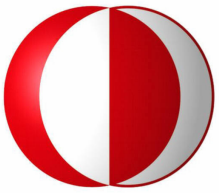


MIDDLE EAST TECHNICAL UNIVERSITY

DEPARTMENT OF PETROLEUM AND NATURAL GAS ENGINEERING

STUDENT BOOK

FOREWORD

We are pleased that you have chosen Middle East Technical University and the Department of Petroleum and Natural Gas Engineering. We have prepared this handbook to help you in your undergraduate study. It is also possible to reach the same and detailed information at the department's web page: **http://www.pete.metu.edu.tr/.**

In this handbook, you will find useful information about the aim of the department and the courses you will take during your study, including prerequisite, elective and compulsory courses. This information will help you to know which courses to be taken in each semester. Besides, there are information about summer practice, academic regulations and interactive registrations. In the last part of the handbook, you can find a brief explanation of Society of Petroleum Engineers (SPE) METU Student Section. By being a SPE member, you may gain information about petroleum and natural gas engineering and share experiences. If you have questions that are not answered in this handbook, you may contact your adviser for further information.

We hope that your METU life brings you success and happiness.

TABLE OF CONTENTS

A. MISSION OF THE DEPARTMENT:

The mission of the Petroleum and Natural Gas Engineering Department is to educate students for the practice of their profession in:

- **a.** Drilling engineering
- **b.** Production engineering
- **c.** Reservoir engineering

for producing underground fluid resources, for the advancement of knowledge and technology and for finding solutions to the national, international, social and environmental issues related to petroleum industry.

B. OBJECTIVES OF THE DEPARTMENT:

The objectives of the Petroleum and Natural Gas Engineering Department are:

1) Teaching how to learn, identify, formulate problems, propose alternate solutions and solve problems in petroleum engineering practice.
2) Providing benefits such as efficient communication, team work, and sharing knowledge.
3) Developing design capabilities and decision-making abilities of students.
4) Providing a basic science and engineering knowledge, including basics on mathematics, physics, chemistry and computer science and encouraging them to learn a second foreign language besides English.
5) Educating students, who are sensitive to ethics of engineering, aware of the issues relevant to society and their career, environmental issues, health and safety.

C. UNDERGRADUATE CURRICULUM

In the first two year period of the undergraduate study, fundamental engineering courses are taken. In the following two years, courses related with petroleum and natural gas engineering are mostly thought.

The details of the courses can be found at the university catalogue at the following address: **https://catalog.metu.edu.tr/program.php?fac_prog=566.**

FIRST YEAR

First Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
PHYS105	GENERAL PHYSICS I	4	3	2	6.5
CHEM111	GENERAL CHEMISTRY I	4	3	2	6.0
MATH119	CALCULUS WITH ANALYTIC GEOMETRY	5	4	2	7.5
ME105	COMPUTER AIDED ENGINEERING GRAPHICS	3	2	2	0.0
ENG101	DEVELOPMENT OF READING&WRITING SKILLS I	4	4	0	6.0
IS100	INTRO.TO INFORMATION TECH.AND APPL.	0	0	0	1.0

Second Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
PHYS106	GENERAL PHYSICS II	4	3	2	6.5
CHEM112	GENERAL CHEMISTRY II	4	3	2	6.0
MATH120	CALCULUS FOR FUNCTIONS OF SEVERAL VARIABLES	5	4	2	7.5
PETE110	INTRODUCTION TO PETROLEUM ENGINEERING	2	2	0	4.0
ENG102	DEVELOPMENT OF REA.&WRITING SKILLS II	4	4	0	6.0

(h/w) = hours/week
ECTS = **E**uropean **C**redit **T**ransfer **S**ystem

SECOND YEAR

Third Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
MATH219	INTRODUCTION TO DIFFERENTIAL EQUATIONS	4	4	0	7.0
HIST2201	PRINCIPLES OF KEMAL ATATÜRK I	0	2	0	1.0
ES202	MATHEMATICS FOR ENGINEERS	3	3	0	5.0
ES221	ENGINEERING MECHANICS I	3	3	0	5.0
GEOE201	GENERAL GEOLOGY	4	3	2	5.0
PETE211	INTRODUCTION TO FLUID MECHANICS	4	3	2	6.0

