ENERGY BUSINESS AND FINANCE, B.S.

Begin Campus: Any Penn State Campus
End Campus: University Park

Program Description
The major in Energy Business and Finance, offered jointly by the College of Earth and Mineral Sciences and the Smeal College of Business, combines training in business, economics, finance, and the physical sciences with a core of courses focusing on energy and related industries. The major helps students prepare for careers in the energy industry, as well as financial institutions, nonprofit groups, and international organizations dealing with energy issues. The curriculum also provides a strong base for further study in business, economics, law, and social sciences.

General Option
The General option of the Energy Business and Finance major is appropriate for students who want a broad understanding of the earth and environmental sciences in preparation for careers in industry, commerce, and government.

Energy Land Management Option
The Energy Land Management Option in the major of Energy Business and Finance focuses on issues in the acquisition of sub-surface exploration rights. Thus, it is designed to prepare students for a career as a land professional in an energy exploration company. The curriculum, designed in consultation with the American Association of Professional Landmen, requires courses in real estate fundamentals, energy law, geographic information sciences, petroleum engineering, and petroleum geology.

What is Energy Business and Finance?
The solutions to society’s existing and emerging energy challenges require interdisciplinary approaches integrating economics and business with the technical knowledge of energy systems and implications for our environment. That’s where Energy Business and Finance experts come in. Our graduates use their knowledge of energy commodity markets, statistics and risk analysis, and project finance related to energy systems and environmental issues to shape the future of energy production. The major was designed to help students build critical analytical skills in preparation for careers with energy companies, public agencies, and the financial institutions that are investing globally in emerging energy technologies. Additionally, the Energy Business and Finance’s program unique option in Land Management offers excellent preparation for law school or careers in obtaining and negotiating property rights for energy projects.

You Might Like This Program If...
• You want to work in the energy sector.
• You enjoy analytical thinking and complex problem solving.
• You are passionate about paving the way for a sustainable energy future.

Entrance to Major
This program currently has administrative enrollment controls. Administrative Enrollment Controls are initiated when limitations of space, faculty, or other resources in a major prevent accommodating all students who request them. Students must follow the administrative enrollment controls that are in effect for the semester that they enter the university.

First-Year Students Entering Summer 2018, Fall 2018, Spring 2019
In order to be eligible for entrance to this major, students must satisfy the following requirements:
• 40-70 cumulative credits (credits completed at Penn State for which a quality letter grade was earned)
• completed with a grade of C or better: MATH 140, MATH 141, ECON 102
• earned a minimum of 2.80 cumulative GPA

Students Who Entered Prior to Summer 2018
Students who entered the University prior to the summer 2018 semester should view the administrative enrollment controls for the semester that they entered the university (http://advising.psu.edu/entrance-major-requirements) on the Academic Advising Portal.

Degree Requirements
For the Bachelor of Science degree in Energy Business and Finance, a minimum of 120 credits is required:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Education</td>
<td>45</td>
</tr>
<tr>
<td>Electives</td>
<td>0-12</td>
</tr>
<tr>
<td>Requirements for the Major</td>
<td>90-102</td>
</tr>
</tbody>
</table>

25-27 of the 45 credits of General Education are included in the Requirements for the Major. This includes: 4-6 credits of GN courses, 9 credits of GWS courses, 6 credits of GQ courses, and 6 credits of GS courses.

General Education
Connecting career and curiosity, the General Education curriculum provides the opportunity for students to acquire transferable skills necessary to be successful in the future and to thrive while living in interconnected contexts. General Education aids students in developing intellectual curiosity, a strengthened ability to think, and a deeper sense of aesthetic appreciation. These are requirements for all baccalaureate students and are often partially incorporated into the requirements of a program. For additional information, see the General Education Requirements (http://bulletins.psu.edu/undergraduate/general-education/baccalaureate-degree-general-education-program) section of the Bulletin and consult your academic adviser.

The keystone symbol appears next to the title of any course that is designated as a General Education course. Program requirements may also satisfy General Education requirements and vary for each program.

Foundations (grade of C or better is required.)
• Quantification (GQ): 6 credits
• Writing and Speaking (GWS): 9 credits
Knowledge Domains
- Arts (GA): 6 credits
- Health and Wellness (GHW): 3 credits
- Humanities (GH): 6 credits
- Social and Behavioral Sciences (GS): 6 credits
- Natural Sciences (GN): 9 credits

Integrative Studies (may also complete a Knowledge Domain requirement)
- Inter-Domain or Approved Linked Courses: 6 credits

University Degree Requirements

First Year Engagement
All students enrolled in a college or the Division of Undergraduate Studies at University Park, and the World Campus are required to take 1 to 3 credits of the First-Year Seminar, as specified by their college First-Year Engagement Plan.

Other Penn State colleges and campuses may require the First-Year Seminar; colleges and campuses that do not require a First-Year Seminar provide students with a first-year engagement experience.

First-year baccalaureate students entering Penn State should consult with their academic adviser for these requirements.

Cultures Requirement
6 credits are required and may satisfy other requirements
- United States Cultures: 3 credits
- International Cultures: 3 credits

Writing Across the Curriculum
3 credits required from the college of graduation and likely prescribed as part of major requirements.

