SELF ASSESSMENT REPORT

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Acknowledgment

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INTRODUCTION

The department of Petroleum Engineering was established in 1973 and started functioning on September 14, 1974 with an undergraduate program. The first B.S. degree in petroleum engineering was awarded in 1977. By end of the first semester 2001-2002, 336 B.S. degrees in petroleum engineering has been awarded. In the academic year 1982-83, the department initiated its M.S. program, and in 1985, the department developed further by implementing its Ph.D. program.

The Deanship of Academic Development (DAD) prepared workshop, procedures and standards for self assessment of academic programs at King Fahd University of Petroleum & Minerals. The self assessment document contains (8) criteria for self assessment. Each criterion is made up of several standards. The Petroleum Engineering Department is one of twelve departments in the university undergoing self assessment this year. The objectives of self assessment are to:

- Improve and maintain academic standards.
- Enhance students’ learning.
- Verify that existing programs meet their objectives and institutional goals.
- Provide feedback for quality assurance of academic programs.
- Prepare the academic programs for accreditation.

A Program Self Assessment Team (PT) was formed to coordinate and prepare the self assessment report according to the guidelines provided by DAD. Faculty members in the Department were informed about this process and its objectives were explained in one of the Departmental meetings. The need of their involvement in this process was emphasized throughout this exercise. In particular the faculty feedback was sought regarding the Department’s mission, objectives and program outcomes. It was also emphasized that this program is neither an exercise of data collection nor a public relation document to enhance the department's image but rather an opportunity to identify areas where improvements can be made so that the department can achieve its mission of providing high quality education, research and community service.

It is important to mention that many of the self assessment tools such as measurable objectives and program outcomes, questionnaires, alignment of courses with objectives, etc. were developed during this self assessment period. Therefore we are in fact laying the ground and developing the tools and procedures for better future assessments.

This report contains eight sections. The first section outlines PETE program, mission and objectives. The second section provides information about the curriculum design and its organization. Section three lists the laboratories and their related information followed by student support and guidance. Sections four through eight cover student support, process control, faculty, and institutional facilities & support.
CRITERION # (1)
Program Vision, Mission, Objectives and Outcomes
1.1 Introduction

The Department of Petroleum Engineering offers two four years programs: one leading to a B.S. degree in Petroleum Engineering and the other leading to a B.S. degree in Applied Petroleum Engineering. The Department's vision, mission, and meaningful measurable programs’ objectives are developed taking into consideration both the options.

1.2 King Fahd University of Petroleum & Minerals (KFUPM)

KFUPM is a leading educational organization for science and technology. The University has adopted advanced training in the fields of science, engineering, and management as one of its goals in order to promote leadership and service in the Kingdom’s petroleum and mineral industries. The University also furthers knowledge through research in these fields. The goal of KFUPM is, and has always been “the quest for excellence”.

1.3 College Mission Statement

The mission of the Colleges of Engineering Sciences and Applied Engineering is to educate professionals in engineering, to create and disseminate knowledge and technology, to expand the base of engineering knowledge through original research, to develop technology as a service to the needs of society; and to benefit the public through industry, government and engineering profession.

1.4 Program Mission Statement

To have a high quality program that provides the student with basic petroleum engineering education as well as cultivating personal skills, ethical values, and awareness of industry needs.

1.5 Program Vision statement

To be recognized as one of the top 10 Petroleum Engineering education programs worldwide.
1.6 Program Educational Objectives

The broad education objectives of the undergraduate program in Petroleum Engineering are to provide a solid foundation of mathematical, scientific and engineering knowledge and to develop the basic engineering skills that will serve students throughout their careers. The specific objectives are to enable our graduate to:

Objective 1:
Identify and devise solution approaches to common Petroleum Engineering problems allowing efficient exploitation of natural petroleum resources.

Objective 2:
Design and execute of experiments in the various areas of petroleum engineering.

Objective 3:
Gather and analyze data.

Objective 4:
Design petroleum engineering processes.

Objective 5:
Acquire communication skills, critical team skills and leadership capabilities.

Objective 6:
Be capable of and keen on continuous professional development.

Objective 7:
Abide by professional and ethical standards and be committed to preserve the environment.
### 1.7 Objectives Measurement

#### Table 1.1: Program Objective Assessment

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<thead>
<tr>
<th>Objective</th>
<th>Performance Criteria</th>
<th>Assessment Methods/Tools</th>
<th>Stakeholders Involved</th>
<th>Time of Data Collection</th>
<th>Actions for Improvement</th>
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<tbody>
<tr>
<td></td>
<td><strong>Direct</strong> Assessment Methods</td>
<td><strong>Indirect Assessment Methods</strong></td>
<td><strong>Who</strong> is assessed? (What methods will be used to gather evidence of performance criteria?)</td>
<td><strong>When</strong> the required data will be collected? (Every semester, annually, every two years, etc.?)</td>
<td><strong>What</strong> actions will be taken to implement changes for program improvement?</td>
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<tr>
<td>(1)</td>
<td>Knowledge</td>
<td>Standardized Exams</td>
<td>Alumni Survey</td>
<td>Alumni, Students, Employers and Faculty</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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<td></td>
<td>Skills</td>
<td>Oral presentations</td>
<td>Employer survey</td>
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<td>(2)</td>
<td>Knowledge</td>
<td>Behavioral observation</td>
<td>Alumni Survey</td>
<td>Alumni, Students, Employers and Faculty</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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<td>Skills</td>
<td>Lab experiment reports</td>
<td>Employer survey</td>
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<td>Presentation</td>
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<td>(3)</td>
<td>Knowledge</td>
<td>Case studies</td>
<td>Alumni Survey</td>
<td>Alumni, Students, Employers and Faculty</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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<td></td>
<td>Skills</td>
<td>Reports</td>
<td>Graduating Senior survey</td>
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<td>Oral Presentation</td>
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<td>(4)</td>
<td>Knowledge</td>
<td>Oral presentation</td>
<td>Alumni Survey</td>
<td>Alumni, Students, Employers and Faculty</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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<td>Skills</td>
<td>Simulation</td>
<td>Employer survey</td>
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<td>Graduating Senior survey</td>
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<td>(5)</td>
<td>Skills</td>
<td>Oral presentation</td>
<td>Alumni Survey</td>
<td>Alumni, Students, Employers and Faculty</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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<td>Graduation projects</td>
<td>Employer survey</td>
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<td>Coop &amp; training performance</td>
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<td>(6)</td>
<td>Skills</td>
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<td>Employer survey</td>
<td>Students, Faculty and Employers</td>
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<td>Values</td>
<td>Class observations</td>
<td>Work records</td>
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<td>Professional exams</td>
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<td>(7)</td>
<td>Behavior</td>
<td>Class observation</td>
<td>Employer survey</td>
<td>Faculty, Peers and Employers</td>
<td>Every two (2) years in a six (6) year cycle. First started (041)</td>
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1.8 Program Outcomes

Program learning outcomes are the tasks students should be able to carry out upon graduation. In its endeavor to achieve the stated objectives, the Program Assessment Team has invoked a set of measurable outcomes to ascertain the expectation that our graduates are capable of displaying a certain degree of skills and capabilities that will reflect on their performance as petroleum engineers:

1. Student shall have the ability to apply knowledge of mathematics, science, and fundamental engineering to petroleum engineering problems.
2. Student shall have the ability to identify, formulate, and solve practical petroleum engineering problems.
3. Student shall have the ability to design petroleum processes and systems to meet desired needs.
4. Student shall have the ability to conduct petroleum engineering experiments to study different petroleum engineering systems as well as to use laboratory instruments and computers to analyze and interpret data.
5. Student shall have the ability to function effectively within multidisciplinary teams.
6. Student shall have the ability to work in a professional petroleum engineering environment, and to understand the role of the petroleum industry in meeting world energy needs and the associated economical considerations while preserving the environment.
7. Student shall have the ability to communicate effectively in written, oral, and graphical forms, including the use of professional-quality visual aids, all in the English language.
8. Student shall practice the professional and ethical standards expected of a petroleum engineers.
9. Student shall identify the need to engage in lifelong learning of petroleum engineering.

These outcomes are the byproduct of the program learning objectives and the two must be interrelated. The matrix that relates the program learning objectives to the expected outcomes is given in Table 1.2.

Table 1.2: Relationship between Program Learning Outcomes and Program Educational Objectives

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Outcomes</th>
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<td>9</td>
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1.9 Outcome Measurement

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Performance Criteria</th>
<th>Assessment Methods/Tools</th>
<th>Stakeholders Involved</th>
<th>Time of Data Collection</th>
<th>Actions for Improvement</th>
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<td></td>
<td></td>
<td>Direct Assessment Methods</td>
<td>Indirect Assessment Methods</td>
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<tr>
<td>(1)</td>
<td>Knowledge Skills</td>
<td>Standardized Exams</td>
<td>Graduating student Survey</td>
<td>Students, Faculty</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>(2)</td>
<td>Knowledge Skills</td>
<td>Capstone exercise</td>
<td>Graduating student Survey</td>
<td>Students, Faculty</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>(3)</td>
<td>Knowledge Skills</td>
<td>Capstone exercise</td>
<td>Graduating student Survey</td>
<td>Students, Alumni, Faculty</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>(4)</td>
<td>Knowledge Skills</td>
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<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>(5)</td>
<td>Skills</td>
<td>Capstone exercise</td>
<td>Graduating student Survey</td>
<td>Students, Alumni, Faculty</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>(6)</td>
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<td>Coop &amp; training performance</td>
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<td>Students, Alumni, Faculty</td>
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<td>Students, Employer, Faculty</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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<td>Graduating student Survey</td>
<td>Students, Alumni</td>
<td>Every two (2) years in a six (6) years cycle. First started (041)</td>
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Standard 1-3: The results of program’s assessment and the extent to which they are used to improve the program must be documented.

Three surveys were conducted to assess the extent to which PETE graduates are performing in light of the stated program learning objectives and program outcomes. The surveys included: Senior Graduating Students’ Survey, Alumni Survey, and Employers’ Survey. Alumni and Employers' Surveys were conducted online while the Graduating Students’ Survey was distributed manually. The details concerning the number of respondents to the different surveys are as follows:

- There were 37 alumni responses, 84% of which came from late batches (2004-1999), few responses came from 89 through 96 batches, and one response came from an earlier batch student (76).

- There were 12 responses from employers who fully responded to all questions. The responses came from different departments at Saudi ARAMCO which have Petroleum Engineers in the range of 6 to 180.

- The surveys included also 21 senior graduating students and 4 professorial-rank faculty members: 2 professors, and 2 associates. The survey questions and the corresponding responses are given in Appendix C-1 through C-4.

The main observations from these surveys are as follows:

(A) Observations and recommendations related to Graduating students Survey.

1. Contribution of PETE program in students' learning and development
   With an overall average of 2.6 out of 4 where 13% of the population rated PETE program as either fair or poor, our strive for higher standards leads to the recommendation that more emphasis be placed on the following elements of the PETE curricula:
   - Writing and presentation skills.
   - Ability to work in multidisciplinary teams.
   - Ability to design a system, a component, or a process.
   - Understanding technology applications relevant to the field.

2. Training
   The overall average is 3.1 out of 4 where 6% of the population rated the training program as either fair or poor. Improvements are recommended in the following areas related to Coop as well as Summer Training Programs:
   - Ability to make ethically responsible decisions.
   - Ability to carry out tasks independently.
   - Ability to participate in projects.
   - Time management skills.
3. **PETE Facilities**
   The overall average is 2.7 out of 4 where 19% of the population rated PETE facilities as either fair or poor. Further improvement should consider the following PETE facilities:
   - Computer labs.
   - Administrative staff.

4. **Faculty of the Department**
   The overall average is 2.2 out of 4 where 25% of the population rated faculty contribution as either fair or poor. Further refinement in faculty contribution to students learning, which is a part of the Department’s commitment to excellence in teaching, can be considered especially in the following aspects:
   - Capability of explaining critical concepts and ideas.
   - Encouraging student-faculty interactions, inside and outside the classroom.
   - Incorporate teamwork as part of the learning process.

5. **University Facilities**
   The overall average is 1.8 out of 4 where 46% of the population rated KFUPM facilities as either fair or poor. Notably, students gave very low ratings for: Housing, Food services, Parking services, Security Services, and Health services.

   The following represents some of the recommendations made by senior graduating students.
   1. *The program is compact and well organized in terms of course sequence.*
   2. *Some courses need a proper textbook like PETE 409, for example.*
   3. *The program should involve wider utilization of software packages.*
   4. *Need more teamwork, projects, field trips, and short courses.*
   5. *The PC-Lab should be open 24 hours /7 days a week.*

(B) **Observations and recommendations related to Alumni Surveys.**

   The Department was able to collect 37 responses from PETE Alumni. Following are some of the observations made by alumni (See Appendix C-2).

1. **Knowledge:**
   More that 89% of the alumni think that they have gained sufficient knowledge skills, which cover engineering, problem-solving, etc. However, the following skills appear to be a concern for some PETE alumni:
   - Apply optimal decision making in company projects using quantitative tools
   - Ability to identify, examine, stabilize and control processes
   - Ability to design a system or process to meet desired specifications

2. **Communication Skills:**
   High percentage of the alumni (87%) believe that they have good report writing, oral communication and presentation skills. However, means to further develop the presentation skills are recommended.
3. **Interpersonal skills:**
   Among the interpersonal skills, the ability to develop leadership skills was the lowest. However, the alumni responses show that they gained higher than average skills in professional development, appreciation of ethical values and independent thinking.

4. **Work Skills:**
   As far as work skills, the alumni think that they have gained excellent discipline and judgment skills but lack on time management skills.

5. **Program Administration and Learning:**
   The overall average is 2.4 out of 4 where 21% of the population rated program administration and learning as either fair or poor. Improvements are recommended in the following areas:
   - The academic advising in the program.
   - The co-op or senior project advising.
   - The course offering.

6. **Program Content:**
   The responses distribution was: 16% evaluated program content as too much, 32% as too little and 52% as just right. The alumni responses show that they are satisfied with the program content related to basic petroleum engineering, reservoir engineering, production engineering and other mathematical & engineering courses. However, more than 62% of the alumni rated drilling engineering courses in the program as too little.

   The following represents some of the recommendations made by alumni.
   1. Students need more field trips and more visits to service companies that work for Saudi Aramco
   2. I strongly suggest that a new course titled “Well Control and Safety Awareness” to be introduced in the department
   3. I think that the content of the current program has an excellent focus on building high technical engineers utilizing best in class technology. However I suggest that you re-arrange the sequence of the program courses to match the steps needed in a real field development approach.
   4. I think the program is very supportive and excellent in preparing future engineers.
   5. At least one more drilling course is required to focus on wide subjects like directional drilling, deep drilling, well control.
   6. On job we are rated to be from the best Petroleum Engineers around Saudi Aramco. We have the ability to handle jobs and responsibilities as all other graduates. I guess the program was very challenging that helped us on our career to face difficult situations. The only suggestion I would like to add is exposing students to field activities, equipments and practices more than before. Theories are very crucial as the basis of Engineering, but what matters most are where and when to implement them.
7. Petroleum engineers should learn how to use available software’s not necessarily through separate courses but through homework’s and projects of current courses.
8. The program needs to be improved in communication and thinking skills.
9. Including real case studies in each semester in the last two years in the college will be very helpful in the future

(C) Observations and recommendations related to Employers’ Surveys.

The collected surveys represent a limited sample (only 12 responses were received). Following are the observations and recommendations made by employers (See Appendix C-3).

1. **Knowledge:**
The overall average is **2.8** out of 4. Most of the employers (96%) think that KFUPM-PETE graduates possess sufficient knowledge skills such as engineering skills, collecting and analyzing data, problem-formulation skills. However, more focus should be given to develop student skills to identify, examine, stabilize and control processes.

2. **Communication Skills:**
The overall average is **2.4** out of 4. Employers agree with the alumni that they need more emphasis on the presentation skills.

3. **Interpersonal skills:**
The overall average is **2.9** out of 4 and only 3% of the employers rated interpersonal skills as either fair or poor. Employers think that KFUPM-PETE graduates are highly motivated, reliable and able to work in teams. However, they think that PETE graduates need to develop skills in leadership.

4. **Work Skills:**
In general, employers showed positive feedback regarding work skills of KFUPM-PETE graduates with an overall average of **3.0** out of 4. However, the alumni need more judgment and time management skills, which agree with the alumni observation.

The following represents some of the recommendations made by employers:

1. *We have generally seen school graduates with high academics; however, with vast variations in English (speaking and oral) skills. That leads me to believe that those with good English skills may have been strong in it prior to joining the school!*

2. KFUPM PE graduates are general very dependable engineers they have the material and the knowledge to make excellent work force
1.9 Improvement Actions:

A plan of action is suggested to improve various aspects of the PETE program to produce engineers who possess skills and capabilities as endeavored by the program's educational objectives and outcomes.

A Tentative Action Plan to Improve PETE Program

Analysis of the surveys results and taking into account the objectives and the intended outcomes of the PETE program shows that four outcomes are not fully realized by the majority of the students, which constitutes weaknesses in the program. In general, all surveys indicated weaknesses in the same outcomes related to design and communication skills with some variability in the order. The outcomes of concern are:

1. Student shall have the ability to design petroleum processes and systems to meet desired needs.
2. Student shall have ability to function effectively within multidisciplinary teams.
3. Student shall have the ability to work in a professional petroleum engineering environment, and to understand the role of the petroleum industry in meeting world energy needs and the associated economical considerations while preserving the environment.
4. Student shall have the ability to communicate effectively in written, oral, and graphical forms, including the use of professional-quality visual aids, all in the English language.

Accordingly, a tentative action plan with recommendations for implementation is proposed to improve the program to better achieve its objectives.

Recommendations Concerning Design Skills

Students must be prepared for engineering design through knowledge and skills acquired in coursework. Students must also be introduced to petroleum engineering design standards and practices. Recommendations for corrective actions within the constraints of the current curriculum are as follows:

1. Revision of courses: course descriptions must be consistent with the program objectives and outcomes. Special attention should be directed towards promoting design concepts in the program as early as possible. Description of courses that have design elements should reflect that in a clear and explicit way.
2. Serious efforts should be made to emphasize project-oriented assignments within courses especially for those having direct industrial applications.
3. Students must be directed to use the available computer software in doing regular textbook problems and carrying out more elaborate design-oriented problems and/or projects. Using such analysis, programs not only will help the students to comprehend the subject material better but also allow students to master the analytical techniques both of which are important parts in the petroleum design process.
4. At least one design assignment should be introduced in each laboratory offered in conjunction with core as well as elective courses. This practice should start from the sophomore level. For example, design projects can be introduced in the following core courses: PETE 203, PETE 204, PETE 205, PETE 303. Lab instructors and class teachers may cooperate to tailor a selection of design projects suitable for the level of the course. Projects that have practical applications are preferred.
5. Exams should contain some non-standard-format problems such as short design problems without absolute right/wrong answers. Taken as a whole, design is basically a decision making process within given constraints. Thus, the objective of such exercise is to train the student and to build in him the confidence needed to tackle design problems.

