on real-world problems and develop programming skills. Students have the freedom to investigate what-if scenarios and to experiment with data, algorithms, and models. They gain proficiency in problem solving, analysis, and design while using industry-standard tools.

A Single Tool Set for Teaching

When your department or university standardizes on MathWorks products, you get a consistent and familiar computing foundation that lets students and instructors focus on technical content rather than on learning new tools. Standardizing also makes it easier for your students to transition from introductory to more advanced classes. You can customize MATLAB and Simulink for a particular course with more than 100 toolboxes and blocksets from The MathWorks and add-on products from its partners.

Model-Based Design in Academia

Widely adopted in industries such as automotive, aerospace, communications, and industrial automation, Model-Based Design places a high-level system model at the center of the development process. This approach enables capturing requirements and specifications as executable models, system design with modeling and simulation, implementation using automatic code generation, and continuous test and verification from early designs to final implementation. For instructors, this approach helps students understand the basic physics of system components, the interaction between components, and the behavior of the overall system as they gain familiarity with system development techniques used in companies around the world.

ACADEMIC SUCCESS STORY

Georgia Tech

More than 1000 Georgia Tech engineering students learn computer science concepts each semester with MATLAB. The students, who start out writing functions and scripts, move on to plots, images, and numerical methods, and finally study dynamic data structures. After completing the course, the students continue using MathWorks tools throughout their undergraduate studies.

“With MATLAB, we are combining computer science theory and concepts with problem solving and engineering. MATLAB is the one language that we want our students to use—the one that we use in all our classrooms.”

**—DR. JAMES CRAIG, PROFESSOR OF AEROSPACE ENGINEERING,
Georgia Institute of Technology, United States**



Hands-on learning at a vehicle design competition for students. The MathWorks supports programs like the EcoCAR Challenge that inspire learning and advance education in engineering, science, finance, and math.



Research with MathWorks Products

A foundation for innovation

MATLAB AND SIMULINK PROVIDE A FLEXIBLE ENVIRONMENT that enables you to accelerate your research, reduce analysis and development time, and deploy advanced applications. This rich set of proven tools for analyzing and visualizing systems and data enables you to experiment with new approaches and gain insight into the behavior of complex systems. The widespread use of MathWorks tools throughout academia and industry helps you connect with your peers and leverage research in your field.

A waterfall plot visualization showing radio channel occupancy over time. The plot consists of numerous vertical bars of varying heights and colors (including green, yellow, orange, and red) against a dark background, representing the frequency and duration of channel usage.

Waterfall plot showing that radio channel occupancy varies over time, a critical factor in developing software defined radio (SDR) devices. MATLAB and Simulink provide a flexible environment for accelerating research, reducing analysis and development time, and deploying advanced applications.

Tools for Specialized Tasks

The MathWorks product family includes more than 100 toolboxes and blocksets for specialized tasks such as analyzing financial data, modeling and simulating biochemical pathways, and processing images and signals. By extending MATLAB and Simulink with these products, you can apply the latest techniques in your field and leverage techniques from other fields.

A Collaborative Environment

When you and your colleagues work in MATLAB and Simulink, you share a common language, which fosters collaboration and interdisciplinary research. Using MathWorks deployment tools, you can share applications and research results with anyone in your network, even those who do not have MATLAB.

Resources for Researchers

MathWorks resources for researchers improve productivity and help you interact with the global community of engineers and scientists who use MathWorks products. Technical articles in the *MATLAB Digest | Academic Edition* and user stories developed for academia describe how MathWorks products are overcoming difficult research challenges and advancing scientific discovery in your discipline. MATLAB Central, the company's vibrant online community, features a file exchange with downloadable code and a newsgroup that facilitates the exchange of ideas and information.