Total Minimum Credits
A minimum of 120 degree credits must be earned for a baccalaureate degree. The requirements for some programs may exceed 120 credits. Students should consult with their college or department adviser for information on specific credit requirements.

Quality of Work
Candidates must complete the degree requirements for their major and earn at least a 2.00 grade-point average for all courses completed within their degree program.

Limitations on Source and Time for Credit Acquisition
The college dean or campus chancellor and program faculty may require up to 24 credits of course work in the major to be taken at the location or in the college or program where the degree is earned. Credit used toward degree programs may need to be earned from a particular source or within time constraints (see Senate Policy 83-80). For more information, check the Suggested Academic Plan for your intended program.

Requirements for the Major
To graduate, a student enrolled in the major must earn a grade of C or better in each course designated by the major as a C-required course, as specified by Senate Policy 82-44.

Common Requirements for the Major (All Options)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCTG 211</td>
<td>Financial and Managerial Accounting for Decision Making</td>
<td>4</td>
</tr>
<tr>
<td>EBF 473</td>
<td>Risk Management in Energy Industries</td>
<td>3</td>
</tr>
<tr>
<td>ECON 104</td>
<td>Introductory Macroeconomic Analysis and Policy</td>
<td>3</td>
</tr>
<tr>
<td>IB 303</td>
<td>International Business Operations</td>
<td>3</td>
</tr>
</tbody>
</table>

Prescribed Courses: Require a grade of C or better

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBF 200</td>
<td>Introduction to Energy and Earth Sciences Economics</td>
<td>3</td>
</tr>
<tr>
<td>EBF 301</td>
<td>Global Finance for the Earth, Energy, and Materials Industries</td>
<td>3</td>
</tr>
<tr>
<td>EBF 304</td>
<td>Global Management for the Earth, Energy, and Materials Industries</td>
<td>3</td>
</tr>
<tr>
<td>EBF 401</td>
<td>Strategic Corporate Finance for the Earth, Energy, and Materials Industries</td>
<td>3</td>
</tr>
<tr>
<td>ECON 102</td>
<td>Introductory Microeconomic Analysis and Policy</td>
<td>3</td>
</tr>
<tr>
<td>ECON 302</td>
<td>Intermediate Microeconomic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>EME 460</td>
<td>Geo-resource Evaluation and Investment Analysis</td>
<td>3</td>
</tr>
<tr>
<td>MATH 140</td>
<td>Calculus With Analytic Geometry I</td>
<td>4</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Calculus with Analytic Geometry II</td>
<td>4</td>
</tr>
<tr>
<td>RM 302</td>
<td>Risk and Insurance</td>
<td>3</td>
</tr>
</tbody>
</table>

Additional Courses

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS 100</td>
<td>Effective Speech</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 15</td>
<td>Rhetoric and Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 30</td>
<td>Honors Freshman Composition</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202C</td>
<td>Effective Writing: Technical Writing</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 202D</td>
<td>Effective Writing: Business Writing</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 101</td>
<td>Introduction to C++ Programming</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 200</td>
<td>Programming for Engineers with MATLAB</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 201</td>
<td>Programming for Engineers with C++</td>
<td>3</td>
</tr>
<tr>
<td>CMPSC 202</td>
<td>Introduction to Electricity Markets</td>
<td>3</td>
</tr>
<tr>
<td>BA 243</td>
<td>Social, Legal, and Ethical Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>BLAW 243</td>
<td>Legal Environment of Business</td>
<td>3</td>
</tr>
<tr>
<td>ERM 411</td>
<td>Legal Aspects of Resource Management</td>
<td>3</td>
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</tbody>
</table>

Requirements for the Option

Energy Land Management Option (25 credits)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBF 402</td>
<td>Energy Law and Contracts</td>
<td>3</td>
</tr>
</tbody>
</table>
### General Option (24-36 credits)

Select 3 credits of the following:

- GEOG 363 Geographic Information Systems 3
- Prescribed Courses: Require a grade of C or better
- GEOG 160 Mapping Our Changing World 3
- GEOG 1 Physical Geology 3

### Additional Courses

Select 6-7 credits of the following:

- EBF 410 Petroleum and Natural Gas Operations 3
- or PNG 405 Rock and Fluid Properties
- EBF 411 Petroleum and Natural Gas Geology for Land Professionals 3
- or GEOSC 454 Geology of Oil and Gas

### Additional Courses: Require a grade of C or better

Select 3 credits of the following:

- PHYS 211 General Physics: Mechanics 4
- or PHYS 250 Introductory Physics I

Select 3 credits of the following:

- GEOG 361 Cartography–Maps and Map Construction
- GEOG 362 Image Analysis
- GEOG 364 Spatial Analysis
- GEOG 463 Geospatial Information Management

### General Option (24-36 credits)

Select 6-7 credits of the following:

- CHEM 110 Chemical Principles I
- EARTH 100 Environment Earth
- EARTH 101 Natural Disasters: Hollywood vs. Reality
- EARTH 103 Earth in the Future: Predicting Climate Change and Its Impacts Over the Next Century
- EARTH 111 Water: Science and Society
- EARTH 150 Dinosaur Extinctions and Other Controversies
- EGEE 101 Energy and the Environment
- EGEE 102 Energy Conservation for Environmental Protection
- EGEE 120 Oil: International Evolution
- GEOS 110 Geology of the National Parks
- GEOS 10 Geology of the National Parks
- GEOS 20 Planet Earth
- GEOS 21 Earth and Life: Origin and Evolution
- GEOS 40 The Sea Around Us
- MATSE 81 Materials in Today’s World
- METEO 3 Introductory Meteorology
- METEO 101 Understanding Weather Forecasting
- PHYS 211 General Physics: Mechanics
- or PHYS 250 Introductory Physics I

Select 3 credits of the following:

- CED 404 Community, Environment and Development Research Methods
- CED 429 Natural Resource Economics
- CED 431 Economic Analysis of Environmental and Resource Policies
- EBF 411 Petroleum and Natural Gas Geology for Land Professionals

### Additional Courses

Select one of the following:

- EBF 483 Introduction to Electricity Markets (if not selected for requirement for the major)
- ECON 490 Introduction to Econometrics
- EME 301 Thermodynamics in Energy and Mineral Engineering
- GEOS 424 Geography of the Global Economy
- GEOS 430 Human Use of Environment
- GEOS 431 Geography of Water Resources
- GEOS 444 African Resources and Development
- GEOS 493 Service Learning
- GEOS 402 Natural Disasters
- GEOS 454 Geology of Oil and Gas
- METEO 473 Application of Computers to Meteorology
- PLSC 490 Policy Making and Evaluation

### Supporting Courses and Related Areas

Select one of the following: 15-26

- Select from one of the following minors: Arabic, Chinese, Civic and Community Engagement, Earth Systems, Energy Engineering, Entrepreneurship and Innovation, Environmental Resource Management, Environmental Systems Engineering, Geographical Information Science, Geosciences, Mathematics, Meteorology, Mining Engineering, Petroleum and Natural Gas Engineering, Russian, Spanish, Statistics, Watersheds and Water Resources or a relevant minor selected in consultation with an adviser

A concurrent major in any subject

A 15 credit semester-long education abroad program approved by the professor in charge of the EBF major

A minor in Asian Studies together with an approved EBF summer term abroad experience

### Integrated B.S. in Energy Business and Finance (EBF) and M.S. in Energy and Mineral Engineering (EME)

The integrated undergraduate-graduate (IUG) program between the Energy Business and Finance undergraduate program and the Energy and Mineral Engineering graduate program enables academically superior and research-focused EBF undergraduate students to also obtain an M.S. degree in Energy and Mineral Engineering in five years of study. Students should refer to the Energy and Mineral Engineering graduate program in the Graduate Program Bulletin (https://bulletins.psu.edu/graduate/programs/majors/energy-mineral-engineering) for the IUG admission and degree requirements.

### Course Substitutions for the Integrated B.S. in Energy Business and Finance (EBF) and M.S. in Energy and Mineral Engineering (EME)

As many as twelve of the credits required for the master's degree may be applied to both the B.S. and M.S. degrees. A minimum of six credits counted for both the B.S. and M.S. degrees must be at the 500-level. Thesis and culminating/capstone experience credits may not be double counted. The undergraduate degree program officer will determine the specific undergraduate required courses for which the 500-level courses may be used to substitute to meet institutional and accreditation requirements.
Program Learning Objectives

Our graduates will have the necessary skills to succeed professionally in analytical functions to support decision-making in the energy industries. They will:

1. Demonstrate knowledge of how markets for energy operate.
   - Articulate the factors that drive the supply of energy;
   - Articulate the factors that drive the demand for energy;
   - Explain how markets and government policies may fail.
2. Demonstrate knowledge of the process of price formation in markets for energy commodities, specifically:
   - Crude Oil
   - Natural Gas
   - Electric Energy
3. Demonstrate knowledge financial skills for the energy industries.
   - Demonstrate a basic understanding of accounting and business law.
   - Calculate the profitability of investment projects.
   - Describe how capital is raised for companies.
   - Describe how commodity markets operate, and how they hedge risk.
   - Demonstrate strategies to hedge risk in financial and insurance markets.
4. Acquire problem solving ability.
   - Solve numerical problems common in energy commodity trading or analysis.
   - Create investment plans for energy projects.
   - Create strategies for business decisions in the face of market or regulatory uncertainty.
5. Acquire the ability to communicate effectively with diverse groups through listening, speaking, and writing.
   - Communicate clearly through problem solving exercises.
   - Present solutions to business problems.
   - Speak with potential employers.
   - Use software programs to make presentations to potential employers

Academic Advising

The objectives of the university’s academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee’s unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (http://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy)