8. Industry must be involved in some form or another in enhancing design education by either design project funding, donations of equipment, or most importantly providing information needed for use as case studies or design problems/projects. Realizing the full potential of such collaboration with industry and keeping in mind the best interest for the students may require initiating a faculty industry placement program for summer sessions or more appropriately for a full regular semester. Professors who lack sufficient practical experience will focus only on textbook design problems which may not be relevant to the local need. Other kinds of industry collaboration may include guest lectures by industry professionals, inviting engineers from industry to participate in design education for selected courses, and inviting involving students in industry design projects.

9. Saudi Arabian Chapter of SPE should organize a yearly contest for best student design project.

Recommendations Concerning Communication Skills:
Among the shortcomings pointed out by all respondents to our surveys, oral and writing skills in English received commonly low rating. Some corrective actions are to be made and some suggestions are outlined below:

1. The size of classes in ENGL 101, ENGL 102, and ENGL 214 need to be reduced to a ratio of 15 to allow each student to have longer contact hours with the instructor and to have a chance to express his ideas orally in class. This issue is very important and needs enough consideration especially in summer sessions. Discussions with ELC need to be initiated from the department for seeking further improvement in the delivery of the aforementioned courses.

2. Skills in technical writing, and in effective speaking and listening, are to be developed through extensive and frequent writing assignments, oral presentations, and participation in discussions in lectures as well as in lab sessions, if applicable. Homework assignments should contain certain amount of descriptive questions and/or essay problems or projects. Lab reports should emphasize individual descriptive writing rather than merely filling tables and drawing graphs. The standard format in technical lab reports including objectives, experimental procedure, results, discussion, and conclusions must be enforced and graded accordingly. Poor reports should be returned to students for style and grammar corrections if needed. Symbolic prizes can be given to “best technical report writer” for each lab to draw students attentions and to increase competition in creative writing.

3. Student's typing skills need to be developed and improved through requiring the student to use word processing programs. He should also be able to express himself through presentations prepares and delivers in class. This will provide him with the opportunity to gain self confidence when standing in public.

4. Student's communication skills can also be improved in elective courses though assigning a project where the student can work on a project and present his work in front of the class and instructor. This will also provide a floor for students’
interaction and oral discussions by asking questions to the presenter.

5. Writing skills can be developed by using technology in teaching. Platforms such as WebCT provide on-line and off-line discussion groups that allow students to disseminate ideas and express their views out of class and hence fully utilize the class time and enhance communication skills in and out of class. The instructor can allocate a grade for participation and he can post a subject for discussion and specify a time range for students to participate.

6. Encouraging students to attend seminars, workshops and have an active role in discussions about the topic of those seminars and workshops. SPE student's chapter and PETE club can have a role in this regard.

7. Organizing a student paper contest and asking the students to present their work. Prizes can be given for distinguished performance.

Recommendations Concerning Team Skills:

1. The senior design project is an effective means to foster team work skills among the students.
2. Group term papers, group experiment reports and field trips can further sharpen these skills.
3. Summer training can also be effective if the student is assigned to a team or group of engineers.

Recommendations Concerning Students Professional Development:

1. Summer training is the major industrial exposure the student gains before graduation. It is recommended that the student should be required to spend at least another summer in industry preferably after the freshman year.
2. The student should also be required to be a member of the SPE student chapter and attend at least three meetings of the local chapter per year.
1.10 Performance Measures:

Educational Program

- The total numbers of undergraduate and graduate students enrolled in the Petroleum Engineering programs for the past twenty academic years (1984-2004) are graphed in Figure 1.1. The average GPA graduating students for the past five years (1999-2003) is listed in Table 1.4. The statistics demonstrate that the overall average GPA for the undergraduate body enrolled is around 2.7 with minimum deviation.

![Figure 1.1: Total Enrollment in the PETE Undergraduate and Graduate Programs for the Years 1984-2004](image-url)
Table 1.4: Graduating Students Performance for 1999-2003.

<table>
<thead>
<tr>
<th>Term</th>
<th>Number of Graduating Students</th>
<th>1st Honors</th>
<th>2nd Honors</th>
<th>3rd Honors</th>
<th>%</th>
<th>Average Graduating GPA</th>
<th>Average time for completion (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>50.0</td>
<td>2.866</td>
<td>5.0</td>
</tr>
<tr>
<td>2000-2001</td>
<td>16</td>
<td>1</td>
<td>0</td>
<td>5</td>
<td>37.5</td>
<td>2.758</td>
<td>5.2</td>
</tr>
<tr>
<td>2001-2002</td>
<td>19</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>21.1</td>
<td>2.548</td>
<td>5.6</td>
</tr>
<tr>
<td>2002-2003</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>30.0</td>
<td>2.610</td>
<td>5.9</td>
</tr>
<tr>
<td>2003-2004</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>56.3</td>
<td>2.944</td>
<td>5.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>77</strong></td>
<td><strong>3</strong></td>
<td><strong>4</strong></td>
<td><strong>23</strong></td>
<td><strong>39.0</strong></td>
<td><strong>2.745</strong></td>
<td><strong>5.4</strong></td>
</tr>
</tbody>
</table>

- The number of professorial rank faculty actively engaged in teaching for the past five years as well as the undergraduate and graduate student faculty ratios are presented in Table 1.5. These ratios indicate that the average undergraduate/faculty ratio for the past two years is 27, which is very high compared with the ratio of 15 suggested by the Ministry of Higher Education. Excluding the Freshman PETE students, this ratio drops to 19. The graduate student faculty ratio is clearly low although there has been a noticeable improvement in the past year.

Table 1.5: Students Faculty ratio for 2000-2004

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Professorial rank faculty</td>
<td>7</td>
<td>7</td>
<td>6</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Undergraduate/faculty</td>
<td>18.9</td>
<td>13.7</td>
<td>14.2</td>
<td>24.0</td>
<td>30.9</td>
</tr>
<tr>
<td>Graduate/faculty</td>
<td>2.1</td>
<td>1.1</td>
<td>0.8</td>
<td>1.3</td>
<td>1.6</td>
</tr>
</tbody>
</table>

- Students' evaluation of the teaching performance of PETE faculty is summarized in Table 1.6 which lists the average teaching evaluation score for all courses offered by the Petroleum Engineering Department for the past three years.
Table 1.6: Average student course evaluation for 1999-2002

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of respondents/section</td>
<td>17.4</td>
<td>14.8</td>
<td>11.3</td>
<td>12.9</td>
</tr>
<tr>
<td>Average score</td>
<td>8.95</td>
<td>8.76</td>
<td>8.81</td>
<td>8.89</td>
</tr>
</tbody>
</table>

Research

- The Petroleum Engineering faculties are actively involved in basic as well as applied research. As shown in Table 1.7, the PETE department is heavily involved in research projects funded by KFUPM as well as external agencies. A continuous growth in the number of funded projects is clearly observed in the latest years.

Table 1.7: Research Activities of PETE Faculty Members

<table>
<thead>
<tr>
<th>Year</th>
<th>Journal papers published/faculty member</th>
<th>Conference papers/ faculty member</th>
<th>Total funded projects/faculty member</th>
<th>Patent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-2004</td>
<td>12.5</td>
<td>8.2</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

- Another indicator of research output is number of graduate thesis completed in the Department. Table 1.8 lists these statistics for the past twenty years.

Table 1.8: MS and PhD Thesis in PETE

<table>
<thead>
<tr>
<th>Period</th>
<th>Total Thesis</th>
<th>Thesis/Faculty member/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984-1989</td>
<td>19</td>
<td>0.345</td>
</tr>
<tr>
<td>1989-1994</td>
<td>12</td>
<td>0.214</td>
</tr>
<tr>
<td>1994-1999</td>
<td>15</td>
<td>0.366</td>
</tr>
<tr>
<td>1999-2004</td>
<td>14</td>
<td>0.359</td>
</tr>
</tbody>
</table>

Table 1.8 indicates a stable, though low, trend. The chief cause of this is the relatively low enrollment in PETE graduate program. The majority of graduate students are part-times who usually take twice as long to complete their degrees, which further diminishes this performance indicator.

- Petroleum engineering faculty has also produced a number of books. One book has already been published; two others are still in the manuscript form. All these books are adopted in PETE courses.
Community Services

- The Department of Petroleum Engineering is playing a leading role in continuing education by offering a range of short courses that have been very popular and highly appreciated by practicing engineers throughout the industry both in the Kingdom and other Gulf countries.

- Thirty-four (34) short courses were given in the period from 1994 to 2004.

- The department has organized one workshop on gas condensate reservoir and PETE faculty have given numerous seminars.

- Numerous professional consultations to local and regional industries have been given.

- Editorial activities are considered to be one of the essential contributions to the scientific community. The PETE faculty participates in these activities through serving as editor-in chiefs and editorial board members of some journals, reviewing technical papers for reputable journals and conferences. One faculty is an editor in the Arabian Journal of Science and Engineering and the Energy International Journal

Administrative Services

- Administrative services offered by the Department were evaluated by faculty as well as the students. Faculty and students rated these services at 2.4 out of 4.
CRITERION # (2)
Curriculum Design & Organization
2.1 Introduction
The Department of Petroleum Engineering at KFUPM offers a curriculum which is designed to give the student a thorough understanding of the basic laws of science and to simultaneously stimulate and develop creative thinking, professional attitude, economic judgment and environmental consciousness. The aim is to develop the student's potential to the fullest, to prepare the student for superior performance as a petroleum engineer, and to provide the student with the fundamental principles necessary for pursuing advanced study in the diverse fields of engineering, science and business.

2A. Degree Titles
The degree title appearing on the diplomas of graduates of this program is: Bachelor of Science in Petroleum Engineering.

2B. Definition of Credit Unit
The ABET definition of credit unit will be adopted, i.e., one semester credit hour represents one class hour or 3 laboratory hours per week. One academic year represents 30 weeks of classes (ABET’s requirement is at least 28 weeks) exclusive of final exams.

2C. Degree Plan (Curriculum Course Content)
The Petroleum Engineering curriculum flowchart and B.S. degree requirements of the Program is given in Figure 2.1 and Table 2.1, respectively. In this table, the required and/or elective courses are classified in appropriate categories as major, electives, general education and other requirements. Tables 2.2 and 2.3 provide the degree plans for Petroleum Engineering and Applied Petroleum Engineering, respectively.

2D. Curriculum Breakdown
Table 2.4 provides the curriculum course content for Petroleum Engineering Science. In this table, the required and elective courses are listed and classified in their appropriate ABET categories. The curriculum content is expressed in terms of the “years of study” in which one half year of study equals 17 semester hours. The categorized contents are compared to ABET requirements in Table 2.5.

2E. Currently Approved Course Syllabi
For each required course and each elective course credited toward meeting the ABET criteria requirement, the course description according to the ABET format is shown in Appendix B.
Figure 2.1 (a): Petroleum Engineering Curriculum Flowchart

**Semester**

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>MATH 101</td>
</tr>
<tr>
<td>4</td>
<td>MATH 102</td>
</tr>
<tr>
<td>5</td>
<td>PHYS 101</td>
</tr>
<tr>
<td>6</td>
<td>CHEM 101</td>
</tr>
<tr>
<td>7</td>
<td>ENGL 101</td>
</tr>
<tr>
<td>8</td>
<td>PETE 201</td>
</tr>
<tr>
<td>9</td>
<td>PE 101</td>
</tr>
<tr>
<td>10</td>
<td>IAS 101</td>
</tr>
</tbody>
</table>

**Courses**

- MATH 101
- PHYS 101
- CHEM 101
- ENGL 101
- PETE 201
- PE 101
- IAS 101
Figure 2.1 (b): Applied Petroleum Engineering Curriculum Flowchart
### Table 2.1: Requirements for B.S. Degree in Petroleum Engineering

<table>
<thead>
<tr>
<th>Class</th>
<th>Course Name</th>
<th>Hours Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General Education Requirements (85 credits)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>COMMUNICATION</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arabic</td>
<td>IAS 101, 201, 301, ENGL 101, 102, 214</td>
<td>6</td>
</tr>
<tr>
<td>English</td>
<td></td>
<td>9</td>
</tr>
<tr>
<td><strong>ENGINEERING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemical</td>
<td>CHE 204</td>
<td>3</td>
</tr>
<tr>
<td>Computer</td>
<td>ICS 101</td>
<td>3</td>
</tr>
<tr>
<td>Electrical</td>
<td>EE 204</td>
<td>3</td>
</tr>
<tr>
<td>Mechanical</td>
<td>ME 203, 205</td>
<td>6</td>
</tr>
<tr>
<td>Systems</td>
<td>SE 301</td>
<td>3</td>
</tr>
<tr>
<td><strong>ISLAMIC STUDIES</strong></td>
<td>IAS 111, 211, 311, 4xx</td>
<td>8</td>
</tr>
<tr>
<td><strong>PHYSICAL EDUCATION</strong></td>
<td>PE 101, 102</td>
<td>2</td>
</tr>
<tr>
<td><strong>SCIENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>CHEM 101, 102</td>
<td>8</td>
</tr>
<tr>
<td>Geology</td>
<td>GEOL 201, 318</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics</td>
<td>MATH 101, 102, 201, 201, 202, STAT 319</td>
<td>17</td>
</tr>
<tr>
<td>Physics</td>
<td>PHYS 101, 102</td>
<td>8</td>
</tr>
<tr>
<td><strong>SOCIAL SCIENCE</strong></td>
<td>ECON 403</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>85</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Major Requirements (48 credits)</strong></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PETROLEUM ENGINEERING</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Properties of Reservoir Rocks &amp; Fluids</td>
<td>PETE 204, 205</td>
<td>6</td>
</tr>
<tr>
<td>Drilling Engineering</td>
<td>PETE 203</td>
<td>4</td>
</tr>
<tr>
<td>Formation Evaluation</td>
<td>PETE 303, 306, 401</td>
<td>9</td>
</tr>
<tr>
<td>Production Engineering</td>
<td>PETE 302, 404, 409</td>
<td>7</td>
</tr>
<tr>
<td>Reservoir Engineering</td>
<td>PETE 301, 402, 405, 410</td>
<td>11</td>
</tr>
<tr>
<td>PETE Elective</td>
<td>PETE 4xx</td>
<td>3</td>
</tr>
<tr>
<td>Senior Design Project</td>
<td>PETE 411</td>
<td>3</td>
</tr>
<tr>
<td>Technical Elective</td>
<td>XE xxx</td>
<td>3</td>
</tr>
<tr>
<td>Others</td>
<td>PETE 201, 408</td>
<td>2</td>
</tr>
<tr>
<td>Co-operative Work Requirements</td>
<td>PETE 351</td>
<td>(9)*</td>
</tr>
<tr>
<td>Summer Training</td>
<td>PETE 350</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td>48</td>
</tr>
</tbody>
</table>

The total credit requirements for a B.S. degree in Petroleum Engineering are: **133**

* For students enrolled in the Applied Petroleum Engineering program only.
### Table 2.2: Petroleum Engineering Curriculum

<table>
<thead>
<tr>
<th>COURSE</th>
<th>TITLE</th>
<th>LT</th>
<th>LB</th>
<th>CR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year (Preparatory)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGL 001</td>
<td>Preparatory English I</td>
<td>15</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>MATH 001</td>
<td>Preparatory Math I</td>
<td>3</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>ME 001</td>
<td>Preparatory Shop I</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>PE 001</td>
<td>Preparatory Physical Education I</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total credits required in Preparatory Program:</strong></td>
<td>18</td>
<td>10</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Second Year (Freshman)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 101</td>
<td>General Chemistry I</td>
<td>3</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>ENGL 101</td>
<td>English Composition I</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>MATH 101</td>
<td>Calculus I</td>
<td>4</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>PE 101</td>
<td>Physical Education I</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>PHYS 101</td>
<td>General Physics I</td>
<td>3</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total credits required:</strong></td>
<td>13</td>
<td>9</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td><strong>Third Year (Sophomore)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHE 204</td>
<td>Transport Phenomena I</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>GEOL 201</td>
<td>Physical Geology</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IAS 111</td>
<td>Belief and its Consequences</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>MATH 201</td>
<td>Calculus III</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>ME 203</td>
<td>Thermodynamics I</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>PETE 201</td>
<td>Introduction to Petroleum</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>PETE 204</td>
<td>Reservoir Rock Properties</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total credits required:</strong></td>
<td>16</td>
<td>6</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td><strong>Fourth Year (Junior)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECON 403</td>
<td>Engineering Economics</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>IAS 211</td>
<td>Ethics in Islam</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>ME 205</td>
<td>Materials Science</td>
<td>2</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>PETE 301</td>
<td>Reservoir Engineering</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>PETE 302</td>
<td>Subsurface Production Eng.</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>SE 301</td>
<td>Numerical Methods</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total credits required:</strong></td>
<td>16</td>
<td>3</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td><strong>Summer Session</strong></td>
<td>PETE 399 Summer Training</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Fifth Year (Senior)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAS 311</td>
<td>Islamic Shareah</td>
<td>2</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>PETE 405</td>
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<td>Percent of the Total</td>
<td></td>
<td>28.57</td>
<td>33.08</td>
<td>14.29</td>
</tr>
<tr>
<td>Must Satisfy one set of Conditions</td>
<td>Minimum credit hours (ABET Requirements)</td>
<td>32</td>
<td>60</td>
<td>16</td>
</tr>
<tr>
<td>Minimum Percentage</td>
<td></td>
<td>25</td>
<td>25</td>
<td>12.5</td>
</tr>
</tbody>
</table>

Table 2.6: Courses versus Program Outcomes

<table>
<thead>
<tr>
<th>Courses</th>
<th>Program Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Arabic</td>
<td></td>
</tr>
<tr>
<td>Islamic Studies</td>
<td></td>
</tr>
<tr>
<td>English</td>
<td></td>
</tr>
<tr>
<td>Physical Education</td>
<td></td>
</tr>
<tr>
<td>Chemistry</td>
<td>✓</td>
</tr>
<tr>
<td>Geology</td>
<td>✓</td>
</tr>
<tr>
<td>Mathematics</td>
<td>✓</td>
</tr>
<tr>
<td>Physics</td>
<td>✓</td>
</tr>
<tr>
<td>Social Science</td>
<td>✓</td>
</tr>
<tr>
<td>Engineering</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 201 Introduction to Petroleum Eng.</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 203 Drilling Engineering</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 204 Reservoir Rock Properties</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 205 Petroleum Fluid Properties</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 301 Reservoir Engineering</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 302 Subsurface Production Engineer</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 303 Well Logging</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 306 Well Testing</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 351 Cooperative Work</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 399 Summer Training</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 400 Special Topics</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 401 Reservoir Description</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 402 Reservoir Simulation</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 404 Production Facilities Design</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 405 Water Flooding</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 406 Improved Oil Recovery</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 408 Seminar</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 409 Artificial Lift</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 410 Natural Gas Engineering</td>
<td>✓</td>
</tr>
<tr>
<td>PETE 411 Senior Design Project</td>
<td>✓</td>
</tr>
</tbody>
</table>

* in Arabic
2.2 Assessment of Petroleum Engineering Curriculum

**Standard 2-1:** The curriculum must be consistent and support the program’s documented objectives.

The matrix shown in Table 2.6 linking courses to program outcomes shows that the PETE curriculum is consistent in supporting the program’s documented objectives.

