

# MECHANICAL ENGINEERING

<http://www.rit.edu/kgcoe/mechanical/>

## PROGRAM OVERVIEW FOR EMPLOYERS

Professional courses are offered in the areas of thermal systems, applied mechanics, manufacturing, materials science, systems analysis, computer-aided graphics and design, robotics, automotive engineering, aerospace engineering, bioengineering, and energy and the environment. Students are prepared for engineering positions in design, development, research, or manufacturing, in a diversity of work environments. All students complete a broad core of mechanical engineering coursework, emphasizing solid-body mechanics and thermal-fluid sciences. The undergraduate program in Mechanical Engineering offers an unparalleled opportunity for hands-on and laboratory experience. Technical electives during the final two years allow each student to emphasize his/her area(s) of interest. All BS students complete a capstone, multi-disciplinary, team-based design and build project (over a period of six months) during their final year of study. Students are very active in professional society activities, including design competitions. The Rochester Institute of Technology Formula SAE race team took first place overall, for the second year in a row, out of 80 teams at the 2011 SAE Collegiate Design Series competition in California. The RIT FSAE team is currently ranked fourth overall worldwide out of 475 teams. Students also took first place in the 2007 & 2009 ASME/NASA Moonbuggy Competition, first place in 2010 SAE Baja National Competition, and regularly finish in the top-10 in the SAE Aero Heavy Lift Competition.

### Degree(s) Awarded

Bachelor of Science (5 year), Bachelor/Master of Science dual degree, Bachelor/Master of Engineering dual degree, Master of Science, Master of Engineering

### Enrollment

Approximately 913 full-time students including 110 dual degrees, 31 full time MEng and 23 full time MS students, and at our campus in Dubai, UAE: 17 MEng students and 38 BS students

### Cooperative Education Component

BS program requires 5 quarters of co-op. BS/MS and BS/ME programs require 4 quarters of co-op. Students available for 3 or 6 month co-ops, year around, beginning third year.

### Salary Information (Avg/Range)

Co-op:	\$16.40	\$9.00 - \$30.00
BS:	\$55,000	\$42,000 - \$75,000
BS/MS:	\$63,870	\$44,000 - \$80,000

### Equipment & Facilities

- Extensive computer availability including three modern PC labs, system dynamics lab, and a measurement, instrumentation, and control lab
- Robotics lab, with a variety of robots and microrobots
- Complete machine tool lab including manual and CNC machines
- Vibration spectrum analyzer
- Computational Fluid Dynamics lab
- Thermo-fluid laboratory experiments
- Subsonic wind tunnel
- Copper Vapor Laser Particle Imaging Velocimetry (PIV)
- Proton Exchange Membrane Fuel Cell Laboratory

- Biomedical Device Engineering Laboratory
- Thermoelectric systems and technology laboratory
- Bioengineering Laboratory
- Material testing equipment: universal testing machine, torsion tester, digital strain gauge testing, x-ray diffraction, atomic force microscope.
- Thermal analysis and microfluidics laboratory
- Engine Performance / Dyno Testing laboratory
- Composite materials laboratory

### Accreditation

The Bachelor of Science degree program in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, Telephone (410) 347-7700. The program and its options are evaluated using the program criteria for mechanical engineering.

### Student Skills & Capabilities

- Engineering graphics and CAD/Pro E
- Use of computers as an engineering tool, including data analysis and system modeling via PC applications and other commercially available software such as MATLAB, LabView, and ANSYS
- Machine design
- Finite Element Analysis
- Thermal-fluid sciences
- Application of machine tools and fabrication processes
- Solid-body mechanics (statics and dynamic/kinematics)
- Materials testing and selection
- "Hands-on" assembly/testing
- Turbomachinery
- Heat transfer
- Aerodynamics and Aerostructures
- Automotive engine performance
- Mechanics of Materials

# Mechanical Engineering

## Course Sequence BS degree

### 1<sup>st</sup> & 2<sup>nd</sup> Years:

MIC Lab  
Calculus, Differential Equations,  
Matrices & BVP  
Engineering Statistics  
Chemistry  
Thermodynamics  
Fluid Mechanics\*  
University Physics\*  
Materials Processing\*  
Problem Solving with Computers\*  
(incl. PC-applications)  
Mechanics of Materials\*; Statics  
Dynamics  
Engineering Design Graphics\*  
Science Elective I

