

**TST 161/Creative Design**

**1 course unit**

(fall and spring)

This is a foundational course that looks at the elements and principles of design as related to practical products, systems, and environments. It introduces students to the creative process practiced by artists, designers, and engineers, valuable to them as both future producers and consumers. Content includes thinking, drawing, and modeling skills commonly used by designers; development of a design vocabulary; the nature and evolution of technological design; the impacts of design on the individual, society, and the environment; patents and intellectual property; human factors; team design; and appropriate technology, risk analysis, and futuring techniques. Design problems are presented within real-world contexts, using field trips and outside speakers. Students complete a major design project, document their work through a design portfolio, and present their solutions before the class. Weekly critiques of class projects build fluency, confidence, and creativity.

**TST 391/Independent Study in Technological Studies**

**1 course unit**

(fall and spring)

*Prerequisites:* Permission of instructor and department chair

Independent Study is for advanced students wishing to pursue a special area of interest. Topic developed in consultation with a faculty advisor.

**ETE 111/Engineering Design**

**1 course unit**

(annually-spring)

Introduces the student to the concepts of mechanical design through the use of solid modeling of machine and product elements, exercises in reverse engineering, and the design of a simple machine. The course endeavors to provide the student the experience of learning a concept by analysis (reverse engineering), giving form to this concept through 3-D modeling, and finally applying the concept(s) in a simple mechanical design.

**ETE 131/Engineering Math**

**1 course unit**

(annually-spring)

*Prerequisite:* MAT 127

Includes a brief review of algebra, trigonometry, geometry, and Calculus A (differentiation and integration). The course will introduce the use of computational methods as a tool for engineering analysis. Computational methods will include Mathematica and MS Excel. Mathematical concepts to be covered include: numerical integration, multiple integrals, vector algebra, and differential equations. All mathematical topics will be tied to the solution of physical problems (the rocket equation, the RC circuit, spring-damper system, etc.). The course will also cover the analysis of experimental data and include the concepts of error analysis and standard deviation.

**ETE 261/Multimedia Design**

**1 course unit**

(annually-fall)

This course is intended to build upon skills and experiences introduced in the TST 161/Creative Design. Students will gain a perspective on the historical and contemporary influence of the information age on the individual and society. Main emphasis will be placed on understanding 2-D visual elements, compositional operations and associated human factors principles. Students will be given design problems in page layout, photography, video production, web-based media using current equipment and software, and prepare an ethical case study.

**ETE 271/Structures and Mechanics**

**1 course unit**

(annually-fall)

*Prerequisites:* Calculus A, PHY 201

This course is a synthesis of the primary concepts that are covered in the traditional ME courses of Statics, Strength of Materials and Machine Design. The lecture portion of the class contains ample real-world examples to illustrate the applicability of the concepts being discussed. The course will also contain a substantial hands-on component where students will be instructed in the safe use of woodworking machines. Students will fabricate a model from print that illustrates

some basic machine concept. The students will make practical use of the course instruction by participating in a design competition where teams of students build a machine to solve a “real world” problem.

**ETE 275/Mechanics and Materials Laboratory** **.5 course units**  
(annually-fall)

*Co-requisite:* ETE 271

This course builds upon the laboratory experience students gained in ETE 271 and the material covered in ETE 131/Engineering Math. Students get further instruction in the use of woodworking tools and learn the theory of cutting tools. The course moves on to machining techniques (lathe and mill) and includes projects that investigate optimal cutting speeds and feed speeds for various engineering materials. Additional projects cover tensile testing, the use of strain gages, sheet metal fabrication, plastics, composite materials and environmental effects.

**ETE 279/Thermo and Fluid Systems** **1 course unit**  
(annually-spring)

*Prerequisite:* ETE 271

Students will study the design requirements of an engineered system such as a modern passenger jet or other major modern engineering accomplishment. Students will then apply these learned concepts and principles to a student selected problem and will design/engineer and make/model a selected solution.