University Park

Zhen Lei
Program Chair, Energy Business and Finance

Suggested Academic Plan

General Option With Minor at University Park

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

<table>
<thead>
<tr>
<th>Knowledge Domain</th>
<th>General Education</th>
<th>Introductory Level Elective</th>
<th>Minor/Concurrent Major Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Credits</td>
<td>Credits</td>
<td>Credits</td>
<td>Credits</td>
</tr>
<tr>
<td>First Year</td>
<td></td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Fall</td>
<td>Spring</td>
<td>15-16</td>
<td>16-17</td>
</tr>
<tr>
<td>MATH 140 or 140G (GQ)</td>
<td>3</td>
<td>16</td>
<td>16-17</td>
</tr>
<tr>
<td>ECON 102 (GS)</td>
<td>3 ENGL 15, 30, or ESL 15 (GWS)</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>EMSC 100S, CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS)</td>
<td>3</td>
<td>16-17</td>
<td></td>
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<tr>
<td>General Education Knowledge Domain</td>
<td>3 Introductory Level Elective</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>Introductory Level Elective</td>
<td>3 Minor/Concurrent Major Course</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>Credits</td>
<td>Credits</td>
<td>15-16</td>
<td>16-17</td>
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<tr>
<td>Second Year</td>
<td></td>
<td>15-16</td>
<td>16-17</td>
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<tr>
<td>Fall</td>
<td>Spring</td>
<td>15-16</td>
<td>16-17</td>
</tr>
<tr>
<td>ECON 104 (GS)</td>
<td>3 ACCTG 211</td>
<td>4</td>
<td>16-17</td>
</tr>
<tr>
<td>ECON 302</td>
<td>3 STAT 301, 401, or EBF 472</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>EBF 301</td>
<td>3 General Education Knowledge Domain</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>CMPSC 101, 200, 201, or 202</td>
<td>3 General Education Knowledge Domain</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>Minor/Concurrent Major Course</td>
<td>3 Minor/Concurrent Major Course</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>Credits</td>
<td>Credits</td>
<td>15-16</td>
<td>16-17</td>
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<tr>
<td>Third Year</td>
<td></td>
<td>15-16</td>
<td>16-17</td>
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<tr>
<td>Fall</td>
<td>Spring</td>
<td>15-16</td>
<td>16-17</td>
</tr>
<tr>
<td>RM 302</td>
<td>3 EBF 304 (Writing across the curriculum)</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>EBF 484 or 483</td>
<td>3 Minor/Concurrent Major Course</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>IB 303 (IL)</td>
<td>3 Minor/Concurrent Major Course</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>EME 460</td>
<td>3 Advanced Level Elective</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>BLAW 243, ERM 411, or BA 243</td>
<td>3-4 General Education Knowledge Domain</td>
<td>3</td>
<td>16-17</td>
</tr>
<tr>
<td>Fourth Year</td>
<td></td>
<td>15-16</td>
<td>16-17</td>
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<tr>
<td>Fall</td>
<td>Spring</td>
<td>15-16</td>
<td>16-17</td>
</tr>
<tr>
<td>EBF 473</td>
<td>3 Elective/Minor/Concurrent Major Course</td>
<td>3</td>
<td>16-17</td>
</tr>
</tbody>
</table>
ENGL 202C or 202D (GWS)†
3 Elective/Minor/Concurrent
Major Course§
3
EBF 401*
3 Elective/Minor/Concurrent
Major Course§
3
Minor/Concurrent Major
Course§
3 General Education
Knowledge Domain
3
General Education Health
and Wellness (GHW)
1.5 General Education Health
and Wellness (GHW)
1.5

Total Credits 120-122

* Course requires a grade of C or better for the major
† Course requires a grade of C or better for General Education
§ Course is an Entrance to Major requirement
‡ Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of ‘C’ or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138 in the spring semester. These courses carry the GWS designation and replace both ENGL 30 and CAS 100. Each course is 3 credits.

1 Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

2 Select 6-7 credits from: CHEM 110 GN(3), EARTH 100 GN(3), EARTH 101 GN;US(3), EARTH 103 GN(3), EARTH 111 GN;US(3), EARTH 150 GN(3), EGEE 101 GN(3), EGEE 102 GN(3), EGEE 120 GN;US;IL(3), GEGO 110 GN(3), GEGO 115 GN(3), GEGO 2 GN(3), GEGO 10 GN(3), GEGO 20 GN(3), GEGO 21 GN(3), GEGO 40 GN(3), MATSE 81 GN;IL(3), METEO 3 GN(3), METEO 101 GN(3), PHYS 211 GN(4) or PHYS 250 GN(4). Most courses can also count toward the General Education Knowledge Domain Natural Science (GN) requirement. If a GN course is not selected for this requirement, students will need to add a GN to their plan. Some selections may have additional prerequisites.

3 Some minors require beginning coursework in a student’s first year; other minors require coursework to begin later. Please check prerequisites for minor courses. Please work closely with your adviser to select and plan for a minor; see list of approved minors in the advising notes section.

4 Select 3 credits from: CED 404(3), CED 429(3), CED 431(3), EBF 411(3), EBF 483(3)[if not selected for requirement above], ECON 490(3), EME 301(3), GEOG 424 US;IL(3), GEOG 430(3), GEOG 431(3), GEOG 444(3), GEOG 493(3), GEOSC 402 IL(3), GEOSC 454(3), METEO 473(3), PL SC 490(3)

Advising Notes:

Entrance to Major requirements: To enter EBF, students must have a cumulative GPA of 2.8 or higher, complete the entrance to major courses (MATH 140, MATH 141, ECON 102) with a C or better, and apply to the major within 40-70 cumulative credits. Only students who are enrolled in EMSC or DUS are eligible to apply to EBF.

