Department of Petroleum & Natural Gas Engineering, B.S.P.N.G.E.

Degree Offered

- Bachelor of Science in Petroleum and Natural Gas Engineering (B.S.P.N.G.E.)

Nature of the Program

Petroleum and Natural Gas Engineering is concerned with design and application aspects of the discovery, production, and transportation of oil and natural gas resources.

Professionals in this field must have a thorough understanding of the geological principles relating to the occurrence, discovery, and production of fluid hydrocarbons. The petroleum and natural gas engineer must know and be capable of applying both conventional engineering design principles as well as those pertaining specifically to the field of petroleum and natural gas engineering. These are developed in the petroleum and natural gas engineering courses in the curriculum. In addition, a strong foundation in mathematics and the sciences broadens the future engineer's professional capabilities. Because many engineers will be employed as supervisors or executives, managerial and social skills are also emphasized.

Students in PNGE enroll in rigorous individual courses in all basic areas of petroleum and natural gas engineering, basic science, mathematics, geology, and humanities and social sciences. The petroleum and natural gas engineering curriculum also contains significant laboratory components aimed at reinforcing the knowledge gained in the classroom. In the senior year, technical electives are offered in which the student may obtain additional depth of knowledge in specific areas of petroleum and natural gas engineering technology. Each student is individually mentored by a member of the petroleum and natural gas engineering faculty.

Students gain practical experience and first-hand knowledge of many aspects of petroleum and natural gas engineering through close proximity to the industry in West Virginia and surrounding states. Production sites, secondary and enhanced oil recovery projects, compressor stations, gas storage fields, and corporate offices all provide excellent opportunities for our students. Additional experience is provided through modern, well-equipped laboratories within the department and the University. Students are urged to gain field experience through summer employment in the industry.

Students are offered the opportunity to enter all phases of the petroleum and natural gas industry in meaningful and important jobs, continue their education towards advanced degrees, or in some cases pursue a combination of professional employment and continued education. The Bachelor of Science degree in Petroleum and Natural Gas Engineering is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org), http://www.abet.org, under the General Criteria and the Program Criteria for Petroleum Engineering.

Program Educational Objectives

- The graduates will be successful in their professional careers as petroleum engineers in the energy industry, government agencies, and/or post-graduate education.
- The graduates will continue to develop professionally and serve in leadership roles.
- The graduates will be successful in demonstrating their obligations to the profession, to their employer, and to society.

The foundation for achieving program objectives is established through a rigorous curriculum that provides the students with:

- An understanding of scientific and engineering principles and the application of these principles in solving petroleum and natural gas engineering problems using modern tools
- An integrated design experience leading to a capstone design course
- A balanced and rounded education to recognize the need for developing technical communication and teamwork skills, as well as understanding the engineer's professional, ethical, and societal obligations

FACULTY

CHAIR

- Samuel Ameri - M.S.Pet.E., P.E. (West Virginia University)
  Formation Evaluation

PROFESSORS

- Kashy Aminian - Ph.D. (University of Michigan)
  Graduate Coordinator. Natural Gas Engineering, Unconventional Reservoirs

- Shahab Mohaghegh - Ph.D. (Pennsylvania State University)
  Intelligent Systems, Shale Analytics

ASSOCIATE PROFESSOR

- H. Ilkin Bilgesu - Ph.D., P.E. (Pennsylvania State University)
  Drilling and Production Engineering
- Ebrahim Fathi - Ph.D. (University of Oklahoma)
  Phase Behavior

ADJUNCT PROFESSORS

- Alan Brannon - Ph.D. (West Virginia University)
  Petroleum Engineering Fundamentals
- Josh Dalton - MSPNGE (West Virginia University)
  Drilling and Completion
- Pramod Thakur - Ph.D. (Pennsylvania State University)
  Coalbed Methane

Click here to view the Suggested Plan of Study (p. 5)

Curriculum in Petroleum and Natural Gas Engineering

General Education Foundations

Please use this link to view a list of courses that meet each GEF requirement. (http://registrar.wvu.edu/gef/)

NOTE: Some major requirements will fulfill specific GEF requirements. Please see the curriculum requirements listed below for details on which GEFs you will need to select.

