

Approved Program of Study for Undergraduate Minors
 Georgia Institute of Technology
 Office of the Registrar
 2013-2014
Minor in Energy Systems

Please type or print in ink:

Name (first/last):	GT Student ID Number:
GT Email Address:	Daytime Phone:
Major:	Anticipated Graduation Date:

In addition to the guidelines listed below, you are responsible for reviewing and following the general guidelines for minors: <http://www.catalog.gatech.edu/academics/minorguide.php>

The minor includes requirements for courses which cut across disciplines. These courses are intended to add breadth of knowledge in areas outside the student's major but important to energy systems. A terminal "capstone" or project course provides an opportunity for students from multiple disciplines to work together in multidisciplinary teams on a significant project in the energy area.

The breadth courses and the capstone project course, courses taken by all students completing the minor, require one or more pre-requisites; specifically, basic economics, mathematics, and lab science courses. List of required prerequisites and curriculum requirements and options for this minor are on the following pages. All courses in the minor also must be 3000 level and above.

It is the **major advisor's responsibility** to verify that students are not using any courses required by name and number for their major, that they are not using any core area A-E courses (including humanities and social sciences), and that they are not using any courses for more than one minor or certificate. Free electives and technical electives may be used towards minors.

List the courses completed for the requested minor:

Course and Section	Course Title	Credit Hours	Grade	Semester Completed
GT 4813	Project in Energy Systems	3		

Student Signature:
Major School Signature:
Minor School Signature (Management) :

Partnering Colleges and Schools:

College of Engineering

The Daniel Guggenheim School of Aerospace Engineering
School of Electrical and Computer Engineering
The George W. Woodruff School of Mechanical Engineering

Ivan Allen College

School of Economics
School of Public Policy

College of Sciences

School of Biology
School of Chemistry and Biochemistry
School of Earth and Atmospheric Sciences

Prerequisite Courses

The prerequisites needed for one or more of the courses required for the minor (breadth courses and the capstone project course) are (all existing courses):

- a) Mathematics (MATH 1501, 1502, 2401 through Calculus III)
- b) Physics (PHYS 2211, 2212)
- c) Chemistry (CHEM 1310 or 1211)
- d) Economics ECON 2100 or 2101 or (2105 and 2106)

Students ordinarily pursue the minor upon completion of the needed prerequisites. However, the depth course requirements (see below) may be taken as soon as students have met the relevant prerequisites. Students pursuing the minor are expected to remain in good academic standing while pursuing the minor. There is no specific GPA requirement nor are there any required grades in specific courses.

Depth Courses

The minor requires **six hours of depth courses** related to energy systems. A list of acceptable courses which meet the depth requirement is provided by each major approving the minor. Depth courses may be taken in the student's major to ensure the depth in that major needed to pursue a multidisciplinary minor. All acceptable depth courses must be consistent with the goals of the minor. Examples of acceptable courses include:

- a) Engineering courses covering a specific energy technology like solar or relevant engineering science
- b) Science courses which cover energy science like biomass or other relevant basic science
- c) Public Policy courses which cover policy analysis or methodology
- d) Economics courses covering economic analysis of complex systems
- e) Relevant CoA or CoM courses

Depth courses may ordinarily serve as technical or free electives in the student's program of study. However, courses required by name and number and/or used to satisfy Core Areas A

through E cannot be used to satisfy the requirements of a minor. All courses in the minor also must be 3000 level and above.

Menus of Depth Courses by Program

The Depth Courses below may have additional prerequisites; please check <http://www.catalog.gatech.edu/courses/index.php> to view the current prerequisites.

Aerospace Engineering

AE 4701	Wind Engineering
AE 4370	Life Cycle Cost Analysis
NRE 3208	Fundamentals of Nuclear and Radiological Engineering
NRE 3301	Radiation Physics
AE 4461	Intro to Combustion

Biology

BIOL 4221	Biological Oceanography
BIOL 4410	Microbial Ecology
BIOL 4418	Microbial Physiology
BIOL 4440	Plant Physiology
CHEM 3511	Survey of Biochemistry
CHEM 4511	Biochemistry I
CHEM 4512	Biochemistry II
EAS 4410	Climate and Global Change
EAS 3110	Energy, the Environment, and Society

Mechanical Engineering

ME 4011	Internal Combustion Engines
ME 4315	Energy Systems Analysis and Design (if not used as Design Elective)
ME 4325	Fuel Cells
ME 4321	Refrigeration and Air Conditioning
ME 4823	Mechatronic Systems in Hybrid-Electric Powertrains
ME 4823	Renewable Energy Systems
ME 4171	Environmental Design and Manufacturing
ME 4172	Sustainable Energy Systems Design
ME 4701	Wind Engineering
ECE 3071	Modern Electric Energy Systems
NRE 3208	Nuclear Reactor Physics I
NRE 4214	Reactor Engineering
NRE 4610	Intro to Plasma Physics and Fusion Engineering

Electrical and Computer Engineering

ECE 3070	Electromechanical and Electromagnetic Energy Conversion*
ECE 3071	Modern Electric Energy Systems*
ECE 4320	Power System Analysis and Control
ECE 4321	Power System Engineering
ECE 4325	Electric Power Quality
ECE 4330	Power Electronics

ECE 4335 Electric Machinery Analysis
NRE 3208 Fundamentals of Nuclear and Radiological Engineering
NRE 3301 Radiation Physics

*Note: If used for EE Breadth credit, ECE 3070 and ECE 3071 cannot be used for this minor.
Any course on this list that is taken for ECE elective, engineering elective, or approved
elective credit can count for this minor.

Public Policy

PUBP 3315 Environmental Policy and Politics
PUBP 3600 Sustainability, Technology & Policy
PHIL 4176 Environmental Ethics
PUBP 4420 Science, Technology, and Regulation

Economics

ECON 4440 Environmental Economics
ECON 4340 Industrial Organization

Chemistry and Biochemistry

CHEM 3511 Survey of Biochemistry
CHEM 4XXX/6284 Environmental Analytical Chemistry
CHEM 4XXX/6483 Chemistry of Electronic Materials

Earth and Atmospheric Sciences

EAS 4410 Climate and Global Change
EAS 3110 Energy, Environment, and Society

Breadth Courses

The minor requires **six hours of breadth courses** (two courses). Students should strive to complete the necessary prerequisites and the depth courses prior to enrolling in the breadth courses. However, depth courses may be taken concurrently with the courses taken to meet the breadth requirement. All students pursuing the minor choose either a) or d) and either b) or c) from the list below. Their choices depend on their majors (see notes below). While restrictions apply as to which courses can be used by various majors to fulfill the minor requirements (see Notes a – d), breadth courses may, with permission of the student's major, be taken for credit outside the minor.

- ME 3700 Introduction to Energy Systems Engineering (See note a)
- ECON 3300 Economics of International Energy Markets (See note b)
- PUBP 3350 Energy Policy (See note c)
- CHEM 3700 The Science of Alternative Energy (See note d)

Notes:

- a) Cannot be used to complete the minor by COE students.
- b) Cannot be used to complete the minor by ECON students.
- c) Cannot be used to complete the minor by PUBP students.
- d) Cannot be used to complete the minor by COS students.

Capstone Course

GT 4813 Project in Energy Systems

Ordinarily, students must complete all minor requirements before they can register for the Project in Energy Systems course.