**Standard 2-2:** Theoretical background, problem analysis and solution design must be stressed within the program’s core material.

Courses containing a significant portion (more than 30%) of the elements in Standard 2-2 within the program’s core material are as listed below:

<table>
<thead>
<tr>
<th>Elements</th>
<th>Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theoretical background</td>
<td>PETE:201, 204, 205, 203, 301, 302, 303, 306, 405, 401, 402, 404, 410, 4xx</td>
</tr>
<tr>
<td>Problem analysis</td>
<td>PETE: 204, 205, 203, 301, 302, 303, 306, 405, 401, 402, 404, 410, 4xx</td>
</tr>
<tr>
<td>Solution design</td>
<td>PETE: 203, 302, 303, 306, 405, 401, 402, 404, 410, 4xx</td>
</tr>
</tbody>
</table>

**Standard 2-3:** The curriculum must satisfy the mathematics and basic sciences requirements for the program, as specified by the respective accreditation body.

The PETE curriculum satisfies the mathematics and basic sciences requirements for the program, as specified by the ABET. The ABET requirement is 32 credits whereas the PETE program at KFUPM has 38 credits for mathematics and basic sciences as shown in Table 2.5.

**Standard 2-4:** The curriculum must satisfy the major requirements for the program as specified by the respective accreditation body.

The ABET minimum requirements for major courses is 60 semester credit hours and it must have a minimum of 12 design credit hours. As shown in Table 2.5, the PETE program has 63 semester credit hours for major courses and it includes 19 design credit hours.

**Standard 2-5:** The curriculum must satisfy humanities, social sciences, arts, ethical, professional and other discipline requirements for the program, as specified by the respective accreditation body.
As indicated in Table 2.5, the ABET requirement of a minimum of 16 credits for breadth and depth in the humanities and social sciences is met. The University core curriculum has specific requirements for social sciences, writing skills, oral communications and humanities. The Petroleum Engineering Program requires a total of 17 semester credit hours, including fourteen credit hours of humanities from the Islamic and Arabic Studies Department, and three semester credit hours from the English Language Department. The students are taught and trained in these courses on social communication, including speech, report writing and the spirit of teamwork and collaboration. In addition to the parts that satisfy the basic ABET requirement, the program enhances social and humanities through the PETE Club activities, SPE KFUPM Student Chapter, competitions and field trips.

| Standard 2-6: | Information technology component of the curriculum must be integrated throughout the program. |

Information Technology (IT) is a term that encompasses all forms of technology used to create, store, exchange, and use information in its various forms (business data, voice conversations, still images, motion pictures, multimedia presentations, and other forms, including those not yet conceived). It is a convenient term for including both telephony and computer technology in the same word. In other words, Information technology refers to the processes, software and equipment by which we access, organize, analyze, evaluate and present information. IT encompasses sensing, communications, computing, and human computer interaction technologies. The University administration has been very supportive by enhancing and upgrading the computational facilities at KFUPM and providing INTERNET and other state-of-the-art IT facilities through ITC. In addition to having access to the central ITC computational facility, the PETE Department has one very equipped PC Lab. Currently; the department adopts a policy of encouraging students to use PCs for their homework and lab reports. This issue has been emphasized and conveyed to students through lectures and tutorials in order to demonstrate the skills gained by utilizing computers in the course work. Regarding computer utilization in the curriculum, all PETE students take an introductory course in computer programming (ICS 101). This course provides an overview of computer components and their functions and programming in FORTRAN with emphasis on modular and structured programming techniques. Many courses require the use of computer packages such as MATLAB, SURFER, ECLIPSE, and STATISTICA. Microsoft Excel is often used by students in projects and homework assignments. In addition, in almost all of the PETE courses, faculty members assign computer based homework, computer based projects, and/or require computer typed reports. Furthermore, all faculty members use their web pages or WebCT accounts for course related issues, and hence enhance communication with the students. In each course, student’s competency in computer usage has an important weight in the overall evaluation, and motivates students further in this regard. Computers are utilized throughout the curriculum using numerous general and specialized software packages. Details of computer experience in the required courses and elective courses involving IT are presented in Table 2.7.
### Table 2.7: Information Technology usage in Petroleum Engineering Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Computer Usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>PETE 201</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>PETE 203</td>
<td>Microsoft Office in solving homework and Lab report.</td>
</tr>
<tr>
<td>PETE 204</td>
<td>Microsoft Office in solving homework and Lab report.</td>
</tr>
<tr>
<td>PETE 205</td>
<td>Microsoft Office in solving homework and Lab report.</td>
</tr>
<tr>
<td>PETE 301</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 302</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 303</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 306</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 351</td>
<td>Microsoft Office</td>
</tr>
<tr>
<td>PETE 399</td>
<td>Microsoft Office</td>
</tr>
<tr>
<td>PETE 400</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 401</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 402</td>
<td>Microsoft Office, and Eclips (reservoir simulation package)</td>
</tr>
<tr>
<td>PETE 404</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 405</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 406</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 408</td>
<td>Microsoft Office (power point)</td>
</tr>
<tr>
<td>PETE 409</td>
<td>Computer is used in solving assigned design problems.</td>
</tr>
<tr>
<td>PETE 410</td>
<td>Use of computer is necessary to perform all the homework and design problems.</td>
</tr>
<tr>
<td>PETE 411</td>
<td>Heavy use of computer software to perform various aspects of analysis and design.</td>
</tr>
</tbody>
</table>

### Standard 2-7: Oral and written communication skills of the student must be developed and applied in the program.

The Petroleum Engineering Program assures the development of competence in oral and written communication in the English language for all PETE students by three means:

1. The English courses offered in the Preparatory Year Program (PYP), and
2. The English courses offered in the University English Program (UEP), and required by the Petroleum Engineering curriculum.
3. Engineering courses requiring technical writing and presentations.
The English Language Center (ELC) is in charge of teaching English. English is the mother language of all teachers in the ELC. All prep-year and university students must take the following English courses:

- ENGL 001: Preparatory English I
- ENGL 002: Preparatory English II
- ENGL 101: English Composition I
- ENGL 102: English Composition II
- ENGL 214: Technical Report Writing

Only students who pass the first two courses with a minimum grade of C in each course are allowed to continue in the university. In the last three courses, instruction and practice in writing expository prose are required. In addition, in ENGL 214, writing reports on individually selected projects is required. All students must submit a written report and must make an oral presentation in PETE 411 (Senior Project) and PETE 399 (Summer Training) or PETE 351 (Co-operative Work) - for students in the co-op stream. In addition, in several senior level courses, students are assigned a project that they must present in writing and/or orally. Finally, English is the University language of instruction.
CRITERION # (3)

Laboratory and Computing Facilities
3.1 Introduction
The following tables list all courses taken by Petroleum Engineering students that require a physical laboratory or a computer laboratory. Each laboratory session of 3 hours is worth one credit hour.

### Table 4.1: Laboratories Taken by Petroleum Engineering Students

<table>
<thead>
<tr>
<th>Basic Sciences Laboratories</th>
<th>Other Engineering Laboratories</th>
<th>Petroleum Engineering Laboratories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course No.</td>
<td>Lab hours</td>
<td>Course No.</td>
</tr>
<tr>
<td>PHYS-101</td>
<td>3</td>
<td>ME-205</td>
</tr>
<tr>
<td>PHYS-102</td>
<td>3</td>
<td>EE-204</td>
</tr>
<tr>
<td>CHEM-101</td>
<td>4</td>
<td>ICS-101</td>
</tr>
<tr>
<td>CHEM-102</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>GEOL-201</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>STAT-319</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

3.2 Detailed Description of PETE Laboratories

The departmental laboratories described below are equipped sufficient equipment and instruments to ensure the effective functioning of each laboratory.

1. Drilling Fluid and Cementing Lab.

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Drilling Fluid and Cementing Lab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2, Room 104, ( A = 128 \text{ m}^2 )</td>
</tr>
</tbody>
</table>
| Objectives: | 1. To run drilling fluid and cement experiment.  
2. To conduct research in drilling fluid rheology mud. |
| Adequacy for Instruction | Sufficient |
| Course Taught | PETE 203: Drilling Engineering |
| Software Available | None |
| Major Apparatuses | Volumetric Glassware |
| Major Equipment: | Mud Balance, Marsh Funnel and Cup, Digital P.H. Meter, Rheometers, Viscometers, Filter Presses, Resistivity Meters, Electrical Stability Testers, Retort Kits, Lubricity Testers, Atmospheric Consistometers, Pressurized Consistometer, Pressure Curing, Chamber, Cement Permeameter, Pressure Fluid, Density Balances, Moisture Analyzer |
| Technology | Non-sophisticated |
| Safety Regulations | 1. All students must be familiar with the location and operational procedures of Emergency Shower, Fire Extinguishers, Gas Masks and Fire Blankets.  
2. Lab. coats, safety glasses and safety shoes must be worn at all times during lab. sessions. No ‘thoabs’ and open sandals allowed.  
4. Report any damage to equipment or instrument or glassware to lab. instructor as soon as it occurs |
| Max. No. of STU/LAB | 25/laboratory |
| Type of Support: | University support |
2. Drilling Flow-Loop Lab.

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Drilling Flow-Loop Lab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2, Room 103, ( A = 65 \text{ m}^2 )</td>
</tr>
<tr>
<td>Objectives:</td>
<td>To evaluate drilling fluid properties under dynamic reservoir conditions.</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>None</td>
</tr>
<tr>
<td>Course Taught</td>
<td>None</td>
</tr>
<tr>
<td>Software Available</td>
<td>None</td>
</tr>
<tr>
<td>Major Apparatuses</td>
<td>-</td>
</tr>
<tr>
<td>Major Equipment:</td>
<td>Thermal Control Panes, Heat Exchangers, Pumping Unit, Multi-Channel Transducer, Corrosion Rate Instrument, Roller Oven.</td>
</tr>
<tr>
<td>Technology</td>
<td>Non-sophisticated</td>
</tr>
</tbody>
</table>

**Safety Regulations**

1. Regularly inspect and check that all Safety Equipment (Emergency Shower, Fire Extinguishers, Gas Masks and Fire Blankets) are in good working condition.
2. Damage to any equipment must be reported immediately for rectification.
3. Any injury must be reported immediately for first aid treatment.

<table>
<thead>
<tr>
<th>Max. No. of STU/LAB</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Support:</td>
<td>University support</td>
</tr>
</tbody>
</table>

3. Drilling Simulator Lab.

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Drilling Simulator Lab.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 3, Room 124, ( A = 80 \text{ m}^2 )</td>
</tr>
<tr>
<td>Objectives:</td>
<td>To run drilling fluid simulator as a part of PETE 302 Lab</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>Sufficient</td>
</tr>
<tr>
<td>Course Taught</td>
<td>PETE 203: Drilling Engineering</td>
</tr>
<tr>
<td>Software Available</td>
<td>Drilling Software</td>
</tr>
<tr>
<td>Major Apparatuses</td>
<td>Instrument accessories and consumables</td>
</tr>
<tr>
<td>Major Equipment:</td>
<td>Program &amp; Miscellaneous Panel, Failure Control Console, Drillers’ Panel, Subsea Panel, Lighting Panel.</td>
</tr>
<tr>
<td>Technology</td>
<td>Sophisticated</td>
</tr>
</tbody>
</table>

**Safety Regulations**

1. All students must be familiar with the location and operational procedures of Emergency Shower, Fire Extinguishers, Gas Masks and Fire Blankets.
2. Trousers, shirts and safety shoes must be worn at all times during lab sessions. No ‘thoabs’ and open sandals allowed.
4. Report any damage to instrument to lab. instructor as soon as it occurs

<table>
<thead>
<tr>
<th>Max. No. of STU/LAB</th>
<th>15/laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Support:</td>
<td>University support</td>
</tr>
</tbody>
</table>
4. Quantitative Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Quantitative Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 105, $A = 43.12, m^2$</td>
</tr>
</tbody>
</table>
| Objectives:                         | 1. To conduct quantitative analysis.  
                                       2. To provide research facilities to faculty and graduate students |
| Adequacy for Instruction            | Sufficient              |
| Course Taught                       | It is a support lab. Mainly utilized by senior design project (PETE 411), MS thesis (PETE 610), Ph D dissertation (PETE 710) and faculty research. |
| Software Available                  | None                    |
| Major Apparatuses                   | -                       |
| Major Equipment:                    | UV Spectrophotometer, Spinning Drop IFT, Density meter, Conductivity meter, Titration unit, Clinical Centrifuge, Dispenser, Moisture Extraction Oven. |
| Technology                          | -                       |
| Safety Regulations                  | Strictly followed       |
| Max. No. of STU/LAB                 | 5/laboratory            |
| Type of Support:                    | University support      |

5. Enhanced Oil Recovery (EOR) Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Enhanced Oil Recovery Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 111, $A = 75.6, m^2$</td>
</tr>
</tbody>
</table>
| Objectives:                         | 1. To conduct senior students design projects.  
                                       2. To provide research facilities to faculty and graduate students in EOR |
| Adequacy for Instruction            | Sufficient                    |
| Course Taught                       | It is a support lab. Mainly utilized by senior design project (PETE 411), MS thesis (PETE 610), Ph D dissertation (PETE 710) and faculty research. |
| Software Available                  | None                           |
| Major Apparatuses                   | -                              |
| Technology                          | -                              |
| Safety Regulations                  | Strictly followed              |
| Max. No. of STU/LAB                 | 6/laboratory                   |
| Type of Support:                    | University support             |
6. Research Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Research Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 112, A = 75.6 m²</td>
</tr>
<tr>
<td>Objectives:</td>
<td>1. To conduct senior students design projects.</td>
</tr>
<tr>
<td></td>
<td>3. To provide research facilities to faculty and graduate students</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>Sufficient</td>
</tr>
<tr>
<td>Course Taught</td>
<td>It is a support lab. Mainly utilized by senior design project (PETE 411), MS thesis (PETE 610), Ph D dissertation (PETE 710) and faculty research.</td>
</tr>
<tr>
<td>Software Available</td>
<td>None</td>
</tr>
<tr>
<td>Major Apparatuses</td>
<td>-</td>
</tr>
<tr>
<td>Major Equipment:</td>
<td>Syringe pump system, Syringe pump system, Beckman Pump, Dead weight tester, Vacuum pump, production Fluid separator, Vacuum Oven, Oven, Mercury Column Tester, Cabinet Oven</td>
</tr>
<tr>
<td>Technology</td>
<td>-</td>
</tr>
<tr>
<td>Safety Regulations</td>
<td>Strictly followed</td>
</tr>
<tr>
<td>Max. No. of STU/LAB</td>
<td>3/laboratory</td>
</tr>
<tr>
<td>Type of Support:</td>
<td>University support</td>
</tr>
</tbody>
</table>

7. Petroleum Fluid Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Petroleum Fluid Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 113, A = 90 m²</td>
</tr>
<tr>
<td>Objectives:</td>
<td>1. To teach the students to measure the reservoir fluid properties.</td>
</tr>
<tr>
<td></td>
<td>2. To provide research facilities to faculty and graduate students in petroleum fluid properties.</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>Sufficient</td>
</tr>
<tr>
<td>Course Taught</td>
<td>Petroleum Fluid properties (PETE 205)</td>
</tr>
<tr>
<td>Software Available</td>
<td>None</td>
</tr>
<tr>
<td>Major Apparatuses</td>
<td>-</td>
</tr>
<tr>
<td>Major Equipment:</td>
<td>Digital Tensiometer, Rolling Ball Viscometer, Oswald kinematic Viscosity Heating bath, Brookfield Viscometer, PVT system, Density Meter</td>
</tr>
<tr>
<td>Technology</td>
<td>-</td>
</tr>
<tr>
<td>Safety Regulations</td>
<td>Strictly followed</td>
</tr>
<tr>
<td>Max. No. of STU/LAB</td>
<td>25/laboratory</td>
</tr>
<tr>
<td>Type of Support:</td>
<td>University support</td>
</tr>
</tbody>
</table>

8. Rock Mechanic Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Rock Mechanic Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 109, A = 60 m²</td>
</tr>
<tr>
<td>Objectives:</td>
<td>To provide research facilities to faculty and graduate students.</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>None</td>
</tr>
<tr>
<td>Course Taught</td>
<td>None</td>
</tr>
<tr>
<td>Software Available</td>
<td>None</td>
</tr>
</tbody>
</table>
9. Core Preparation Laboratory

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Core Preparation Laboratory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 2 Room 108, $A = 45$ $m^2$</td>
</tr>
</tbody>
</table>
| Objectives:           | 1. To prepare core samples for testing.  
                        | 2. To provide facilities for fabricating physical models  
                        | 3. To support maintaining and fixing equipments          |
| Adequacy for Instruction | Sufficient                        |
| Course Taught         | None                                |
| Software Available    | None                                |
| Major Apparatuses     | -                                   |
| Major Equipment:      | 1. Mighland Park cutting machine  
                        | 2. Turret drilling and cutting machine  
                        | 3. ELE core cutter  
                        | 4. Black and Decker bench grinder  
                        | 5. lathe machine  
                        | 6. Automatic Drill Press          |
| Technology            | -                                   |
| Safety Regulations    | Strictly followed                   |
| Max. No. of STU/LAB   | -                                   |
| Type of Support:      | University support                 |

10. Petroleum Engineering Computer Lab

<table>
<thead>
<tr>
<th>Laboratory Name</th>
<th>Petroleum Engineering PC Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location &amp; Area:</td>
<td>Building 3 Room 222, $A = 86$ $m^2$</td>
</tr>
<tr>
<td>Objectives:</td>
<td>Teaching and Research</td>
</tr>
<tr>
<td>Adequacy for Instruction</td>
<td>Users are regularly instructed and updated about the utilization of LAB</td>
</tr>
<tr>
<td>Course Taught</td>
<td>PETE 404, PETE 306, PETE 545 and PETE 408</td>
</tr>
<tr>
<td>Software Available</td>
<td>ECLIPSE, MATLAB, SAPHIR, SURFER, FORTRAN POWER STATION, STATISTICA, GRAFWIN AND AUTOCAD</td>
</tr>
<tr>
<td>Major Apparatuses</td>
<td>-</td>
</tr>
<tr>
<td>Major Equipment:</td>
<td>IBM Dual Processor Server (1), HP LaserJet Printer (1), Epson Dot-Matrix Printer (1) and IBM P IV Computers (30)</td>
</tr>
<tr>
<td>Technology</td>
<td>Latest</td>
</tr>
<tr>
<td>Safety Regulations</td>
<td>University safety regulations are followed</td>
</tr>
<tr>
<td>Max. No. of STU/LAB</td>
<td>30/laboratory</td>
</tr>
<tr>
<td>Type of Support:</td>
<td>University support</td>
</tr>
</tbody>
</table>
### 3.3 Assessment of PETE Laboratories

<table>
<thead>
<tr>
<th>Standard 3-1:</th>
<th>Lab manuals/documentation/instructions for experiments must be available and readily accessible to faculty and students.</th>
</tr>
</thead>
</table>

For each course offered by the department, that requires laboratory activities, a manual is prepared. The manual is updated to reflect the state-of-the-art in the respected field. The manual is made available to all students taking the course, and the faculty teaching the course. Most the existing labs have sufficient space and enough manpower to run them. All labs are accessible to faculty for research purposes. Even though some existing labs are under continuous development, they are, for the time being, satisfying all criteria for quality instruction. Some existing labs need to upgrade their equipment and/or instruments such as Petroleum Fluid Properties (PVT) Lab. The PC lab needs to be expanded to accommodate more stations to cope with the increasing student enrollment. The production lab is being developed.

