3510. Introduction to Abstract Algebra I. 3 hours. Groups, rings, integral domains, polynomial rings and fields. Prerequisite(s): MATH 3000.

3520. Abstract Algebra II. 3 hours. Topics from coding theory, quadratic forms, Galois theory, multilinear algebra, advanced group theory, and advanced ring theory. Prerequisite(s): MATH 3510.

3610. Real Analysis II. 3 hours. Continuation of 3000. Topics include derivatives, integrals, limits of sequences of functions, Fourier series; and an introduction to multivariable analysis. Prerequisite(s): MATH 3000; and 2700 (may be taken concurrently).

3680. Applied Statistics. 3 hours. Descriptive statistics, elements of probability, random variables, confidence intervals, hypothesis testing, regression, contingency tables. Prerequisite(s): MATH 1710; MATH 1720 (may be taken concurrently).

3740. Vector Calculus. 3 hours. Theory of vector-valued functions on Euclidean space. Derivative as best linear-transformation approximation to a function. Divergence, gradient, curl. Vector fields, path integrals, surface integrals. Constrained extrema and Lagrange multipliers. Implicit function theorem. Jacobian matrices. Green's, Stokes', and Gauss' (divergence) theorems in Euclidean space. Differential forms and an introduction to differential geometry. Prerequisite(s): MATH 2700 and 2730.

4050. Advanced Study of the Secondary Mathematics Curriculum. 3 hours. Study of mathematical topics in the secondary curriculum from an advanced viewpoint. Discussion of the relationship between secondary and collegiate curricula. Combinatorics. The Euclidean algorithm, congruence classes, and prime factorization. Modeling with differential equations. Conic sections. Pedagogical techniques. Prerequisite(s): MATH 2100 and either MATH 3510 or 3610.

4060. Foundations of Geometry. 3 hours. Selections from synthetic, analytic, projective, Euclidean and non-Euclidean geometry. Prerequisite(s): MATH 3000. Prior or concurrent enrollment in MATH 3510 or MATH 3610 is strongly recommended.

4100. Fourier Analysis. 3 hours. Application-oriented introduction to Fourier analysis, including Fourier series, Fourier transforms, discrete Fourier transforms, wavelets, orthogonal polynomials and the Fast Fourier Transform (FFT) algorithm. The theoretical portions of the course emphasize interconnections and operator algebraic formalism. Applications are chosen from among differential equations, signal processing, probability and high precision arithmetic. Prerequisite(s): MATH 1720 and 2700; MATH 2730 and 3410 are recommended (may be taken concurrently).

4200. Dynamical Systems. 3 hours. One-dimensional dynamics. Sarkovskii's theory, routes to chaos, symbolic dynamics, higher-dimensional dynamics, attractors, bifurcations, quadratic maps, Julia and Mandelbrot sets. Prerequisite(s): MATH 3610.

4430. Introduction to Graph Theory. 3 hours. Introduction to combinatorics through graph theory. Topics introduced include connectedness, factorization, Hamiltonian graphs, network flows, Ramsey numbers, graph coloring, automorphisms of graphs and Polya's Enumeration Theorem. Connections with computer science are emphasized. Prerequisite(s): MATH 3000 or 2770.

4450. Introduction to the Theory of Matrices. 3 hours. Congruence (Hermitian); similarity; orthogonality, matrices with polynomial elements and minimal polynomials; Cayley-Hamilton theorem; bilinear and quadratic forms; eigenvalues. Prerequisite(s): MATH 2700.

4500. Introduction to Topology. 3 hours. Point set topology; connectedness, compactness, continuous functions and metric spaces. Prerequisite(s): MATH 3610.

4520. Introduction to Functions of a Complex Variable. 3 hours. Algebra of complex numbers and geometric representation; analytic functions; elementary functions and mapping; real-line integrals; complex integration; power series; residues, poles, conformal mapping and applications. Prerequisite(s): MATH 2730.

4610. Probability. 3 hours. Combinatorial analysis, probability, conditional probability, independence, random variables, expectation, generating functions and limit theorems. Prerequisite(s): MATH 2730.

4650. Statistics. 3 hours. Sampling distributions, point estimation, interval estimation, hypothesis testing, goodness of fit tests, regression and correlation, analysis of variance, and non-parametric methods. Prerequisite(s): MATH 3680 and 4610.

