ENERGY TECHNOLOGY PROGRAM

Program Director: Andrew Baruth, PhD
Program Office: HLSB G77

The Energy Technology Program addresses energy issues from an interdisciplinary perspective. The program emphasizes the use of projects and case studies to develop problem-solving skills. The Bachelor of Science with a major in Sustainable Energy Science serves students interested in a science, math and/or engineering career.

Specific Requirements for Admission to the Energy Technology Major

- MTH 245 Calculus I or equivalent.

Bachelor of Science (B.S.), Majors in the Energy Technology Program

- Sustainable Energy Science ([http://catalog.creighton.edu/undergraduate/arts-sciences/energy-technology/energy-science-bs](http://catalog.creighton.edu/undergraduate/arts-sciences/energy-technology/energy-science-bs))

Minors in the Energy Technology Program

- Sustainable Energy ([http://catalog.creighton.edu/undergraduate/arts-sciences/energy-technology/sustainable-energy-minor](http://catalog.creighton.edu/undergraduate/arts-sciences/energy-technology/sustainable-energy-minor))

Courses

**ERG 131. Installation and Maintenance of Photovoltaic Systems. 3 credits.**
Design, installation and maintenance of commercial and residential solar arrays.

**ERG 132. Convection and Passive Solar Energy Systems. 3 credits.**
Design, installation and maintenance of convection and passive solar heating. This course provides a working knowledge of solar warm air systems. Topics will include collector design and placement, principles of heat transfer and air movement, ventilation and register placement, blower selection, controller function, and electrical safety.

**ERG 157. Contemporary Composition: Energy in Society. 2 credits.**
Energy technology component of an interdisciplinary course on the fundamental principles and applications of energy. A hands-on exploration of the physical laws governing energy, energy production and transfer methods, and personal energy usage, with an emphasis on the interplay between energy, technology, humanity, and the environment. CO: ENG 154.

**ERG 213. Three Dimensional Design. 2 credits.**
A hands-on introduction to basic engineering principles, including forces, statics, mechanisms, mechanical systems. Basic design skills will also be explored, including the design process, 2- and 3-dimensional visualization and sketching, dimensioning and tolerances, CAD software, rapid prototyping equipment, and analysis of the environmental impact of designed products.

**ERG 221. Electronics Design. 4 credits.**
A hands-on, project-based introduction to basic electronics design through the use of microcontrollers. Students learn about the behavior of electricity, how to use basic electronics components, and how to design systems capable of interacting with the physical world using both hardware and software. P. ERG 213.

**ERG 241. Introduction to Energy Transfer. 3 credits.**

**ERG 251. Introduction to Material Science. 2 credits.**
Introduction to Material Science is an integrated course with HIS 285 to form "The Stuff of History: Materials That Have Shaped Our World" that combines the knowledge, skills, and attitudes of materials science and history. Throughout three project-based modules, students will explore key events that shaped the history of Western society, along with the materials science concepts and technologies that made these events possible. P. MTH 245; One Critical Issues in Human Inquiry course; CO: HIS 285.

**ERG 301. Modeling Electrical Load and Yield. 3 credits.**
This course is designed for students in the Energy Technology program. Basic principles associated with modeling and forecasting electrical load and potential yield will be explored through a series of project based laboratory exercises. These exercises will introduce students to the basic environmental parameters that determine electrical demand and the yield of solar panels. P. MTH 245.

**ERG 351. Energy Policy. 3 credits.**
Tools for economic, social impact and political analyses will be considered. Student teams present cases for specific energy sources examining public policies in the US and abroad. The class will attempt to reach consensus on a policy proposal that will be reviewed by a panel of government and energy experts. P or CO: ERG 241.

**ERG 361. Internship. 3 credits.**
This is a semester- or summer-long experience in professional energy - or sustainability-related setting. With the assistance of the internship supervisor students will identify their personal learning objectives. P. PHY 212 or PHY 221; ERG 131 or ERG 132 or ERG 213; ERG 591; ERG 157 or PHY 157.

**ERG 493. Directed Independent Readings. 1-3 credits.**
A readings project under the guidance of a member of the faculty. The project may be in the areas of design engineering, electronics engineering, architectural engineering or sustainable energy. May be repeated up to 6 credits. P. IC.

**ERG 495. Directed Independent Study. 1-3 credits.**
A study project under the guidance of a member of the faculty. The project may be in the areas of design engineering, electrical engineering, architectural engineering or sustainable energy. May be repeated up to 6 credits. P. IC.

**ERG 497. Directed Independent Research. 1-3 credits.**
A research project under the guidance of a member of the faculty. The project may be in the areas of design engineering, electronics engineering, architectural engineering or sustainable energy. May be repeated up to 6 credits. P. IC.

**ERG 520. Introduction to Solar Energy. 3 credits.**
This course develops a thorough understanding of the scientific principles involved in the production of electricity from solar radiation. Solar radiation, the function of solar cells, DC and AC circuits and the storage and transmission of electrical energy are covered. Economic and policy issues related to solar energy are introduced. P. ERG 241 or PHY 212 or PHY 221 or graduate standing.
ERG 521. Introduction to Photovoltaic Materials. 3 credits.
This course is designed as an introduction to photovoltaic materials including silicon, organic and other n-and p-type semiconductors. Sufficient scientific theory relating to the operating principles of photovoltaic devices is covered to give an appreciation of both the strengths and weaknesses of current solar cell technologies. P: ERG 321 or 520.

ERG 551. Grants and Funding for Sustainable Technology. 3 credits.
This course is designed for students with a major in Energy Technology. Students will engage in weekly topical reading, research and class discussion, culminating in a community-based grant writing project. P: Jr. stdg.

This is the first semester of a formal year-long senior capstone course designed to provide real life experiences applying the science, engineering, research, communication and community service expertise developed throughout your Energy Science curriculum. P Senior or Graduate Standing; ERG 520 or PHY 201 or PHY 213; Oral Communication; Ethics.

ERG 582. Energy Innovation Project II. 3 credits.
Second semester of a formal year-long engineering, research or community service project done in under the guidance of a faculty member and course coordinator. Students may conduct advanced research, perform policy analysis, develop experimental prototypes, design new products, redesign existing products or engage the community in a significant sustainability effort. P: ERG 581.

ERG 591. Seminar in Engineering. 1-3 credits. (Same as PHY 591)
This course will prepare students particularly interested in careers in energy technology, engineering, or related disciplines, to gain internship and employment opportunities. Students will be exposed to diverse disciplines and fields in these areas via guest speakers and personal research which all will continue the development of written and oral communication skills as well as further the development of the students’ ethical awareness in their careers. P: Contemporary Composition; Oral Communication; Ethics.

ERG 595. Special Topics in Energy Studies. 1-3 credits.
A course treating topics of special interest. This course will be subtitled in the Schedule of Courses and may be repeated under different subtitles. The course may be in the areas of design engineering, electronics engineering, architectural engineering or sustainable energy. P: IC.

ERG 597. Computer Models for Short Term Weather Forecasting. 3 credits.
Independent research and study course in Atmospheric Science and Energy Science. Students will work on computational models for weather short term weather forecasting. Students will work with advanced meteorological software and multi-node processors applied to projected wind and solar energy production and questions of peak electric utility demand. P: ERG 301 or IC.