

Outcome 3. The graduates will have the ability to apply scientific and engineering fundamentals to formulate solutions to petroleum & natural gas engineering problems.

The assessment is performed with respect to the key abilities that the students are expected to acquire in specific courses that have been identified with respect to this outcome.

| Course | Key abilities | Performance indicators |
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| PNGE 333 | Evaluate oil and gas resources and reserves. | Use reservoir rock and fluid properties to perform volumetric and material balance studies. |
| PNGE 420 | Size oil and gas production equipment. | Apply scientific and engineering principles to determine requirements for various production equipment. |
| PNGE 441 | Forecasting well performance. | Perform reserve estimation and decline curve analysis |
| PNGE 450 | Make decision relative to well completion. | Perform well log interpretations to determine formation characteristics and make decision relative to well completion. |
| PNGE 470 | Size the natural gas production equipment and production system. | Apply fluid mechanics and thermodynamic principles to determine pressures, flow rates, and power requirements for various natural gas production equipment. |

Tools used: Course-embedded assessment, Program-level composite assessment scores, Graduating student survey

Note: The faculty/instructors in all PNGE courses evaluate the student performance relative to the “Performance Indicators” based on different assignments such as homework, exams, projects, reports, etc. The score for each student outcome is then determined by the instructor according to the combination of the different assignments.

Data Collection: The data are collected every semester based on the course offerings.

Frequency of data collection: This outcome is subject to review every year based on performance criteria and metrics. The analyzed data are presented to faculty and specific action items are developed, if necessary, to revise the content of the courses.

Data Analysis: The data obtained are analyzed every year.

Closing the loop: This outcome is subject to review every year based on performance criteria and metrics. The analyzed data are presented to faculty and specific action items are developed, if necessary, to revise the content of the courses.

Performance criteria:

- a) The students must demonstrate the ability to identify problems and methodology to solve petroleum engineering problems as related to the key abilities in specific courses.
- b) The students must demonstrate the ability to apply the scientific and engineering principles to solve petroleum engineering problems by the time of graduation.

Metrics:

- a) An overall score of 75% based on the Program-level composite assessment score and the Graduating student survey results.

Assessment Tool:

Program-level composite assessment scores

Assessment Tool:

Graduating student survey

SENIOR EXIT SURVEY

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| Graduation Date | |
| Degree | |
| Minor | |
| Date you began your education at WVU | |
| Previous University(s) if transfer student | |
| Plans after graduation: | Accepted position with Starting Salary |
| | Attending graduate school (MS or Ph.D.) Field of study |
| | Seeking employment Primary area of interest |
| Do you plan to become a registered professional engineer? (Y or N) | |
| When did you take the FE Exam? (Y or N) | |
| Do you plan to pursue an advanced degree someday? (Y or N) | |
| If yes, in what discipline? | |
| Are you a member of the SPE? (Y or N) | |
| PART I | Assessment of student outcomes |
| | A graduate of any ABET accredited engineering program must be able to |
| 1a | apply knowledge of mathematics, science and engineering |
| 1b | design and conduct experiments, analyze and interpret data |
| 1c | design a system, component or process to meet needs |
| 1d | function on a multi-disciplinary team |
| 1e | identify, formulate and solve engineering problems |
| 1f | understand professional and ethical responsibility |
| 1g | communicate effectively |
| 1h | know the impact of engineering in a global/societal context |
| 1i | recognize the need for, and engage in life-long learning |
| 1j | know about contemporary issues |
| 1k | use techniques, skills and modern tools in engineering |
| 2l | mathematics through differential equations |
| 2m | probability and statistics |

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| 2n | fluid mechanics |
| 2o | strength of materials |
| 2p | thermodynamics |
| 2q | design and analysis of well systems |
| 2r | procedures for drilling and completing wells |
| 2s | characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods |
| 2t | design and analysis of systems for producing, injecting and handling fluids |
| 2u | application of reservoir engineering principles and practices for optimizing resource development and management |
| 2v | design and decision making under conditions of risk and uncertainty |
| PART II | Assessment of elements related to the educational environment |
| | Please rate the following components of the educational environment at WVU |
| 1 | availability, quality, and quantity of computing facilities in the department |
| 2 | availability, quality, and quantity of computing facilities at the college |
| 3 | quality of classrooms |
| 4 | quality of chemistry laboratories |
| 5 | quality of the physics laboratories |
| 6 | quality of the PVT laboratory |
| 7 | quality of reservoir engineering laboratory |
| 8 | quality of the drilling fluids laboratory |
| 9 | quality of the natural gas laboratory |
| 10 | quality of the library facilities |
| 11 | quality of the PNGE library collection |
| 12 | quality of the academic advising you received |
| 13 | quality of the pre-registration process |
| 14 | quality of the registration process |
| 15 | quality of the career advising and placement services |
| 16 | quality of career advising you received from the Department |

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| 17 | support received from the PNGE faculty |
| 18 | accessibility of the PNGE faculty |
| 19 | competency of the PNGE faculty |
| 20 | support received from the Chair of the PNGE Dept. |
| 21 | accessibility of the Chair of the PNGE Dept. |
| 22 | quality of service provided by the Dept. secretary |
| 23 | quality of freshman year experience |
| 24 | quality of GEC electives |
| 25 | quality of the mathematics courses |
| 26 | quality of the chemistry courses |
| 27 | quality of the geology courses |
| 28 | quality of the engineering (excluding PNGE) courses |
| 29 | quality of physics courses |
| PART III | Assessment of educational outcomes related to the Petroleum & Natural Gas |
| | Please rate the followings |
| 1 | The PNGE program provided me with a fundamental knowledge of petroleum engineering in the areas of drilling, production and reservoir engineering. |
| 2 | The PNGE program provides students with opportunities throughout the curriculum to develop, written and oral communication skills as well as computational skills as they relate to both technical and non-technical material. |
| 3 | The PNGE program provided me with an integrated design experience beginning with exposure and exercises in freshman-level courses leading to a senior design experience. |
| 4 | The senior design course provided a culminating experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economics, environmental,.. |
| 5 | The PNGE program provided me with a recognition and understanding of the professional and societal responsibilities associated with being a petroleum engineer. |

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| 6 | The PNGE program provided me with an environment in which I could address global and multi-cultural issues, investigate models and social behavior and leadership, sharpen my aesthetic sense and embrace my own social and personal development |
| 7 | My education at West Virginia University adequately prepared me to function on multi-disciplinary teams. |
| 8 | My education has adequately prepared me for my profession |
| Is there anything else you would like to say about your education at West Virginia University? | |
| Is there anything else you would recommend that we can do to improve the PNGE program? | |