

## Graduate Courses

For 600- and 700-level courses, see the BYU 2007–2008 Graduate Catalog.

## Mathematics Education Faculty

### Professors

Speiser, Robert David (1984) AB, Columbia Coll., 1965; PhD, Cornell U., 1970.  
Williams, Steven R. (1993) BS, MS, Brigham Young U., 1980, 1983; PhD, U. of Wisconsin, Madison, 1989.

### Teaching Professor

Voyles, Jacqueline Taylor (1978) BS, Idaho State U., 1966; MA, EdD, Brigham Young U., 1976, 1987.

### Associate Professors

Armstrong, Gerald M. (1970) BS, MS, Brigham Young U., 1963, 1965; PhD, U. of Wisconsin, Madison, 1971.  
Lawlor, Gary R. (1991) BS, Brigham Young U., 1984; PhD, Stanford U., 1988.  
Peterson, Blake (1996) BA, Utah State U., 1986; MS, PhD, Washington State U., 1990, 1993.  
Siebert, Daniel (2000) BS, MS, Brigham Young U., 1989, 1993; PhD, U. of California, San Diego, 2000.  
Walter, Charles N. (1969) BA, MA, PhD, U. of New Mexico, 1963, 1965, 1970.

### Assistant Professors

Belnap, Jason (2004) BS, Utah State U., 1996; MS, PhD, U. of Arizona, 1998, 2005.  
Gerson, Hope (2005) BA, Whittier Coll., 1990; MS, U. of Iowa, 1992; PhD, U. of New Hampshire, 2000.  
Leatham, Keith (2003) BS, MS, Utah State U., 1992, 1998; PhD, U. of Georgia, 2002.  
Walter, Janet (2002) BA, MA, Brigham Young U., 1988, 1992; EdD, Rutgers U., 2004.

### Assistant Teaching Professor

Hendrickson, Scott (2005) BA, MA, Brigham Young U., 1979, 1984.

### Instructor

Corey, Douglas (2006) BA, MA, Brigham Young U., 1999, 2001; MA, U. of Michigan, 2004.

## Mechanical Engineering

Larry L. Howell, Chair  
435-A CTB, (801) 422-2625

Ira A. Fulton College of Engineering and Technology Advisement Center  
264 CB, (801) 422-4325

### Admission to Degree Program

The degree program in the Department of Mechanical Engineering carries special enrollment limitations at the junior level. Please see Professional Program Acceptance below and the college advisement center for specific details.

### Graduation Requirements

To receive a BYU bachelor's degree a student must complete, in addition to all requirements for a specific major, the following university requirements:

- The university core, consisting of requirements in general and religious education (See the University Core section of this catalog for details. For a complete listing of courses that meet university core requirements, see the current class schedule.)
- A minimum of 30 credit hours in residence
- A minimum of 120 credit hours
- A cumulative GPA of at least 2.0

### Undergraduate Programs and Degrees

BS Mechanical Engineering

Students should see their college advisement center or a faculty member for help or information concerning the undergraduate programs.

### Graduate Programs and Degrees

MS Mechanical Engineering

PhD Mechanical Engineering

For more information see the BYU 2007–2008 Graduate Catalog.

### The Discipline

Mechanical engineers work with concepts, ideas, and products that are primarily mechanical or energy related. Mechanical engineering is a broad discipline that prepares a person to contribute in a wide range of fields such as aerospace, computer graphics, power generation, machine tools, petroleum, agricultural and construction equipment, medicine, government, and all types of transportation. A mechanical engineer may work in research, design, analysis, manufacturing, testing, operations, sales, or management. Engineers use critical problem-solving methods and basic principles of mathematics and science to creatively solve problems.

### Educational Objectives

The Brigham Young University Department of Mechanical Engineering undergraduate bachelor of science program pursues the following objectives:

1. Teach the fundamental concepts of math, science, and mechanical engineering to produce graduates who demonstrate technical excellence and provide service to their profession, community, family, and church.
2. Instill a desire and ability to learn continuously, both through study and faith, to enable graduates to meet the changing demands of their profession and personal life.
3. Provide practical and open-ended engineering experiences to develop graduates who think independently and demonstrate leadership and creativity.