4900-4910. Special Problems. 1–3 hours each.

4951. Honors College Capstone Thesis. 3 hours. Major research project prepared by the student under the supervision of a faculty member and presented in standard thesis format. An oral defense is required of each student for successful completion of the thesis. Prerequisite(s): completion of at least 6 hours in honors courses; completion of at least 12 hours in the major department in which the thesis is prepared; approval of the department chair and the dean of the school or college in which the thesis is prepared; approval of the dean of the Honors College. May be substituted for HNRS 4000.

Mechanical and Energy Engineering

Mechanical and Energy Engineering, MEEN

1110. Mechanical and Energy Engineering Practice I. 1 hour. Introduction to the practice of mechanical and energy engineering, applications of the subject, presentation of the work of the faculty and practicing engineers, seminars on "real world" projects, ethics and professional orientation.

Prerequisite(s): MATH 1650 or the equivalent (with a grade of C or better) or concurrent enrollment in MATH 1710.

1210. Mechanical and Energy Engineering Practice II. 1 hour. Continuation of MEEN 1110. Applications of mechanical and energy engineering, presentations by faculty and practicing engineers, professional orientation, professional ethics. Prerequisite(s): MATH 1650 (with a grade of C or better).

2130. Statics and Dynamics. 4 hours. Statics of particles and rigid bodies. Concepts of force, moments, free body diagrams, equilibrium and friction with engineering applications. Kinematics and kinetics of particles and rigid bodies. Energy and impulse momentum methods applied to particles and rigid bodies. Plane motion of rigid bodies and force analysis of linkages. Prerequisite(s): MATH 1720, PHYS 1710 and 1730.

2210. Thermodynamics. 3 hours. Zeroth, first and second laws of thermodynamics with applications to engineering and energy conversion, open and closed systems, thermodynamic properties of simple substances, equations of state, thermodynamic properties of mixtures, psychrometrics and psychrometric charts. Prerequisite(s): MATH 2730.

2250. Computer Aided Engineering. 3 hours. (2;0;2) Computational techniques applied to engineering analysis and design. Computer aided design (CAD) techniques, constrained and unconstrained optimization, simulation and solution of simple differential equations, symbolic manipulation, application of finite element analysis. Prerequisite(s): MATH 2700. Corequisite(s): ENGR 2332 and MATH 3310.

2900-2910. Special Problems in Mechanical and Energy Engineering. 1–3 hours each. Individual instruction in theoretical, experimental or research problems. Prerequisite(s): consent of instructor. Each course may be repeated for 6 credit hours. For elective credit only; may not be substituted for required MEEN courses.

3110. Applied Thermodynamics II. 3 hours. Introduction to steam and gas cycles, improvements on cycles, advanced thermodynamics cycles, psychrometrics and psychrometric charts, chemical reactions and chemical equilibria, combustion, flame temperature. Prerequisite(s): CHEM 1415/1435, or CHEM 1410/1430 and 1420/1440; MATH 2730; MEEN 2210.

3120. Fluid Mechanics. 3 hours. Fundamental concepts and properties of fluids; hydrostatics; basic equations of fluid flow in differential and integral form. Dimensional analysis, potential and viscous flow. Viscous boundary layers, pipe flow, turbulence, and fluid flow correlations for objects of simple shape. Prerequisite(s): MATH 2730 and 3310.

3125. Thermal Engineering Projects. 2 hours. (0;6) Project component of the thermal science courses in the curriculum. Students work in teams to complete engineering practice projects. The theoretical aspects of this course are given in MEEN 2210, 3110 and 3120. Prerequisite(s): MEEN 2210. Corequisite(s): MEEN 3110, 3120.

3130. Machine Elements. 3 hours. Applications of the principles of mechanics and mechanics of materials to machine design. The elements of machines are analyzed in terms of their dynamic behavior. Selection and sizing of machine elements. Students use the finite element technique for the analysis of machines and their components. Prerequisite(s): PHYS 2220, ENGR 2332.

