

**PNGE 470**  
**NATURAL GAS ENGINEERING**

**Catalog Description:**

*Natural gas properties, compression, transmission, processing, and application of reservoir engineering principles to predict the performance and design of gas, gas-condensate, and storage reservoirs. Includes a laboratory devoted to gas measurements*

**Pre-requisites:**

1. PNGE 333: Basic Reservoir Engineering
2. MAE 320: Thermodynamics

**Course Objectives:**

- To size the natural gas production equipments
- To predict the performance of the natural gas well and reservoir.
- To apply scientific and engineering concepts to collect and interpret data
- To effectively communicate the results of engineering analysis.
- To understand the need for considering the impact of engineering solution
- To understand the need for life-long learning.

**Semester:** Fall 2014

**Instructor:** Kashy Aminian, 345-F Mineral Resources Building  
293-3964, [Khaminian@mix.wvu.edu](mailto:Khaminian@mix.wvu.edu)

**Office Hours:** Monday- Wednesday-Friday 9:30-11:30 AM

**Schedule:** Lectures: Tuesday and Thursday 4:00-5:15 PM  
Laboratory: Monday and Wednesday 1:30-4:30 PM

**Location:** Lectures: 102 Engineering Science Building  
Laboratory: Room 133 Mineral Resources Building

**Textbook(s) and/or Other Required Material**

1. Gao and Ghalmbor, Natural Gas Engineering Handbook, Gulf Publishing, 2005
2. Supplemental Notes available on eCampus
3. Natural Gas Measurement Laboratory Manual available on eCampus

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**Lecture Schedule:**

Week 1:	<i>Properties of Natural Gas and Condensate</i>
Week 2:	<i>Thermodynamics of Natural Gas Systems</i>
Week 3:	<i>Natural Gas Compression</i>
Week 4:	<i>Natural Gas Gathering and Transmission</i>
Week 5:	<i>Natural Gas Flow in Wellbore</i>
Week 6:	<i>Natural Gas Flow in Reservoir</i>
Week 7:	<i>Gas Well Deliverability Testing</i>
Week 8:	<i>Gas Well Pressure Transient Testing</i>
Week 9:	<i>Estimation of Gas Reserves</i>
Week 10:	<i>Gas Reservoir Performance Predictions</i>
Week 11:	<i>Geopressured Gas Reservoirs</i>
Week 12:	<i>Water Drive Gas Reservoirs</i>
Week 13:	<i>Gas Condensate Reservoirs</i>
Week 14:	<i>Natural Gas Processing</i>

**Laboratory Projects**

1. *Dead-weight Tester*
2. *Bell Prover*
3. *Sonic Nozzle Prover*
4. *Low Pressure Prover*
5. *Orifice Meter*
6. *Transfer Prover*

**Grading**

- |   |            |
|---|------------|
| • <i>Quizzes&amp; Special Assignments</i> | <i>20%</i> |
| • <i>Homeworks</i>                        | <i>20%</i> |
| • <i>Laboratory</i>                       | <i>20%</i> |
| • <i>Exams</i>                            | <i>20%</i> |
| • <i>Project</i>                          | <i>20%</i> |

**Grading Scale: A: 86-100, B: 76-85, C: 66-75, D: 55-65**

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**Attendance Policy**

- *Class attendance is mandatory unless excused in advance or in the case of a documented legitimate emergency.*
- *Students who are absent from class for any reason are responsible for all missed work.*
- *Students who miss a quiz or an exam will not be permitted to make it up.*
- *Make-up exam will be given only when there is an excused absence.*

**Days of Special Concern:**

- *WVU recognizes the diversity of its students and the needs of those who wish to be absent from class to participate in Days of Special Concern, which are listed in the schedule of courses.*
- *Students should notify their instructors by the end of the second week of classes regarding Day of Special Concern observances that will affect their attendance.*
- *Reasonable accommodation will be made for missed Quizzes or Exams as a result of observing a Day of Special Concern.*

**Classroom Conduct:**

- *You are expected to conduct yourself in a professional manner while in this class.*
- *Be on time. Do not enter the classroom after the class has started.*
- *Attend to any personal needs (drink, restroom, phone calls, etc.) prior to class time.*
- *Do not return to class if you have to leave the class for any reason.*
- *While in the class, everyone is expected to remove their hats and sunglasses, put away the newspaper, refrain from eating and drinking, and turn off cell phones.*
- *Bring your notes, paper, and a calculator to class.*
- *Please do not force the instructor to remind you that you should behave in a professional manner.*

**Course Policies:**

- *Homeworks must be submitted at the beginning of the class on the due date.*
- *Homeworks submitted in the office, via email, or placed in the mail box are not accepted.*
- *Late homeworks will not be accepted.*
- *In case of an excused absence, the homework must be submitted prior to the due date.*

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**WVU Social Justice Statement**

*The West Virginia University is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion.*

*If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (304-293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see*

**WVU Academic Integrity Statement**

*The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code at <http://studentlife.wvu.edu/studentconductcode.html>.*

*Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.*

**Emergencies:**

*In the case of an emergency such as fire alarm, please evacuate the building and gather at least 100 yards away from the building. DO NOT return to the building until the emergency is over and it is cleared by the fire marshal or police.*