Students must complete an approved minor, a concurrent major in any subject, a 15-credit semester-long education abroad program approved by the professor in charge of EBF, or a minor in Asian Studies with an approved summer education abroad experience. Approved minors include Arabic, Chinese, Civic and Community Engagement, Earth Systems, Energy Engineering, Entrepreneurship and Innovation, Environmental Resource Management, Environmental Systems Engineering, Geographic Information Science, Geosciences, Mathematics, Meteorology, Mining Engineering, Petroleum and Natural Gas Engineering, Russian, Spanish, Statistics, Watersheds and Water Resources, or a relevant minor selected in consultation with the professor in charge of EBF.

Courses required for the major may be offered fall semester only, spring semester only, or both fall and spring semesters. Consult with your adviser and department to discuss your academic progress and course sequencing.

General Option with Semester Study Abroad at University Park Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

<table>
<thead>
<tr>
<th>First Year</th>
<th>Credits</th>
<th>Fall</th>
<th></th>
<th>Credits</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 140 or 140G (GQ)†#†</td>
<td>4</td>
<td>MATH 141 or 141G (GQ)†#†</td>
<td>4</td>
<td>ENCON 102 (GS)†#†</td>
<td>3 ENGL 15, 30, or ESL 15 (GWS)†</td>
</tr>
<tr>
<td>EMSC 100S, CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS)††</td>
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Second Year

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Third Year

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<td>EBF 304 (Writing across the curriculum)*</td>
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Fourth Year

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Total Credits 120-122

* Course requires a grade of C or better for the major
† Course requires a grade of C or better for General Education
# Course is an Entrance to Major requirement
‡ Course satisfies General Education and degree requirement

University Requirements and General Education Notes:

US and IL are abbreviations used to designate courses that satisfy University Requirements (United States and International Cultures).

W, M, X, and Y are the suffixes at the end of a course number used to designate courses that satisfy University Writing Across the Curriculum requirement.

GWS, GO, GHW, GN, GA, GH, and GS are abbreviations used to identify General Education program courses. General Education includes Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH, GS, and Integrative Studies). Foundations courses (GWS and GQ) require a grade of ‘C’ or better.

Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138 in the spring semester. These courses carry the GWS designation and replace both ENGL 30 and CAS 100. Each course is 3 credits.

1. Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

2. Select 6-7 credits from: CHEM 110 GN(3), EARTH 100 GN(3), EARTH 101 GN;US(3), EARTH 103 GN(3), EARTH 111 GN;US(3), EARTH 150 GN(3), EGEI 101 GN(3), EGEI 102 GN(3), EGEI 120 GS;US;IL(3), GEOG 110 GN(3), GEOG 115 GN(3), GEOSC 2 GN(3), GEOSC 10 GN(3), GEOSC 20 GN(3), GEOSC 21 GN(3), GEOSC 40 GN(3), MATSE 81 GN;IL(3), METEO 3 GN(3), METEO 101 GN(3), PHYS 211 GN(4) or PHYS 250 GN(4). Most courses can also count toward the General Education Knowledge Domain Natural Science (GN) requirement. If a GN course is not selected for this requirement, students will need to add a GN to their plan. Some selections may have additional prerequisites.


4. Students can study abroad in any semester. Selection of specific courses depends on the study abroad program; at least 12 credits of EBF courses, supporting course, or introductory/advanced electives must be taken while abroad. Some courses may satisfy other requirements, such as general education. Students must work closely with their adviser to plan for their study abroad semester, and refer to the “EBF Study Abroad Guide for students in the General Option” linked at the bottom of the following web site: http://www.eme.psu.edu/ebf.

Advising Notes:

Entrance to Major requirements: To enter EBF, students must have a cumulative GPA of 2.8 or higher, complete the entrance to major courses (MATH 140, MATH 141, ECON 102) with a C or better, and apply to the major within 40-70 cumulative credits. Only students who are enrolled in EMSC or DUS are eligible to apply to EBF.

Students must complete an approved minor, a concurrent major in any subject, a 15-credit semester-long education abroad program approved by the professor in charge of EBF, or a minor in Asian Studies with an approved summer education abroad experience.

Courses required for the major may be offered fall semester only, spring semester only, or both fall and spring semesters. Consult with your adviser and department to discuss your academic progress and course sequencing.