## Mechanical Engineering

- Engage students in activities to produce graduates who communicate and work effectively and ethically with people of diverse backgrounds.

### Program Outcomes

To assure that these objectives are reached, the department has articulated twelve outcomes of the BS program. Each student graduating from this program is expected to have:

- A basic understanding of fundamental physical phenomena and governing principles.
- An ability to develop and solve mathematical models of fundamental physical phenomena.
- An ability to design a system, component, or process to meet desired needs.
- The expertise to plan and conduct an experimental program and evaluate the results.
- An ability to use modern engineering tools and techniques in engineering practice.
- An understanding of manufacturing processes and planning.
- Effective oral and written communication skills.
- An ability to work with others to accomplish common goals.
- An appreciation of history, philosophy, literature, science, and the fine arts.
- Personal behavior consistent with high moral and ethical standards.
- An understanding of engineering in a global, societal context.
- A desire for and commitment to lifelong learning and service.

All courses in the curriculum are designed to help achieve these outcomes.

The curriculum in mechanical engineering is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc. (ABET).

### Career Opportunities

A bachelor of science degree in mechanical engineering provides widely recognized professional training for careers in industry, government, and other areas. Most industrial companies hire some mechanical engineers. Companies that make mechanical or energy-related products may hire mostly mechanical engineers. As a result, many mechanical engineering positions are available worldwide. Mechanical engineers have job opportunities in companies involved in such areas as aircraft and spacecraft design; manufacturing processes; product safety and reliability; solar energy; electronic equipment packaging and cooling; power plant design; jet, train, truck, and automobile engines; environmental protection; artificial intelligence; robotics; medical and hospital equipment; new material development and applications; and technical writing. Increasing numbers of positions utilize foreign language experience.

A graduate in mechanical engineering is prepared for advanced studies in the field as well as in a variety of other disciplines, including law, medicine, and business administration. Perhaps most important to graduates are the problem-solving strategies and thinking processes acquired in the study of mechanical engineering that help one to succeed in any area of endeavor.

### General Information

Any student may choose to major in mechanical engineering and to enroll in all classes in the preprofessional program (items 1 and 2 under BS Mechanical Engineering Major Requirements).

### Professional Program Acceptance

Students must be accepted into the professional program before they may take the professional Me En core or technical electives (items 4 and 5 in the major requirements). To apply, students must have completed the following four courses at a college or university (neither AP nor concurrent enrollment credit meet this requirement):

- One course from the basic science core (item 1 in the major requirements).

- One course from the mathematics core (item 2 in the major requirements).
- Me En 172.
- CE En 103.

Only one repeat is allowed in any of these courses for purposes of determining professional program acceptance. If a student has taken more than four professional application courses or has repeated any of these courses, all grades received in the professional application courses will be considered in determining professional program acceptance.

A fixed number of students is granted acceptance to the professional program each year. Acceptance is based primarily upon the grade point average for the professional application courses. Because the class size is fixed, the GPA necessary for admission varies from year to year. Historically, students with a GPA of 2.9 or above in the professional application courses have been admitted to the professional program.

Normal application deadlines are June 12, October 1, and February 1. Applications from transfer students who have been admitted to the university may be considered at other times.

Professional program application forms are available in the college advisement center.

### Academic Standards and Continuance

On gaining acceptance into the professional program, students must maintain a minimum university cumulative grade point average of 2.0. No more than 6 credit hours of grades below C– in major courses may be applied toward graduation. A professional program course may not be retaken more than once.