<table>
<thead>
<tr>
<th>Standard 3-2:</th>
<th>There must be adequate support personnel for instruction and maintaining the laboratories.</th>
</tr>
</thead>
</table>

Lab technicians and research assistants, in addition, to faculty members help in conducting the laboratory activities. The personnel support available for the laboratories is fair. There is a need for one laboratory technician or engineer with good skills in computer and network related technologies.

<table>
<thead>
<tr>
<th>Standard 3-2:</th>
<th>The University computing infrastructure and facilities must be adequate to support program’s objectives.</th>
</tr>
</thead>
</table>

There is an adequate number of computer labs in the Department and the College to support courses and student needs outside the classroom. The Information Technology Center (ITC) also provides computing support for education, research, and administrative applications for the University community. It also provides services for governmental and industrial agencies. The ITC supports the following services through its network:

- e-mail,
- centralized printing,
- software repositories,
- application servers,
- remote access services,
- WWW services, and
- Interactive Voice Response (IVR) services.

Academic Computer Services (ACS) at ITC, is dedicated to academic support. It offers services to faculty, students (graduate and undergraduate), and research staff. ACS has a number of full time staff members supporting the engineering programs and one available at the “help desk”. Seminars and short courses are offered each semester. Manuals and in-house documents are prepared for all software. The support of the ACS covers: (1) Installation and software support (2) Selection and distribution of PC and peripheral hardware (3) Software volume licensing and (4) University course exams, entrance exams, faculty performance and course evaluation services.
CRITERION # (4)

Student Support and Advising
4.1 Introduction:
In accordance with the University’s policy, the PETE Department is dedicated to advise students effectively. The University publishes the Undergraduate Bulletin (UB) every two years describing all University, College, and Program requirements. The mission, objectives, course requirements and course options for both degrees offered by the PETE department are provided in the Bulletin. The department has also prepared a flow chart for the required courses and prerequisites for each program. Students can perform early-registration, registration, drop and add without the need to consult their respective academic advisors. However, students are strongly encouraged to consult their respective advisors during early registration and registration time for clarification and seeking expert advice. The faculty members in the department are asked to provide extra office hours during these activities.

4.2 Criterion Assessment

**Standard 4-1:** Courses must be offered with sufficient frequency and number for students to complete the program in a timely manner.

- Department’s core courses are offered based on the number and needs of the students. Most frequently each core course is offered once a year. This strategy is very helpful to the students. However, during summer session, two-hundred-level courses such as PETE 203, 204, and 205 are usually offered, which will extremely help the students in timely completion of their BS program.

- Elective courses are offered based on the needs of the students. Students together with their advisors decide which elective is desired and the chairman is informed prior to the early registration period in order to include that course in the list of courses to be offered during the following semester.

- Required courses outside the department are offered according to the plan of the program. These courses are mostly offered every semester. Therefore, there is no difficulty for the students in taking these courses.

**Standard 4-2:** Guidance on how to complete the program must be available to all students and access to qualified advising must be available to make course decisions and career choices.

- The office of the registrar maintains an updated website where each student can login to his account and find information about:
  1. The latest approved curriculum.
  2. The prerequisite structure of the courses.
  3. The list of Petroleum Engineering elective courses.
  4. The list of acceptable technical electives.
  5. The list of humanities/social sciences courses.

Also, the registrar's office maintains a computerized system called “sisweb”, which generates a report for each student entitled: Analysis of Academic Progress. This report contains a list of courses already taken along with the respective grade, a list
of courses yet to be taken, and a list of PETE electives, technical electives and social courses. Generally, students are informed about program requirements by (1) Department brochures (2) Department bulletin boards, (3) Department web pages, (4) registrar's office, and (5) University bulletins.

- Students at KFUPM are encouraged to be responsible for knowing their own academic standing and requirements in reference to University and College standards, regulations, and degree requirements. In addition to the Undergraduate Bulletin (UB), the department has also prepared a flow chart for the required courses along with their pre-requisites and co-requisites. Students can collect these charts from their academic advisors or directly from the department secretaries. Each Petroleum Engineering student has an academic adviser and his adviser is a Petroleum Engineering faculty member. The university has established rules regarding the maximum and minimum number of credit hours a student can take. These hours depend upon the student cumulative and semester GPA. Any violation of the rules is detected by the registrar’s computer registration system. Students are encouraged to contact their advisor to get assistance in planning their courses and other career choices. The advising system at KFUPM has been in transition in the past couple of years from advisor-dependent toward student-dependent. Students now can perform early-registration, registration, drop and add without the need to consult their respective academic advisors. In certain specific circumstances, students have to consult with their respective advisors and get approval for special requests such as increasing the course load limit. However, in all circumstances students are strongly encouraged to consult their respective advisors during pre-registration and registration time for clarification and seeking expert advice. The faculty members in the department are asked to provide extra office hours during these activities.

- The University's Student Affairs Department offers a multitude of academic and nonacademic services from the date of student’s joining until graduation. These include student services, housing, student activities, cooperative program, and summer training program. Student affairs also offer student services through the Counseling and Advising Center (CAAC) where individual student or group of special-need students can have professional academic, social counseling, or personal skills improvement programs. The Student Affairs also organizes an annual Career Day where students have the opportunities to interact with local industry practitioners, to observe the job market, and to seek jobs. Together with Petroleum Engineering Club, the department organizes meetings where the PETE Department chairman, faculty and students discuss the different aspects of students learning.

- Students can join the Society of Petroleum Engineers (SPE) by direct contact with the elected Society Officers and benefit from attending technical meetings and seminars, as well as getting acquainted with their prospective peers in industry. However, there are no incentives for involvement at present. Only students with self-initiative and vision for their future participate in such activities. Due to great significance, students must be motivated to actively participate in such organizations. This is an area where faculty members and the Department can play a proactive role. Generally, there is no specific platform for providing opportunities to join international technical and professional societies.
CRITERION # (5)

Faculty
5.1 Introduction:

The full time faculty of the Petroleum Engineering Department is committed to program development and course coverage, in addition to maintaining continuity and stability. The interests and qualifications of all faculty members are sufficient to teach all courses, as well as plan, modify and update courses and curricula. All faculty members have acquired high levels of competence in their areas of specialty through their academic work experience.

5.2 Criterion Assessment

Table 5.1: Faculty distribution by program areas of specialization.

<table>
<thead>
<tr>
<th>Program area of specialization</th>
<th>Courses in the area</th>
<th>average number of sections per year</th>
<th>Number of faculty members in each area</th>
<th>Number of faculty with Ph.D. degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drilling Engineering</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Formation Evaluation</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Production Engineering</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Reservoir Engineering</td>
<td>4</td>
<td>6</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Petroleum Economics</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>11</strong></td>
<td><strong>21</strong></td>
<td><strong>7</strong></td>
<td><strong>7</strong></td>
</tr>
</tbody>
</table>

Standard 5-2: All faculty members must remain current in the discipline and sufficient time must be provided for scholarly activities and professional development. Also, effective programs for faculty development must be in place.

The criterion for a faculty member to be deemed current is that a faculty member needs to be actively involved in teaching and research which means that all faculty members are active. Active involvement in teaching requires teaching at least one undergraduate course per academic year and 2 different courses over a period of 5 years, in addition to active participation in academic development programs on effective teaching organized on campus. Active involvement in research requires yearly involvement in one of the following: a refereed journal publication or a refereed conference publication or a funded research project. The outcome of the research production over a period of 5 years is then manifested by 5 refereed publications; of which at least 2 should be refereed journal publications. The average teaching load in the department is about 7 credit hours, in addition to membership of two standing committees per year. Hence, a
full-time faculty member has sufficient time for scholarly and professional development. Also, some faculty members are assigned a Research Assistant for 3-hours weekly to help in this regard.

The Academic Development Center (ADC) at the University organizes a number of short courses, workshops and forums in issues related to faculty development such as effective teaching, use of instructional technology in teaching, peer consultation and effective research. Also, the ADC offers grants and fellowships for research on activities that assist in enhancing teaching and student learning and grants for developing online courses. A good number of Petroleum Engineering Faculty members do participate in these activities and found them to be very effective in their development. Also, the University has venues for funded research projects and use of instructional technology and IT tools in teaching and does support participation in international and national conferences and workshops.

Faculty development programs at the department or university levels are evaluated through the evaluation of each activity being carried out in this regard. Evaluation forms for each activity are completed by the participants and the results are analyzed and used as a feedback to improve all the aspects of such activities. These activities always cover the latest developments in the areas of teaching and research at the university level. Also, the department uses the productivity of its faculty members in attending local and international conferences and in journal publications to assess the level of its faculty development.

**Standard 5-3:** The process of recruiting and retaining highly qualified faculty members must be in place and clearly documented. Also processes and procedures for faculty evaluation, promotion must be consistent with institution mission statement. These processes must be periodically evaluated to ensure that it is meeting its objectives.

1. **Recruiting Process**

The competent full-time faculty constitutes one of the strengths of the program. All of the faculty members in the department hold Ph.D. degrees and generally have graduated from reputed universities with diverse backgrounds of academic and non-academic experiences. The regulating policy for faculty recruitment, selection and mentoring described below is observed for all applications that are reviewed by the concerned committee in the department. Faculty appointments are generally made from candidates of outstanding technical competence and on the basis of demonstrated achievement in teaching, research and industrial experience. The recruitment procedure is normally applied to all faculty positions that include professorial ranks, instructors, lecturers, research assistants, and graduate assistants.

- **Professorial rank faculty and lecturers**

  The procedure for recruiting new professorial rank faculty and lecturers is described below:

  1. Advertisement of available faculty positions for professorial rank faculty members and lecturers is published in the University web-page, departmental web-page and local and professional international journals.
The applicants are requested to provide complete resumes and application forms, along with photocopies of official transcripts/degrees, list of publications, especially those published in refereed professional journals, and at least four references with their complete addresses. In addition, they are asked to submit statements about their research, scholarly interests and their teaching experience. Applicants are selected on a merit basis after conducting their personal interviews with the University representative.

2. Application files for professorial rank, instructor and lecturer are reviewed and evaluated by the PETE council. The application files are reviewed on the basis of their qualification and demonstrated achievements in teaching and research.

3. The Chairman in consultation with the Dean of College of Engineering Sciences and based on the need of the department recommends to recruit a new faculty or a replacement for a faculty position. The requests of recruitment are submitted to the Vice Rector for Academic Affairs who will advise the Dean of the Faculty and Personnel Affairs to complete the recruitment process. The recommended application files along with the proposed academic ranks, salary ranges and teaching responsibilities are then forwarded to the Rector for final approval. University representative arrange personal interviews with the applicants in their locations. The interview reports are sent to the Chairman and the final selection of new recruitments will be sent to the Dean of Faculty and Personnel Affairs for approval. The selection methods are based on the expectations of the applicant and the need of the department.

- **Lecturers-B and research/ graduate assistants**
  There is a certain amount of attention in the practice of recruiting, selecting and mentoring lecturers-B, research assistants and graduate assistants. Only the excellent applicants who graduated from top universities with high academic records (GPA>3.00/4.00 or equivalent) are evaluated and recommended by the department council for recruitment. The Chairman reviews the recommended application files and then forwards them to the Dean of Graduate Studies for final approval. Graduating students with outstanding academic achievements are encouraged by the faculty to join as graduate assistants. Students interested in becoming graduate assistants are interviewed and examined by the Department Council. The recommended applicants are encouraged to submit their employment applications in the last semester of their graduation in order to expedite the employment process.

2. Faculty evaluation
The performance of a faculty member in teaching, research and other university services is evaluated annually. Faculty evaluations are based on their teaching performances, self-evaluation and chairman’s evaluation. The teaching evaluation is based on the students’ input and is conducted every semester for all courses offered in the department. Toward the end of the second semester, faculty members are requested to fill out their self-evaluation forms. After the Chairman reviews the teaching evaluations and self evaluations, he forwards them along with his input to the Dean of
College of Engineering Sciences, which are subsequently sent to the Dean of Faculty and Personnel Affairs. Then the Faculty Affairs Committee, which is appointed each year as one of the standing committees of the University and chaired by the Dean of Faculty and Personnel Affairs, reviews and finalizes the faculty evaluations. The annual performance evaluation of each faculty member is sent directly to the faculty member himself every academic year.

3. Faculty benefits
Maintaining the high standards and continuously improving the quality of teaching, research and other services in the University are enhanced by associating the benefits, incentives and awards granted to the faculty with their development, productivities and achievements. The outcome of the rewarding policy is clearly evidenced by progress observed in teaching and level of the program graduates, increased rate of publications in reputed journals and research contributions, in addition to the professional satisfaction level among faculty members. The policy has furnished a stable educational environment and ensured the continued teaching competence and professional growth of the faculty. The major benefits, incentives and awards offered to the faculty which contribute in retaining excellent faculty members, include the following:

1. Free furnished housing on-campus.
2. Competitive salaries based on qualifications and experience.
3. Prepaid round-trip air tickets up to a maximum of four tickets for the travel of the faculty and his dependents to the official point of origin.
4. Two months annual vacation with pay eligible after completion of 10 months on academic duty.
5. A local transportation allowance provided according to the faculty rank, up to SR 7200 per year.
6. A termination-of-service benefit equivalent to one month of annual base salary for completion of each full year of service, for a ceiling sum of SR 100,000.
7. Educational assistance grants with local tuition fees of maximum total amount of SR 25,000 for school-age dependent children.
8. Merit increase in salaries based on the ratings of the faculty performance each year.
9. Instituting the policy of yearly grants of excellence awards in teaching, research, and services.
10. Availability of University-funded research in the forms of grants and released time.
11. Encouragement of faculty to author textbooks by providing financial grants.
12. Availability of a sabbatical leave program. A faculty member is eligible for a sabbatical leave after completion of 5 years of full academic service at KFUPM.
13. Participation in contractual research projects funded by external clients.
14. Facility in offering and organizing short courses.
15. Support to attend one local and one international conference each year by providing air tickets, per diem, and registration fees based on a paper presentation or published paper in a refereed journal.

Some of the above benefits like free on-campus housing, repatriation tickets, educational assistance grants, and termination benefits apply only to expatriate faculty members. The salary scale and benefits of Saudi Arab Faculty are according to the
Civil Service Regulations.

4. Faculty promotion

The faculty promotion policy is designed to encourage academic excellence and to guard against mediocrity and marginal contribution. Hence, achievements of faculty members are evaluated in comparisons with international standards in all areas relevant to the University programs. The promotion process aims at determining the promotability of the candidate and provides feedback to the candidate through the college dean on his performance in research, teaching, and public and university services.

The procedure implemented in the department for faculty promotion follows precisely the University regulations. The University policies and regulations regarding faculty promotion are described in detail in the KFUPM booklet: Faculty Promotion; Regulations & Guidelines, September 2000.

Faculty input for their motivation and job satisfaction has been solicited through the faculty survey form (Appendix C-4). Four faculty members responded to the survey, two of them are professors, and two are associate professors. Analysis of the responses to items 1 through 13 of the survey indicates that more than 90% of the faculty members are satisfied with all the items addressed in the survey. Around 10% of the faculty members are unsatisfied. The results of the analysis are shown in Table 5.2. The faculty responses regarding programs/factors available for faculty motivation and job satisfaction and suggestions for further improvement are summarized as follows:

Suggestions:
1. Exposure of faculty members to industry experience.
2. Improve quality of students.
3. Graduate program need to be revitalized to attract more participants. Saudi, and even international, students should be encouraged since this will improve research capabilities.
4. Course contents should be reviewed and updated according to a master-plan that fills gaps between courses.
5. Provide more flexibility in the 4th year courses of undergraduate program and allow 2-summers of training.
6. Impose minimum GPA limit upon students choosing the PETE program.
7. Promote faculty motivation by boosting salaries.

Best factors available:
1. Small department with close faculty-student interaction and strong team spirit.
2. Active support by the administration and Saudi Aramco.
3. Lab facilities are very good.
4. Computer facilities and support are excellent.
Table 5.2: Results of Faculty Survey

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Weight Average out of (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Your mix of research, teaching and community service. Bottom of Form</td>
<td>2.43</td>
</tr>
<tr>
<td>2</td>
<td>The intellectual stimulation of your work Bottom of Form</td>
<td>2.86</td>
</tr>
<tr>
<td>3</td>
<td>Type of teaching/research you currently do. Bottom of Form</td>
<td>2.67</td>
</tr>
<tr>
<td>4</td>
<td>Your interaction with students. Bottom of Form</td>
<td>3.00</td>
</tr>
<tr>
<td>5</td>
<td>Cooperation you receive from colleagues. Bottom of Form</td>
<td>2.86</td>
</tr>
<tr>
<td>6</td>
<td>The mentoring available to you. Bottom of Form</td>
<td>2.33</td>
</tr>
<tr>
<td>7</td>
<td>Administrative support from the department. Bottom of Form</td>
<td>2.14</td>
</tr>
<tr>
<td>8</td>
<td>Providing clarity about the faculty promotion process.</td>
<td>2.57</td>
</tr>
<tr>
<td>9</td>
<td>Your prospects for advancement and progress through ranks. Bottom of Form</td>
<td>2.43</td>
</tr>
<tr>
<td>10</td>
<td>Salary and compensation package. Bottom of Form</td>
<td>1.14</td>
</tr>
<tr>
<td>11</td>
<td>Job security and stability at the department Bottom of Form</td>
<td>3.43</td>
</tr>
<tr>
<td>12</td>
<td>Amount of time you have for yourself and family. Bottom of Form</td>
<td>1.29</td>
</tr>
<tr>
<td>13</td>
<td>The overall climate at the department.</td>
<td>2.57</td>
</tr>
</tbody>
</table>

Figure 5.1: Distribution of satisfaction degree for Faculty Survey
CRITERION # (6)

Process Control
6.1 Introduction

The processes for executing the major functions of the program that include student admission, student registration, faculty recruitment, teaching, and graduation are documented and conducted in a well-organized manner. These processes are controlled, periodically reviewed, evaluated and continuously monitored and improved. The details of delivering and controlling these processes are described below.