Energy Land Management Option at University Park Campus

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes...
in policies, procedures, educational offerings, and requirements at any
time. This plan should be used in conjunction with your degree audit
(accessible in LionPATH as either an Academic Requirements or What If
report). Please consult with a Penn State academic adviser on a regular
basis to develop and refine an academic plan that is appropriate for you.

| First Year | 
| --- | --- |
| **Fall** | **Credits** | **Spring** | **Credits** |
| MATH 140 or 140G (GQ) | 4 | MATH 141 or 141G (GQ) | 4 |
| ECON 102 (GS) | 3 | ENGL 15, 30, or ESL 15 (GWS) | 3 |
| EMSC 100S, CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS) | 3 | EBF 200* | 3 |
| GEOG 160† | 3 | PHYS 250 or 211 (GN)† | 4 |
| General Education Knowledge Domain | 3 | General Education | 3 |
| **Total Credits** | 16 | **Total Credits** | 17 |

| Second Year | 
| --- | --- |
| **Fall** | **Credits** | **Spring** | **Credits** |
| ECON 104 (GS)* | 3 | ACCTG 211 | 4 |
| ECON 302‡ | 3 | STAT 301, 401, or EBF 472* | 3 |
| EBF 301* | 3 | CMPSC 101, 200, 201, or 202 | 3 |
| GEOG 1 (Can count as General Education GN course by petition)* | 3 | GEOG 363 | 3 |
| General Education Knowledge Domain | 3 | EME 460* | 3 |
| **Total Credits** | 15 | **Total Credits** | 16 |

| Third Year | 
| --- | --- |
| **Fall** | **Credits** | **Spring** | **Credits** |
| RM 302* | 3 | EBF 304 (Writing across the curriculum)* | 3 |
| EBF 484 or 483* | 3 | EBF 402 | 3 |
| IB 303 (IL) | 3 | PNG 405, 301, or EBF 410 | 3 |
| GEOG 361, 362, 364, or 463* | 3 | General Education Knowledge Domain | 3 |
| BLAW 243, ERM 411, or BA 243 | 3 | Elective | 2 |
| **Total Credits** | 15-16 | **Total Credits** | 14 |

| Fourth Year | 
| --- | --- |
| **Fall** | **Credits** | **Spring** | **Credits** |
| EBF 473 | 3 | ENGL 202C or 202D (GWS)†† | 3 |
| EBF 401* | 3 | GEOSC 454 or EBF 411 | 3 |
| General Education Knowledge Domain | 3 | Elective | 3 |
| Elective | 3 | Elective | 3 |
| General Education Health and Wellness (GHW) | 1.5 | General Education Health and Wellness (GHW) | 1.5 |
| **Total Credits** | 13.5 | **Total Credits** | 13.5 |

Total Credits 120-121

* Course requires a grade of C or better for the major
† Course requires a grade of C or better for General Education
‡ Course satisfies General Education and degree requirement

University Requirements and General Education Notes:
US and IL are abbreviations used to designate courses that satisfy
University Requirements (United States and International Cultures). W, M, X, and Y are the suffixes at the end of a course number used to
designate courses that satisfy University Writing Across the Curriculum
requirement.

GWS, GQ, GHW, GN, GA, GH, and GS are abbreviations used to identify
General Education program courses. General Education includes
Foundations (GWS and GQ) and Knowledge Domains (GHW, GN, GA, GH,
GS, and Integrative Studies). Foundations courses (GWS and GQ) require
a grade of ‘C’ or better.

Integrative Studies courses are required for the General Education
program. N is the suffix at the end of a course number used to designate
an Inter-Domain course and Z is the suffix at the end of a course number
used to designate a Linked course.

All incoming Schreyer Honors College first-year students at University
Park will take ENGL/CAS 137 in the fall semester and ENGL/CAS 138
in the spring semester. These courses carry the GWS designation and
replace both ENGL 30 and CAS 100. Each course is 3 credits.

1 Students who begin their studies at non-UP locations and/or join
the college after their first year should substitute CAS 100, CAS
100A, CAS 100B, or CAS 100C (GWS) for EMSC 100S (GWS). EMSC
100S Earth and Mineral Sciences First year Seminar (3) is a required
course only for students who begin their studies at UP in the College
of Earth and Mineral Sciences.

Advising Notes:
Entrance to Major requirements: To enter EBF, students must have a
cumulative GPA of 2.8 or higher, complete the entrance to major courses
(MATH 140, MATH 141, ECON 102) with a C or better, and apply to the
major within 40-70 cumulative credits. Only students who are enrolled in
EMSC or DUS are eligible to apply to EBF.

Courses required for the major may be offered fall semester only, spring
semester only, or both fall and spring semesters. Consult with your
adviser and department to discuss your academic progress and course
sequencing.

General Option with Minor at Commonwealth Campuses
The course series listed below provides only one of the many possible
ways to move through this curriculum. The University may make changes
in policies, procedures, educational offerings, and requirements at any
time. This plan should be used in conjunction with your degree audit
(accessible in LionPATH as either an Academic Requirements or What If
report). Please consult with a Penn State academic adviser on a regular
basis to develop and refine an academic plan that is appropriate for you.

<p>| First Year |
| --- | --- |
| <strong>Fall</strong> | <strong>Credits</strong> | <strong>Spring</strong> | <strong>Credits</strong> |
| MATH 140 (GQ)†† | 4 | MATH 141 (GQ)†† | 4 |
| ECON 102 (GS)†† | 3 | EBF 200 (online)* | 3 |
| ENGL 15, 30, or ESL 15 (GWS)†† | 3 | CAS 100, 100A, 100B, or 100C (GWS)†† | 3 |</p>
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<th>Minor/Concurrent Major Course</th>
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* Course requires a grade of C or better for the major
†‡ Course requires a grade of C or better for General Education
‡ Course requires a grade of C or better for the minor
# Course is an Entrance to Major requirement
† Course satisfies General Education and degree requirement

**Advising Notes:**

- **Entrance to Major requirements:** To enter EBF, students must have a cumulative GPA of 2.8 or higher, complete the entrance to major courses (MATH 140, MATH 141, ECON 102) with a C or better, and apply to the major within 40-70 cumulative credits. Only students who are enrolled in EMSC or DUS are eligible to apply to EBF.