Code	Title	Hours
General Education Foundations		
F1 - Composition & Rhetoric		3-6
ENGL 101 & ENGL 102 or ENGL 103	Introduction to Composition and Rhetoric and Composition, Rhetoric, and Research Accelerated Academic Writing	
F2A/F2B - Science & Technology		4-6
F3 - Math & Quantitative Reasoning		3-4
F4 - Society & Connections		3
F5 - Human Inquiry & the Past		3
F6 - The Arts & Creativity		3
F7 - Global Studies & Diversity		3
F8 - Focus (may be satisfied by completion of a minor, double major, or dual degree)		9
Total Hours		**31-37**

Please note that not all of the GEF courses are offered at all campuses. Students should consult with their advisor or academic department regarding the GEF course offerings available at their campus.

Degree Requirements

Students must meet the following criteria to qualify for a Bachelor of Science in Petroleum and Natural Gas Engineering degree:

- Complete a minimum of 128 credit hours
- Satisfy WVU's undergraduate degree requirements
- Satisfy Statler College's undergraduate degree requirements
- Complete all courses listed in the curriculum requirements with the required minimum grades
- Attain an overall grade point average of 2.00 or better
- Attain a WVU grade point average of 2.00 or better
- Attain a Statler grade point average of 2.00 or better
- A maximum of one math or science courses with a grade of D+, D, or D- may apply towards a Statler College degree

- Complete a survey regarding their academic and professional experiences at WVU, as well as post-graduation job placement or continuing education plans.

The Statler GPA is computed based on all work taken at WVU with a subject code within Statler College (AI, BIOM, BMEG, CE, CHE, CPE, CS, CSEE, CYBE, EE, EMGT, ENGR, ENVE, ETEC, IENG, MAE, MINE, MPGE, MSEN, PDA, PNGE, ROBE, SAFM, SENG) excluding ENGR 140, ENGR 150, and CS 101. The WVU GPA is computed based on all work taken at WVU. The Overall GPA is computed based on all work taken at WVU and transfer work.

Curriculum Requirements

Code	Title	Hours
University Requirements		16
Fundamentals of Engineering Requirements		5
Math and Science Requirements		37
Petroleum & Natural Gas Engineering Program Requirements		70
Total Hours		**128**

University Requirements

Code	Title	Hours
General Education Foundations (GEF) 1, 2, 3, 4, 5, 6, 7, and 8 (31-37 Credits)		
Outstanding GEF Requirements 1, 5, 6, and 7		15
ENGR 191	First-Year Seminar	1
Total Hours		**16**

Fundamentals of Engineering Requirements

Code	Title	Hours
A minimum grade of C- is required in all Fundamentals of Engineering courses.		
ENGR 101	Engineering Problem Solving 1	2
Engineering Problem Solving (Select one of the following):		3
CHE 102	Introduction to Chemical Engineering	
ENGR 102	Engineering Problem Solving 2	
MAE 102	Introduction to Mechanical and Aerospace Engineering Design	
Total Hours		**5**

Math and Science Requirements

Code	Title	Hours
A minimum grade of C- is required in all Math and Science courses.		
CHEM 115 & 115L	Fundamentals of Chemistry 1 and Fundamentals of Chemistry 1 Laboratory (GEF 2B)	4
MATH 155	Calculus 1 (GEF 3)	4
MATH 156	Calculus 2 (GEF 8)	4
MATH 251	Multivariable Calculus	4
MATH 261	Elementary Differential Equations	4
PHYS 111 & 111L	General Physics 1 and General Physics 1 Laboratory (GEF 8)	4
PHYS 112 & 112L	General Physics 2 and General Physics 2 Laboratory	4
STAT 215	Introduction to Probability and Statistics	3
or IENG 213	Engineering Statistics	
SUST 101	Sustainable Earth	3
GEOL 373	Introduction to Petroleum Geology	3
Total Hours		**37**

