Physics and Astronomy

Scott Sommerfeldt, Chair
N-281A ESC, (801) 422-2205

College of Physical and Mathematical Sciences Advisement Center
N-179 ESC, (801) 422-6270

Admission to Degree Program

All degree programs in the Department of Physics and Astronomy are open enrollment. However, special limitations apply for teaching majors.

The Discipline

Over the centuries physicists and astronomers have studied the fundamental principles that govern the structure and dynamics of matter and energy in the physical world, from subatomic particles to the cosmos. Physicists also apply this understanding to the development of new technologies. For example, physicists invented the first lasers and semiconductor electronic devices.

Physics and astronomy students learn to approach complex problems in science and technology from a broad background in mechanics, electricity and magnetism, statistical and thermal physics, quantum mechanics, relativity, and optics. The tools they develop at BYU include problem solving by mathematical and computational modeling, as well as experimental discovery and analysis. All students gain professional experience in a research, capstone, or internship project, usually in close association with faculty. Together these experiences can provide excellent preparation for employment or for graduate studies in physics, other sciences, engineering, medicine, law, or business.

Most physicists and astronomers work in research and development in industrial, government, or university labs to solve new problems in technology and science. They also share the beauty discovered in our physical universe by teaching in high schools, colleges, and universities.

Career Opportunities

A degree in physics or physics–astronomy can provide:

1. Preparation for those who intend to enter industrial or governmental service as physicists or astronomers.
2. Education for those who intend to pursue graduate work in physics or astronomy.
3. Education in the subject matter of physics for prospective teachers of the physical sciences.
4. Undergraduate education for those who will pursue graduate work in the professions: business (e.g., an MBA), law, medicine, etc.
5. Fundamental background for other physical sciences and engineering, in preparation for graduate study in these fields.
6. Physics fundamentals required by the biological science, medical, dental, nursing, and related programs.

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	Applied Physics
	Emphases:
	Computer Science
	Selected Options
BS	Physics
BS	Physics-Astronomy
BS	Physics Teaching
Minors	Astronomy
	Physics
	Physics Teaching

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

Graduate Programs and Degrees

MS	Physics
PhD	Physics
PhD	Physics and Astronomy

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

General Information

1. It is recommended that a student complete the following courses in high school:

   3 units of English
   1 unit of physical science, either chemistry or physics.
   4 units of mathematics, consisting of algebra, geometry, trigonometry, and calculus. This should qualify students to begin college mathematics with Math 113, Calculus 2.

   Because mathematics provides the foundation for all work in the physical and mathematical sciences, high school preparation in this subject is of particular importance.
2. Students in physics should take mathematics beginning the first semester of the freshman year. Physics majors should ordinarily begin with Math 113. If preparation is inadequate, students might wish to enter the university during the spring or summer term and bring their mathematics preparation to the point where they can take Math 113 concurrently with Phscs 121 during the fall semester.
3. Students are strongly urged to learn to use a computer, including some knowledge of programming.

BS Applied Physics: Computer Science Emphasis

(62.5–65.5 hours*)

Major Requirements

1. No D credit is allowed in major courses.
2. Complete the following:
   Phscs 121, 123, 140, 145, 191, 220, 222, 230, 240, 318, 321, 330, 430, 441, 581.

   Note: Phscs 191 should be taken the first semester.
3. Complete one of the following options:
   Either Math 113, 302
   Or Math 113, 214, 343.
4. Complete one course from the following:
   Math 303, 334.
5. Complete the following:
   C S 142, 235, 236, 240.
6. Complete one course from the following:
   C S 124, ~~224~~, 252, ~~324~~, 330.
   EC En 124, 224, 324, 450.
   Phscs 513R.

7. Complete one course from the following:
   Phscs 360, 427, 442, 451, 471, ~~517~~, 545, 561, 571, 585.
8. Complete a capstone project, including the following:
   a. Meet with department applied physics capstone project coordinator early in the junior year or before to obtain information about projects and procedures.
   b. Complete 2 hours of the following:
      Phscs 492R.