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## BS Mechanical Engineering (94.5–98.5 hours\*)

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*This is a limited-enrollment program requiring departmental admissions approval. Please see the college advisement center or the department office for information regarding requirements for admission to this major.*

### Major Requirements

- Complete the following basic science core:  
Chem 105.  
Phscs 123, 220.  
**Note:** Students without high school physics should start with Phscs 121.
- Complete one of the following mathematics core sequences:
  - Math 112, 113, 302, 303.
  - Math 112, 113, 214, 334, 343.
- Complete the following preprofessional engineering courses:  
CE En 103, 203, 204.  
EC En 301.  
Me En 172, 191, 250, 282.
- Complete the following professional mechanical engineering core:  
Me En 312, 321, 335, 340, 363, 372, 373, 475, 476.
- Complete the following supporting courses:  
Engl 316.  
Stat 332.
- Complete 15 hours (five courses) of technical electives. The purpose of these courses is to strengthen the engineering education of the student by
  - deepening the student's understanding of engineering and/or science fundamentals,
  - helping the student learn to apply engineering fundamentals in specific areas of interest, and
  - helping the student to develop critical skills related to engineering practice.

The technical electives are normally 400-level or higher mechanical engineering courses, but other courses may be used as long as the following requirements are met:

- At least three courses must be in mechanical engineering.

- No courses may be below the 300 level.
- A maximum of 3 credit hours in Me En 595R or other independent project courses may be applied to meet technical elective requirements.
- All courses must be of an acceptable level from mechanical engineering, civil engineering, chemical engineering, computer engineering, electrical engineering, mathematics, statistics, physics, chemistry, or computer science; or they must be on the approved elective list in the department office.

If a student wishes to count a course outside these areas as an elective, approval must be granted *before* the course is taken. Approval is requested by submitting to the department undergraduate committee a one-page petition that lists all of the proposed electives and demonstrates how the proposed exception meets the purposes described above.

- No course used to satisfy other major requirements for graduation may be used as an elective.

### Manufacturing Option

The Society of Manufacturing Engineers has identified four areas of competency for manufacturing engineering as follows: (1) materials and manufacturing processes; (2) process, assembly and product engineering; (3) manufacturing competitiveness; and (4) manufacturing systems design.

An option in manufacturing engineering is available for mechanical engineering majors. It may be completed by taking 12 hours of technical electives from the following three areas (which may be counted against the 9 hours of mechanical engineering electives) according to the following requirements:

1. Complete the following:  
Me En 585.
2. Complete one or more courses from the following:  
Me En 482, 486, 537.
3. Complete the 12-hour requirement with courses from the following:  
Me En 452, 456, 477, 558, 584.

When combined with required courses for all mechanical engineering majors related to manufacturing, namely Me En 250, 282, 475/476, and Stat 332, this option provides a strong foundation in manufacturing engineering.

\*Hours include courses that may fulfill university core requirements.

## Mechanical Engineering (Me En)

### Undergraduate Courses

**172. Engineering Graphics—Principles and Applications.** (3:3:0) F, W, Sp Prerequisite: engineering and technology major status.

Comprehensive applications of CAD-based national (ANSI) and international (ISO) graphics standards, including coordinate and geometric dimensioning and tolerancing practices, manufacturing, and product verification procedures.

**191. New Student Seminar.** (.5:1:0) F, W

Topics of special interest to new mechanical engineering majors. Required of all first-semester freshman and transfer students.

**199R. Academic Internship.** (1–3:Arr.:Arr. ea.) F, W, Sp or Su Prerequisite: consent of both department chair and cooperative education coordinator.

Work experience evaluated by supervisor and posted on student's transcript.

**250. Science of Engineering Materials.** (3:3:0) F, W, Sp or Su Prerequisite: Chem 105.

Principles and properties of solid materials and their behavior as applied to engineering.

**282. Manufacturing Processes.** (3:2:3) F, W, Sp or Su Prerequisite: CE En 203, Me En 250.

Common manufacturing processes, including technological limitations and economic considerations. Influence of product design on process selection and manufacturing efficiency.

**312. Fluid Mechanics.** (3:3:1) F, W, Sp or Su Prerequisite: Me En 321, 363; 373 or concurrent enrollment.

Physics and modeling of fluid flow; fluid statics, dimensional analysis, momentum, internal and external viscous flow, compressible flow, and fluid machinery.