6.2 Criterion Assessment

<table>
<thead>
<tr>
<th>Standard 6-1:</th>
<th>The process by which students are admitted to the program must be based on quantitative and qualitative criteria and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.</th>
</tr>
</thead>
</table>

- **Admission Process:**

  The process of admitting students to the program is carried out on quantitative and qualitative bases, as clearly documented by the Deanship of Admission and Registration. The process is evaluated regularly every semester to ensure that it is meeting its objectives. The process consists of well-defined procedures and steps executed at the University, college, and departmental levels. Based upon the recommendation of the college councils and the Deanship of Admission and Registration in coordination with the Deanship of Educational services, the number of new students to be admitted in the following academic year is determined by the University Council. Each admitted student is assigned a unique identification number that reveals the year of his admission. A student admitted to the University must have satisfied the following conditions:

  1. Obtained the secondary school certificate or its equivalent from inside or outside the Kingdom of Saudi Arabia. Saudi secondary school certificates are in the natural, or technological sciences, or the administrative and social sciences.
  2. Obtained the secondary school certificate in a period less than 5 years prior to the date of application.
  3. Have a record of good conduct.
  4. The applicant is required to take the KFUPM entrance examination consisting of two parts, i.e., RAM I and RAM II. RAM I, an aptitude test, has two components: Mathematics and Linguistics. The test is aimed at determining the general capabilities of students in the two areas mentioned above. Students having graduated from High School are eligible to sit RAM I. Students who pass the RAM I exam are required to take the RAM II exam. Generally, about 25% of the entrants of RAM I make it to the stage of RAM II. RAM II is an objective type multiple-choice test given in four subjects, i.e., Mathematics, Physics, Chemistry and English.

  The objective of this examination is to evaluate the student’s knowledge and ability in English and Science. Out of those who pass RAM I and RAM II, the best students are selected for admission taking into consideration both their high school grade and the two test results. The number of students accepted is limited to the number of seats available as decided by the University Administration based on the capacity of resources at the University.
Application for the entrance examination constitutes application for admission to KFUPM. The entrance examination is administered in the major cities of Saudi Arabia each summer.

5. Have physical fitness and good health;
6. Have approval from employers in case employed.

Generally, newly admitted students are enrolled in the preparatory year program in the University before starting their undergraduate program. The courses covered in the two semester preparatory year are English, mathematics, graphics, workshop, and physical education. Students may be exempted from the entire preparatory year program if their proficiency in English and mathematics in the promotion exam are established. Students who pass the requirements of either English or mathematics part, are partially promoted to the next academic level, but are required to fulfill the remaining requirement in the same year. The preparatory year requirement is fulfilled by completing all the required courses with grade C or better in the first and the second level courses of English and grade C or better in the first or the second level course of mathematics.

The Deanship of Admission and Registration and the colleges in the University coordinate with each other in the matter of determining the majors of the students who are completing the preparatory year program. The major of each student is determined according to his own choice provided the required criterion of the major is satisfied. Students select their majors immediately after they complete the preparatory year program; qualified students are admitted directly into the selected majors of the undergraduate program as freshmen. Lists of new freshmen students of each major are communicated to the concerned departments at the beginning of each semester by the Deanship of Admission and Registration. Students are required to earn a minimum grade of C in each course of English and mathematics of the first and second levels of the preparatory year to select majors in the Colleges of Engineering Sciences and Applied Engineering.

- **Transfer from outside the university:**
  The transfer of a student from outside the University may be accepted under the following conditions:
  1. The student should have been enrolled at a recognized college or university.
  2. The student must not have been dismissed from that university for disciplinary reasons.
  3. The student must satisfy the transfer provisions as determined by the University Council.

All transfer applications are submitted to the Admission and Academic Standing Committee which studies the application and ensures that the applicant fulfills the above requirements, in addition to any other provisions the Committee deems necessary, in coordination with the colleges concerned.

The Council of the College of Engineering Sciences shall review the courses taken by the student outside the University based on the recommendations of the department which offer equivalent courses. The courses are usually evaluated by the Curriculum Committee in the department and approved by the Chairman. The courses evaluated as equivalent will be transferred to the student’s record but will not be included in the
calculation of his cumulative GPA.

In order to get transfer of credit for any course taken outside the University, the student should:

1. Have obtained a grade of C or higher in that course.
2. Have taken the course at a recognized college or university.
3. Have taken a course equivalent in all respects to one of the courses which are included in the KFUPM degree requirements;
4. The grade earned by the student in the course is not included in the student’s cumulative GPA.

If, after his transfer, it is discovered that a student had been dismissed from his previous university for disciplinary reasons, his enrollment will be considered canceled as from the date of acceptance of his transfer to the University.

The transfer of a student from one university to another during any semester takes place in accordance with the procedures and the dates announced by the university to which the student is transferring, under the general transfer rules.

**Transfer from another college in the university:**
A student may be transferred from another college to the program inside the university in accordance with University Council rules as follows:

1. A student may transfer from one college to the program within the University before he completes the sixth academic level.
2. The student should continue to study all the courses registered for at the level preceding the transfer, in compliance with the adding and dropping rules.
3. The transfer from one college to another will be recorded in the academic record of the student the term following his transfer.
4. A student is allowed a maximum of two transfers from one college to another.

The academic record of a student transferred from one college to another includes all the courses he has studied together with the grades and the semester and cumulative GPA’s obtained throughout his period of study at the University.

**Transfer from another major within the college:**
With the approval of the Dean of the College of Engineering Sciences, a student may transfer from one major to program within the college according to the following rules:

1. A student may transfer from one major to the program at any time before he completes the sixth academic level. The Council of the College of Engineering Sciences may consider exceptional cases where students have already completed the sixth level.
2. The transfer will be recorded in the academic record of the student at the beginning of the term following the transfer.
3. A student is allowed a maximum of two transfers from one major to another within the same college. The college council may consider exceptional cases.

The academic record of a student transferring from one major to another will include all the courses the student has taken, including the grades and the semester and cumulative GPA’s.
GPA’s obtained throughout his period of study at the University. The detailed policies and regulations regarding credit transfer of students are described in KFUPM Undergraduate Study and Examinations Regulations, and the Rules of their Implementation booklet.

**Standard 6-2:** The process by which students are registered in the program and monitoring of students progress to ensure timely completion of the program must be documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

Students usually register in the program at the end of the second term in the preparatory program. Once registered in the program, they may register the courses offered for their degree over the internet. The students are allowed to make all the necessary registration changes directly on line using the Deanship of Admission and Registration (DAR) website: [http://regweb.kfupm.edu.sa](http://regweb.kfupm.edu.sa). Students with good GPA are not required to see their advisor for any approval of adding or dropping. However, students with GPA less than 2.0 are required to consult with their advisors for academic advice. They are fully responsible to ensure that both pre-requisite and co-requisite requirements for the courses registered have been met. The use of on-line registration in the last two years has produced effective results in reducing the time and effort spent in the registration process.

Unfortunately, student monitoring is possible but there is no mechanism for enforcing any changes suggested by the advisor. It seems that the advising system in the institution and in the department is not strong enough.

All faculty members and active students can access the DAR website using their individual pin numbers and passwords. The registration process and its control are conducted on line through the following web-pages of DAR website:

- **Registration Information Web-Page**
  
  All information needed to guide the students in conducting the registration process are provided in details in this web-page. The registration instructions for advisors are also provided. In addition to the course schedule, timing and location, the web-page includes registration procedure, steps for adding and dropping courses, and section changing.

  For students on good academic standing status, the minimum course load is 12 credit hours during a regular semester, provided that the total number of credit hours registered by a student in any two consecutive semesters is not less than 28. This condition is relaxed in the last semester before graduation. The maximum course load is 19 credit hours. A student is permitted to register for 21 credit hours with the approval of the department chairman, if the student has maintained a minimum cumulative GPA of 3.00 out of 4.00 in all works undertaken during the preceding terms in which he earned his last 28 credit hours.

  For students not on good status, the minimum course load is 12 credit hours and the maximum course load is 13 credit hours. Students who have early-registered
in more than 13 credit hours and their academic status are not on good standing should drop course(s) to bring the course load within 13 credit hours. Otherwise, their course(s) will be dropped after the last day of adding. Students who are promoted to freshman level and whose cumulative GPA is less than 2.00 in preparatory year program, their course load should not exceed 13 credit hours.

- **Student Web-Page**
  Students are allowed to perform their registration by themselves through this page. Moreover, each student can view his degree plan, academic record, registered courses, registration violations (if any), mid-term warning grades and final grades. In addition, his advisor's name is provided. However, the information on the page is continuously updated.

- **Faculty Web-Page**
  The advisees of each faculty can collect their web pins from their advisors, which are provided through this page. The faculty can view the names of his advisees with all their academic records, degree plans and the active registered courses. This allows the advisors to verify that his advisees are following their degree plans closely. In addition, the instructor of each course submits the mid-term warning grades of his students, who have low performance in the mid-term exams, to the registrar. These warnings are communicated to these students. The advisor views his advisees' names along with the courses with mid-term warning grades in order to meet and advise them. After the faculty submits the final grades of his courses to the Registrar's Office, he must check and confirm those grades on line through the web-page. The advisee lists and degree plans are updated every semester from the official transcripts of the students by the Registrar's Office.

- **Chairman Web-Page**
  The Chairman monitors all the records of the students; courses offered for registration, number of students registered in each course, list of advisors and their advisees. He also views the mid-term warnings and the confirmed final grades that are submitted by the instructors. The on-line information of student registration facilitates in controlling the registration process such as opening and closing courses/sections and changing the sizes of the sections.

- **Dean Web-Page**
  All the activities related to the registration processes occurring in the departments of the college are monitored by the Dean.

- **Administration Web-Page**
  The registration processes are monitored and controlled by the upper administration.

- **Class Schedule**
  During the early registration period of each semester, the class schedule of the course program of the coming semester is displayed along with the rest of the courses. The course schedule is prepared by the department and submitted to the Registrar. The timing, location and the name of the instructor of each course are provided as well.
Final Exam Schedule
The page displays the dates, timings and locations of final exams of all the courses offered.

Academic Violations
During the early registration and registration, students who registered courses without satisfying the pre- and co- requisites will receive warning to replace the courses otherwise will be dropped.

Academic Calendar
The official dates of the registration and early registration for the academic year are provided in addition to the other deadline dates such as the last day late registration, last day for adding/dropping courses, mid-term grade reports and final exams.

Standard 6-3:
The process and procedures used to ensure that teaching and delivery of course material to the students emphasizes active learning and that course learning outcomes are met. The process must be periodically evaluated to ensure that it is meeting its objectives.

The processes and procedures used to ensure that teaching and delivery of course material is effective and focuses on students learning do exist but they are not currently documented. They include the following:

- **Teaching assignment**
Each semester, the Department council prepares the teaching assignment for the following semester in Coordination with the Department Chairman. Instructors’ teaching preferences are solicited and every effort is made so that instructors are assigned to courses in which they have experience, knowledge and interest. Efforts are also made to limit section sizes to 25 students whenever possible.

- **Course Coordination**
The Chairman selects a faculty member to act as a course coordinator for each multi instructor course. Experienced, competent faculty members with excellent teaching record are usually selected as course coordinators. The duty of the course coordinator/instructor is to ensure that:
  ✓ All the topics of the course syllabus are included uniformly in the course teaching coverage material.
  ✓ Instructional materials are selected based on quality and appropriateness to the course objectives and assigned textbook.
  ✓ Grading scheme is prepared and followed by all instructors teaching the same course.
  ✓ The instructors discuss students’ progress and areas for improvement.
  ✓ Enforcement of the University regulations and policies regarding attendance and absences.
  ✓ Emphasizing the use of computer applications and introducing design oriented problems.
• **Laboratory Coordination**

Every year, the Chairman appoints a laboratory committee and lab coordinator. Their duties are to ensure that:

- Safety regulations are applied in the labs.
- The experiments are streamlined with course lectures.
- Experiments handouts are well prepared and readily available.
- Experimental setups and facilities are properly arranged and maintained.

• **Course files**

A course file contains the documentation of course syllabus, names of students and their grades, copies of all quizzes and exams, homework assignments, copies of term projects, copies of the highest, average, and lowest graded final exams, grader evaluation, and instructor’s report. The course files are kept in the department as a reference.

• **Coop Coordinator**

All the records of student participating in coop program and their progress are handled and documented by the coop coordinator. The coordinator ensures that all the coop requirements have been satisfied before he assigns the coop grades of the students. He processes the progress reports and company evaluations of the students and arranges for the students oral presentations and examining committees.

• **Summer Training Coordinator**

All the records of student participating in summer training program and their progress are handled and documented by the summer training coordinator. The coordinator ensures that all the summer training requirements have been satisfied before he assigning the grades. He also coordinates the process of evaluating the students' final reports.

• **Seminar coordinator**

In order to complement and enrich the academic environment and update the faculty members’ knowledge, seminars are presented approximately every five week. The speakers are either from the PETE faculty, RI or invited from industry or from other academic institutions.

• **Senior design Project coordinator**

The senior design project coordinator divided students into different groups taking into consideration the variation in GPA. Each group has 4 students at maximum and is assigned to a faculty member. The coordinator keeps track of all students’ records and also their progress. The coordinator ensures that all the senior design project requirements have been satisfied before reporting the final grades. He also coordinates the students' oral presentations and exam committees.

• **Students’ supervision**

Every student has an academic advisor. The role of the advisor is to assist his advisees in selecting the courses according to their degree plans, and monitoring their learning performance in courses through the midterm warning grades and final grades.
**Teaching record**
A record-keeping system for faculty teaching performance evaluations, course files, and student feedback is maintained in the department to guide and assist with short- and long-range planning, modification and improving teaching and learning process.

**Curriculum and course syllabus**
From the instructor's input, students' feedback and course files, the Chairman verifies that the contents and objectives of the actual teaching experience are aligned with the syllabi of the courses. Each instructor distributes to his class a copy of the detailed syllabus that contains the course title, textbook, reference books, sequential coverage of the material lecture by lecture, schedule of examinations, grading scheme, attendance policy and other important information.

**Office hours**
Faculty members are requested to allocate a significant amount of time for teaching and meeting their students and advisees. A minimum of 5 hours weekly are scheduled at times convenient to students, distributed over the days of the week. The schedule of the office hours is posted at the instructor's office and a copy is provided to the department.

**Examinations and grade**
Generally, student performance in courses are evaluated by a combination of oral and written examinations, seminars, term projects, homework assignments, laboratory or field work, and final exams depending on the nature of the course. All the examinations, except the finals, are scheduled by the instructors themselves. The final examinations are mandatory for all courses and scheduled by the Deanship of Admission and Registration. The duration of the written final examinations are between one and three hours.

**Textbooks**
The adopted textbooks for teaching are frequently evaluated by the course coordinators and instructors. Proposed new textbooks either as a replacement for an existing one or as a new addition for a course are first evaluated by the Textbook Committee and recommended by the Department Council before obtaining the University approval.

**Process evaluation**
Achieving excellence in teaching and learning is the major focus area of the department. In order to achieve this goal, evaluation and process control of teaching and learning are conducted regularly. Moreover, the department emphasizes improvement in the method of instruction by recommending the instructors to utilize the current modern technologies such as multimedia, audio-visual facilities, computer animations, and models. Aspects of active learning that include student-instructor in class and out of class interaction, homework and project assignments, student presentations, peer discussions, etc. are practiced in all of the courses. In addition, teaching effectiveness is enhanced by encouraging faculty members to attend relevant short courses, workshops, and seminars. The processes and procedures used to ensure that teaching and delivery of course material are effective and focuses on students learning, are conducted through implementing the following practices:
Standard 6-4: The process that ensures that graduates have completed the requirements of the program must be based on standards, effective procedures and clearly documented. This process must be periodically evaluated to ensure that it is meeting its objectives.

At the end of each semester, the Registrar sends a list of candidates for graduation along with their degree audits and transcripts. Each of these graduating students, in consultation with his academic advisor, fills out a graduation declaration form. The Chairman reviews the student records and ensures that all program degree requirements for graduation have been completed. The Chairman then signs the graduation forms and sends them to the Registrar. The Registrar makes a final check and approves the graduation.

The requirements of Engineering Sciences students to qualify for graduation are:
1. Completion of all specified and elective courses according the degree plan of the program (133 credit hours minimum) with a cumulative GPA of 2.00 or better.
2. Achievement of a GPA of 2.00 or better for all courses offered by and taken in the student’s major department.
3. Spending eight weeks in one summer (after either the third or fourth year) working in industry.

For the Applied Engineering students, the requirements for graduation are:
1. Completion of all specified and elective courses according to the degree plan of the program (133 credit hours minimum) with a cumulative GPA of 2.00 or better;
2. Achievement of a GPA of 2.00 or better for all courses offered by and taken in the student’s major department; and
3. Completing successfully, after the third year a 28-week, cooperative program working in industry.

Standard 6-5: The process and procedure of curriculum/course, textbook and lab update and development must be effective and clearly documented.

Curriculum:
Small changes to program curriculum are normally introduced after it gets approved by departmental council. However, major alteration need College and University approval.

Textbooks:
Textbooks are evaluated from time to time to ensure that the best books are adopted. This is not done in any systematic way. It is usually left to the initiative of the faculty member. Proposed new textbooks either as a replacement for an existing one or as a new addition for a course are first evaluated by the Textbook Committee and recommended by the Department Council before obtaining the University approval.