*Hours include courses that may fulfill university core requirements.

BS Applied Physics: Selected Options Emphasis (57.5–61.5 hours*)

Major Requirements

1. No D credit is allowed in major courses.
2. Consult with a faculty advisor as early as possible to choose electives.
3. Complete the following:
   Phscs 121, 123, 140, 145, 191, 220, 222, 230, 240, 245, 318, 321, 330, 430, 441.

   Note: Phscs 191 should be taken the first semester.
4. Complete one course from the following:
   EC En 466.
   Phscs 442, 471.
5. After gaining department chair's approval of courses selected to define an option, complete an additional 12 hours of electives (cannot include any courses already taken above). These 12 hours must consist of a coherent set of upper-division courses with an identified educational goal.
6. Complete one of the following options:
   Either Math 113, 302
   Or Math 113, 214, 343.
7. Complete one course from the following:
   Math 303, 334.
8. Complete a capstone project, including the following:
   a. Meet with department applied physics capstone project coordinator early in the junior year or before to obtain information about projects and procedures.
   b. Complete 2 hours of the following:
      Phscs 492R.

Sample Elective Courses

Acoustics: Phscs 561, 562 and choices from Ec En 380, 487, IT 346, Me En 363.

Biophysics: biology, biochemistry, PDBio 568.

Electrical Engineering (graduate school preparation): EC En 320, 324, 380 and 400-level courses.

Materials Science (graduate school preparation): Phscs 451, 452, 581, Chem 105, 106 or Chem 111, 112.

Microelectronics/Semiconductor Devices: Chem 105, Ch En 381, Phscs 281 or 581, EC En 450 or Phscs 587, Stat 332.

Nuclear Physics (power generation for industry or navy): Phscs 360, 451, 452, Me En 422.

Optical Communication Engineering: Phscs 471, 571, EC En 380, 466, 555, 562.

Optical/Laser Engineering: Phscs 442, 471, and/or 571, EC En 466, 555, and/or 562.

Premedicine, Prelaw (including patent law), Prebusiness: Courses in specialty.

*Hours include courses that may fulfill university core requirements.

BS Physics (58.5–61.5 hours*)

Major Requirements

1. No D credit is allowed in major courses.
2. Complete the following:
   Phscs 121, 123, 140, 145, 191, 220, 222, 230, 240, 245, 318, 321, 330, 360, 430, 441, 442, 451, 452, 471.

   Note: Phscs 191 should be taken the first semester.
3. Complete one of the following options:
   Either Math 113, 302
   Or Math 113, 214, 343.
4. Complete one course from the following:
   Math 303, 334.
5. Complete a senior thesis, including the following:
   a. Meet with department undergraduate research coordinator early in the junior year or before to obtain information about research projects and senior thesis procedures.
   b. Complete 2 hours of the following:
      Phscs 498R.

Recommended Course

Chem 105.

*Hours include courses that may fulfill university core requirements.

BS Physics-Astronomy (61.5–64.5 hours*)

Major Requirements

1. No D credit is allowed in major courses.
2. Complete the following:
   Phscs 121, 123, 140, 145, 191, 220, 222, 227, 228, 230, 240, 318, 321, 329, 330, 360, 427, 428, 451, 471.

   Note: Phscs 191 should be taken the first semester.
3. Complete one of the following options:
   Either Math 113, 302
   Or Math 113, 214, 343.
4. Complete one course from the following:
   Math 303, 334.
5. Complete a senior thesis, including the following:
   a. Meet with department undergraduate research coordinator early in the junior year or before to obtain information about research projects and senior thesis procedures.
   b. Complete 2 hours of the following:
      Phscs 498R.

Recommended Course

Chem 105.

*Hours include courses that may fulfill university core requirements.

BS Physics Teaching (74.5–75.5 hours*, including licensure hours)

Major Requirements

1. No D credit is allowed in major courses.
2. Contact the Education Advisement and Certification Office for entrance requirements into the licensure program.
3. A teaching minor is not required for licensure. However, it is strongly recommended.