3210. Heat Transfer. 3 hours. Basic concepts of steady and unsteady conduction. Elements of radiation. Black and gray body radiation. F-factor analysis. Thermal boundary layers, convection, heat transfer correlations. Combined modes of heat transfer. Simple heat exchange devices and systems. Prerequisite(s): MEEN 3110, 3120.

3230. Dynamics, Vibrations and Control. 3 hours. Review of basic modeling techniques of the dynamic behavior of mechanical and electrical systems. Linear dynamics. Block diagrams. Feedback and compensation. Computer simulations of steady-state and dynamic behavior. Root locus and frequency response methods. Vibration analysis, control and suppression. Prerequisite(s): MATH 2700, MATH 2730, MATH 3310, and MEEN 2130 (all with a grade of C or better); or consent of instructor.

3240. Mechanical and Energy Engineering Laboratory I. 2 hours. (1;3) Principles of experimentation. Measurement techniques and instruments. Statistical analysis of experimental data and error analysis. Presentation of data and report writing. Students perform a series of experiments in areas of mechanical engineering and undertake a project in which they design an experiment to obtain data. Prerequisite(s): MEEN 2210, MEEN 2130, MATH 3310 (all with a grade of C or better); or consent of instructor.

3242. Mechanical and Energy Engineering Laboratory II. 2 hours (1;3). Continuation of MEEN 3240. Principles of experimentation. Students perform a series of experiments in key areas of mechanical and energy engineering including convection, heat and energy transfer, experimental aerodynamics, thermal cycles, refrigeration, control of thermal systems, and alternative energy technologies (solar energy, fuel cells and wind power). Prerequisite(s): MEEN 3240.

4110. Alternative Energy Sources. 3 hours. Introduction to the physics, systems and methods of energy conversion from non-conventional energy sources, such as solar, geothermal, ocean-thermal, biomass, tidal, hydroelectric, wind and wave energy. Advantages and disadvantages of alternative energy sources and engineering challenges for the harnessing of such forms of energy. Energy storage. Fuel cells. Prerequisite(s): MEEN 3110, 3120 and 3210.

4112. Nuclear Energy. 3 hours. Atomic physics and the structure of the atom. Radioactivity. Interactions of neutrons with matter, nuclear cross-sections. Nuclear fuels and fuel elements. Elements of nuclear reactors. Components and operation of nuclear power plants. Notable accidents of nuclear reactors. Breeder reactors. Prerequisite(s): MEEN 3110, 3120 and 3210.

4150. Mechanical and Energy Engineering Systems Design I. 3 hours. (2;3) Advanced treatment of engineering design principles with an emphasis on product and systems design, development and manufacture. Mimics "real world" environment with students working in teams to prepare product specification, develop several concepts, perform detailed design, and construct prototypes subject to engineering, performance and economic constraints. Prerequisite(s): EENG 2610, MEEN 3130, 3210, 3230.

4250. Mechanical and Energy Engineering Systems Design II. 3 hours. (0;9) Continuation of MEEN 4150, in which the student teams complete their product design, development and manufacturing projects. Patterned on a professional workplace environment in which the teams plan and manage their resources while adhering to an overall project schedule. The teams give weekly oral and written progress reports and obtain feedback from the faculty mentor. Prerequisite(s): MEEN 4150.

4800-4810. Topics in Mechanical and Energy Engineering. 3 hours. Varying topics in mechanical and energy engineering. Prerequisite(s): consent of instructor. May be repeated for credit as topics vary.

4890. Directed Study in Mechanical and Energy Engineering. 1–3 hours. Study by individuals or small groups. Plan of study must be approved by supervising faculty. Written report is required. Prerequisite(s): MEEN 2210. May be repeated for 6 credit hours, but a maximum of 3 credit hours apply to major.

4900-4910. Special Problems in Mechanical and Energy Engineering. 1–3 hours each. Individual instruction in theoretical, experimental or research problems. Prerequisite(s): consent of instructor. May be repeated for 6 credit hours, but a maximum of 3 credit hours from 4900-4910 apply to major.

4920. Cooperative Education in Mechanical and Energy Engineering. 3 hours. (0;0;3) Supervised field work in a job directly related to the student's major, professional field of study or career objectives. Summary report required. May be repeated for credit.