**321. Thermodynamics.** (3:3:0) F, W, Sp or Su Prerequisite: Phcs 123; Math 303 or 334.

Fundamentals of thermal energy and work; principle of state, conservation of mass, conservation of energy, increase of entropy principle; application to thermal and mechanical processes.

**335. Dynamic System Modeling and Analysis.** (3:3:1) F, W, Sp or Su Prerequisite: Math 303 or 334; Me En 363, 373, CE En 204.

Formulating mathematical models for mechanical, electrical, fluid, and combined systems; numerical solution of motion equations; first- and second-order systems, frequency response, and transfer functions.

**340. Heat Transfer.** (3:3:1) F, W, Sp or Su Prerequisite: Me En 312.

Fundamentals of heat transfer; basics of conduction, convection, and radiation; mass transfer by analogy; heat exchangers; computer applications to practical design and analysis problems.

**363. Elementary Instrumentation.** (3:2:3) F, W, Sp or Su Prerequisite: Math 303 or 334; EC En 301; Engl 316 or concurrent enrollment.

Fundamentals of mechanical measuring systems; sensors, signal conditioning, statistical error analysis, dynamic response, standards.

**372. Mechanical System Design Fundamentals.** (3:2:3) F, W, Sp or Su Prerequisite: CE En 203, Me En 172, 250, 282; Me En 373 or concurrent enrollment.

Static and dynamic stress and failure analysis for mechanical systems.

**373. Introduction to Scientific Computing and Computer-Aided Engineering.** (3:2:3) F, W, Sp or Su Prerequisite: Math 113; concurrent enrollment in Math 214 or 302.

Computer programming for engineers taught in context of solving physical systems using numerical methods. Student will program solutions using the C++ language, spreadsheets, symbolic solvers, etc.

**412. Applications of Fluid Dynamics.** (3:3:0) F Prerequisite: Me En 312.

One-dimensional compressible flow, shocks, expansions, nozzles; turbomachinery design and performance; pumps, compressors, fans, and turbines; introduction to CFD with applications.

**415. Applied Aerodynamics and Flight Mechanics.** (3:3:0) Sp or Su Prerequisite: Me En 312.

Modern applied aerodynamics, including performance, stability, and control of aerospace vehicles.

**422. Applied Thermodynamics.** (3:3:1) W, Sp or Su Prerequisite: Me En 321, 363, 373.

Applied engineering thermodynamics including air and steam power cycles, thermodynamic relations, and introduction to combustion and equilibrium chemical reactions.

**425. Internal Combustion Engines.** (3:2:3) F Prerequisite: Me En 321 or equivalent.

Fundamental operating characteristics of internal combustion engines, spark and compression ignition. Thermodynamic cycle analysis, performance and emissions characterization, and dynamometer testing on CFR and production engines.

**426. Gas Turbine and Jet Engine Design.** (3:3:0) W Prerequisite: Me En 312, 321; or equivalents.

Design and synthesis of land-based and aircraft gas turbines utilizing fluid flow and thermodynamic fundamentals. Extensive discussion of turbojet, turbofan, and turboprop engines.

**431. (Me En–EC En 483) Design of Control Systems.** (3:3:0) F Prerequisite: Me En 335 or EC En 380.

Classical frequency response and time domain design of control systems. State variable control and computer simulation of control systems.

**437. Kinematics.** (3:3:0) W, Sp or Su Prerequisite: CE En 204; Math 303 or 334; Me En 373.

Relative motion of links in mechanisms; velocities and accelerations of machine parts; rolling contact; cams; synthesis of mechanisms. Includes computer-aided engineering techniques.

**452. Intermediate Materials.** (3:3:0) Prerequisite: Me En 250, 372; or equivalent.

Mechanical behavior of engineering materials including metals, plastics, ceramics, and composites.

**456. Composite Material Design.** (3:3:0) Prerequisite: Me En 250.

Macro- and micro-mechanical analysis and design of uni- and multidirectional composite materials.