4. Complete the following:
   Phscs 121, 123, 127, 140, 145, 191, 220, 222, 240.

   Note: Phscs 191 should be taken the first semester.
5. Complete one course from the following:
   Phil 423.
   Phscs 314.
6. Complete the following:
   Math 112, 113, 302.
7. Complete one course from the following:
   Math 303, 334.
8. Complete an additional 9 hours from the following or any 300-, 400-, or 500-level physics course not already taken. At least 6 hours must be upper-division physics courses (Phscs 321 and 471 are highly recommended):
   Phscs 137, 167, 281.
9. Complete the Professional Education Component:
   a. Complete the following:
      CPSE 402.
      IP&T 286.
      Sc Ed 276R, 350, 353, 377R, 378, 379.

      Note: Fingerprinting and FBI clearance must be completed prior to enrolling in ScEd 377R.

   b. Complete 12 hours of one of the following:
      Sc Ed 476R, 496R.

*Hours include courses that may fulfill university core requirements.

Minor Astronomy (23 hours*)

Minor Requirements

Complete the following:
Math 112, 113.
Phscs 121, 127, 227, 228, 329.

*Hours include courses that may fulfill university core requirements.

Minor Physics (24 hours*)

Minor Requirements

Complete the following:
Math 112, 113.
Phscs 121, 123, 140, 145, 220, 222, 240.

*Hours include courses that may fulfill university core requirements.

Minor Physics Teaching (26 hours*)

Minor Requirements

Complete the following:
Math 112, 113.
Phscs 121, 123, 145, 220, 222, 240, 314.

*Hours include courses that may fulfill university core requirements.

Physics and Astronomy (Phscs)

Undergraduate Courses

101. Fundamentals of Physics. (3:3:0) F
Principles of classical and modern physics as they relate to current concepts of our physical environment.

105. Introductory Applied Physics. (3:3:0) F, W, Sp Prerequisite: high school algebra and trigonometry. Recommended: concurrent enrollment in Phscs 107.
Applied physics course not requiring calculus. Topics include mechanics, heat, wave motion, sound.

106. Introductory Applied Physics. (3:3:0) F, W, Su Prerequisite: Phscs 105 or equivalent. Recommended: concurrent enrollment in Phscs 108.
Continuation of Phscs 105. Topics include electricity and magnetism, atomic and nuclear physics, and optics.

107. Introductory Applied Physics Laboratory. (1:0:3) F, W, Sp Prerequisite: Phscs 105 or concurrent enrollment.

108. Introductory Applied Physics Laboratory. (1:0:3) F, W, Su Prerequisite: Phscs 106 or concurrent enrollment.

121. Principles of Physics 1. (3:3:1) F, W, Sp, Su Prerequisite: calculus or concurrent enrollment.
Newtonian mechanics. Weekly lab.

123. Principles of Physics 2. (3:3:1) F, W, Sp Prerequisite: Phscs 121.
Waves, thermal physics, optics, special relativity, and introduction to modern physics. Weekly lab.

127. Descriptive Astronomy. (3:3:0.5) F, W, Sp, Su Honors also.
Nonmathematical presentation of knowledge of the content and history of the cosmos, frequently using observatory and planetarium.

137. Introduction to the Atmosphere and Weather. (3:3:0) F, W Prerequisite: Phy S 100 or equivalent.
Nonmathematical introduction to characteristics of the atmosphere, emphasizing structure and dynamic behavior, including the environmental impact of man.

140. Electronics Lab. (1:1:2) F, Sp
Introduction to analog and digital circuits.

145. Experimental Methods in Physics. (1:0:3) W, Su Prerequisite: Phscs 121, 140.
Introduction to physical measurement and analysis, optics, sensors, actuators, and computer-based data acquisition.

