Bachelor of Science with a Major in Energy Science

This course of study is intended for students interested in a science, math and/or engineering career.

Learning Objectives:

1. Graduates will be able to explain the principles of energy and its transfer, the production of solar energy and its distribution, the human and political factors in changing the way that energy is supplied.
2. Graduates will be able to explain the engineering design process and will have hands-on experience with the design process.
3. Graduates will have a knowledge of Ignatian (Jesuit) Pedagogy and will have developed related life-long learning skills.
4. Graduates will be able to communicate technology to a wide variety of audiences.
5. Graduates will be able to explain effective project team operation and will have worked effectively in this environment.
6. Graduates should emerge from the program having demonstrated a commitment to social and global responsibility including an awareness of Catholic Social Teaching.
7. Graduates will demonstrate advanced problem solving skills.
8. Graduates will know the detailed principles of at least one energy production method and will have related production and operation experience.
9. Graduates will have obtained the competencies needed for graduate study in at least one area of science, mathematics or engineering or an entry level position in a technology related field.

Required Courses in the Major:

Design and Rapid Prototyping Lab I (3 cr: 1 cr. ERG 211, 1 cr. ENG 151, 1 cr. COM 153)
Design and Rapid Prototyping Lab II (3 cr: 1 cr. ERG 212, 2 cr. JMC 202)
Design and Rapid Prototyping Lab III (3 cr: 1 cr. ERG 311, 1 cr. ENG 152, 1 cr. COM 154)
Design and Rapid Prototyping Lab IV (3 cr: 1 cr. ERG 312, 1 cr. ENG 153, 1 cr. COM 155)
The Design and Rapid Prototyping Series provides an introduction to engineering design and the related communication skills.
ERG 241 Introduction to Energy Transfer (3 cr)
The Energy Transfer course is a Thermodynamics and Heat Transfer course including applications.
History and Technology in the Modern World (5 cr; 2 cr. ERG 251, 3 cr. HIS 110)
The History and Technology in the Modern World is the introductory course in Material Science. The course is taught from a historical perspective.
ERG 301 Modeling Electrical Load and Yield (3 cr)
Modeling Electrical Load and Yield is an Introduction to Weather Modeling and Statistics using actual solar and wind energy production and regional consumption as case studies.
ERG 321 Introduction to Solar Energy (3 cr)
The Solar Energy course covers the physics and electrical engineering of photovoltaic energy production.
ERG 351 Energy Policy (3 cr)
The Energy Policy course examines state and national energy policies in a seminar format. The course is taught by a lawyer and a professional engineer.
ERG 481 Senior Project in Energy Studies I (3 cr)
ERG 482 Senior Project in Energy Studies II (3 cr)
The Senior Project Series consists of either a research project or professional work done under the direction of faculty.
ERG 521 Introduction to Photovoltaic Materials (3 cr)
The Photovoltaics Materials course is an advanced course in material science and with a focus on photovoltaic material fabrication and testing.
Modeling the Physical World I (6 cr: 3 cr. MTH 249, 3 cr. PHY 221)
Modeling the Physical World II (6 cr: 3 cr. MTH 349, 3 cr. PHY 222)
The Modeling the Physical World Series is combination of Calculus II and III and General Physics I and II for Energy Science and Physics Majors
PHL 255 Ethics, Energy, and Environment (3 cr)
The program has its own professional ethics course.

The following courses were developed to fulfill the General Education (Core) requirements:
THL 101 Theology, Cosmology, and the Environment (3 cr)
THL 336 Divine Providence, Catholic Social Teaching, and the Problem of Climate Change (3 cr)

The list of required includes courses that can be used to address two of the core Theology courses, the core Science requirement, the core Mathematics requirement, the core Introductory Composition requirement, the core Communication requirement, the core Ethics requirement, part of the Core History requirement, and one course in the Social Sciences core.

Electives (Students must complete 16 credits from the following):
ATS 315 Computer Applications in Meteorology
ATS 460/EVS 460 Terrestrial Remote Sensing
ATS 510 Introduction to Physical Meteorology
ATS 516 Computer Methods in Atmospheric Sciences
ATS 531 Operational Prediction Models
ATS 548/EVS 548 Introduction to Solar-Terrestrial Environment
ATS 510 Introduction to Physical Meteorology
ATS 533/EVS 533 Physical Climatology and Climate Change
ATS 564 Statistical Applications in the Atmospheric Sciences
ATS 570 Quantitative Methods in the Atmospheric Sciences
ATS 481 National Weather Service Internship
ATS 482 Atmospheric Sciences Internship with Industry
ATS 597/ERG 597 Computer Models for Short Term Weather Forecasting
BUS 201 Legal Environment of Business
CHM 315 Green Chemistry
CHM 446 Statistical Mechanics
CHM 447 Physical Chemistry of Macromolecules
CHM 544 Quantum Chemistry
CHM 532 Mathematical Concepts in Chemistry
CHM 549 Computational Chemistry
CSC 221 Introduction to Programming
CSC 222 Object-Oriented Programming
CSC 321 Data Structures
CSC 414 Computer Organization
CSC 421 Algorithm Design and Analysis
CSC 551 Web Programming
CSC 581 Mobile Application Development
ENT 312 Innovation and Creativity
ENT 314 Business Planning for Social Entrepreneurs
ERG 131 Installation and Maintenance of Photovoltaic Systems
ERG 132 Convection and Passive Solar Energy Systems
ERG 361 Internship
ERG 493 Directed Independent Readings
ERG 495 Directed Independent Study
ERG 497 Directed Independent Research
ERG 551 Grants and Funding for Sustainable Technology
ERG 595 Special Topics in Energy Studies: Control Systems
ERG 595 Special Topics in Energy Studies: Low Voltage Lighting
ERG 595 Special Topics in Energy Studies: Energy Auditing
ENG 315 Technical Writing
EVS 374 Management of Environmental Risk
HRS 303 Sources and Methods: Fuzzy Math Logic
HRS 311 Sources and Methods: Graph Theory
HRS 315 Sources and Methods: Imagination to Invention
HRS 312 Sources and Methods: Gödel, Escher and Bach
HRS 334 Sources and Methods: Green Chemistry and Sustainability

HRS 342 Sources and Methods: Modeling Global Issues
JMC 220 Professional Writing
MTH 529 Linear Algebra
MTH 545 Differential Equations
MTH 546 Partial Differential Equations
MTH 561/STA 561 Mathematical Statistics I
MTH 562/STA 562 Mathematical Statistics II
MTH 593 Complex Analysis
PHY 223 Project Physics Laboratory I
PHY 224 Project Physics Laboratory II
PHY 301 Modern Physics
PHY 303 Electronics Laboratory
PHY 331 Physical Optics
PHY 332 Optics Laboratory
PHY 471 Classical Mechanics
PHY 481 Electricity and Magnetism
PHY 521 Electronics for Scientists
PHY 522 Electric Circuits
PHY 531 Quantum Mechanics
PHY 541 Thermodynamics and Statistical Mechanics
PHY 551 Mathematical Physics
PHY 553 Computational Physics
PHY 571 Solid State Physics
PHY 572 Solid State Physics Laboratory
PHY 591 Seminar in Engineering
STA 569 Analysis of Variance and Design of Experiments

The elective requirements for the major can be fulfilled in part with up to 12 transfer engineering credits that have been pre-approved