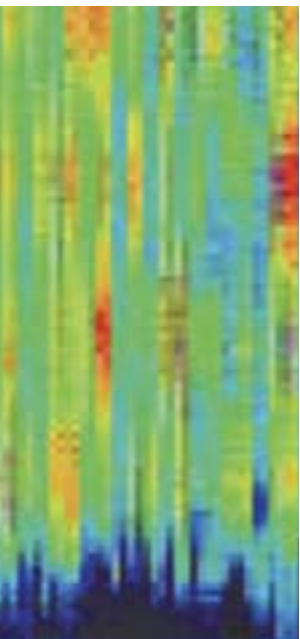
ACADEMIC SUCCESS STORY

University of Nottingham and AstraZeneca

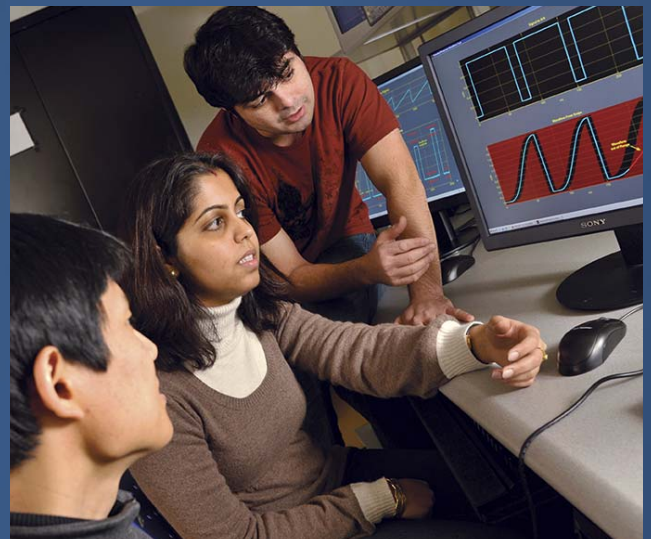
The University of Nottingham and AstraZeneca Research and Development Charnwood collaborated to accelerate clinical research of anti-inflammatory drugs. Using MathWorks tools, researchers analyzed hyperspectral images as a measurement of oxygen saturation. They developed advanced algorithms that convert image data into saturation maps for researchers and doctors.

"MATLAB not only shortens analysis and algorithm development time, but it allows me to experiment with new methods that otherwise would be too time-consuming."

—PAUL RODMELL, SENIOR RESEARCH FELLOW,
University of Nottingham, England



Researching real-world problems with industry-standard tools. Adopting MATLAB and Simulink at your university helps attract, engage, and retain students, and gives them a competitive edge in their academic and professional careers. ▶





Licensing Options

Academic institutions can select from a variety of licensing options for classrooms, departments, and campuses. The Total Academic Headcount License provides all faculty, researchers, and students with cost-effective access to MathWorks products, even when they work from home. Administrators can conveniently manage licenses online from their MathWorks Account by visiting the License Center.

Resources

Online MathWorks resources for teaching include shared course materials organized by department at the Curriculum Exchange and self-paced video tutorials. Educators and researchers can join the community at MATLAB Central, which features a newsgroup and downloadable code from users at the File Exchange. *MATLAB Digest | Academic Edition* and academic user stories describe how leading educational institutions apply MathWorks products in teaching and research.

Visit mathworks.com/academia to learn about products, resources, and programs available to support the use of MATLAB and Simulink at your university. To try software or request pricing, e-mail your request to info@mathworks.com.

Getting Started

- Free Online Video Tutorials
- Product Training
- E-Books by Cleve Moler

Teaching

- MATLAB and Simulink Student Version
- Curriculum Exchange
- MATLAB Central
- Book Program for Authors
- MATLAB and Simulink Based Books
- MATLAB Digest | Academic Edition*
- Software Evaluation for Instructors

Research

- File Exchange
- Newsletters
- User Stories
- Student Competitions
- Application Areas

Product Support

- MathWorks Account Registration
- License Center
- Documentation
- Technical Support

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