The University of Tulsa
Petroleum Engineering Department
Course Syllabus

Course General Information

Number	Title	Credit Hours	Required or Elective
PE4063	**Well Completion Design**	3	Required

Catalog Description

Well Completion Design

Casing program, casing and tubing design, principles of cementing, completion added skin, well perforating, hydraulic fracturing, sand control and acidizing.

Requisites

Number	Title	Type (Pre or Co)	Inherited Prerequisites
PE 3013	Computer Applications in Petroleum Engineering	Prerequisite	PE 2112, PE2123
PE 3023	Reservoir Eng I	Prerequisite	PE 2112, PE 2123
PE 3043	Drilling Eng I	Prerequisite	ES3003,ES3023, Math 3073

Requisites by Topics

Equilibrium of forces (free body diagram), stress – strain relationship, strength determination, shear stress – shear rate relationship, pressure loss calculations, basic rock and fluid properties, inflow equations (production rate vs. drawdown), computations with VBA.

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

A set of notes is developed for this class.

References

"Well Completion and Servicing" Denis Perrin, ISBN 2-7108-0765-3

"**Applied Drilling Engineering**," T.Bourgoyne et al.

SPE 1986, ISBN 1-55563-001-6 (strongly recommended)

"**Petroleum Well Construction**." Edited by M. Economides et al.

John Wiley and Sons, 1998, ISBN 0-471-96938-9.

"**Well Design - Drilling and Production**" , B.C. Craft et al.

Prentice-Hall, 1962, Catalog card number: GL-9949-95002-C.

"Oil Well Stimulation" R.S. Schechter, Prentice Hall,1992

ISBN 0 13 949934-2

Technical papers – SPE (on-line), ASME

Course Objectives

The objective of this course is to provide the student with good understanding of the concepts involved in a design of all essential elements of well completion system (casing, cementing, perforating, hydraulic fracturing sand control) with the emphasis on the practical application of engineering science (fluid and solid mechanics) principles.

Main Topics Covered

1. Well plan design (casing program design)
2. Types of well completions (open hole, perforated casing, etc.)
3. Casing string design: forces acting on casing string, strength evaluation, design on collapse, burst and tension.
4. Well cementing design (basic concepts, materials, and calculations).
5. Perforating, completion added skin.
6. Fracturing (fundamental concepts, fracture propagation, production performance upon fracturing).
7. Tubing design - tubing movement calculation.
8. Sand control and acidizing fundamentals.

Contribution to ABET Professional Program Criteria

ABET Program Specific Criteria are statements describing competencies that students must possess by the time of graduation. The following table summarizes the contribution of this course to the Program Specific Criteria.

Program Specific Criteria		Course Contribution
a	Competency in mathematics through differential equations, probability and statistics, fluid mechanics, strength of materials, and thermodynamics.	√
b	Competency in design and analysis of well systems and procedures for drilling and completing wells	√

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. 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	√
b	Ability to design and conduct experiments, as well as analyze and interpret data	
c	Ability to design a system, component, or process to meet desired needs	√
d	Ability to function on multi-disciplinary teams	
e	Ability to identify, formulate, and solve engineering problems	√
f	Understanding of professional and ethical responsibility	
g	Ability to communicate effectively	
h	Broad education necessary to understand the impact of engineering solutions in a global and societal context	
i	Recognition of the need for, and an ability to engage in life-long learning	
j	Knowledge of contemporary issues	
k	Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	
l	Obtain basic and in depth 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

This course essentially contributes to both the professional and design component of our undergraduate curriculum as it covers subjects that are common to practically all oil/gas producing wells. In particular the emphasis is placed on the design of well plan, casing and tubing strings. It requires practical application of engineering science principles for performing the required analysis, calculations and design. It forms the desired bridge between drilling, production and reservoir engineering.

Person Responsible for Course Syllabus

Prof. Stefan Miska ; August 13, 2007

Fall 2007 Information

Instructor: Dr. Stefan Miska Professor of Petroleum Engineering
Class Hours: T and Th 2.00 - 3:15 PM
Office Hours: T and Th 3:30 – 5:00 PM and any other time by appointment.

Grading:

Home Assignments - 20 pts. (Not all assignments will be graded)

Quizzes - 10 pts

MTE (Oct. 9th , Tuesday) - 30 pts.

Final Exam (comprehensive) - 40 pts. (as scheduled by TU)

A – 85 and above

B – 75 – 84

C – 60-74

D – 51-59

F – 50 and below

Policy on Home Assignments:

Each homework assignment **must include**: statement of problem (in your own words or as stated), solution, and conclusions. Computer usage (spreadsheets, programs etc) is strongly recommended. Neatness is very important and will be considered at the time of grading.

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NOTE: The class starts at 2:00PM.

Turn off your cell phones before entering the classroom.

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.

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.