\*Laboratory/major project required

### 3<sup>rd</sup> & 4<sup>th</sup> Years:

Materials Science\*  
Science Elective II  
Design of Machine Elements  
Advanced Computational  
Techniques  
Heat Transfer  
System Dynamics\* (modeling,  
analysis, and design)  
Circuits I\*  
Numerical Methods  
Technical Electives\*  
Four (4) co-op quarters  
Transport Phenomena\*  
Intermediate Machining Lab

### 5<sup>th</sup> Year:

Senior Design Project\*\* (6 month,  
team-based working solution to an  
actual multi-disciplinary problem)  
4 Technical Electives\*  
One (1) co-op quarter

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3 Free Electives  
9 Liberal Arts Courses

**BS/MS (dual degree) Program**  
All undergraduate courses, plus:  
Nine (9) grad courses, Thesis

**BS/ME (dual degree) Program**  
All undergraduate courses, plus:  
Twelve (12) grad courses

**Both Dual Degree Programs:**  
Three courses common  
undergrad/grad  
Four (4) co-op quarters

**Option Courses** (Take all in 4<sup>th</sup> & 5<sup>th</sup> years; available to other students separately as electives as space is available):

### Aerospace

Intro to Control Systems  
Intro to Aerospace Engineering  
Aerostructures\*  
Aerodynamics  
Propulsion  
Flight Dynamics  
Fatigue & Fracture Mechanics  
Composite Materials\*  
Orbital Mechanics

### Bioengineering

Contemporary Issues in  
Bioengineering  
Biomaterials  
Fund of Particulate Behavior in Bio  
Sys  
Biomechanics  
Biomedical Device Engineering

### Automotive

Intro to Automotive Design & Mfg.  
Vehicle Dynamics  
Internal Combustion Engines  
Intro to Control Systems  
Fuel Cell Technology  
Tribology and Lubrication  
Powertrain Systems and Design  
High Performance Vehicle  
Engineering  
Alt. Fuels & Energy Efficiency  
for Transportation  
Design of Machine Systems  
Design for Manufacturing  
Dynamics of Machinery  
Production Systems Practicum  
(TPS)\*  
Intermediate Machining Lab\*

### Energy & the Environment

Contemp. Issues in Energy &  
The Environment  
Renewable Energy Systems  
Refrigeration & Air Conditioning  
Advanced Thermodynamics  
Turbomachinery  
Alt. Fuels & Energy Efficiency  
for Transportation  
Internal Combustion Engines  
Intro to Control Systems  
Fuel Cell Technology  
Engineering Economy

### New Program Offerings:

The Mechanical Engineering Department is thrilled to announce a fantastic new opportunity! Mechanical Engineering students now have the opportunity to Study Abroad at our campus in Dubai, in the United Arab Emirates. Students will be able to take RIT courses from RIT faculty at our Dubai campus. The quarters at our Dubai campus begin and end in-line with our calendar here at our Rochester campus. The first offering will be in Winter Quarter – 2010/2011. For more information, visit our website:  
<http://www.rit.edu/kgcoe/mechanical/newsevents/StudyAbroadPamphlet.pdf>

### New Summer Program Offered:

Now it is even easier to get co-op students during the academic year. The Mechanical Engineering Department is pleased to announce a new, robust Summer Program Offering for Mechanical Engineering Students! 14 core courses are being offered this summer to allow students more flexibility in the fall, winter, and spring quarters. In addition, a robust employer program is also being offered with visits to employers weekly. To date, tours/visits have been scheduled with Constellation Energy, Dresser Rand, ITT Goulds Pumps, and Welch Allyn. Finally, a social calendar is also being planned with potential outings to area festivals, Red Wings Games, etc. For more information, contact Barry Robinson, 585-475-7489 or [bdrctst@rit.edu](mailto:bdrctst@rit.edu).

### Selected Employers of Mechanical Engineering Co-op and Graduating Students:

Ariel Corporation, Bausch & Lomb, Boeing, Borg Warner Morse TEC, Constellation Energy, Cummins Engine, Delphi, Fisher Price, General Dynamics, Getinge, Hamilton Sundstrand, Harris RF, Honda R&D, Impact Technologies, IIT, Johnson & Johnson, Lighting Services, Lockheed Martin, Lord Corporation, Moog, NASA, Parker Hannifin, PPC, Precision Castparts (PCC), Special Metals Corp, The Raymond Corporation, Toyota, Vicor, Wegmans Food Markets, Welch Allyn, Xerox, & dozens more!

### Sarah W. Burke, Program Coordinator

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