**471. Computer-Aided Engineering Applications.** (3:3:0) F Prerequisite: Me En 172, 373, CE En 203, 204.

Application of computer-aided engineering tools to design; 3-D geometry and solid modeling; applying finite element analysis, kinematic analysis, and other software to engineering analysis.

**472. Mechanical Systems Design Applications.** (3:3:0) W Prerequisite: Me En 372.

Theory, analysis, and design of mechanical systems and components.

**475, 476. Integrated Product and Process Design 1, 2.** (3:2:3 ea.) F, W Prerequisite: Me En 321, 363, 372, 373; senior standing (fewer than 30 hours remaining in the program) in mechanical engineering, manufacturing engineering technology, industrial design, or related disciplines with instructor's consent.

Comprehensive two-semester design experience from conception to manufacturing planning and prototype. Product development process. Economic and manufacturing considerations. Intellectual property assignment agreement required. Must be taken in consecutive fall and winter semesters.

**477. Design for Manufacture and Assembly.** (3:3:0) W Prerequisite: Me En 282, 372; or equivalent.

Design practice for manufacturing considerations. Surface finish, tolerances, GD&T, and inspection and gaging principles. Application of computer-aided tolerancing and inspection.

**482. Manufacturing Systems Analysis and Design.** (3:3:0) F Prerequisite: Me En 250, 282; or equivalents.

Analysis, synthesis, and control of processing and assembly operations; mathematical modeling of manufacturing processes; systems integration; applying conservation principles to processing and assembly operations.

**486. Automation.** (3:3:0) F

Determining appropriate levels of manufacturing automation based on economics and productivity. Elements of automation, including sensors, robots, conveyors, and part feeders.

**495R. Mentored Learning for Undergraduates in Mechanical Engineering.** (1–6:Arr:Arr. ea.) F, W, Sp, Su

Independent learning with a faculty member.

**499R. Honors Thesis.** (1–6:0:0 ea.) F, W, Sp or Su

## 500-Level Graduate Courses (available to advanced undergraduates)

**500. (Me En–CE En) Design and Materials Applications.** (3:3:0) W Prerequisite: CE En 203; Me En 372 or CE En 321; or equivalent.

Applied and residual stress; materials selection; static, impact, and fatigue strength; fatigue damage; surface treatments; elastic deflection and stability—all as applied to mechanical design.

**501. (Me En–CE En) Stress Analysis and Design of Mechanical Structures.** (3:3:0) Sp or Su Prerequisite: CE En 321 or Me En 372; or equivalent.

Stress analysis and deflection of structures; general bending and torsion, with computer applications to mechanical and aerospace structure design.

**503. (Me En–CE En) Plasticity and Fracture.** (3:3:0) F Prerequisite: CE En 203; Me En 250; Math 303; senior standing or instructor's consent.

Tensor algebra; stress and deformation tensors; relationships between dislocation slip, yielding, plastic constitutive behavior, and microstructure development; cracks and linear elastic fracture mechanics.

**504. (Me En–CE En) Computer Structural Analysis and Optimization.** (3:3:0) F Prerequisite: linear algebra; CE En 321 or Me En 372; or equivalents.

Matrix analysis of rods, shafts, beams, trusses, frames, and grids using the generalized stiffness method. Optimization methods for these structures. Organizing computer programs for structural analysis and structural optimization.

**506. (Me En–CE En) Continuum Mechanics and Finite Elements.** (3:3:0) W Prerequisite: linear algebra; CE En 321 or Me En 372; or equivalents.

Equilibrium, constitutive, and compatibility equations; closed-form solutions from elasticity; finite element theory, programming, and usage; membrane, axisymmetric, and solid elements. Application to heat transfer, fluid mechanics, and seepage.

**508. (Me En–CE En) Structural Dynamics.** (3:3:0) F Prerequisite: CE En 321 or Me En 372; or equivalents.

Dynamic analysis of single degree-of-freedom, discrete multi-degree-of-freedom, and continuous systems.

**510. Compressible Fluid Flow.** (3:3:1) W odd yr. Prerequisite: Me En 312.

One-dimensional analysis of compressible flow with area change, friction, heat transfer, shock waves, and combined effects, including experimental methods.