Fourth Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
HIST2202	PRINCIPLES OF KEMAL ATATÜRK II	0	2	0	1.0
ES224	STRENGTH OF MATERIALS	3	3	0	5.0
CHE204	THERMODYNAMICS I	4	4	0	7.0
PETE216	RESERVOIR ROCK AND FLUID PROPERTIERS	4	3	2	6.0
CENG230	INTRODUCTION TO C PROGRAMMING	3	2	2	4.0
ENG211	ACADEMIC ORAL PRESENTATION SKILLS	3	3	0	4.0
	RESTRICTED ELECTIVE				

THIRD YEAR

Fifth Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
ES303	STATISTICAL METHODS FOR ENGINEERS	3	3	0	5.0
ES361	COMPUTING METHODS IN ENGINEERING	3	3	0	5.0
PETE300	SUMMER PRACTICE I	0	0	0	4.0
PETE321	DRILLING ENGINEERING I	4	3	2	6.0
PETE331	PETROLEUM PRODUCTION ENGINEERING I	3	3	0	6.0
PETE343	PETROLEUM RESERVOIR ENGINEERING I	3	3	0	5.0
Any 1 of the following set:					
TURK105	TURKISH I	0	2	0	1.0
TURK201	ELEMENTARY TURKISH	0	0	0	1.0
TURK303	TURKISH I	0	0	0	1.0

Sixth Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
GEOE410	PETROLEUM GEOLOGY	3	2	2	5.0
PETE322	DRILLING ENGINEERING II	3	3	0	6.0
PETE332	PETROLEUM PRODUCTION ENGINEERING II	3	3	0	0.0
PETE344	PETROLEUM RESERVOIR ENGINEERING II	3	3	0	5.0
PETE352	WELL LOGGING	3	3	0	6.0
	NONTECHNICAL ELECTIVE				
Any 1 of the following set:					
TURK106	TURKISH II	0	2	0	1.0
TURK202	INTERMEDIATE TURKISH	0	0	0	1.0
TURK304	TURKISH II	0	0	0	1.0

FOURTH YEAR

Seventh Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
PETE400	SUMMER PRACTICE II	0	0	0	4.0
PETE411	PETROLEUM PROPERTY VALUATION	3	3	0	5.0
PETE417	PETROLEUM ENGINEERING DESIGN I	2	2	0	5.0
PETE461	NATURAL GAS ENGINEERING	3	3	0	5.0
	TECHNICAL ELECTIVE				
	TECHNICAL ELECTIVE				
	NONTECHNICAL ELECTIVE				

Eighth Semester

Course Code	Course Name	METU Credit	Contact (h/w)	Lab (h/w)	ECTS
PETE418	PETEROLEUM ENGINEERING DESIGN II	3	1	4	5.0
	FREE ELECTIVE				
	TECHNICAL ELECTIVE				
	TECHNICAL ELECTIVE				
	TECHNICAL ELECTIVE				

D. SUMMER PRACTICE PROGRAM, (PETE 300 and PETE 400)

A total of eight weeks of summer practice is obligatory to fulfil the requirements for the B.Sc. degree in Petroleum and Natural Gas Engineering. Drilling, production and reservoir operations are observed in the summer practice. A report of summer practice should be presented to the department at the end of training period. The standards of the summer practice reports are given at the following address:

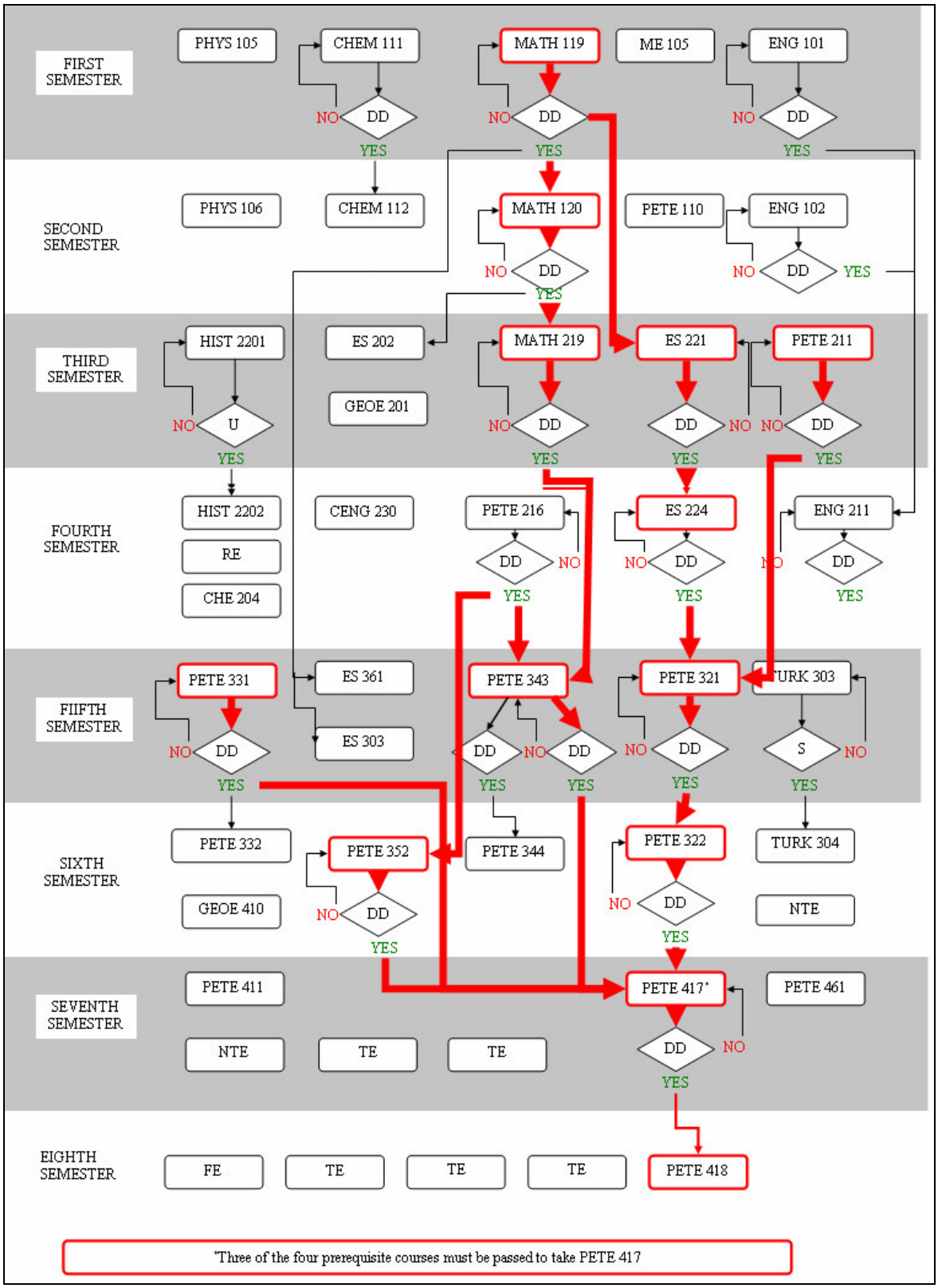
http://www.pete.metu.edu.tr/staj_rapor_formati.pdf

E. PREREQUISITE COURSES

A prerequisite course is a course, which a student must pass before being allowed to take another course. Prerequisite courses are proposed to the Faculty Committee by the Department offering the courses and are confirmed after approval by that Committee. The list of the prerequisite courses in the program of Petroleum and Natural Gas Engineering is given below.

Course	Semester	Prerequisite (Grade)
MATH 120	2	MATH 119 (DD)
CHEM 112	2	CHEM 111 (DD)
MATH 219	3	MATH 120 (DD)
ES 202	3	MATH 120 (DD)
ES 221	3	MATH 119 (DD)
ES 224	4	ES 221 (DD)
ENG 211	4	ENG 101(DD), ENG 102 (DD)
ES 303	5	MATH 119 (DD)
ES 361	5	MATH 119 (DD), CENG 230 (DD)
PETE 321	5	ES 224 (DD), PETE 211 (DD)
PETE 343	5	MATH 219 (DD), PETE 216 (FD)
TURK 304	6	TURK 303 (S)
PETE 322	6	PETE 321 (DD)
PETE 344	6	PETE 343 (FD)
PETE 352	6	PETE 216 (FD)
PETE 417	7	PETE 331, PETE 343, PETE 322, PETE 352 (DD 3 of 4 courses)
PETE 418	8	PETE 417 (DD)

DEPARTMENT OF PETROLEUM AND NATURAL GAS ENGINEERING COURSE PREREQUISITE FLOWCHARTH



F. NON-TECHNICAL ELECTIVE COURSES

There are 2 non-technical elective courses that should be taken at the 6th and 7th semesters of undergraduate program of Petroleum and Natural Gas Engineering Department.

Non-Technical Electives are intended to serve in meeting the following objectives of the education of engineering students and the engineering profession:

- To be aware of their humanistic, social, and environmental responsibilities,
- To be able to consider these factors in their professional decision-making processes,
- To be exposed to a broad spectrum of disciplines other than science and engineering, and
- To be able to establish a sound communication with professionals other than engineers.