Lab update:
Lab manuals are upgraded almost every year.
CRITERION # (7)

Institutional Facilities
7.1 Introduction

The Administration at KFUPM has always been very vigorous in acquiring and establishing world-class educational infrastructure and facilities. Today, the majority of the classrooms have network-connected computer with in-focus projector for assistance in delivering presentations. The computer labs are equipped with printers, overhead projectors, and some with blackboard. All the PCs are networked and connected to inter and intra-net allowing direct downloading of material needed during class time. The location of the labs, the available software, and the quality of the PCs and servers can be rated as very adequate for the support of new trends in learning. The technical collection of the main library as well as the Petroleum Engineering Department library can be considered as very adequate for the PETE program.

7.2 Assessment of institutional facilities

| Standard 7-1 | The institution must have the infrastructure to support new trends in learning such as e-learning. |

Practically all the classes of PETE/ APETE program are taught in building 3. Classrooms in this building have network connected computers with in-focus projectors for assistance in delivering presentations. These are referred to as “Smart-Classrooms”.

Presently, there are no full on-line-courses available in the department but the department’s main lab is equipped to support e-learning. Meanwhile PETE/APETE students use this lab to access course information and some of course notes, homework assignments and solutions which are made available to them on WebCT. Most of the templates in WebCT include the following:

- Course syllabus and course calendar.
- Course material notes, primarily lectures that students can consult anytime.
- Home work and solutions.
- Grades and feedback on exams.

In addition to the PETE PC lab, the students can use five other general-purpose PC labs that are directly administered by the KFUPM Information Technology Center (ITC). These labs have an average of 30-networked PCs. These facilities are located in four different buildings: 4, 9, 14 and students’ dorms. In summary, there are 30 networked PCs in the Petroleum Engineering department and more than 120 others in the ITC general-purpose computer labs. Excluding the later, the PC to student ratio in PETE department is about 1 to 8. This falls a little below the standard of 1 to 5 set by the Ministry of Higher Education. So far, except for registration periods, no queues ever seen in any of the computer facilities.

The location of computer labs, quality of the PCs and servers and the available software can be rated as very adequate for supporting new learning trends. The Ministry of Higher Education standard can be considered as fulfilled if the general-purpose computer labs are considered. The number of smart classrooms should be increased to allow the instructor to efficiently utilize multimedia in teaching; however, the classical chalk-type blackboards should not be removed from these classrooms. Faculty should be encouraged to develop ore on-line courses. The support of the PETE department and DAD in this effort is of utmost importance.
**Main Library:**
The main University Library is well-established with contemporary online computer search and other facilities. The KFUPM main library is basically a science and engineering library and nearly 80% of its collection is related to the fields of science and engineering. The collection includes books periodicals, proceedings, theses, reports, maps, charts, electronic resources, and audiovisual materials. The details of the collection are as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monographs</td>
<td>314,189 (Volumes)</td>
</tr>
<tr>
<td>Periodicals (Bound)</td>
<td>72,603 (Volumes)</td>
</tr>
<tr>
<td>Periodicals titles</td>
<td>1,169</td>
</tr>
<tr>
<td>Electronic Journals</td>
<td>2,725</td>
</tr>
<tr>
<td>Electronic documents</td>
<td>365</td>
</tr>
<tr>
<td>Electronic Databases</td>
<td>24</td>
</tr>
<tr>
<td>Microfilms</td>
<td>37,585 (Reels)</td>
</tr>
<tr>
<td>Microfiche</td>
<td>486,923 (Pieces)</td>
</tr>
<tr>
<td>Films</td>
<td>2,516</td>
</tr>
<tr>
<td>Other media</td>
<td>23,947</td>
</tr>
</tbody>
</table>

Further to the collection described above, the KFUPM Library, during the last few years, has focused its attention to supplement printed texts with electronic formats. The pace of development of electronic resources was accelerated and many of the printed journals, subscribed by the Library, are now available through the Library web site. These are in addition to the Internet access of many databases like
- ACM Digital Library, which includes access to the Association of Computing Machinery journals and conference proceedings.
- MathSci Net, which provides access to American Mathematical Society's journals and Mathematical Reviews
- OIL (Online Information Library) which provides access and download to more than 30,000 technical papers from the Society of Petroleum Engineers (SPE) Library
- ABI/INFORM which provides access to Business Periodicals
- SIAM (Society for Industrial & Applied Mathematics), and others.

The KFUPM Library is currently subscribing to 11 full-text databases which provide a total 2140 journals. Additional access to 585 electronic journals against print copy subscriptions is available through the library Web site for e-journals. In summary, the technical collection of the library can be considered as adequate for the PETE programs.

**The PETE library**
The Petroleum Engineering library, housed in the PETE department, has a collection of around 350 individual titles of textbooks and handbooks, about 700 journals, 60 short course notes, computer books, 53 MS and PhD theses, and more than 307 Co-op and summer training reports for the period from 1978-2003.
**Support Rendered by the Library**
The support rendered by the KFUPM library can be described by:

1. **Access to Resources on the Internet:** Fourteen out of the 24 databases subscribed to by the library can be reached through desktop of the users’ PCs.
2. **Library Website:** The integrated library Web site through the university Intranet system, in addition to online services such as the KFUPM Online Catalog, WebPAC, it allows also access to electronic journals, databases, encyclopedias, etc.
3. **Audiovisual Support:** Besides in-library services concerning microfilms, videotapes and slides the department has an auditorium facility that can be used for lectures with multimedia presentations.
4. **Online Searching:** Currently, the Library has online access thru the Internet to more than 600 international databases covering science and engineering, and social sciences and humanities.
5. **Interlibrary Loan:** Since 1984, the personal computer is used to organize the growing demand for interlibrary loans (ILLS), to transmit ILL requests abroad, to automate day to-day activities related to the processing and monitoring of ILLs, and to reduce the work related to manual ILL record keeping. All interlibrary loan functions currently are automated.

To facilitate the smooth and continuing supply of ILLs, the KFUPM Library has opened deposit accounts with various lending institutions worldwide:

- a. British Library Document Supply Center, UK
- b. Centrale Bibliothek Technische Hogeschool, The Netherlands
- c. Engineering Societies Library, USA
- d. Universitats bibliothek und Till, Germany
- e. Indian National Scientific Documentation Center, India
- f. GCC University Libraries

In order to cut down the turn around time, the library has decided to source the photocopy requests in electronic format (pdf files) from the British Library, CBT, and other lending institutions.

**Circulation, Reference, Reserve, and Information Services:**
Circulation services provide assistance in check-in, check-out, renewals, searching of material not available on the shelf, holds and recalls, book reserves, and photocopy services. Reference and information services consist of several inter-related activities which include reference and readers' advisory services, interlibrary loan, online searching, assistance in searching of the Internet and Intranet databases, reference collection development, and library orientation and instruction. They explain how to use the library, identify location of various library facilities, provide assistance in using library resources including the computer catalog, and assist in obtaining information from the collection within the library and outside the KFUPM library. The library has a good collection of reference sources, which consist of encyclopedias, dictionaries, manuals guides, directories, yearbooks, almanacs, etc. and full-text databases, Internet resources, and CD-ROM and traditional databases of indexes and abstracts.
• **Library Orientation Programs and Publications:**

To familiarize new students and faculty members with the library services and promotion of library use, the Reference & Information Department of the library gives orientation programs, bibliographic instructions, and organizes library tours and Library Awareness Days and seminars. Library instructions on searching of OPAC and Internet/CD-ROM databases are also given to students and research assistants. One to one and point of use instruction is also available for all types of users through out the year. In addition, the library conducts promotional activities and produces publications on its services and systems. The publications include: Library Newsletter, Library Handbook, Bibliographic Guides, a Comprehensive Guide to the Online Catalog, etc.

• **Selection & Acquisition of Materials:**

The library coordinates selection of appropriate engineering books, periodicals, and other related materials on the basis of anticipated user needs and expressed faculty requests. Subject profiles have been set up with reputable vendors and publishers for receiving updated information on new publications. These resources are scanned by the qualified librarians, and selected titles are sent to the academic departments for their input. Electronic resources like Global Books in Print, Ulrich, and Amazon (online database) are also used for selection. Orders are placed online/e-mail to the vendors/publishers.

• **Physical Facilities, Staff, and Organization:**

  1. **Equipment:**
     - Terminals (33)
     - Microcomputers (107)
     - Microfilm Reader Printers (7)
     - Photocopiers (4)
     - Others: (3) Televisions, (4) video players, (1) film projector, (1) slide projector.

  2. **Seating capacity:**
     - 267 persons

  3. **Library hours:**
     - The library is open for about 15 hours on regular work days and for about 11 hours and 6 hours on Thursday and Friday respectively. These periods are extended during examination weeks.

  4. **Library Staff and Organizational Structure:**
     - The Deanship of Library Affairs is organized with (1) the Collections Development Division (2) the Cataloging Operations Division, and (3) the User Services Division. Each Division is managed by the senior managers, who report to the Dean of Library Affairs. The library has 22 professional staff and 12 professional staff with recognized library service training and support staff of 25. The staff extends help to the faculty and students to meet their academic and research needs.

  5. **Arrangement of Collections:**
     - Library of Congress Classification scheme is followed for arrangement of collection on the shelves. Online Public Access catalog is available for searching the collection of the
library. The functions of the library are fully automated and an integrated Dobis/Libis online system is used for all library functions. Old books and periodicals are available on 3rd and 4th floors, while current periodicals, newspapers, new books, and reference materials are located on the plateau level. Microfilms are located in the microfilms cabinets on the 3rd floor, which are arranged numerically.

The plateau level also has separate collections of textbooks, government publications, and faculty publications. Faculty and students labs for searching electronic databases are also located at plateau level. From the above description of the library services, it can be concluded that the KFUPM library has all the necessary facilities and human resources to provide quality support to the students and faculty of the PETE program.

| Standard 7-3  | Class-rooms must be adequately equipped and offices must be adequate to enable faculty to carry out their responsibilities |

Class rooms
The majority of PETE courses are delivered in classrooms equipped with computer-in-focus projector system. These classes are improving course delivery. However, the support of these computers is not adequate. In many occasions, faculty members complain of finding these systems out of order.

Faculty offices
All PETE faculty offices are housed in building 3. The average surface area of most of the offices is around 15 m². Most of these offices have adequate space, lighting and air conditioning. All offices are furnished with desks, chairs and sufficient bookshelves. Each faculty member is provided with a PC system with network connection and printer. The department has 2 laptops and portable in-focus video projectors for occasional use by faculty in classes for audio-visual and multi-media applications.
CRITERION # (8)

Institutional Support
Standard 8-1  There must be sufficient support and financial resources to attract and retain high quality faculty and provide the means for them to maintain competence as teachers and scholars.

The financial matters at KFUPM are run by the KFUPM administration, and little is left at the departmental levels. The university provides the financial support needed to run the programs of studies in the department of Petroleum Engineering. Salaries and related compensations are facilitated by the university to all faculty members. Other benefits such as housing and children schooling are provided by KFUPM to non-Saudi faculty members.

The secretarial support with two secretaries and one Arabic typist provides the administrative support needed. However, little if any support is provided to faculty members for their research work. Secretarial support for faculty research is lacking in the department. Equipments available are not satisfied the needs of the department at present.

Standard 8-2  There must be an adequate number of high quality graduate students, research assistants and PhD students.

The number of graduate students, research assistants and Ph. D students, for the last three years is given in Table 8.1.

| Table 8.1: Number of graduate students, research assistants and Ph. D students |
|-------------------|-------------|-------------|-------------|
| Semester | Research Assistant | Graduate Assistant | Ph.D. |
| 032 | 0 | 1 | 0 |
| 031 | 0 | 0 | 0 |
| 022 | 3 | 0 | 0 |
| 021 | 0 | 0 | 0 |
| 012 | 2 | 0 | 0 |
| 011 | 1 | 0 | 0 |

Recruiting good graduate students remains a chronic problem at the university level and a strategy at the highest levels needs to be developed and implemented to solve this very important problem. Hence the number is not adequate.

Standard 8-3  Financial resources must be provided to acquire and maintain Library holdings, laboratories and computing facilities.

The library seems to have adequate financial support since they are updating books collection and subscribing to a good number of periodicals. Although, as far as PETE Department is concerned, many faculty members would like to see more books acquisition. Financial support for our labs is adequate. Most lab requests, especially those related to teaching labs are approved without delay. Computing facilities support is adequate with computers updated frequently as needed to provide good support for students, teaching labs and faculty.
Petroleum engineering is a discipline of much interest and demand in both Saudi Arabia and elsewhere. The Kingdom of Saudi Arabia relies on its petroleum industry as the main source of income. Due to the rapid increase in demand, and consequently the projected expansion in this industry, employment opportunities for qualified petroleum engineers are ample.

The Petroleum Engineering Department provides a program that develops the necessary skills and competence required of a practicing petroleum engineers. The PETE curriculum emphasizes a number of areas such as, drilling engineering, formation evaluation, reservoir engineering, and production engineering. In addition, sufficient emphasis is given to the study of Geology in order to provide a coherent view of reservoir lithology and an understanding of the interdependencies of exploration, drilling and reservoir development.

The current self-assessment process is conducted in order to highlight the points of strengths and otherwise weaknesses in the PETE program. The exercise has been carried out in compliance with the criteria and standards provided by the Deanship of Academic Development at KFUPM.

This report presents the findings of the self-assessment process according to the eight criteria provided by the Deanship of Academic Development. In addition to our own assessment of the departmental facilities, policies and programs, four surveys were also conducted to address the views of graduating students, faculty members, alumni and employers. On the assessment of First Criterion regarding the programs’ mission, objectives and outcomes, the three surveys from Graduating Students, Alumni and Employers showed an overall satisfactory and useful feedback, with average overall ratings ranging from 2.4 to 3.0 out of 4. Although the surveys have rated many features of our program as excellent, and praised most of the facilities both in the Department and the University, our focus in this conclusion section is directed to highlighting the areas where further improvement can be made. In this regard, both Alumni and Employers gave relatively lower ratings for PETE graduates outcomes regarding (i) designing petroleum components and systems, and (ii) awareness to issues related to safety and the environment. In addition, it was concluded that some extra effort could be invested in the program attributes to analysis/interpretation of data, oral communication skills, and written communication skills.

On the assessment of Second Criterion regarding curriculum design and organization, the analysis of linking courses to program outcomes showed that the curriculum is consistent and supports the documented objectives of the program. The program satisfies the ABET requirements completely. The ABET requirement for mathematics and basic sciences is 32 credits whereas the PETE program at KFUPM has 38 credits. For Engineering Sciences, the ABET requirement is 32 credits while the Engineering Science component in PETE program is 44 credits. ABET specifies a requirement of 16 credits for Engineering Design, while the PETE curriculum provides 19 credits for this component. The ABET requirement for Humanities and Social Science courses is 16 credits whereas the PETE curriculum provides 17 credits for breadth and depth in these courses. The PETE program also satisfies the Major credit hours requirements as
specified by ABET. The ABET requirement is 42 Major credit hours out of which a minimum of 12 credit hours must be for Design. The PETE program has 48 Major credit hours out of which 18 credit hours are engineering design. Regarding the Information Technology (IT) component, the University administration has been very supportive by enhancing and upgrading the computational facilities at KFUPM and providing INTERNET and other state-of-the-art IT facilities through ITC. In this context, the PETE program emphasizes the use of digital computers for problem solving. Computers are utilized throughout the curriculum using numerous general and specialized software packages. Several courses involve term projects and require various computer-aided tools and simulators. The Department ensures the development of competence in oral and written communications in the English language for its students through the following means: (i) English courses offered in the Preparatory Year Program (PYP), (ii) Three required English courses as part of the BS program, (iii) Most of the PETE Elective and core courses require technical report writing and professional presentations, and (iv) A dedicated course PETE-408, through which students are trained on how to make professional presentations.

The adequacy of laboratories and computing facilities is the essence of the third criterion. There are ten laboratories in the Department. Most of the existing labs are self-sufficient for conducting the lab sessions of various courses as well as supporting faculty research. Most of the PETE labs have sufficient space and equipped with latest equipment except the PVT which needs to replace all Mercury-dependant equipments with Mercury-free. The production and well logging lab are still underdevelopment. With regard to lab manuals, hard copies of updated versions of such manuals for all teaching labs are available and accessible to all faculty and students. These lab manuals have instructions pertaining to all experiments conducted in the lab. In addition to the hard copies, soft copies in PDF Format of some lab manuals are now available and accessible through the department web page or courses' WebCT. The computer facilities in the Department are very good and the main computer lab is well maintained and periodically updated with state-of-the-art computers and modern software according to the arising need in various PETE courses.

The Fourth Criterion addresses students’ support and guidance. One basic principle that governs our care and support measures for PETE students is the provision of the best possible academic advising. The PETE Department has a dedicated “Student Guide” for its students which includes all required information about the curriculum, courses, prerequisite requirements, and template degree plans for both Coop and non-Coop students. The PETE Student Guide is available to all students both online and as a paper document. The PETE faculty members dedicate extra office hours during registration period for students’ help and guidance. The chairman dedicate four office hours a week to receive students who want to discuss academic issues. The department also holds a student-faculty gathering once every year during which students and faculty can exchange views about curriculum matters in a relaxed and friendly setting. All PETE core courses are offered at least once a year. In addition, required courses outside the department are usually offered every term. Elective courses are offered quite frequently and are dependent mostly on the interest and number of the students. Many efficient measures have been implemented to help and ensure effective interaction between students and faculty. Classes are made of small groups averaging a maximum of 20 students per class. Students are required to attend their classes regularly and on time.
More than 20% unexcused absences of a student in any course results in a “DN” (denial) grade. All multi-section courses are assigned a course coordinator to ensure reasonable uniformity in course material offering and grading. In addition, the Counseling and Advising Center (CAAC), offers a multitude of academic and non-academic services to the students at an individual or group level.

On the fifth sixth criterion that relates to faculty, it is noted that the interests and qualifications of all faculty members are sufficient to teach all courses. Almost all the faculty members in the Department maintain the status of “current” both in teaching and research according to the stated criteria. The teaching load is adequate, and the faculty-student ratio is nearly close to recommended ratio. The PETE department currently has eight faculty members of which seven have doctorate degrees (85.5%). The number of PETE faculty and their background is currently inadequate to meet the fast growth in undergraduate enrollment and new faculty members are needed. Faculty professional development is achieved through participation in the technical seminars, workshops/symposium normally organized by the Department. In addition, the Deanship of Academic Development (DAD) at KFUPM organizes a number of short courses, workshops and forums in issues related to faculty development such as effective teaching, use of instructional technology in teaching, Peer Consultation and effective research. Also, DAD offers grants and fellowships for research on activities that assist in enhancing teaching and student learning and grants of developing online courses. Faculty Development programs at the department and university levels were evaluated, wherein evaluation forms for each activity were completed by the participants and the results were analyzed and used as a feedback to improve all the aspects pertinent to faculty professional development and job satisfaction. Moreover, the Department utilizes the activities of its faculty members in attending local and international conferences and in journal publications to assess the level of its faculty development.

