The University of Tulsa
Petroleum Engineering Department
Course Syllabus

Course General Information

Number	Title	Credit Hours	Required or Elective
PE 3033	Natural Gas Engineering	3	Elective

Catalog Description

Equations of state, Real gas pseudopressure, Single-phase flow equations, Drawdown and buildup tests, Semilog analysis and type curve matching, Non-Darcy flow, Special topics on well testing of unconventional gas reservoirs, Flow after flow deliverability testing, Isochronal and modified isochronal tests, Deliverability predictions, Gas condensate reservoir performance prediction, Pressure maintenance by gas cycling. Prerequisite: PE 3023.

Requisites

Number	Title	Type (Pre or Co)	Inherited Prerequisites
PE 3023	Reservoir Engineering	Prerequisite	PE 2112, PE 2123

Requisites by Topics

Rock and fluid properties, flow in porous media, reservoir geology.

Class/Lab Schedule

This course consists of 2.5-hour lecture each week. There is no lab associated with this course.

Textbook and other Required Material

i. Lee, W. J., Wattenbarger, R. A., *Gas Reservoir Engineering*,1996.

Auxiliary non-required References

1. Katz: D. L., *Natural Gas Engineering-Production and Storage*, McGraw-Hill Publishing Company, New York, 1990.
(the above book is out of print but specific references will be taught in class using the book).
2. Journal papers posted on shared space (S:\ENS\Petroleum Engineering\Mahadevan\PE3033).

Course Objectives

The objectives of this course are to:

- introduce the properties of natural gas and associated fluid systems such as condensate and its phase behavior.
- teach the theory of compressible flow through porous media and application to natural gas production.
- understand natural gas well testing principles.
- introduce engineering aspects and production from unconventional natural gas reservoirs such as tight gas, shale gas, coalbed methane and gas hydrates with the above learning background.

Main Topics Covered

Natural gas properties, phase behavior, compressible flow through porous media, well testing and in-flow performance, unconventional natural gas engineering.

Course Outcomes

The student will become knowledgeable in reservoir engineering and simulation aspects of natural gas production and storage; inflow performance analysis, well testing and decline curve analysis of conventional and unconventional reservoirs;

Contribution to Program Objectives

Program objectives are statements describing the career and professional accomplishments that the program is preparing graduates to achieve.

The relationship of this course with the specific program objectives is summarized in the following table:

	Objective	Course Contribution
1	To produce a petroleum engineer who has a basic and applied understanding in drilling and completions, production and reservoir engineering	√
2	to develop an understanding of the application of basic engineering science principles to petroleum engineering	√
4	To develop the ability necessary to use computer software for solving engineering problems	√

Relationship to ABET Program Outcomes (ABET a-k)

Program outcomes describe what students are expected to know or be able to do by the time of graduation from the Program. The following table summarizes the contribution of this course to the Program outcomes.

	Outcome	Course Relationship
a	Ability to apply knowledge of mathematics, science, and engineering	√
e	Ability to identify, formulate and solve engineering problems	√
h	The broad education necessary to understand the impact of engineering solution in a global and social context	√
j	Knowledge of contemporary issues	√
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	√

Contribution to Program Professional Component and to Design Component

The course will discuss the importance of natural gas to overall energy industry and discuss various methods of optimizing natural gas resource.

Person Responsible for Course Syllabus

This syllabus was prepared by Jagan Mahadevan

Information

Instructor: Jagan Mahadevan, Assistant Professor – Petroleum Engineering, L105 KEP
Class Hours: MW 3:30 – 4:45 p.m., U11, KEP
Office Hours: 10:00 am – 12:00 p.m. Monday / Wednesday
Grading: In class quizzes 5 %, Assignments 15 %, 2 tests 30 % each, Final project 20 %.

POLICY ON ACADEMIC MISCONDUCT

Any action by the instructor on a specific instance of alleged academic misconduct can be appealed by the student involved to the Review Board for Cases of Academic Misconduct if he/she so desires.

Any student detected cheating on an examination will receive a grade of zero on the examination for the first offense and a grade of F will be given for the course if there is a second offense. If another student is involved in the offense knowingly, he will receive the same penalty.

Any student detected copying homework, or allowing his or her homework to be copied, will receive a zero grade for that homework. Repeated offenses will result in an F grade in the course.

In the event that the instructor awards an F grade in the course because of academic misconduct, he will so notify the Review Board and will recommend to them that if the student has been involved in similar cases that the student be dismissed from the University.

POLICY ON ABSENCES

Although attendance is not required, it is clear that attendance is desirable because a good deal of the factual information conveyed (which may be covered in the exams) is passed on in class. Furthermore, class discussion of regularly assigned homework enhances a student's understanding. In case of a final grade that is borderline, attendance will be considered as a deciding factor.

Absence at examination time is excusable only in case of illness of the student or a similar emergency. A written doctor's statement is necessary in case of an illness that requires makeup of an exam. An unexcused absence from an exam will result in a zero grade on that exam.