The list of courses which may be used to satisfy non-technical elective requirements accepted by Engineering Faculty can be found in the following address:

http://www.eng.metu.edu.tr/pages/geninfo/nte/ntemain.html

G. TECHNICAL ELECTIVE COURSES

Students should take 5 technical elective (TE) courses given by the department during the undergraduate period. These courses are taken at the 3rd and 4th years of the program. The list of technical elective courses given by the department is shown below. The details of the courses can be found within the University Catalogue and Department's Internet site:

http://www.pete.metu.edu.tr/#

Course Code	Course Name
PETE 422	PRESSURE CONTROL
PETE 424	SPECIAL OPERATIONS IN DRILLING
PETE 426	DRILLING FLUID ENGINEERING
PETE 432	PRODUCTION OPTIMIZATION BY NODAL SYS.ANAL
PETE 434	WELL STIMULATION
PETE 436	RESERVOIR CHARACTERIZATION
PETE 440	WELL TEST ANALYSIS
PETE 441	PETROLEUM RESERVOIR ENGINEERING II
PETE 443	ENHANCED OIL RECOVERY METHODS
PETE 444	MATH.MODELLING OF HYDROCARBON RESERVOIR
PETE 445	TRANSPORT PHENOMENA IN GEOSYSTEMS

PETE 446	THERMAL RECOVERY METHODS
PETE 448	MISCIBLE EOR PROCESSES
PETE 450	INTR. TO GEOTHERMAL RESERVOIR ENG.
PETE 460	NATURAL GAS TECHNOLOGY
PETE 462	UNDERGROUND GAS STORAGE
PETE 490	PETROLEUM ENGINEERING RESEARCH
PETE 491	ENVIROMENT CONTROL IN PETROL.ENG.OPERA.
PETE 492	SPECIAL TOPICS IN EMERGING TEC. IN DRILLING ENG.
PETE 493	SPE.TOP.IN GAS. FUELS FROM RES. TO THE END USER
PETE 494	SPECIAL TOPICS IN PETE.ENG:UNDERBALANCED DRILLING
PETE 495	PIPELINE TRANSPORTATION SYSTEMS I
PETE 497	SPECIAL TOPICS IN PETROLEUM ENGINEERING FLOW OF TWO PHASE FLUIDS IN PIPES

H. COMPULSORY COURSES FOR ALL UNDERGRADUATE PROGRAMS

The student's Department will decide the program of compulsory courses to be taken each semester. Students are required to take the compulsory courses of the Department in which they are registered.

1. All Turkish students are required to take courses of "Turkish Language" and HIST 200 "Principles of Kemal Atatürk", preferably in the first and second years of their programs.
2. All non-Turkish speaking foreign students are required to take TURK 201 "Elementary Turkish" and TURK 202 "Intermediate Turkish" in their second or third year and HIST 400 "History of the Turkish Revolution II" in their fourth year.
3. All freshmen are required to take ENG 101 "Development of Reading and Writing Skills I" and ENG 102 "Development of Reading and Writing Skills II" in their first year as well as ENG 211 "Advanced Reading and Oral Communication" courses in their second year, unless exempt by METU examination.

I. GRADES

For each course taken, the student is given one of the following grades by the course teacher. The letter grades, coefficients and percentage equivalents are given below.

PERCENTAGE	COURSE GRADE	COEFFICIENT
90-100	AA	4
85-89	BA	3.5
80-84	BB	3
75-79	CB	2.5
70-74	CC	2
65-69	DC	1.5
60-64	DD	1
50-59	FD	0.5
49 and below	FF	0

I- Incomplete, S-Satisfactory Completion, U-Unsatisfactory, P-Satisfactory Progress,

NA-Nonattendance is the grade given to students who have failed to regularly attend courses or have not fulfilled the requirements of course practices. NA is processed like FF in computing grades.

EX-Exempt, NI-Not Included, W-Withdrawn

The student's standing is calculated in the form of a Grade Point Average (G.P.A.) and Cumulative Grade Point Average (C.G.P.A.) and is announced at the end of each semester by the Registrar's Office.

The total credit points for a course are obtained by multiplying the coefficient of the final grade by the credit hours. In order to obtain the G.P.A. for any given semester, the total credit points are divided by the total credit hours. The C.G.P.A. is calculated by taking into account all the courses taken by a student from the beginning of entrance to the University.