167. Descriptive Acoustics of Music and Speech. (3:3:0) F, W, Sp Prerequisite: Phy S 100 or equivalent.
Introductory acoustics course, emphasizing physical principles underlying production and perception of music and speech.

191. Introduction to Physics Careers and Research. (0.5:1:0) F
Survey of BYU undergraduate physics and astronomy programs, careers in physics and astronomy, and current physics and astronomy research. Take first semester after registered as physics major.

198. Physics and Mathematics Review. (1:2:0) F 1st blk. Prerequisite: Phscs 121; Math 113 or concurrent enrollment.
Review of mathematics and introductory physics for returning missionaries and others returning after a significant break.

220. Principles of Physics 3. (3:3:1) F, W, Sp Prerequisite: Phscs 121 or equivalent; Math 113 or equivalent.
Electricity and magnetism. Weekly lab.

222. Modern Physics. (3:3:0) F, W, Su Prerequisite: Phscs 121, 123, 220.
Quantum physics, atoms, molecules, condensed matter, nuclei, elementary particles, and selected topics in contemporary physics.

227. Solar System Astronomy. (3:3:0) F Prerequisite: Phscs 121, 123; Math 113 or concurrent enrollment.
Physics of light and matter, Newton's laws, solar-system dynamics, and planetary surfaces and atmospheres.

228. Stellar and Extragalactic Astronomy. (3:3:0) W Prerequisite: Math 113, Phscs 227.
Stellar atmospheres, stellar interiors, stellar evolution, interstellar matter, galactic structure, external galaxies, and cosmology.

230. Computational Physics Lab 1. (1:0:3) F, W Prerequisite: Phscs 220 or concurrent enrollment.
Numerical and symbolic differentiation, integration, and differential equations, using Maple. Applications in mechanics, optics, and special relativity.

240. Design, Fabrication, and Use of Scientific Apparatus. (2:0:6) F, Sp Prerequisite: Phscs 123, 145.
Machining, computer interfacing, controls, and vacuum systems.

245. Experiments in Contemporary Physics. (2:0:6) W, Su Prerequisite: Phscs 220, 240.
In-depth, multi-period experiments in contemporary physics, using advanced instrumentation.

281. Principles of Solid State Physics. (3:3:1) For students in science, computer science, technology, and engineering. F Prerequisite: Phscs 121, 220.
Introduction to physics of solids, including laboratory experience.

297R. Introduction to Research. (1–3:0:Arr. ea.) F, W, Sp, Su
Faculty-supervised research experience.

313R. Special Topics in Physics. (1–3:Arr.:0 ea.) On dem.
Special topics in physics for undergraduate physics majors.

314. (Phscs–Phil 423) History and Philosophy of Science. (3:3:0) F Prerequisite: Phy S 100 or instructor's consent.
Scientific explanation, concepts, and models. Philosophical assumptions and criteria for theory selection, as exemplified by historical development of basic ideas in science.

318. Introduction to Classical Field Theory. (3:3:0) F, W, Sp Prerequisite: Phscs 230; Math 303 or 334.
Classical equations of physical fields; algebra of complex variables; applying Fourier analysis, Fourier transforms, and orthogonal functions.

321. Mechanics. (3:3:0) F, Sp Prerequisite: Phscs 121, 230; Math 303 or 334 or concurrent enrollment. Recommended: concurrent enrollment in Phscs 330.
Newton's laws applied to particles and systems of particles, including rigid bodies. Conservation principles and Lagrange's and Hamilton's equations.

329. Observational Astronomy. (3:2:4) W Prerequisite: Phscs 127 (or 227 and 228).
Basic techniques of observational astronomy, emphasizing practical experience in optical data acquisition and analysis.

330. Computational Physics Lab 2. (1:0:3) F, Sp Prerequisite: Phscs 230; 321 or concurrent enrollment; Math 303 or 334 or equivalent.
Numerical solution of ordinary differential equations, linear algebra and eigenvalues, chaos theory. Applications to dynamics. Introduction to programming in Matlab.

