Insider’s Guide to the EBF Option in Energy Land Management (ELM)

Andrew Kleit, ankl@psu.edu

Professor of Energy and Environmental Economics, Director, Penn State Energy Land Management Option

August 2015

Opened for students in August 2013, this option provides excellent employment opportunities. Sixteen EBF students had internships in the land industry in summer 2015. Students in this option take the required courses for all EBF students, as outlined in the Penn State Undergraduate Bulletin (See: http://www.bulletins.psu.edu/undergrad/programs/baccalaureate/E/EBF), with some exceptions. In particular, students in the ELM option are not required to take a minor; concurrent major; or term abroad program. Because the ELM option is accredited by the American Association of Professional Landmen, all courses must be approved by the option’s Industry Advisory Board. This means that for some requirements for the major there are fewer choices in the ELM option than in the General Option.

Since the ELM option was established, it has become clear how vital a role GIS plays in the land business in Appalachia. Thus, we require three GIS courses for the option. It is advised that you take as many GIS courses as you can (though you can’t substitute a GIS class for the other requirements). By taking three additional GIS courses, you can qualify for a GIS minor, which will be impressive to potential employers.

Classes are listed in the suggested order they should be taken for students starting this course of study during their freshman year. (See https://rap.psu.edu/node/1304 for a slightly different ordering.) New ELM classes for AY 2016-17 are discussed below the current ELM requirements.

Course Requirements:

GEOSC 001(3) Physical Geology. Earth processes and their effects on the materials, structure, and morphology of the earth's crust. Practicum includes field work, study of rocks, minerals, dynamic models, and topographic maps. (This course includes from one to several field trips for which an additional charge will be made to cover transportation.) This course contains several field trips for which an additional charge will be made to cover transportation.

C required, offered every semester. Take this class your freshman year, if possible.

PHYS 211 GN(4) General Physics: Mechanics Calculus-based study of the basic concepts of mechanics: motion, force, Newton's laws, energy, collisions, and rotation.

   Concurrent: MATH 140

or
PHYS 250 GN(4) **Introductory Physics I** (4) Selected topics in mechanics, heat, and sound.

Prerequisite: MATH 022, MATH 026; or MATH 040; or MATH 041 or satisfactory performance on the mathematics proficiency examination. (If you have gotten at least a C in MATH 140, you are fine.)

C required, offered every semester. You should take one of these classes your freshman year. Former engineering majors will likely have taken PHYS 211, but PHYS 250 is fine for the ELM option.

GEOG 160 GS(3) **Mapping Our Changing World** Fundamental concepts of GIS, cartography, remote sensing, and GPS in the context of environmental and social problems.

C required. Take this class your freshman year.

GEOG 363(3) (Sem: 5). **Geographic Information Systems**. Principles and use of geographic information; emphasis is on data acquisition and techniques for computer-aided analysis.

Prerequisite: GEOG 160

This is the basic GIS class.

Either

**GEOG 361 Cartography--Maps and Map Construction** (3) The art and science of creating small-scale maps as a medium for communication and research.

Prerequisite: GEOG 160 (but you’ll also want to take GEOG 363 first).

or

**GEOG 362 Image Analysis** (3) Introduction to the basic principles of remote sensing, and the analysis of aerial and satellite data.

Prerequisite: GEOG 160 (but you’ll also want to take GEOG 363 first).

or

**GEOG 364(3) Spatial Analysis** Geographic measurement, scaling, and classification; analysis of spatial pattern and structure; geographic covariation and autocorrelation.

Prerequisite: STAT 200 and 6 credits in social science (but you’ll want to take GEOG 363 and STAT 301/401/EBF 472 first, and not take STAT 200).

or
GEOG 463(3) **Geospatial Information Management** (3) This course examines geospatial data representations and algorithmic techniques that apply to spatially-organized data in digital form.

Prerequisite: GEOG 363

A C is required for each of these classes. (Sem: 6-7) In AY 16-17 ELM students will have another choice for an advanced elective, as described below.

E B F 410(3) **Petroleum and Natural Gas Operations**  The course is designed to instruct energy land management option students of the EBF major in the drilling of petroleum and natural gas wells and the challenges in that process.

Prerequisite: PHYS 211 or PHYS 250, GEOSC 001

Or

P N G 405(3) **Rock and Fluid Properties**  Reservoir rock properties, rock and fluid properties (interaction between rock and fluids), flow behavior in reservoir, and fluid properties.

Prerequisite: PHYS 211. Don’t take this class if you only took PHYS 250, take EBF 410.

PNG 405 is listed for students who are also majoring or minoring in Petroleum Engineering. Otherwise, you will want to take EBF 410. These courses are offered fall term only, so I suggest you take one of these courses Semester 7.

E B F 411(3) **Petroleum and Natural Gas Geology for Land Professionals**  This course provides energy land students with a knowledge base, as well as a set of notes and references, that they can draw on during a career in the petroleum industry.

Prerequisite: GEOSC 001

or

GEOSC 454(3) **Geology of Oil and Gas** (3) Properties, origin, migration, and occurrence of oil and gas. This course has one or more required field trips for which a fee is charged to the student.

Prerequisite: GEOSC 001

GEOSC 454 is listed for students who are also majoring or minoring in Petroleum Engineering or Geosciences. Otherwise, you will want to take EBF 411. These courses are offered spring term only, so you will want to take them Semester 8.
E B F 402(3) (Sem: 6 or 8) **Energy Law and Contracts.** An examination of the law that applies to acquiring the property rights for exploration and drilling of energy sources.

Prerequisite: **B LAW 243** (or whatever business law class you have taken)

This course is only offered spring term. If you plan to get an internship, this class can be extremely helpful. So you might want to take it during your sixth semester.

**Plans for New Courses**

We are planning for two new courses for AY 16-17, most likely in the fall term. The first, “Topics in the Energy Land Industry,” will be a writing class including issues such as negotiation, ethics, and the economics of energy land contracts. It can substitute for EBF 304W in the ELM curriculum.

The second class, “GIS for Energy Land Professionals,” will include several GIS projects designed by members of the ELM Industry Advisory Board. It can take the place of an advanced GIS elective in the ELM curriculum.