



*Department of Mechanical Engineering
and Mechanics*

Good Day,

Welcome to Drexel University and the Department of Mechanical Engineering and Mechanics (MEM). We are here to discuss the opportunities of mechanical engineering with you. Hopefully this visit will give you the sense of enthusiasm and commitment our community has to the engineering profession, to the development of the next generation of practitioners, to discovery and innovation, and to the creation of systems that improve the state of mankind.

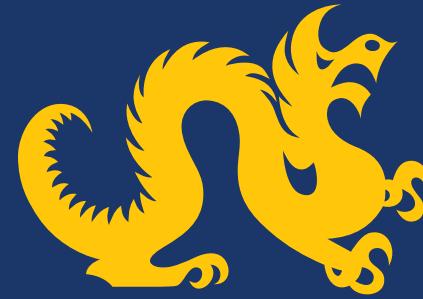
Creativity is a term I want to emphasize. People have long asked where human activity ends and machine activity begins. Engineers utilize the knowledge and tools of mathematics, physics, chemistry, biology, and the sciences of sociology and psychology to create tools that expand the frontiers of the human-machine interface for the benefit of humankind. They work with energy systems, structures and mechanics, manufacturing, and robotics from scales as large as a skyscraper to as small as a single molecule.

Our highly networked, collaborative environment is a second home for a distinctive kind of engineer: one who is eager to work across STEM fields, collaborate with classmates and colleagues in the humanities and social sciences, and partner on breakthrough ideas with organizations ranging from Boeing and the American Heart Association to the U.S. Office of Naval Research, the Department of Energy, and PeaceTech Lab. In Drexel MEM, we're taking on the real problems of real people using the values of modern design thinking—making life more equitable and meaningful, whether in our local Philadelphia neighborhoods or communities around the world. Increasingly our students and graduates will be called upon to lead: developing complex systems, teaching and mentoring new generations of engineers, playing roles in securing peace through improving the lives of those in need.

When you choose Drexel MEM, you join a vast alumni network with members spread across the country and over the world with opportunities to find mentorship, build connections, and collaborate that can be personally and professionally transformative. One in one hundred American engineers holds an engineering degree from Drexel University. Finding a college that fits you is a time of great opportunity and excitement – we hope you'll choose Drexel MEM as the next step in your adventure.

A handwritten signature in blue ink, appearing to read "J. Spanier".

Jonathan E. Spanier, Professor
Department Head
Mechanical Engineering and Mechanics



DREXEL UNIVERSITY

College of

Engineering

MECHANICAL ENGINEERING

UNDERGRADUATE PROGRAM

Mechanical Engineers (MEs) apply the principles of energy and materials, and mechanics to design and manufacture machines and devices of all types that physically, and figuratively, move modern society. MEs are essential to industries such as manufacturing, robotics, transportation and energy and have a significant impact on medicine and health. This breadth ensures that MEs will continue to be among the most in-demand professionals in the 21st century.

Drexel's program in Mechanical Engineering prepares graduates for successful careers in industry, government and NGOs and also provides a springboard for advanced studies in engineering, medicine, law, business, data science and all disciplines for which analytical skills are important.

► EMPLOYERS

Here are some of the organizations that have hired Drexel MEM students as full-time employees:

- Barry Miller Design Group
- Bristol-Myers Squibb Company
- Lockheed Martin Corporation
- Lutron Electronics
- Naval Sea Systems Command
- SpaceX
- Tesla Motors

► RANKINGS

Ranked 4th of 37 ME programs in Pennsylvania

R1 Research Status, Carnegie Classification of Institutions

Ranked 53rd of Graduate Programs in Mechanical Engineering, *U.S. News & World Report* 2019

College of Engineering ranked 75th overall for Graduate Programs in Engineering, *U.S. News & World Report* 2019

► POTENTIAL CAREERS

- Aerospace Engineer
- Auto Research Engineer
- Heating & Cooling Systems Engineer
- Patent Examiner
- Robotics Engineer