The institutional facilities and institutional support are the subjects of the seventh and eighth criteria, respectively. It is worth mentioning that KFUPM maintains an infrastructure with state-of-the-art academic facilities that are comparable to that of the leading universities in the industrialized world. Majority of the classrooms have network connected computer with in-focus projector for assistance in delivering presentations. The computer labs are equipped with printers, and overhead projectors. All the PCs are networked and connected to inter and intra-net allowing direct downloading of material needed during class time. The location of the labs, the available software, and the quality of the PCs and servers can be rated as very adequate for the support of new trends in learning. The technical collection of the main library as well as the PETE library can be considered as very adequate for the PETE program. Although, there still are no complete on-line-courses available in the department but all of the labs are equipped to support e-learning. Meanwhile PETE students use these labs to access course information and some of course notes, homework and solutions that are made available on WebCT. Regarding the financial resources, the Ministry of Higher Education and the University’s Administration have been very successful and generous in securing sufficient financial resources to fulfill the mission of the University of providing leadership in engineering education and research, which is dedicated to serving the industrial development within the Kingdom and the Gulf area.
DR. MUHAMMAD ALI AL-MARHOUN

ACADEMIC RANK

- Professor

EDUCATION


EMPLOYMENT HISTORY

- Professor, Department of Petroleum Engineering, KFUPM, 1991-present.
- Associate Professor, Department of Petroleum Engineering, KFUPM, 1982-1991.
- Assistant Professor, Department of Petroleum Engineering, KFUPM, 1978-1982.
- Part-time Faculty and Graduate Student, Department of Petroleum Engineering, University of Oklahoma, Norman, Oklahoma U.S.A., January 1975-May 1978.
- Graduate Assistant, Department of Mathematical Sciences, KFUPM, September 1973-December 1974.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS

- PETE 201 Introduction to Petroleum Engineering, Several times
- PETE 204 Reservoir Rock Properties Several times
- PETE 205 Petroleum Fluid Properties Several times
- PETE 304 Reservoir Description Several times
- PETE 408 Seminar Several times
- PETE 411 Senior Design Project Several times
- PETE 511 Advanced Drilling Fluids Several times
- PETE 540 Advanced Reservoir Engineering Several times
- PETE 544 Advanced Natural Gas Engineering Several times
- PETE 590 PETE Special Topics Several times
- PETE 599 Seminar Several times
- Short course PVT and Phase Behavior of Reservoir Fluids Every year
- Short course Basic Fluid Properties, Banoco, 2000 Once
- Short course Reservoir Fluid Properties, Aramco, 2000, 2004 Twice
RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Refereed Journals

Papers Published in Conference Proceedings

Master Thesis Supervised at KFUPM
DR. SIDQI A. ABU-KHAMSIN

ACADEMIC RANK

- Professor

EDUCATION

- BS (with highest honors) Chemical Engineering, University of Petroleum & Minerals, Dhahran, Saudi Arabia, June 1975.
- Ph.D. Petroleum Engineering, Stanford University, USA, October 1984.

EMPLOYMENT HISTORY

- Professor, Dept. of Petroleum Engineering, KFUPM, Dhahran, Saudi Arabia, Jan. 2005-present.
- Graduate Assistant, Dept. of Chemical Engineering, UPM, Dhahran, August 1975-December 1977.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS

- PETE 201: Introduction to Petroleum Engineering (3 times)
- PETE 202: Rock & Fluid Properties (3 times)
- PETE 204: Reservoir Rock Properties (2 times)
- PETE 203: Drilling Engineering (1 time)
- PETE 303: Well Logging (1 time)
- PETE 405: Water Flooding (4 times)
- PETE 410: Natural Gas Engineering (1 time)
- PETE 411: Senior Design Project (3 times)
- 6 short courses on various topics
RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Refereed Journals

Patents:

Reports:

Others:
1. Participated in 3 externally-funded research projects.
2. Managed 1 externally-funded research project.
3. Supervised 1 MS thesis.
ACADEMIC RANK

- Associate Professor

EDUCATION

- BS (with honors) Petroleum Engineering, Cairo University, Egypt, June, 1966.
- MS Petroleum Engineering, Alazhar University, Cairo, Egypt, Dec., 1973.
- Ph.D. Petroleum Engineering, Texas A&M Univ., USA, October 1976.

EMPLOYMENT HISTORY

- Teaching Assistant, Alazhar Univ., Cairo, Egypt, 1968-1977.
- Lecturer, Alazhar Univ., Cairo, Egypt, 1977-1978.
- Associate Professor, King Saud Univ., Riyadh, Saudi Arabia, 1983-1985.
- Associate professor, Petroleum Department, KFUPM, Saudi Arabia, 2004-Now.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS

- Taught the following courses on part time basis: Reservoir Simulation (graduate in Al Azhar Univ.) – Graduation Project (Al Azhar and Suez Canal Univ.). Over 10 short courses for industry engineers on various topics.
- PETE 302: Subsurface Production Engineering (1 time)
- PETE 409: Artificial Lifting (1 time)
- PETE 303: Well Logging (1 time)
- PETE 404: Petroleum Facilities Design (1 time)
RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Refereed Journals


Others

- Performed several studies and reports on reservoir management while working for Agiba Pet. Co.

Master Thesis Supervised at other university

- Supervised 4 MS theses
DR. HASAN SALMAN AL-HASHIM

ACADEMIC RANK
- Associate Professor

EDUCATION
- BS in Petroleum Engineering University of Petroleum and Minerals, Dhahran, Saudi Arabia, June, 1977

EMPLOYMENT HISTORY
- Associate Professor, Department of Petroleum Engineering, KFUPM.
- Assistant Professor, Department of Petroleum Engineering, KFUPM.
- Chairman, Department of Petroleum Engineering, KFUPM.
- OTIS Engineering, Summer 1990.
- Consultant, Reservoir Simulation, Saudi Aramco, Three months, Summer 1984.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS
- PETE 204: Reservoir Rock Properties (7)
- PETE 221: Reservoir Rock properties (1)
- PETE 408: Seminar (4)
- PETE 301: Reservoir Engineering (7)
- PETE 411: Senior Design Project (9)
- PETE 306: Well Testing (5)
- PETE 410: Natural Gas engineering (2)
- PETE 520: Advanced Well Testing (4)
- PETE 645: Fluid Flow in Porous Media (1)
- 6 short courses on various topics

RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Technical Papers :


**Master Thesis Supervised at KFUPM**


DR. HASAN YOUSEF AL-YOUSEF

ACADEMIC RANK
- Associate Professor

EDUCATION
- Ph.D. in Petroleum Engineering, Stanford University, Stanford, California, U.S.A., 26 September, 1985

EMPLOYMENT HISTORY
- Associate Professor, Department of Petroleum Engineering, KFUPM, 1996-present.
- Assistant Professor, Department of Petroleum Engineering, KFUPM, 1985-1996.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS
- PETE 401 Reservoir Description 12
- PETE 402 Reservoir Simulation 15
- PETE 306 Well Testing 6
- PETE 301 Reservoir Engineering 3
- PETE 444 Water Flooding 2
- PETE 420 Petroleum Calculations 1
- PETE 430 Special Problems 1
- PETE 343 Petroleum Statistical Analysis 1
- PETE 520 Advanced Well Testing 3
- PETE 545 Advanced Reservoir Simulation 6
- 3- Reservoir Simulation short courses.

RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Conference Proceedings
2. A. A. Habelreeh, M. A. Mohiuddin, S. Saner, and H. Y. Al-Yousef
"Comparison of Basic Core Properties of Carbonate Reservoir Rocks at
Ambient and Reservoir Stress Conditions". SPE SA-58 paper presented
at the 2004 SPE Technical Symposium of Saudi Arabia Section held in

Cores - Analytical Solution and Application”. paper SPE 93559
presented at the 14th Middle East Oil Show & Conference, March 12-
15, 2005, Bahrain.

**Funded Projects:**

1. “Rock Wettability: Restoration for Core Analysis and Effect on Oil
Recovery,” KFUPM RI (Div. 1), Project No. 21090, conducted for
Saudi Aramco, Task Leader, 30 months (completed).

2. “Rock Wettability: Restoration for Core Analysis and Effect on Oil
Recovery-II,” KFUPM RI (Div. 1), Project No. 21109, conducted for
Saudi Aramco, Project Manager and Task Leader, 24 months
(completed).

3. “Capillary Pressure and Relative Permeability by Layer (Arab-D
Reservoir, Ghawar),” KFUPM/RI (Div. I), Project No.21127,
conducted for Saudi Aramco, Task Leader, 36 months (completed).

(Div. 1) Project No. 21148, conducted for Saudi Aramco, Task Leader,
24 months (completed).

5. “Effect of Condensate Dropout on the Productivity of Hawiyah Gas
Wells,” KFUPM RI (Div. 1) Project No. 21159, conducted for Saudi
Aramco, Task Leader, 36 months (in progress).

Properties,” KFUPM RI (CPM) Project No. 21173, funded by KFUPM
and JNOC, Project Manager, 60 months (completed).

7. "A study of electrical properties and capillary pressure characteristics
of the Safaniya field," KFUPM RI (CPM) Project No. 2216 conducted
for Saudi Aramco, Member (completed).

8. "Study of Archie Parameters and CT Visualization of Fluid Flow in
Arab-D Cores," KFUPM RI (CPM) Project No. 2224 conducted for
Schlumberger, Member (completed).

9. "Development of Marginal Oil Reserves from Tight Reservoirs,"
KFUPM RI (CPM) Project No. 2229 conducted for Saudi Aramco,
Task Leader (completed).

10. "Petrophysical Rock-Typing of the Arab-D Reservoir in the Mezalij
Field," KFUPM RI (CPM) Project No. 2234 conducted for Saudi
Aramco, Member (completed).

11. "Electrical parameters and Capillary Pressure Measurements and
Analysis", KFUPM RI (CPM) Project No. 2240 conducted for Saudi
Aramco, Member (in progress).

12. "Evaluating Formation Damage and Remedial Actions in Horizontal
Wells in Haradh", KFUPM RI (CPM) Project No. 2242 conducted for
Saudi Aramco, Task Leader (in progress).
DR. ABDULAZIZ AL-MAJED

ACADEMIC RANK
- Associate Professor

EDUCATION
- Ph. D. in Petroleum Engineering, University of Southern California, Los Angeles, USA, 1988.
- M.S. in Petroleum Engineering, Stanford University, California, USA, 1981.

EMPLOYMENT HISTORY

I. Academic
1. Director, Center for Petroleum & Minerals, Research Institute from August 2002.
3. Manager/Head, Petroleum & Gas Engineering Section, Center for Petroleum and Minerals, Research Institute, KFUPM, November 3, 1997 – to-date.
4. Associate Professor, Petroleum Engineering Department 2000.
5. Assistant Professor, Department of Petroleum Engineering, KFUPM, 1988.

II. Industrial
2. Summer Program for Petroleum Engineering Graduates, Reservoir Engineering Division, Petroleum
3. Faculty Summer Program in the Drilling and Workover Division of Petroleum Engineering Department, Saudi Aramco, 1990.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS
- PETE 411 (Lab) Senior Design Project
- PETE 412 (Lab) Senior Design Project
- PETE 203 (Lecture) Drilling Engineering
- PETE 203 (Lab.) Drilling Engineering
- PETE 203 (Lecture) Drilling Engineering
- PETE 203 (Lab.) Drilling Engineering
- Short courses.
RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Refereed Journals


DR. EL-SAYED A. OSMAN

ACADEMIC RANK

- Assistant Professor

EDUCATION

- B. Sc. (with honors) Petroleum Engineering, Cairo University, Cairo Egypt, July 1983.

EMPLOYMENT HISTORY

- Assistant Professor, Dept. of Petroleum Engineering, KFUPM, Dhahran, Saudi Arabia, March 2004 - present.
- Research Engineer II (Associate Professor), Center for Petroleum and Minerals, The Research Institute, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. November 2003 - February 2004
- Research Engineer III (Assistant Professor), Center for Petroleum and Minerals, The Research Institute, King Fahd University of Petroleum and Minerals, Dhahran, Saudi Arabia. September 1995 - October 2003
- Instructor, Mining, Petroleum and Metallurgical Engineering Department, Cairo University, Cairo Egypt, October 1983 - December 1987

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS

- PETE 201: Introduction to Petroleum Engineering (2 times)
- PETE 203: Drilling Engineering (1 time)
- PETE 301: Reservoir Engineering (2 times)
- PETE 302: Subsurface Production Engineering (1 time)
- PETE 411: Senior Design Project (1 time)
- PETE 532: Well Performance (1 time)
- PETE 560: Mathematical Methods in PETE (1 time)
- Short Course on “Virtual Intelligence Applications in Oil and Gas Industry”

RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

Papers Published in Refereed Journals


Patents:

Books and Book Chapters:
“Atlas of the Kingdom of Saudi Arabia” This is the first ever Atlas for Saudi Arabia, published by the Ministry of Higher Education, 1999 (In Arabic). I wrote and edited the following chapters (sections):
- Chapter 3: Natural Resources (Section 2)
- Chapter 4: Climate
- Chapter 6: Economic Resources (Section 2)

Reports:
MR. MANSOUR AL-DHAFEER

ACADEMIC RANK

- Lecturer

EDUCATION

- Engineer Degree (Petroleum Engineering) University of Southern California, U.S.A, 1984
- MS (Petroleum Engineering) University of Southern California, U.S.A., 1981
- BS (Petroleum Engineering) University of Petroleum and Minerals, KSA, 1977

EMPLOYMENT HISTORY

- 2004-Present: Lecturer & Laboratory Supervisor, Department of Petroleum Engineering, KFUPM.
- 1985-2003: Graduate Assistant & Laboratory Supervisor, Department of Petroleum Engineering, KFUPM.
- 1978-1984: Graduate Assistant, Department of Petroleum Engineering, KFUPM.
- 1978: Petroleum Engineer, (Summer Employment), Production Engineering Dept. ARAMCO, Dhahran.

TEACHING ACTIVITIES FOR THE LAST FIVE YEARS

- PETE 201 - Introduction to Petroleum Engineering
- PETE 202 - Rock and Fluid Properties (Lab. Session)
- PETE 203 - Drilling Engineering (Lab. Session)
- PETE 204 - Reservoir Rock Properties (Lab. Session)
- PETE 205 - Petroleum Fluid Properties (Lab. Session)

RESEARCH ACTIVITIES AND PUBLICATIONS IN THE LAST FIVE YEARS

- Not applicable
APPENDIX (B)

Course Syllabi
PETE 201
INTRODUCTION TO PETROLEUM ENGINEERING  (2-3-3)

Catalog Data  The course's main goal is to provide the student with an overview of the petroleum industry: its history, its technical achievements, its role in the global economy and its future prospects. A brief introduction to modern exploration, production and processing operations is included as well as highlights of the petroleum industry in Saudi Arabia and the Middle East.

Textbook  M.A. Al-Marhoun and S.A. Abu-Khamsin, Introduction to Petroleum Engineering, KFUPM

Reference:  None

Coordinator  None

Objective  To introduce the beginning student to the history and evolution of petroleum engineering and to show him the interdependency of its branches.

Prerequisite  CHEM 101: General Chemistry I

Course outline
1. Basic chemistry of hydrocarbons
2. Petroleum origins, migration and entrapment
3. Exploration and drilling methods
4. Production and processing techniques
5. Reserve estimation and recovery enhancement
6. Refining and petrochemicals
7. History of the petroleum industry

Computer Usage  None

Evaluation Methods  1. Two major exams and a final exam
2. Home works

ABET Category  Engineering Science: 67%
               Hum. & Soc. Sci.: 33%

Instructor  Dr. El-Sayed A. Osman

Date  March 12, 2005
PETE 203: DRILLING ENGINEERING  (3-3-4)

Catalog Data  The course's main goal is to provide the student with an overview of the petroleum industry: its history, its technical achievements, its role in the global economy and its future prospects. A brief introduction to modern exploration, production and processing operations is included as well as highlights of the petroleum industry in Saudi Arabia and the Middle East.


Reference:  None

Coordinator  None

Objective  Familiarize the student with drilling rig components and operations, and introduce him to design and optimization procedures.

Prerequisite  PETE 201: Introduction to Petroleum Engineering

Course outline
- Introduction to Drilling Operations
- Planning of Drilling Operations
- Rotary Drilling
- Pressure Control (BOP)
- Cementing and Cementing Operations
- Formation Pore Pressure and Fracture Resistance
- Casing Design
- Directional Drilling and Deviation Control
- Horizontal Drilling
- Bottom-hole Assembly
- Offshore Drilling and Equipment
- Problems in Drilling
- Laboratory Sessions cover properties of drilling fluids and cements; casing design problems; and simulation of drilling operations.
<table>
<thead>
<tr>
<th>Computer Usage</th>
<th>Casing design problems require computer work.</th>
</tr>
</thead>
</table>
| Evaluation Methods | 1. Two major exams and a final exam  
                        2. Home works  
                        3. Lab |
| ABET Category | Engineering Science 50%  
                       Engineering Design 50% |
| Instructor | Dr. Abdullaziz A Al Majed |
| Date | February 12, 2005 |
PETE 204: RESERVOIR ROCK PROPERTIES (2-3-3)

Catalog Data  Basic petrophysical properties of reservoir rocks including porosity, permeability, fluid saturation, electrical resistivity, and capillary pressure. Derivation of flow equations for various flow systems employing Darcy's law. Effective and relative permeabilities as they relate to fluid saturation and capillary pressure. Laboratory tests on reservoir rock properties.


Objective  To enable the student to understand the properties of reservoir rocks, and how they influence storage and flow of fluids within them.

Prerequisite  PHYS 101: General Physics I  
CHEM 101: General Chemistry I

Course outline
1. Introduction  1 Week
2. Porosity  2 Week
   Definition, types and measurement
3. Rock compressibility  1 Week
   Definition, significance and measurement
4. Fluid saturation  1 Week
   Definition and measurement
5. Rock resistivity  2 Week
   Definition, significance and the resistivity log
6. Rock permeability  3 Week
   Definition and measurement
   Differential form of Darcy’s law and application to simple and complex flow systems
   Averaging permeability
7. Fluid-rock interaction  2 Week
   Surface and interfacial tension and wettability
   Capillary pressure: Measurement, applications, and correlations
8. Effective and relative permeability  2 Week
   Effective permeability: Measurement and correlation
   Relative permeability: Definition, data smoothing, estimation and correlation
   Three-phase relative permeability
Applications of relative permeability

9. Laboratory experiments on fluid properties 14 Lab sessions

Computer Usage
Some of the homework problems need computer usage.