**512. Intermediate Fluid Dynamics.** (3:3:0) F Prerequisite: Me En 312 or instructor's consent.

Review of fluid properties, Navier-Stokes equations, exact and similarity solutions, introduction to potential flows, stream functions, lift and drag, boundary layers, vorticity, and turbulence.

**521. Intermediate Thermodynamics.** (3:3:0) F odd yr. Prerequisite: Me En 422 or equivalent.

Review of first and second law analysis; energy; equations of state and other thermodynamic relations; properties of mixtures and multiphase systems; chemical reactions and equilibrium.

**522. Combustion.** (3:3:0) W Prerequisite: Chem 105, Me En 422, or instructor's consent.

Introduction to first- and second-law ideal gas combustion systems along with elementary models of homogeneous and heterogeneous premixed and/or diffusion flames.

**523. (Me En–CE En) Aircraft Structures.** (3:3:0) W Prerequisite: CE En 305, 321 or Me En 250, 372; or equivalents.

Requirements, objectives, loads, materials, and tools for design of airframe structures; static behavior of thin-wall structures; durability and damage tolerance; certification and testing. Airframe component team design project.

**534. Dynamics of Mechanical Systems.** (3:3:0) W Prerequisite: Me En 335 or equivalent.

Hamiltonian and Lagrangian dynamics, generalized coordinates, linear and angular momentum, Euler angles, rigid-body motions, and gyroscopic effects. Theory taught with applications integrated.

**535. Mechanical Vibrations.** (3:3:0) F Prerequisite: Me En 335 or equivalent.

Introduction to energy methods for system modeling, eigenvalues and mode shapes, frequency response, and spectral characterization of vibrations.

**537. Advanced Mechanisms, Robotics.** (3:3:0) W Prerequisite: Me En 437 or equivalent.

Kinematics and dynamics of advanced mechanisms, such as robots, with computer simulation of mechanism motion.

**538. Compliant Mechanisms.** (3:3:0) Prerequisite: Me En 372; 475 or concurrent enrollment; or instructor's consent.

Design and analysis of compliant mechanisms and compliant structures. Large-deflection analysis/force displacement relationships; mechanisms synthesis.

**540. Intermediate Heat and Mass Transfer.** (3:3:0) W Prerequisite: Me En 340 or equivalent.

Analytical approaches to conduction, convection, and radiation heat transfer. Introduction to mass transfer.

**541. Numerical Heat Transfer.** (3:3:0) F Prerequisite: Me En 340 or instructor's consent.

Heat transfer analysis by numerical methods. Finite difference and finite element methods, stability, and error analysis.

**550. (Me En-EC En) Microelectromechanical Systems (MEMS).** (3:3:0) F even yr. Prerequisite: EC En 450 or Me En 372 or equivalent.

Design, fabrication, and applications of MEMS. Mechanical properties governing their design and reliability and the processing technologies used to fabricate them.

**557. Corrosion.** (3:3:0) F odd yr. Prerequisite: Chem 105 or equivalent.

Basic principles, eight common forms of corrosion, testing, materials, applications, modern theory, and high temperature metal-gas reactions.

**558. Metallurgy.** (3:3:0) F even yr. Prerequisite: Me En 250 or instructor's consent.

Fundamental principles of physical metallurgy and their application to design.

**561. (Me En-Phscs) Fundamentals of Acoustics.** (3:3:0) F Prerequisite: Phscs 123 or equivalent; Math 303 or 334 or equivalent. Recommended: Phscs 318, 321; or equivalents.

Sound generation, transmission, reflection, and reception. Vibrating systems, elastic media, mechanical energy, and radiation. Sound in tubes and cavities. Acoustic filters. Noise measurement and perception.

**562. (Me En-Phscs) Analysis of Acoustic Systems.** (3:3:0) W Prerequisite: Phscs 561 or instructor's consent.

Analyzing and modeling electro-mechano-acoustic systems. Transducers, calibration, and acoustical measurements. Sound sources, arrays, coupling, radiation, and directivity. Duct acoustics. Energy-based acoustics.