MEDIAN TOTAL PRIMARY COMPENSATION:
\$124,000*

*ASME 2017 Salary Survey

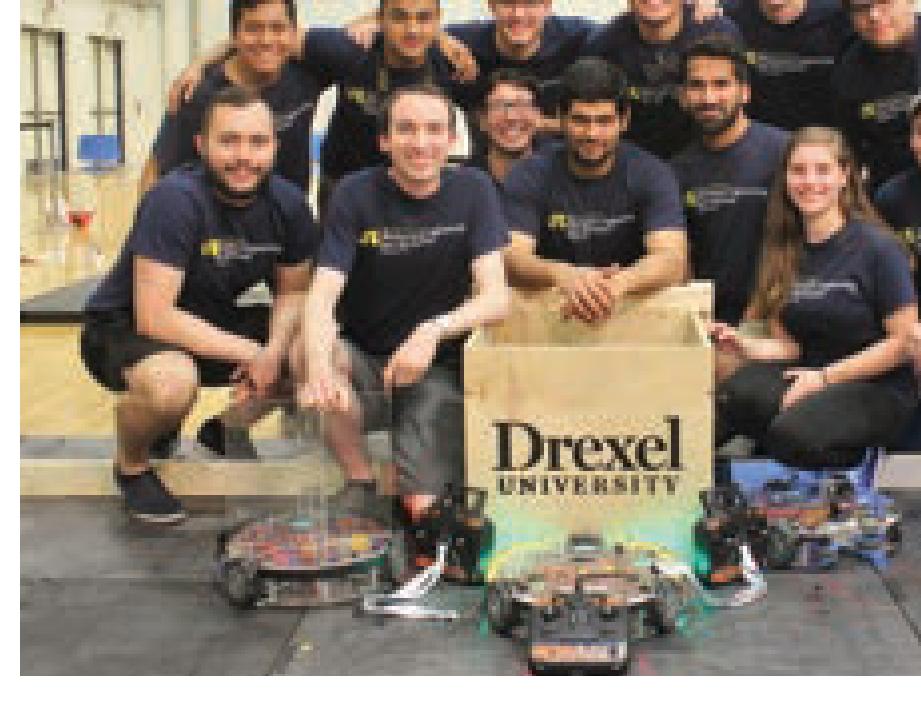


CONTACT US

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Philadelphia, PA 19104

1.800.2.DREXEL
215.895.2400
enroll@drexel.edu

www.drexel.edu/em



► COURSES YOU'LL REALLY ENJOY

Aerospace Structures

Covers properties of wing and fuselage sections, torsion of thin-walled and skin-stringer multiple-cell sections, non-symmetrical bending of wing and fuselage sections, shear in thin-walled and skin-stringer sections, and buckling. Introduces matrix methods.

Solar Energy Fundamentals

This course focuses on basic theories of solar radiation, solar thermal energy, and photovoltaics. Students will learn basic radiation heat transfer, solar radiation, solar thermal collection and storage, passive and active solar heating/cooling, physics of photovoltaic cells, and characteristics and types of solar cells.

Micro-Based Control Systems

Provides hands-on experience in real-time control and manipulation of hardware dynamic systems, including microcomputer, architecture, software, and device drivers. Emphasizes real-time interfacing of data acquisition and control systems.

► ACCELERATED DEGREE OPTIONS

Accelerated degree programs, such as the BS/MS in Engineering, as well as the BS/JD, BS/MD, and BS/MBA, enable qualified students to earn both degrees sooner than they would in traditional programs. Eligible students can be admitted to these degree programs in two ways: apply as an incoming freshman for provisional admission through Undergraduate Admissions or apply to the Graduate Studies Office after completion of a minimum 90 credits.

To learn about accelerated degree option, visit drexel.edu/em/ug/accelerated.



DREXEL UNIVERSITY
College of
Engineering

Mechanical Engineering and Mechanics

SPECIALIZATIONS

What Can You Do with a Degree in Mechanical Engineering?

Students may customize their degrees in mechanical engineering by selecting electives in one of the following specialty areas offered by the department. While these subspecialties are NOT offered as academic concentrations (with the exception of aerospace), students nonetheless have the flexibility to tailor their coursework to prepare them for courses in each of these subfields.