360. Statistical and Thermal Physics. (3:3:0) W Prerequisite: Phscs 222, Math 303 or 334.
Principles of statistical mechanics and thermodynamics, with applications.

391R. Seminar in Current Physics. (1:1:0 ea.) F, W on dem.

399R. Academic Internship. (1–9:Arr.:Arr. ea.) For students engaged in the cooperative education program. F, W, Sp, Su Prerequisite: both department chair's and cooperative education coordinator's consent.

416A. Writing in Physics 1. (1:3:0) W on blk., Sp Prerequisite: completed research for thesis or capstone project.
First part of Phscs 416. Writing scientific and technical articles and proposals. Writing and presentation skills applied to senior thesis or capstone project. Resources and guidelines for publishing in physics.

416B. Writing in Physics 2. (2:3:0) W on blk., Su Prerequisite: Phscs 416A.
Second part of Phscs 416. Writing scientific and technical articles and proposals. Writing and presentation skills applied to senior thesis or capstone project. Resources and guidelines for publishing in physics.

427, 428. Introduction to Astrophysics. (3:3:0 ea.) 427:F; 428:W Prerequisite: Phscs 227, 228.
Principles and observational techniques of astrophysics.

430. Computational Physics Lab 3. (1:0:3) W, Su Prerequisite: Phscs 222, 318, 330.
Static and dynamic boundary value problems, partial differential equations. Applications in electrostatics, thermodynamics, waves, and quantum mechanics. Programming with Matlab.

441. Electrostatics and Magnetism. (3:3:0) F, Sp Prerequisite: Phscs 220, 318.
Classical theory of static electric and magnetic fields.

442. Electrodynamics. (3:3:0) W, Su Prerequisite: Phscs 441.
Maxwell's equations, radiation, interaction of electromagnetic fields with matter, and special relativity.

451. Quantum Mechanics. (3:3:0) F Prerequisite: Phscs 222, 318, or equivalent.
Analytical foundations of quantum mechanics.

452. Applications of Quantum Mechanics. (3:3:0) W Prerequisite: Phscs 451.
Applications of quantum mechanics to atomic, molecular, statistical, condensed-matter, and nuclear physics; elementary particles.

471. Principles of Optics. (3:3:1) F, W Prerequisite: Phscs 123, 220. Recommended: Phscs 318.
Electromagnetic wave phenomena, including polarization effects, interference, coherence, dispersion, ray theory, diffraction; introduction to quantum nature of light. Laboratory component emphasizes applications.

492R. Capstone Project in Applied Physics. (1–3:0:Arr. ea.) F, W, Sp, Su
Senior capstone projects in applied physics. Topic must be approved by department applied physics capstone project coordinator or department chair.

497R. Research in Physics. (1–3:0:Arr. ea.) F, W, Sp, Su

498R. Senior Thesis. (1–3:0:Arr. ea.) F, W, Sp, Su
Individually directed research for seniors. Thesis topic must be cleared by faculty member before registration.

500-Level Graduate Courses (available to advanced undergraduates)

513R. Special Topics in Contemporary Physics. (1–3:3:0 ea.) F, W Prerequisite: instructor's consent.
Topics generally related to recent developments in physics.

529. Advanced Observational Astronomy. (3:3:0) On dem. Prerequisite: Phscs 427, 428.
Advanced techniques of observational astronomy, emphasizing knowledge and skills necessary to carry out observational scientific investigation in astronomy.

545. Introduction to Plasma Physics. (3:3:0) F alt. yr. Prerequisite: Phscs 321, 431, 441.
Introduction to plasma physics, including single-particle motion and both fluid and kinetic models of plasma behavior.

561. (Phscs–Me En) 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.

571. Laser Physics. (3:3:0) F alt. yr. Prerequisite: Phscs 471 or basic understanding of electromagnetic waves and optics.
Laser amplification, cavity design, and control and characterization of temporal and spatial modes. Applications in nonlinear optics and atomic physics.