**564. Digital Instrumentation and Mechatronic Systems.** (3:2:3) F Prerequisite: Me En 363 or equivalent.

Design and analysis of instrumentation systems, fundamental sensor characteristics, and computer data acquisition; time and frequency domain modeling with analog and digital components.

**570. (Me En-CE En) Computer-Aided Engineering Software Development.** (3:3:0) F Prerequisite: Me En 373 or C programming.

Programming methods for development of engineering software. Data structures, architecture, libraries, and graphical user interfaces, with applications to CAD systems.

**572. (Me En-CE En-C S 557) Computer-Aided Geometric Design.** (3:3:0) W Prerequisite: proficiency in C programming.

Mathematical theory of free-form curves and surfaces and solid geometric modeling. Bezier and B-spline curve and surface theory, parametric and implicit forms, intersection algorithms, topics in computer algebra, free-form deformation. Several programming projects.

**575. (Me En-CE En) Optimization Techniques in Engineering.** (3:3:0) W Prerequisite: Math 302 and FORTRAN, C, or similar computer language.

Application of computer optimization techniques to constrained engineering design. Theory and use of state-of-the-art computer routines. Robust design methods.

**576. Product Design.** (3:3:0) F Prerequisite: Me En 475 or instructor's consent.

Emerging design methodology and design strategies for complex systems, including decomposition methods and sensitivity analysis. Advanced CAD/CAE/CAM technologies applied to design.

**578. CAD/Cam Applications.** (3:3:0) W Prerequisite: advanced FORTRAN, C, or C++.

Principles and practices involved in parametric surface and solid modeling, associativity, NC tool path generation, etc. Construction of complete CAD models for design, analysis, and manufacture.

**584. Manufacturing Process Machine Design.** (3:3:0) W Prerequisite: Me En 372 or equivalent.

Applying machine design principles to manufacturing process machines and tooling; integrating machine elements; precision machine design. Designing and analyzing the effects of loading, combined stresses, and deflections on machine process capability. Sensors applied to process machines.

**585. Manufacturing Competitiveness: Quality and Productivity.** (3:3:0) F Prerequisite: Stat 332, Me En 282; or equivalents.

Production strategies to improve quality, decrease cost, and increase throughput to create market advantage; effective production management systems; applying quality improvement tools to process data; theory of constraints and lean production.

**595R. Special Topics in Mechanical Engineering.** (1-18:2:0 ea.) F, W, Sp, Su Prerequisite: department chair's consent.

## Graduate Courses

For 600- and 700-level courses, see the BYU 2007-2008 Graduate Catalog.

## Mechanical Engineering Faculty

### Professors

- Adams, Brent L. (1999) BES, U. of Utah, 1974; MS, PhD, Ohio State U., 1976, 1979.  
 Chase, Kenneth W. (1968) BES, MS, Brigham Young U., 1962, 1964; PhD, U. of California, Berkeley, 1972.  
 Howell, Larry L. (1994) BS, Brigham Young U., 1987; MS, PhD, Purdue U., 1991, 1993.  
 Magleby, Spencer P. (1989) BS, MS, Brigham Young U., 1983, 1983; PhD, U. of Wisconsin, Madison, 1988.  
 Parkinson, Alan R. (1982) BS, Brigham Young U., 1977; MS, PhD, U. of Illinois, 1979, 1982.  
 Red, W. Edward (1983) BA, BSME, Rice U., 1965; PhD, Arizona State U., 1972.  
 Smith, Craig C. (1980) BES, MS, Brigham Young U., 1969, 1970; PhD, Massachusetts Inst. of Technology, 1973.  
 Todd, Robert H. (1989) BS, California State U., Northridge, 1964; MS, PhD, Stanford U., 1965, 1971.  
 Webb, Brent W. (1986) BS, MS, Brigham Young U., 1981, 1982; PhD, Purdue U., 1986.

### Associate Professors

- Blotter, Jonathan D. (2002) BS, MS, Utah State U., 1991, 1993; PhD, Virginia Polytechnic Institute and State U., 1996.