Biomechanics: Orthopedics, cardiovascular engineering, biomimetics, bio-inspired robotics and control, rehabilitations, forensic engineering, injury protection; artificial organs, tissues, and biological sensors; lab-on-a-chip, cell and protein mechanics.
Potential careers at: Exponent, Synthes, Children's Hospital of Philadelphia, Johnson & Johnson, Glaxo Smith Klein, Nike...



Autonomous Systems, Control, and Robotics: Systems modeling, simulation, and control system design; networked robotic systems, autonomous air, land, and sea vehicles; adaptive and intelligent controls, swarms, multi robot systems.
Potential careers at: NAVSEA, Ocean Power Technologies, Pratt & Whitney...



Design and Manufacturing. 3D-printing, bio-fabrication, laser etching; CAD, CNC machining; wrought metal alloys production, macrofabrication of devices; bio-inspired designs and design methodologies.

Potential careers at: Volvo, Boehringer, Synthes, Merck, Black & Decker, Air Products...



Thermal Fluids and Energy Sciences: Fluid Dynamics, heat transfer, combustion, applied thermodynamics; Alternative/green-energy systems, fuel cell technology, battery, hydrogen energy, plasma energy, propulsion, chemical processing, power generation.

Potential careers at: Volvo, Exelon Nuclear, Sunoco, Johnson Matthey, Siemens, DuPont, AirProduct...



Mechanics and Structures: Mechanical behavior of structures and machine parts, failure mechanisms, advanced materials, finite element methods for stress analysis; design of electronic parts, biomechanical systems, buildings, aircraft, machine components.

Potential careers at: Airbus, GM, Black & Decker, DuPont, NASA, DoD, DoE, NIST...



Aerospace: Air and space systems design, atmospheric flight mechanics, orbital mechanics, guidance and control, structural design, propulsion systems, computational fluid mechanics.

Potential careers at: NASA, Boeing, Augusta Aerospace, Lockheed Martin...

Create your own We will work with students to customize a specialization targeted to emphasize their individual interest.

CO - OP PROGRAM CO-OP PROGRAM

Drexel Co-Op for Mechanical Engineers

A key part of the major is Drexel's prestigious co-operative education program, in which students alternate periods of classroom study with periods of engineering work experience. Mechanical Engineering students can choose from the following:

- Three Co-op Option (Five Years): includes three six-month periods of full-time employment.
- One Co-op Option (Four Years): includes one six-month period of full-time employment.

Some of the companies that have worked with MEM students include: Exelon Corp.; Lockheed Martin; NASA; NAVSEA; CDI Corp.; Southco, Inc.; Johnson & Johnson; and Dorman Products, to name a few. Our co-op students are generally paid, with an average six-month pay of \$18,500, which may be augmented with a housing/moving allowance.



ACCELERATED DEGREE PROGRAM

Accelerated degree programs, such as the BS/MS in Engineering, as well as the BS/JD, BS/MD, and BS/MBA, enable qualified students to earn both degrees sooner than they would in traditional programs. Eligible students can be admitted to these degree programs in two ways: apply as an incoming freshman for provisional admission through Undergraduate Admissions or apply to the Graduate Studies Office after completion of a minimum 90 credits. To learn about accelerated degree option, visit www.drexel.edu/em/ug/accelerated.

Degree Requirements

Freshman Year

Fall:

CALCULUS I
CHEMISTRY I
INTRO TO ENGINEERING
EXPOSITORY WRITING
UNIVERSITY 101

Winter:

CALCULUS II
PHYSICS I
CHEMISTRY II
INTRO TO PROGRAMMING
PERSUASIVE WRITING
CO-OP 001 (1 credit)

Spring:

MULTI VARIABLE CALC
PHYSICS II
ESSENTIAL BIOLOGY
FRESHMAN DESIGN
ANALYTICAL WRITING

Sophomore Year

Fall or Spring:

LINEAR ALGEBRA
PHYSICS III
MATERIALS I
STATICS
CIVIC ENGAGEMENT

Winter or Summer:

DIFFERENTIAL
EQUATIONS
INTRO THERMODYNAMICS
DYNAMICS
FOUNDATIONS OF CAD
MATH/SCIENCE ELECTIVE

Fall and Winter/ Spring and Summer:

CO-OP

Pre-Junior Year

Fall or Spring:

MECH OF MATERIALS
THERMO ANALYSIS
TECHNOLOGY IN HISTORY
ENG ECONOMICS
FREE ELECTIVE

Winter or Summer:

INTRO TO CONTROLS
MECH BEHAV OF MAT'L
FLUID MECHANICS
ENGINEERING ETHICS
EXPERIMENTAL MECH LAB

Fall and Winter/ Spring and Summer:

CO-OP

Junior Year

Fall or Spring:

DYNAMIC SYSTEMS
CAD/CAM
THERMAL FLUID LAB
HEAT TRANSFER
FUNDAMENTAL ELECTIVE
INTRO TO DESIGN

Winter or Summer:

ENGINEERING RELIABILITY
DYNAMIC SYSTEMS LAB
GEN ED ELECTIVE
FUNDAMENTAL ELECTIVE
FUNDAMENTAL ELECTIVE

Senior Year

Fall:

SENIOR DESIGN I
MATH/SCIENCE ELECTIVE
GEN ED ELECTIVE
FUNDAMENTAL ELECTIVE
MEM/COE ELECTIVE

Winter:

SENIOR DESIGN II
MATH/SCIENCE ELECTIVE
GEN ED ELECTIVE
MEM ELECTIVE
MEM/COE ELECTIVE

Spring:

SENIOR DESIGN III
FREE ELECTIVE
GEN ED ELECTIVE
MEM ELECTIVE

Example MEM Electives

Machine Design
Manufacturing Process I
Manufacturing Process II
Robotics I
Robotics II
Micro-Based Control Systems
Aircraft Design & Performance
Aerospace Structures
Aircraft Flight Dynamics & Control
Aerodynamics
Applied Machine Learning for Mechanical Engineers
Finite Element Methods
Numerical Methods in Design



The Department of
Mechanical Engineering
and Mechanics
welcomes

New Faculty



Dr. Joshua Agar joins us from Lehigh University, where he has been an assistant professor. Dr Agar earned his PhD from the Univ of Illinois at Urbana-Champaign, and he completed a postdoctoral fellowship at the Univ of California, Berkeley. His research interests center around codesign of automation and controls for experimental synthesis, manufacturing, and nanoscale spectroscopy, machine learning, and heterogeneous computing. He joined us July 1, 2022.

Dr. Ania-Ariadna Baetica is currently a Postdoctoral Scholar in Biochemistry and Biophysics at the Univ of California, San Francisco. She earned the BA in Mathematics from Princeton and the PhD in Engineering Control Theory from Caltech, under the supervision of Thomas E. and Doris Everhart Professor of Control & Dynamical Systems and Bioengineering Richard Murray. Her research interests and expertise span biological control and systems biology. She will be joining us in Spring 2023.



Dr. Yue Zheng is currently a Postdoctoral Researcher at UMass Amherst and recently completed a postdoctoral fellowship at the Univ of Southern California. She received the BS in Theoretical and Applied Mechanics from Fudan Univ and the PhD in Mechanical Engineering from the Univ of California, San Diego. Her research interests lie in the mechanics of soft materials, mechanical metamaterials, and biomechanics, including both modeling and simulation, and experiment, with applications in soft robotics. She will join the department in Fall 2023.

Dr. Wesley Chang is a Beckman Postdoctoral Fellow at Caltech, researching electrochemical methods to decarbonize the industrial sector, following completion of a postdoctoral appointment at Columbia. He received the BS and MS from Stanford, and the PhD in Mechanical Engineering from Princeton. His research has explored a variety of battery technologies, including next-generation lithium metal batteries for electric vehicles. Dr. Chang's lab will focus on electrochemical energy storage and conversion technologies. He will be joining us in Fall 2023.