581. Solid-State Physics. (3:3:0) W Prerequisite: Phscs 222 or equivalent.
Introduction to the physics of solids. Crystal structure and symmetry, X-ray diffraction, lattice vibrations, metals and semiconductors, superconductivity, thermal properties, magnetic properties, and dielectric and optical properties.

583. Physics of Nanostructures, Surfaces, and Interfaces. (3:3:0) Prerequisite: Phscs 222 or equivalent. Recommended: Phscs 281 or 581 or equivalent; Phscs 451 or Chem 462 or equivalent.
Properties of nanostructures, surfaces, and interfaces; experimental methods. Applications to emerging problems and opportunities in science and technology. Emphasis on concepts.

585. Thin-Film Physics. (3:3:0) W alt. yr. Prerequisite: Phscs 222 or equivalent.
Preparation, characterization, use, and special properties of modern thin films; interdisciplinary treatment. Of interest to students in applied physics and engineering.

587. Physics of Semiconductor Devices. (3:3:0) F Prerequisite: Phscs 281 or 581 or EC En 450.
Device physics, with an in-depth study of the MOS transistor and other nanoscale computing devices.

599R. Academic Internship. (2–9:Arr.:Arr. ea.) F, W, Sp, Su Prerequisite: department cooperative education coordinator's consent.
Cooperative education internships off campus.

Graduate Courses

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

Physics and Astronomy Faculty

Professors
Allred, David D. (1987) BS, Brigham Young U., 1971; MA, PhD, Princeton U., 1973, 1977.
Berrondo, Manuel (1993) BS, U. of Mexico, 1966; PhD, U. of Upsala, 1969.
Clark, Robert B. (2000) BA, MPhil, PhD, Yale U., 1963, 1966, 1968.
Moody, J. Ward (1990) BS, Brigham Young U., 1980; MS, PhD, U. of Michigan, 1984, 1986.
Rees, Lawrence B. (1986) BS, Brigham Young U., 1976; MS, PhD, U. of Maryland, 1979, 1983.
Sommerfeldt, Scott D. (1995) BM, MS, Brigham Young U., 1983, 1986; PhD, Pennsylvania State U., 1989.
Spencer, Ross L. (1984) BS, Brigham Young U., 1974; MS, PhD, U. of Wisconsin, 1976, 1979.
Stokes, Harold T. (1981) BS, Brigham Young U., 1971; PhD, U. of Utah, 1977.
Taylor, Benjamin J. (1980) BA, PhD, U. of California, Berkeley, 1964, 1969.
Turley, R. Steven (1995) BS, Brigham Young U., 1978; PhD, Massachusetts Inst. of Technology, 1984.

Associate Professors
Bergeson, Scott D. (1998) BS, Brigham Young U., 1990; PhD, U. of Wisconsin, Madison, 1995.
Christensen, Clark G. (1972) BS, Brigham Young U., 1966; PhD, California Inst. of Technology, 1972.
Davis, Robert C. (1998) BS, Brigham Young U., 1989; PhD, U. of Utah, 1996.
Hart, Grant W. (1985) BS, Brigham Young U., 1977; PhD, U. of Maryland, 1983.
Hart, Gus L. (2006) BS, Brigham Young U., 1994; MS, PhD, U. of California, Davis, 1997, 1999.
Hess, Bret C. (1994) BS, Brigham Young U., 1982; PhD, Iowa State U., 1988.
Hintz, Eric (1998) BS, Case Western Reserve U., 1988; PhD, Brigham Young U., 1995.
Hirschmann, Eric W. (2000) BS, Brigham Young U., 1991; PhD, U. of California, Santa Barbara, 1996.
Peatross, Justin B. (1995) BS, MS, Brigham Young U., 1986, 1988; PhD, U. of Rochester, 1993.
VanHuele, Jean-François S. (1988) BS, Teacher's Proficiency, PhD, Brussels Free U., Belgium, 1979, 1983, 1987.