**ETE 281/Analog Circuits and Devices** **1 course unit**  
(annually-spring)

*Prerequisites:* MAT127

This introductory course provides the student with an overview of the fundamental concepts of electrical circuits. The course is lecture-based but requires the student to build and test a wide range of electrical circuits. The course will cover the use of the digital multimeter, variable power supply, function generator, and oscilloscope. Topics covered include Ohm’s law, resistor networks, Kirchhoff’s Laws, RC circuits, LEDs and diodes, transformers and rectifiers, transistors, op-amps, 555 timers, dc motors.

**ETE 283/Digital Electronics** **1 course unit**  
(annually-fall)

*Prerequisite:* ETE 281

This course introduces the student to digital electronics as they are designed and used in modern electrical devices. Basic logic circuit concepts are briefly introduced, and the course then moves on to applications of digital circuits such as digital signal processing and digital process control. This course will also cover programming fundamentals using the C programming language and Mathematica.

**ETE 285/Robotics and Controls Laboratory** **.5 course unit**  
(annually-spring)

*Prerequisites:* ETE 283

This course extends the scope of the hands-on components of ETE 281 and ETE 283. Students are given the opportunity to build and test various electrical systems that introduce a wide range of electrical and electro/mechanical components such as optical encoders, sensors and actuators.

**ETE 361/Architectural and Civil Engineering Design** **1 course unit**  
(annually-spring)

*Prerequisite:* ETE 261, ETE 271

This is an advanced course in the design of structures with an emphasis on understanding the historical and contemporary influence of designed objects on end users and society. Content includes key design themes from the Industrial Revolution to the present, architectural style, product development, civil engineering and structural analysis, and human factors. A Design (Style) Case Study is used to better understand the influence of human design on the individual,

society, and the environment. A thematic approach is used to select some problems for this course.

**ETE 365/Prototyping Laboratory** **.5 course unit**

(annually-fall)

*Co-requisite:* ETE 111, ETE 271

This is an advanced laboratory course designed to give students hands-on experiences with a variety of modeling techniques, tools, and machines. Students will make a variety of products including a mockup model, appearance model and prototype model. The experience is designed to develop the student's fabrication skills with advanced techniques to produce high quality models for product development.

**ETE 371/Mechanical Systems Design** **1 course unit**

(annually-fall)

*Prerequisite:* ETE 275

This course combines the knowledge of the previous mechanical oriented courses and considers applications where the only possible engineering solution requires a combination of these mechanical engineering concepts. Some examples are HVAC systems, internal combustion engines, fuel cells, power plants, space vehicles, and automobiles. Examples of mechanical systems will be covered by means of case studies. Students will work in teams to solve a series of design problems. These design problems will require that the student teams apply the methodology of engineering analysis to iterate an optimal solution that satisfies multiple criteria (e.g., weight, size, cost, ease of assembly, recyclability, etc.)

**ETE 381/Mechatronics** **1 course unit**

(annually-spring)

*Prerequisite:* ETE 285

This course is to be a directed design class with an emphasis on the concepts of mechatronics. Various topics will be introduced using real-world examples such as engine control units (ECUs), autonomous vehicles (e.g., Mars rovers), and smart houses.

**ETE 461/Manufacturing Systems** **1 course unit**

(annually-spring)

*Prerequisite:* ETE 365

This course challenges advanced students to design multi-step, automated production systems, including related elements of coordination, management, evaluation and continuous improvement. It documents the effects of mass production on individuals and society, and engages students with issues of economics, ethics and globalization.

**ETE 470/Topics in Technological Studies** **1 course unit**

(occasionally)

*Prerequisites:* Recommendation of faculty adviser, approval of department chair

Topics is an advanced course dealing with an emerging issue in technological studies.

**ETE 495 Senior Design Project** **1 course unit**

(annually-spring)

Senior Design Project is a culminating experience that provides the structure for students to further develop their design, problem solving and technical skills. Intended to come at the end of the program, students draw from their experiences to solve a major technical problem, including research, solution planning and development, testing and evaluation.