Petroleum & Natural Gas Engineering Program Requirements

Code	Title	Hours
A minimum grade of C- is required in all PNGE courses.		
ECON 201	Principles of Microeconomics (GEF 4)	3
ECON 202	Principles of Macroeconomics	3
EE 221	Introduction to Electrical Engineering	3
MAE 241	Statics	3
MAE 243	Mechanics of Materials	3
MAE 320	Thermodynamics	3
MAE 331	Fluid Mechanics	3
PNGE 200	Introduction to Petroleum Engineering	3
PNGE 310	Drilling Engineering	3
PNGE 312L	Drilling Fluids Laboratory	1
PNGE 332	Petroleum Properties and Phase Behavior	3
PNGE 333	Basic Reservoir Engineering	3
PNGE 400	Petroleum Engineering Ethics	1
PNGE 420	Production Engineering	3
PNGE 432L	Petroleum Reservoir Engineering Laboratory	1
PNGE 441	Oil and Gas Property Evaluation	3
PNGE 447	Introduction to Carbon Capture and Storage	3
PNGE 450	Formation Evaluation	3
PNGE 460	Well Stimulation Design	3
PNGE 470 & 470L	Natural Gas Engineering and Natural Gas Engineering Laboratory	4
PNGE 472	Shale Analytics	3
PNGE 480	Petroleum Engineering Design	3
Professional Elective (Select two of the following):		6
PNGE 415 & 415L	Well Control and Well Control Laboratory	
PNGE 434	Applied Reservoir Engineering	
PNGE 439	Introduction to Reservoir Simulation	
PNGE 463	Horizontal Drilling	
PNGE 471	Natural Gas Production and Storage	
PNGE 493	Special Topics	
Cultural/Sustainability Elective		3
AGEE 220	Group Organization and Leadership	
ARE 187	Energy Resource Economics	
ARE 220	Introductory Environmental and Resource Economics	
DSGN 140	Sustainable Living	
ENGL 226	Non-Western World Literature	
ESWS 155	Elements of Environmental Protection	
PHIL 170	Introduction to Critical Reasoning	
PHIL 346	History of Ethics	
PLSC 140	Sustainable Living	
SOC 207	Social Problems in Contemporary America	
SOC 235	Race and Ethnic Relations	
SOWK 147	Human Diversity	
WMAN 150	Principles of Conservation Ecology	
Total Hours		**70**

Suggested Plan of Study

It is important for students to take courses in the order specified as much as possible; all prerequisites and concurrent requirements must be observed. A typical B.S.P.N.G.E. degree program that completes degree requirements in four years is as follows.

First Year

Fall	Hours	Spring	Hours
MATH 155 (GEF 3)	4	MATH 156 (GEF 8)	4
ENGR 101	2	ENGR 102	3
ENGR 191	1	PHYS 111 & 111L (GEF 8)	4
CHEM 115 & 115L (GEF 2B)	4	SUST 101	3
ENGL 101 (GEF 1)	3	GEF 6	3
GEF 5	3		
	17		**17**

Second Year

Fall	Hours	Spring	Hours
PHYS 112 & 112L	4	MATH 261	4
MATH 251	4	MAE 243	3
MAE 241	3	MAE 331	3
ENGL 102 (GEF 1)	3	IENG 213 or STAT 215	3
ECON 201	3	PNGE 200	3
	17		**16**

Third Year

Fall	Hours	Spring	Hours
PNGE 332	3	PNGE 310	3
EE 221	3	PNGE 312L	1
MAE 320	3	PNGE 333	3
ECON 202	3	PNGE 432L	1
GEF 7	3	GEOL 373	3
		Cultural/Sustainability Elective	3
	15		**14**

Fourth Year

Fall	Hours	Spring	Hours
PNGE 420	3	PNGE 400	1
PNGE 441	3	PNGE 447	3
PNGE 450	3	PNGE 460	3
PNGE 470 & 470L	4	PNGE 472	3
Professional Elective	3	PNGE 480	3
		Professional Elective	3
	16		**16**

Total credit hours: 128

Major Learning Outcomes

PETROLEUM & NATURAL GAS ENGINEERING

Upon graduation, all Bachelors of Science students in Petroleum and Natural Gas Engineering will have:

a. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

b. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors

c. an ability to communicate effectively with a range of audiences

d. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts

e. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives

f. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions

g. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.