## **Mechanical Engineering**

- Bons, Jeffrey P. (2002) BS, MS, PhD, Massachusetts Inst. of Technology, 1988, 1990, 1997.  
Bowman, W. Jerry (1997) BS, Brigham Young U., 1977; MSE, U. of Central Florida, 1982; PhD, Air Force Inst. of Technology, 1987.  
Cox, Jordan (1986) BA, MS, Brigham Young U., 1983, 1984; PhD, Purdue U., 1991.  
Eastman, Paul F. (1985) BA, PhD, U. of Utah, 1960, 1965.  
Jensen, C. Gregory (1983) BS, MS, Brigham Young U., 1979, 1982; PhD, Purdue U., 1993.  
Jones, Matthew R. (2001) BS, Brigham Young U., 1988; MS, PhD, U. of Illinois, 1990, 1993.  
Maynes, R. Daniel (1997) BS, MS, Utah State U., 1992, 1993; PhD, U. of Utah, 1997.  
McLain, Timothy W. (1995) BS, MS, Brigham Young U., 1986, 1987; PhD, Stanford U., 1995.  
Nelson, Tracy W. (1994) BS, MS, PhD, Ohio State U., 1991, 1993, 1998.  
Sorensen, Carl D. (1987) BS, Brigham Young U., 1981; PhD, Massachusetts Inst. of Technology, 1985.  
Tree, Dale R. (1994) BS, Brigham Young U., 1986; MS, Purdue U., 1988; PhD, U. of Wisconsin, Madison, 1992.

### **Assistant Professors**

- Cotton, Mark B. (2006) BS, MS, PhD, U. of Utah, 1997, 2001, 2006.  
Jensen, Brian D. (2005) BS, MS, Brigham Young U., 1996, 1998; MS, PhD, U. of Michigan, 2004, 2004.  
Mattson, Christopher A. (2006) BS, MS, Brigham Young U., 1999, 2001; PhD, Rensselaer Polytechnic Inst., 2003.  
Snyder, Deryl D. (2004) BS, MS, PhD, Utah State U., 1998, 1999, 2002.  
Thomson, Scott L. (2004) BS, MS, Brigham Young U., 1999, 2000; PhD, Purdue U., 2004.

### **Adjunct Faculty**

- Beckwith, Scott W. (1990) BS, Texas A & M U., 1964; MS, California Inst. of Technology, 1965; PhD, Texas A & M U., 1974.  
Germane, Geoffrey J. (1979) BS, MS, Rose-Hulman Inst. of Technology, 1972, 1975; PhD, Brigham Young U., 1978.  
Simonsen, John M. (1954) BSME, U. of Utah, 1950; PhD, Purdue U., 1952, 1955.  
Warner, Charles Y. (1966) BES, MS, Brigham Young U., 1957, 1963; PhD, U. of Michigan, 1966.  
Woolley, Ronald L. (1983) BES, MS, Brigham Young U., 1966, 1968; PhD, Stanford U., 1974.

### **Emeriti**

- Andersen, Blaine W. (1970) BS, U. of Utah, 1949; MS, PhD, U. of Illinois, 1951, 1953.  
Cannon, John N. (1957) BS, MS, U. of Utah, 1952, 1955; PhD, Stanford U., 1965.  
Free, Joseph C. (1961) BES, Brigham Young U., 1958; MS, California Inst. of Technology, 1961; PhD, Massachusetts Inst. of Technology, 1967.  
Heaton, Howard S. (1963) BES, U. of Southern California, 1957; MS, PhD, Stanford U., 1959, 1963.  
Mortensen, Kay S. (1968) BS, MS, Utah State U., 1962, 1963; PhD, U. of Utah, 1967.  
Polve, James H. (1969) BS, U. of Utah, 1948; MS, Princeton U., 1951; PhD, U. of Arizona, 1966; ME, U. of Utah, 1954.  
Raisor, E. Max (1968) BS, MS, Brigham Young U., 1968, 1975.  
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## **Media Arts**

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