4951. Honors College Capstone Thesis. 3 hours. Major research project prepared by the student under the supervision of a faculty member and presented in standard thesis format. An oral defense is required of each student for successful completion of the thesis. Prerequisite(s): completion of at least 6 hours in honors courses; completion of at least 12 hours in the major department in which the thesis is prepared; approval of the department chair and the dean of the school or college in which the thesis is prepared; approval of the dean of the Honors College. May be substituted for HNRS 4000.

Mechanical Engineering Technology

see Engineering Technology

Merchandising and Hospitality Management

Merchandising and Hospitality Management, SMHM

Courses numbered 4900-4910 are open to advanced undergraduate students who are capable of developing a problem independently. A project is chosen by the student and instructor, and developed through conferences and approved activities under the direction of the instructor, who may require a term paper. Not open to graduate students, these courses are scheduled only when other required courses are unavailable. Prerequisite: consent of instructor and approval of the dean.

1420. Food Sanitation. 1 hour. An introduction to food service sanitation, providing training in the regulations and procedures necessary to prevent food poisoning and food-borne diseases in a food service environment.

1450 (HECO 1322). Principles of Nutrition. 3 hours. An introduction to the scientific fundamentals of human nutrition as they relate to health. Prevention of illnesses such as cancer, heart disease, osteoporosis, gastrointestinal disorders and obesity is discussed. A healthful diet and lifestyle are emphasized to enhance long-term wellness. Food and nutrition controversies are critically evaluated. *Satisfies a portion of the Understanding the Human Community requirement of the University Core Curriculum.*

1470. Introduction to Professional Food Preparation. 3 hours. (2;3) A laboratory-based course designed to familiarize students with professional food preparation principles and techniques. Uniforms required. Prerequisite(s): SMHM 1420 (may be taken concurrently).

1500. Orientation to the Hospitality Industry. 2 hours. A course designed to survey the hotel, restaurant, club and food service industries, including history, scope, organization and career opportunities.

1650. Apparel Evaluation. 3 hours. (2;2) Analysis of quality issues relative to developing and producing ready-to-wear apparel. Concepts include apparel components, silhouettes, piece good selection, sizing, and costing. Includes application of software package.

2090. Introduction to Electronic Merchandising. 3 hours. Survey of electronic merchandising and its application to consumer products and services for business to business and business to consumer. Introduction to electronic merchandising theory, terminology, resources, industry participants and career opportunities.

2280. Hospitality Industry Financial Accounting. 3 hours. Application of financial accounting principles to the hospitality industry: Uniform System of Accounts for restaurants, hotels, and clubs; completion of the accounting cycle for hospitality operations; transactions related to payroll, inventories, receivables, and payables for the hospitality industry. Prerequisite(s): open to hospitality management majors only.

2360. Aesthetics and Environment. 3 hours. (2;2) Introduction to elements and principles of visual merchandising, costume and furnishings from ancient cultures; aesthetic and functional consideration in material selection, and introduction of merchandising portfolio.

2380. AutoCAD for Interiors. 3 hours. (2;4) Application of computer-aided design, drafting and dimensioning to interior-built spaces in an AutoCAD environment. Prerequisite(s): ADES 2630 and 2640.

2400. Introduction to the Furniture Industry. 3 hours. Overview of the furniture and home furnishings industry. Topics include product development, manufacturing, distribution and merchandising of these products. Introduction to industry terminology, resources and career opportunities.

2460. Introduction to Nutrition Science. 3 hours. (3;2) Introduction to the relationship between nourishment, lifestyle choices and long-term health. Topics include classes, sources and functions of nutrients and their digestion, absorption and metabolism. Investigation of eating patterns using database technology demonstrates the relationship between food consumption and nutrition adequacy. The economic, cultural and psychological implications of food choices and eating behaviors are studied. *Satisfies a portion of the Natural Sciences requirement of the University Core Curriculum.*

2480. Hospitality Industry Managerial Accounting. 3 hours. Comprehensive application of accounting principles to the hospitality industry. Managerial accounting approach to accounting practices, financial statements and operating activities. Problem-solving methods applied to managerial decisions for the hospitality industry. Prerequisite(s): SMHM 2280.

2490. Introduction to Apparel Merchandising. 3 hours. Survey of the apparel industry including development, merchandising and distribution. Introduction to apparel terminology, resources, industry participants and career opportunities.