- **Students must complete an approved minor, a concurrent major in any subject, a 15-credit semester-long education abroad program approved by the professor in charge of EBF, or a minor in Asian Studies with an approved summer education abroad experience. Approved minors include Arabic, Chinese, Civic and Community Engagement, Earth Systems, Energy Engineering, Entrepreneurship and Innovation, Environmental Resource Management, Environmental Systems Engineering, Geographic Information Science, Geosciences, Mathematics, Meteorology, Mining Engineering, Petroleum and Natural Gas Engineering, Russian, Spanish, Statistics, Watersheds and Water Resources, or a relevant minor selected in consultation with the professor in charge of EBF.**

- Students must complete an approved minor, a concurrent major in any subject, a 15-credit semester-long education abroad program approved by the professor in charge of EBF, or a minor in Asian Studies with an approved summer education abroad experience. Approved minors include Arabic, Chinese, Civic and Community Engagement, Earth Systems, Energy Engineering, Entrepreneurship and Innovation, Environmental Resource Management, Environmental Systems Engineering, Geographic Information Science, Geosciences, Mathematics, Meteorology, Mining Engineering, Petroleum and Natural Gas Engineering, Russian, Spanish, Statistics, Watersheds and Water Resources, or a relevant minor selected in consultation with the professor in charge of EBF.
Courses required for the major may be offered fall semester only, spring semester only, or both fall and spring semesters. Consult with your adviser and department to discuss your academic progress and course sequencing.

**General Option with Semester Study Abroad at Commonwealth Campuses**

The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

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### Second Year

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### Third Year

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### Fourth Year

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<td>EBF 473</td>
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<th>1.5 General Education Health and Wellness (GHW)</th>
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</table>

* Course requires a grade of C or better for the major

† Course requires a grade of C or better for General Education

# Course is an Entrance to Major requirement

‡ Course satisfies General Education and degree requirement

**University Requirements and General Education Notes:**

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Integrative Studies courses are required for the General Education program. N is the suffix at the end of a course number used to designate an Inter-Domain course and Z is the suffix at the end of a course number used to designate a Linked course.

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1 Students who begin their studies at non-UP locations and/or join the college after their first year should substitute CAS 100, CAS 100A, CAS 100B, or CAS 100C (GWS) for EMSC 100S (GWS). EMSC 100S Earth and Mineral Sciences First year Seminar (3) is a required course only for students who begin their studies at UP in the College of Earth and Mineral Sciences.

2 Select 6-7 credits from: CHEM 110 GN(3), EARTH 100 GN(3), EARTH 101 GN;US(3), EARTH 103 GN(3), EARTH 111 GN;US(3), EARTH 150 GN(3), EEE 101 GN(3), EEE 102 GN(3), EEE 120 GS;US;IL(3), GEG 110 GN(3), GEG 115 GN(3), GEOC 2 GN(3), GEOC 10 GN(3), GEOC 20 GN(3), GEOC 201 GN(3), GEOC 40 GN(3), MATSE 81 GN;IL(3), METEO 03 GN(3), METEO 101 GN(3), PHYS 211 GN(4) or PHYS 250 GN(4). Most courses can also count toward the General Education Knowledge Domain Natural Science (GN) requirement. If a GN course is not selected for this requirement, students will need to add a GN to their plan. Some selections may have additional prerequisites.

3 Select 3 credits from: CED 404(3), CED 429(3), CED 431(3), EBF 411(3), EBF 483(3)[if not selected for requirement above], ECON 490(3), EME 301(3), GEOG 424 US;IL(3), GEOG 430(3), GEOG 431(3), GEOG 444(3), GEOG 493(3), GEOC 402 IL(3), GEOC 454(3), METEO 473(3), PL SC 490(3)
Students can study abroad in any semester. Selection of specific courses depends on the study abroad program; at least 12 credits of EBF courses, supporting course, or introductory/advanced electives must be taken while abroad. Some courses may satisfy other requirements, such as general education. Students should work closely with their adviser to plan for their study abroad semester, and refer to the "EBF Study Abroad Guide for students in the General Option" linked at the bottom of the following web site: http://www.eme.psu.edu/ebf.

Advising Notes:
Entrance to Major requirements: To enter EBF, students must have a cumulative GPA of 2.8 or higher, complete the entrance to major courses (MATH 140, MATH 141, ECON 102) with a C or better, and apply to the major within 40-70 cumulative credits. Only students who are enrolled in EMSC or DUS are eligible to apply to EBF.