Associate Research Professors
Peterson, Bryan G. (1991) BS, PhD, Brigham Young U., 1978, 1983.
Joner, Michael D. (1981) BS, MS, Brigham Young U., 1979, 1981.

Assistant Professors
Campbell, Branton (2002) BS, Brigham Young U., 1993; MA, PhD, U. of California, Santa Barbara, 1995, 1999.
Durfee, Dallin (2001) BS, Brigham Young U., 1994; PhD, Massachusetts Inst. of Technology, 1999.
Gee, Kent L. (2006) BS, MS, Brigham Young U., 2001, 2002; PhD, Pennsylvania State U., 2005.
Leishman, Timothy W. (2000) BA, Brigham Young U., 1990; PhD, Pennsylvania State U., 2000.
Nielsen, David (2004) BS, MS, Brigham Young U., 1992, 1995; PhD, U. of Texas, Austin, 1999.
Stephens, Denise C. (2007) BS, Brigham Young U., 1996; MS, PhD, New Mexico State U., 1999, 2002.
Vanfleet, Richard R. (2003) BA, Brigham Young U., 1992; MS, PhD, U. of Illinois, 1994, 1997.
Ware, Michael (2004) BS, PhD, Brigham Young U., 1999, 2001.

Assistant Teaching Professor
Merrell, Duane (2004) BS, MEd, Utah State U., 1985, 1988.

Emeriti
Ballif, Jae R. (1962) BS, Brigham Young U., 1953; MA, PhD, U. of California, Los Angeles, 1961, 1962.
Barnett, J. Dean (1958) BA, PhD, U. of Utah, 1954, 1959.
Decker, Daniel L. (1958) BS, MS, Brigham Young U., 1953, 1955; PhD, U. of Illinois, 1958.
Dibble, William E. (1961) BS, PhD, California Inst. of Technology, 1954, 1960.
Dixon, Dwight R. (1959) BS, Utah State U., 1942; PhD, U. of California, Berkeley, 1955.
Dudley, J. Duane (1956) BS, Brigham Young U., 1952; MA, Rice U., 1953; PhD, U. of Utah, 1959.
Evenson, William E. (1970) BS, Brigham Young U., 1965; PhD, Iowa State U., 1968.
Gardner, Andrew L. (1964) BS, Utah State U., 1940; PhD, U. of California, Berkeley, 1955.
Gardner, John H. (1949) BS, Utah State U., 1943; MA, PhD, Harvard U., 1947, 1950.
Hansen, H. Kimball (1963) BS, MS, Brigham Young U., 1957, 1959; PhD, U. of California, Berkeley, 1966.
Harrison, B. Kent (1964) BS, Brigham Young U., 1955; MA, PhD, Princeton U., 1957, 1959.
Hatch, Dorian M. (1968) BS, Utah State U., 1962; MA, PhD, State U. of New York, 1965, 1968.
Jones, Douglas E. (1964) BS, MS, PhD, Brigham Young U., 1957, 1959, 1964.
Knight, Larry V. (1973) BS, MS, Brigham Young U., 1958, 1959; PhD, Stanford U., 1965.
Mason, Grant W. (1970) BA, Brigham Young U., 1961; PhD, U. of Utah, 1969.
McNamara, D. Harold (1955) BS, PhD, U. of California, Berkeley, 1947, 1950.
Merrill, John J. (1971) BS, MS, PhD, California Inst. of Technology, 1955, 1956, 1960.
Nelson, H. Mark (1959) BS, MS, Brigham Young U., 1953, 1954; PhD, Harvard U., 1960.
Palmer, E. Paul (1966) BA, PhD, U. of Utah, 1952, 1956.
Rasband, S. Neil (1972) BA, PhD, U. of Utah, 1964, 1969.
Strong, William J. (1967) BS, MS, Brigham Young U., 1958, 1959; PhD, Massachusetts Inst. of Technology, 1964.
Vanfleet, Howard B. (1960) BS, Brigham Young U., 1955; PhD, U. of Utah, 1961.