
The University of Tulsa
Petroleum Engineering Department
Course Syllabus

Course General Information

| Number | Title | Credit Hours | Required or Elective |
|---------|--------------------------|--------------|----------------------|
| PE 3073 | Production Engineering I | 3 | Required |

Catalog Description

Inflow performance relationships, single and multiphase flow in pipes, components of production system, basic design of artificial lift systems and analysis and optimization of production systems. Prerequisites: ES3003, PE3023.

Requisites

| Number | Title | Type (Pre or Co) |
|---------|------------------------------|------------------|
| ES 3003 | Introductory Fluid Mechanics | Prerequisite |
| PE 3023 | Reservoir Engineering I | Prerequisite |

Pre-requisites by Topics

Basic principles of fluid mechanics including conservation laws of mass and momentum. Understanding of rock and fluid properties. Darcy's law. Reservoir drive mechanisms.

Class/Lab Schedule

This course consists of 2 weekly lectures of 1 hour and 15 minutes each. There is no lab associated with this course.

Textbook and References

No textbook is adopted for this course.

Class notes, hand-outs and technical papers will be distributed by the instructor

The following books can be used as reference literature:

Production Optimization – H. Dale Beggs, 2nd edition, OGC Publication, Tulsa 2003

The Technology of Artificial Lift Methods – Kermit Brown, PennWell Publishing Company

Course Objectives

The objective of this course is to provide the students with the basic and applied knowledge in production engineering. During the course the student can develop a solid understanding of the basic principles of single and multiphase flow through porous media, pipes and restrictions and apply these principles to production system design and optimization.

Main Topics Covered

Introduction to production system; Inflow performance relationship; Single phase flow in pipes; Multiphase flow in pipes; Flow through restrictions; Nodal analysis; Analysis and optimization of production systems; Artificial lift fundamentals.

Contribution to ABET Professional Program Criteria

ABET Professional Program Criteria are statements describing competencies that students must possess by the time of graduation. This course contributes to the following Program Specific Criteria.

| Program Specific Criteria | |
|---------------------------|---|
| a | Competency in mathematics through differential equations, probability and statistics, fluid mechanics, strength of materials, and thermodynamics. |
| d | Competency in design and analysis of systems for producing, injecting, and handling fluids |

Relationship to Program Outcomes

Program outcomes describe what students are expected to know or be able to do by the time of graduation from the Program. This course contributes to the following Program outcomes.

| | |
|---|---|
| a | Ability to apply knowledge of mathematics, science, and engineering. |
| c | Ability to design a system, component, or process to meet desired needs, e.g. a project on well placement to maximize oil recovery. |
| d | Ability to function on multi-disciplinary teams |
| e | Ability to identify, formulate, and solve engineering problems |
| k | Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. |
| l | Obtain basic knowledge of design principles in each area of petroleum engineering – drilling, production and reservoir and be aware of their interdependence. |

Contribution to Program Professional Component and to Design Component

The materials and projects of this course emphasize the understanding of basic sciences, mathematics and engineering principles and their application to design and optimization of production systems.

Person Responsible for Course Syllabus

This syllabus was prepared by Mauricio Prado on November 13, 2007.

Spring 2008 Information

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| <i>Instructor:</i> | Dr. Mauricio Prado, e-mail: mauricio-prado @utulsa.edu North Campus Building – Room 202 D Tel.: 631-5163 |
| <i>Class Hours:</i> | TTh 5:00 - 6:15PM at KEP - U5 |
| <i>Office Hours:</i> | TTh 4:00 - 4:55PM at KEP – L119 Other days by appointment at NCB – 202 D |
| <i>Grading:</i> | Consists of participation in lectures, quizzes and projects/exams. Final grades will be determined as follows: Quizzes will contribute with 45% of the final grade. These will be unannounced. They will cover basic concepts and will occur during the first 10 minutes of class. There will be no make-up quizzes. Exams/Projects will contribute with 45% of the final grade. Exams may be administered as an in-class, closed-book exam or as an individual or team project. Exams are comprehensive and will cover all material presented until the date of the exam. Make up exams will be given only to those students who notify the instructor in advance of the missed exam. Some projects will require the use computational methods for its solution. These projects can be properly solved using Excel spreadsheets and Macros. Projects may require a presentation in class. Project and presentation reports should follow a professional format. Informal reports or presentations will not be accepted. Dress code for presentations is left at student discretion. When required, Excel spreadsheets or equivalent computational codes or data should be included as an Appendix to project reports. Excel spreadsheets or equivalent computational listings will not be accepted as project reports. Participation in class is encouraged and is an important part of the student final evaluation. Participation in class will contribute with the remaining 10% of the final grade. Although home-works will not contribute to the final grade students are encourage to work individually in their solution. |

POLICY ON ACADEMIC MISCONDUCT

The policy in this class on academic misconduct will follow that stated in:

*Policies and Procedures Relating to Academic Misconduct
in the College of Engineering and Applied Sciences.*

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.