Students must complete an approved minor, a concurrent major in any subject, a 15-credit semester-long education abroad program approved by the professor in charge of EBF; or a minor in Asian Studies with an approved summer education abroad experience. Approved minors include Arabic, Chinese, Civic and Community Engagement, Earth Systems, Energy Engineering, Entrepreneurship and Innovation, Environmental Resource Management, Environmental Systems Engineering, Geographic Information Science, Geosciences, Mathematics, Meteorology, Mining Engineering, Petroleum and Natural Gas Engineering, Russian, Spanish, Statistics, Watersheds and Water Resources, or a relevant minor selected in consultation with the professor in charge of EBF.

Courses required for the major may be offered fall semester only, spring semester only, or both fall and spring semesters. Consult with your adviser and department to discuss your academic progress and course sequencing.

Energy Land Management Option at Commonwealth Campuses
The course series listed below provides only one of the many possible ways to move through this curriculum. The University may make changes in policies, procedures, educational offerings, and requirements at any time. This plan should be used in conjunction with your degree audit (accessible in LionPATH as either an Academic Requirements or What If report). Please consult with a Penn State academic adviser on a regular basis to develop and refine an academic plan that is appropriate for you.

### First Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 140 (GQ)†‡</td>
<td>4</td>
<td>MATH 141 (GQ)†‡</td>
<td>4</td>
</tr>
<tr>
<td>ECON 102 (GS)†</td>
<td>3</td>
<td>CAS 100, 100A, 100B, or 100C (GWS)††</td>
<td>3</td>
</tr>
<tr>
<td>ENGL 15, 30, or ESL 15 (GWS)††</td>
<td>3</td>
<td>PHYS 250 or 211 (GN)††</td>
<td>4</td>
</tr>
<tr>
<td>GEOG 160 (GS; inquire about online through Digital Learning Cooperative)†</td>
<td>3</td>
<td>EBF 200 (online)†</td>
<td>3</td>
</tr>
<tr>
<td>General Education Knowledge Domain</td>
<td>3</td>
<td>General Education Knowledge Domain</td>
<td>3</td>
</tr>
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</table>

**Total Credits 16**

### Second Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON 104 (GS)†</td>
<td>3</td>
<td>ACCTG 211</td>
<td>4</td>
</tr>
<tr>
<td>EBF 301 (online)†</td>
<td>3</td>
<td>ENGL 202C or 202D (GWS)††</td>
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<tr>
<td>General Education Knowledge Domain</td>
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<td>BA 243</td>
<td>3-4</td>
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</table>

**Total Credits 17**

### Third Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>RM 302†</td>
<td>3</td>
<td>EBF 304 (Writing across the curriculum)†</td>
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<tr>
<td>IB 303 (IL)</td>
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<td>EBF 402</td>
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<tr>
<td>EME 460†</td>
<td>3</td>
<td>EBF 484 or 483†</td>
<td>3</td>
</tr>
<tr>
<td>STAT 301, 401, or EBF 472†</td>
<td>3</td>
<td>GEOG 363</td>
<td>3</td>
</tr>
<tr>
<td>GEOSC 1 (can count as General Education GN course by petition)†</td>
<td>3</td>
<td>PNG 405, EBF 410, or PNG 301</td>
<td>3</td>
</tr>
</tbody>
</table>

**Total Credits 15**

### Fourth Year

<table>
<thead>
<tr>
<th>Fall</th>
<th>Credits</th>
<th>Spring</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EBF 401†</td>
<td>3</td>
<td>GEOSC 454 or EBF 411</td>
<td>3</td>
</tr>
<tr>
<td>EBF 473</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>GEOG 361, 362, 364, or 463†</td>
<td>3</td>
<td>Elective</td>
<td>3</td>
</tr>
<tr>
<td>General Education Knowledge Domain</td>
<td>3 Elective</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Elective</td>
<td>3</td>
<td>General Education Health and Wellness (GHW)</td>
<td>1.5</td>
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</table>

**Total Credits 15**

Total Credits 120-121

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Career Paths

Energy Business and Finance provides equally good preparation for a career or for further graduate study. EBF graduates pursue a wide variety of career options, most of which are in the energy or environmental sector. Many also pursue graduate study, especially when the EBF major is paired with a quantitative minor or concurrent major at Penn State.

Careers

There are hundreds of EBF alumni now working for oil and gas firms; electric utilities or power generation companies; consulting firms, banks, and insurance companies; or in the public and nonprofit sector. Common career roles for Energy Business and Finance majors include analyst positions, commodities trading and marketing, energy delivery scheduling, and project finance analysts. Energy Business and Finance students are also competitive for rotational programs with major energy firms.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES OF THE ENERGY BUSINESS AND FINANCE PROGRAM (http://www.eme.psu.edu/ebf/career)

Opportunities for Graduate Studies

Graduates from the Energy Business and Finance program are well positioned for professional graduate study in economics, business, finance, and law. Students with strong research interests should consider the M.S. or Ph.D. programs in Energy and Mineral Engineering or Energy, Environmental and Food Economics.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (http://www.eme.psu.edu/academics/graduate)

Professional Resources

- Penn State Energy Marketing Association (http://psema.org)
- Positive Energy (http://spepennstate.org/positive-energy)
- Energy Land Management Society (http://www.eme.psu.edu/academics/student-orgs)