The status according to Grade Point Average (G.P.A.) and Cumulative Grade Point Average (C.G.P.A.) are given below:

C.G.P.A and G.P.A. > 2.00 ⟹ SUCCESSFUL STUDENT

3.00 < G.P.A. < 3.49 HONOUR STUDENT

G.P.A. > 3.50 ⟹ HIGH HONOUR STUDENT

G.P.A. < 2.00 ⟹ UNSUCCESSFUL STUDENT

C.G.P.A. < 1.80 ⟹ SUSPENSION

2 CONSECUTIVE SEMESTERS WITH SUSPENSION
WILL RESULT WITH DISMISSAL
CHANGED TO

14 SEMESTER MAXIMUM PERIOD OF STUDY

FOR GRADUATION C.G.P.A. > 2.00

J. REGULATIONS

The following addresses should be visited for the Academic Rules and Regulations.

1. Academic Rules and Regulations Concerning Undergraduate Period of Study, Examinations and Assessment

   http://www.oidb.metu.edu.tr/english/regulations/oidb41a.htm

   http://www.oidb.metu.edu.tr/yonetmelik/yonet/weblis2.html

2. Academic Rules and Regulations Concerning Graduate Period of Study, Examinations and Assessment

   http://www.oidb.metu.edu.tr/english/regulations/oidb42a.htm

   http://www.oidb.metu.edu.tr/yonetmelik/yonet/yonylisans.htm

3. Academic Rules and Regulations Vocational School of Higher Education Period of Study, Examinations and Assessment

   http://www.oidb.metu.edu.tr/english/regulations/oidb47b.html

   http://www.oidb.metu.edu.tr/yonetmelik/yonet/oidb47a.html

4. Directive for Undergraduate Double Major Programs

   http://www.oidb.metu.edu.tr/english/regulations/ddoublem.html

   http://www.oidb.metu.edu.tr/yonetmelik/yonet/ciftyeniy.html

5. Directive for Undergraduate Minor Program

   http://www.oidb.metu.edu.tr/english/regulations/dminorp.html

   http://www.oidb.metu.edu.tr/yonetmelik/yonet/yandalyeniy.html

K. INTERACTIVE REGISTRATION

- Students are supposed to renew their registration each semester within the registration period announced in the Academic Calendar. Registration renewal is composed of during the processes below:

  1.Tuition fee payment

  2.Interactive registration

  3.Advisor approval

  In case of one of these processes is incomplete, the student will stay in "not-registered" status.

  http://oibs.metu.edu.tr/registration.

- Students can use the PC rooms announced by Registrar's office for their registration.
- New students, irregular students and those who are uncertain about their programs should consult their Advisors before attempting to register.
- Beginning from 2008-2009 fall semester, students who have not completed their registration in the "registrations and advisor approvals" period will not be able to register in the add-drop period. These not-registered students can apply to the Administrative Committee of the relevant unit until the last day of the Add-drop period (they should also indicate and prove their excuse) for a registration renewal. Those whose excuses are accepted by the Administrative Committee allowed to renew their registration; and others, whose excuses are not accepted, will stay not-registered and lose their student status.
- Students who register during the Registration Period, completing the Approval procedures can make changes with their registration during the Add/Drop period, which is also announced in the Academic Calendar. Changes made during Add/Drop period must be approved by the Advisor. Add/Drop is final and students cannot make changes in their programs after "Approval".

L. SOCIETY OF PETROLEUM ENGINEERS (SPE) METU STUDENT SECTION:

Society of Petroleum Engineers (SPE) is the international technical and professional association for engineers and the management of energy resources produced through the wellbore. It collects, distributes, and exchanges information on techniques and operations to nearly 49,500 members in 125 countries through a broad range of activities, including section meetings, publications, continuing education programs, and technical meetings and exhibitions.

Mission of SPE is to provide the means for collection, and exchange of technical information concerning the development of oil and gas resources, subsurface fluid flow production of other materials through wellbores for the public benefit to provide opportunities through its programs for interested (and qualified) individuals to maintain and upgrade their individual technical competence.

SPE has a section in Turkey as the part of South and Central Europe Region. SPE sponsors student chapters all over the world with 102 student chapters in 36 countries. There are two student chapters in Turkey, Istanbul Technical University and Middle East Technical University SPE Student Chapters. If you become a SPE METU Student Section member, you may be aware of all knowledge and experience through SPE conferences and exhibitions, workshops, journals and books, short courses, and section meetings.