Evaluation Methods
1. Two major exams and a final exam
2. Home works
3. Lab work

ABET Category
Engineering Science  3 Credits

Instructor
Dr. Muhammad Al-Marhoun

Date
19 October, 2004
PETE 205: PETROLEUM FLUID PROPERTIES (2-3-3)

Catalog Data
Study of the phase behavior of hydrocarbon systems as related to petroleum recovery. Ideal and real gas behavior, single and multicomponent two-phase systems, properties of reservoir fluids under various conditions of pressure and temperature. Laboratory tests on reservoir fluids.

Textbook

Objective
To enable the students to understand the behavior of reservoir fluids under different operating conditions and to be able to determine or estimate PVT properties.

Prerequisite
ME 203 : Thermodynamics I
PETE 201: Introduction to Petroleum Engineering

Course outline
Introduction 1 Week
Petroleum fluid composition 1 Week
Phase behavior 1 Week
Reservoir types 1 Week
Properties of gases 2 Week
Properties of black oils – Definitions 2 Week
Properties of black oils – Fluid studies 2 Week
Properties of black oils – Correlations 2 Week
Gas-liquid equilibrium 2 Week
Properties of oilfield waters 1 Week
Laboratory experiments on fluid properties 14 Lab sessions

Computer Usage
Some of the homework problems need computer usage.

Evaluation Methods
4. Two major exams and a final exam
5. Home works
6. Lab work

ABET Category
Engineering Science 3 Credits

Instructor
Dr. Muhammad Al-Marhoun

Date
19 October, 2004
PETE 301: RESERVOIR ENGINEERING (3-0-3)

Catalog Data
Derivation of the general material balance equation. Estimation of water influx using steady and unsteady-state models. Application of the general material balance equation for determining initial oil in place, gas cap size and water influx constant under different drive mechanisms. Application of the general material balance equation for determining the initial gas in place for conventional gas reservoir. Estimation of the initial gas and condensate in place for gas condensate reservoir. Decline curve analysis.

Textbook

References

Coordinator
None

Objective
To teach the student how to make and interpret indirect measurements of the quantitative characteristics of the reservoir and to utilize such information along with basic physical principles to predict the behavior of the reservoir under potentially useful production schemes.

Prerequisite
PETE 204: Reservoir Rock Properties
PETE 205: Petroleum Fluid Properties

Course outline
1. Introduction to Reservoir Engineering
   - Objective of reservoir engineering
   - Classification of petroleum reservoirs
   - Drive mechanisms
2. The General Material Balance Equation
   - Derivation of the general MBE
   - The MBE as an equation of straight line
3. Water Influx
   - Water influx models
   - Unsteady-state water influx calculations
   - Application of MBE to determine water influx
4. Saturated Oil Reservoir
- Application of the general MBE to determine initial oil in place, water influx constant and size of the gas cap

5. Undersaturated Oil Reservoir
   - Gas solubility
   - Changes in formation volume factor and gas-oil ratio with depletion
   - Oil in place by volumetric method and material balance
   - Effect of rock and water compressibilities

6. Decline Curve Analysis

**Computer Usage**

The students are encouraged to write computer programs to determine the initial oil and gas in place using the general material balance equation as an equation of straight line. They are also required to utilize EXCEL spread sheets to program Turner's and Muskat’s method to predict the performance of depletion drive reservoirs.

**Evaluation Methods**

1. Two major exams and a final exam
2. Home works
3. Lab work

**ABET Category**

Engineering Science: 100%

**Instructor**

Dr. El-Sayed A. Osman

**Date**

March 12, 2005
PETE 302: SUBSURFACE PRODUCTION ENGINEERING (3-0-3)

Catalog Data
Covers subsurface operations concerning preparing the well for production after being drilled and cased. Well completion design based upon reservoir, mechanical and economic considerations. The production process including bottom-hole, tubing, choke surface facilities. Subsurface Production Control, Completion and Workover Fluids, Perforation, Remedial Cementing, Sand Control, Well Stimulation Operations.

Textbook
Class notes

References

Coordinator
Dr. M. Doklah, Associate Professor of Petroleum Engineering

Objective
To familiarize students with Subsurface Production Engineering Operations. Introduces production systems and parameters affecting well rates. Performing design calculations based upon which equipment are chosen. Diagnosing of well problems and possible corrective measures.

Prerequisite
PETE-203: Drilling Engineering

Course outline
- Production engineering as part of field development and operations.
- Reservoir and mechanical factors.
- Well completion types and applications.
- Inflow performance relationship.
- Introduction to vertical and horizontal flow.
- Production tubing design.
- Production Control and Safety.
- Completion and Work-over fluids.
- Perforation.
- Remedial Cementing
- Sand Control
- Well Stimulation.

Design activities / projects:
1. Reservoir parameters affecting well completion, homework.
2. Inflow performance, homework.
4. Design of a subsurface production system - report required.
5. Mechanical design of production tubing - report required.

Computer Usage: Use of computer is required to solve homework problems and plot performance curves.

Evaluation Methods:
1. Major exams and final exam
2. Home works
3. Quizzes

Student learning outcome
1. Students will demonstrate understanding of production engineering principles.
2. Diagnosing well performance, trouble shooting to identify source of problems and needed corrective measures.
3. Equipment design based upon well parameters.

ABET Category
Engineering Science 1.5 (50%)
Engineering Design 1.5 (50%)

Revised by
Dr. Mahmoud Doklah

Date
Feb. 22, 2005
PETE 303: WELL LOGGING (3-3-4)

Catalog Data
Comprehensive study of modern well logging methods, open hole and cased hole log interpretation methods. Production logging. Design of logging programs and examples of applications

Textbook
Zaki Bassiouni, Theory, Measurement, and Interpretation of Well Logs, Society of Petroleum Engineers, Texas, U.S.A

References
Schlumberger Charts and Notes from Production Logging: Theoretical and Interpretative Elements by A.D. Hillnotes

Coordinator
None

Objective
On successful completion of this course, the student will learn and use the basic skills and techniques needed to interpret modern open hole well logs. The student will be able to identify and evaluate potential hydrocarbon zones from a standard suite of logs. This will include estimating hydrocarbon in-place and prediction of producibility. Clean as well as shaly sand formations interpretation will be covered. Production logs and well completion logs will also be covered.

Prerequisite
EE 204: Circuits & Electronics
PETE 202: Rock & Fluid Properties
Junior standing for Earth Sciences Student

Course outline

1. Introduction and Overview
2. The Logging Environment
3. Evaluation of Hydrocarbons
4. Permeable Zones Logs
5. Resistivity Logs
6. Porosity Logs
7. Clean Formation Interpretation
8. Shaly Formation Interpretation
9. Prediction of Producibility
10. Wellsite Computed Logs
11. Other Types of Well Logging
12. Well Logging Program
13. Cased Hole Logs/Production Logs and Interpretation
**Computer Usage:**

Use of computer is required to solve homework problems.

**Evaluation Methods:**

4. Major exams and final exam  
5. Home works  
6. Quizzes

**Student learning outcome**

<table>
<thead>
<tr>
<th>ABET Category</th>
<th>Percentage</th>
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<tr>
<td>Engineering Science</td>
<td>(75%)</td>
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<tr>
<td>Engineering Design</td>
<td>(25%)</td>
</tr>
</tbody>
</table>

**Revised by**

Dr. Mahmoud Doklah

**Date**

Feb. 22, 2005
PETE 306: WELL TESTING (2-0-2)

Catalog Data
Derivation of the diffusivity equation for slightly compressible fluid. Solution of the diffusivity equation using Boltzman transformation. Pressure drawdown, buildup tests. Injection and fall-off tests. Average reservoir pressure. Reservoir limit tests. Flow of real gas through porous media. Modification of the diffusivity equation for gas. Application pseudopressure function, pressure square and pressure methods for analysis of gas well tests. Gas well deliverability tests. Type curve matching. Interference and pulse testing. Test design and instrumentation

Textbook

References

Coordinator
Dr. Elsyed Osman

Objective
To introduce the petroleum engineering student to the fundamentals of pressure transient in porous media and analyze pressure drawdown and buildup data.

Prerequisite
PETE 301: Reservoir Engineering

Course outline

1. Introduction
   - Role of well testing in formation evaluation
   - Importance of rock and fluid properties
2. Fluid flow in porous media
   - Derivation of the diffusivity equation
   - Solution of the diffusivity equation
   - Dimensionless variables, Skin factor, Wellbore storage effect, Radius of investigation
3. Pressure drawdown tests
   - Single rate tests
   - Principles of superposition theory
   - Multirate tests
4. Pressure buildup tests
5. Injection and fall-off tests
6. Average reservoir pressure
7. Reservoir limit test
8. Flow of real gases in porous media
   - Steady and unsteady state flow in gas reservoirs
   - Gas slippage and non-Darcian effects
   - Diffusivity equation for compressible fluid
   - Solution of the diffusivity equation for compressible fluid
9. Gas well testing methods
   - Use of P, P2 and pseudopressure function
   - Pressure drawdown and buildup tests
   - Deliverability tests, Flow after flow tests, Isochronal tests, Modified isochronal tests
10. Test design and instrumentation

**Computer Usage:**
The use of computers to program pressure transient solutions is required in this course.

**Evaluation Methods:**
1. Major exams and final exam
2. Home works
3. Quizzes

**Student learning outcome**
1. Understand the importance of well testing in formation evaluation.
2. Understand well test types and objectives.
3. develop basic understanding of well testing analysis method
4. Use of well testing to identify causes of productivity problems.
5. Design well test.

**ABET Category**
- Engineering Science 67%
- Engineering Design 33%

**Revised by**
Dr. Hassan Al-Hashim

**Date**
Feb. 5, 2005
PETE 399: SUMMER TRAINING (0-0-0)

Catalog Data
A continuous period of 8 weeks to be spent in the industry to get exposed to different aspects of the petroleum engineering profession. The student is required to write a concise report, summarizing his experience and discussing the engineering work he was engaged in, and give a presentation of his work.

Textbook
Not Applicable

Handbook of the Cooperative Program

Coordinator
As assigned by the department from time to time.

Objective
To provide exposure to business and industry experience through actual work and training before graduation.

Prerequisite
ENGL 214: Tech. Report Writing
PETE 302: Subsurface Production Engineering

Course outline (Topic)
- Petroleum Engineering

Design activities / projects:
6. Reservoir parameters affecting well completion, homework.
8. Vertical and horizontal performance, homework.
10. Mechanical design of production tubing - report required.

Computer Usage:
Dependent on the job assignment

Evaluation Methods:
1. Reports submitted by the students
2. Company evaluation report

Student learning outcome
1. Observe and understand how the various jobs in petroleum engineering are executed and handled.
   2. Get to know to prepare a technical reports.

ABET Category
Other (Training): 100%

Revised by
Dr. Hassan Al-Hashim

Date
Feb. 15, 2005
PETE 400: SPECIAL TOPIC (3-0-3)

Catalog Data
The course covers a special topic in one of the areas of the petroleum engineering discipline. Topics are selected according to the faculty expertise and the students' interest and enrollment.

Textbook
Not Applicable

References
Petroleum textbooks and publications

Coordinator
Course Instructor

Objective
To assist students in widening their knowledge by pursuing a subject of personal interest in depth and breadth.

Prerequisite
Consent of the department.

Course outline
- Topics will be selected by the student in consultation with the course instructor

Computer Usage:
Moderate and course dependent.

Evaluation Methods:
1. Major exams and final exam
2. Home works
3. Quizzes

ABET Category
Engineering Science: 100%

Revised by
Date
Feb. 22, 2005
PETE 401: RESERVOIR DESCRIPTION (3-0-3)

**Catalog Data**

**Textbook**
Course handouts.

**References**

**Coordinator**
None

**Objective**
This course is designed to cover the fundamental concepts of integrating various reservoir data to construct a geologic model of the reservoir. The course introduces computer applications in geostatistics and contouring

**Prerequisite**
PETE 303: Well Logging

**Course outline**
1. Introduction to Reservoir Description
2. Data Acquisition for Reservoir Description
   - Geological data
   - Engineering Data
3. Characteristics of Sandstone and Carbonate Reservoirs
4. Univariate Description
5. Bivariate Description
6. Estimation Techniques
7. Contour Maps
8. Cross-sections
9. Reserve Estimation Methods
Computer Usage: A geostatistical package is used to estimate the spacial distribution of properties and generate contour maps from discrete data. The use of computers to solve homework assignments is encouraged throughout the course.

Evaluation Methods:
1. Major exams and a final exam
2. Homework assignments
3. Computer sessions

Learning outcomes:
1. Understanding the importance of reservoir description.
2. Developing basic understanding of reservoir description techniques.
3. Using geostatistical techniques to construct a geologic model of the reservoir.
4. Introducing computer applications in geostatistics.

ABET Category
Engineering Science: 67% (2 Credits)
Engineering Design: 33% (1 Credit)

Revised by
Dr. Hassan Y. Al-Yousef

Date
November 20, 2004
PETE 402: RESERVOIR SIMULATION (2-3-3)

Catalog Data
Basic theory and practices in reservoir simulation. Formulation of equations governing single phase and multi-phase flow in porous media. Introduction to finite difference methods and solution techniques. Solution of systems of linear equations. Applications using a black oil simulator. Laboratory sessions covering examples of applications using a reservoir simulation package.

Textbook
Basic Applied Reservoir Simulation by T. Ertekin, J. H. Abou-Kassem, and G. R. King

Coordinator
None

Objective
This course is designed to cover the fundamental concepts of simulation and how to conduct a reservoir simulation study. It introduces computer applications in reservoir simulation.

Prerequisite
SE 301: Numerical Methods

Course outline
1. INTRODUCTION
   - Definition of Simulation
   - Types of Models
   - Types of Reservoir Simulators
   - Objectives of a Reservoir Simulation Study

2. FORMULATION OF FLUID FLOW EQUATIONS
   - Darcy’s Law
   - Continuity Equation
   - Equations of State
   - Single Phase Flow Equations
   - Multiphase Flow Equations
   - Auxiliary Relationships

3. FINITE DIFFERENCE FORMULATIONS
   - Discretization in Space
   - Discretization in Time
   - Explicit Formulations
   - Implicit Formulations
   - System of Linear Equations
4. SOLUTION TECHNIQUES
   - Matrix Structure
   - Direct Methods
   - Iterative Methods

5. APPLICATIONS USING A SIMULATOR
   - Data Preparation and Input
   - Equilibrium Run
   - History Matching
   - Performance Predictions

Computer Usage: A reservoir simulation package is used to simulate several fluid flow problems in reservoir engineering. The use of computers to solve homework assignments is required.

Evaluation Methods:
1. Major exams and a final exam
2. Homework assignments
3. Computer laboratory sessions
4. Course reservoir simulation project

Learning outcomes
1. Understanding the importance of reservoir simulation.
2. Developing basic understanding of reservoir simulation techniques.
3. Using a reservoir simulation package to conduct a reservoir simulation study.

ABET Category
Engineering Science: 67% (2 Credits)
Engineering Design: 33% (1 Credit)

Revised by
Dr. Hasssan Y. Al-Yousef

Date
November 20, 2004
PETE 404: PETROLEUM FACILITIES DESIGN (3-3-4)

Catalog Data
Types, operation and design of individual components of oil, gas and water surface handling/processing facilities. Design Projects that integrate studied material for Complete Surface Production facilities. Lab sessions covering design principles for one basic complete production unit.

Textbook

References

Coordinator
Dr. M. Doklah, Associate Professor Petroleum Engineering.

Objective
The course provides basic theories and techniques needed to design and analyze oil, gas and water handling facilities.

Prerequisite
CHE 204: Chemical Engineering Fluid Mechanics

Course outline
1. Production Fluid Properties 3 classes
2. Two-phase oil and gas separation 4 classes
3. Oil and water separation 4 classes
4. Crude oil treating systems 5 classes
5. Produced water treating systems 5 classes
6. Gas handling facilities 2 classes
7. Acid gas treating 3 classes
8. Gas Dehydration 4 classes

Design Activities / Projects:
1. Multi-stage gas/oil separation 2 weeks
2. Two-phase separator sizing (Horizontal & Vertical) 1 week
3. Three-phase separator sizing (horizontal & vertical) 1 week
4. Crude oil Treating Equipment Design 2 weeks
5. Produced Water Treating Equipment Design 2 weeks
6. Acid Gas Treating Equipment Design 1 week
7. Gas Dehydration Equipment Design 2 weeks
8. Complete the Design of one Basic Production Unit 3 weeks
Computer Usage: Use of computer is necessary to perform all the design problems.

Evaluation Methods: 1. Major exams and a final exam  
2. Homework assignments  
3. Course project

Learning outcomes: 1. Understanding basic theories of phase behavior, separation dynamics and treatment procedures.  
2. Ability to perform design calculations and equipment functions.  
3. Use of computer programming to solve engineering problems

ABET Category:  
Engineering Science: 25%  
Engineering Design: 75%

Revised by: Dr. Mahmoud Doklah

Date: March 5, 2005
PETE 405: WATER FLOODING (2-0-2)

Catalog Data
Basic theoretical and design aspects of waterflooding processes. Derivation and significance of the fractional-flow equation. Theory of immiscible displacement including piston-like and frontal advance mechanisms. Performance prediction and injectivity analysis of linear and pattern flooding for both homogeneous and heterogeneous reservoirs. Problems encountered in waterflooding projects.

Textbook

References

Coordinator
None

Objective
To enable the student to conduct basic performance analysis of waterflooding projects.

Prerequisite
CHE 204: Transport Phenomena I
PETE 301: Reservoir Engineering

Course outline
1. Introduction
   - Stages of primary recovery
   - Development and status of waterflooding
2. Flow of Immiscible Fluids
   - The fractional-flow equation
   - Variations in the fractional-flow curve
3. Modes of Immiscible Displacement
   - Piston-like displacement
   - Frontal displacement
4. Frontal Advance Theory
   - Theoretical development
   - Linear waterflood performance
5. Pattern Flooding
   - Flood patterns
   - Area sweep efficiency
   - Pre and post-breakthrough analyses
6. Injection Rates
   - Analytical and pseudo-analytical estimation
   - Conductance ratio
7. Waterflooding in Heterogeneous Reservoirs
- Coefficient of permeability variation
- Vertical coverage
- The Dykstra-Parsons method

8. Overview of Aramco's seawater treatment & injection system.
9. Overview of oil field scaling problems

Design Activities / Projects:
Term Project: Development of a numerical simulator based on the stream-tube theory; and application of the simulator to design a pattern flood. Formal presentation of results.

3 weeks

Computer Usage:
Use of computer is necessary to perform all the homework and design problems.

Evaluation Methods:
1. Major exams and a final exam
2. Homework assignments
3. Course project

Learning outcomes
1. Understand the basic theory of 2-phase immiscible flow in porous media.
2. Be able to predict performance of linear and regular pattern floods.
3. Design a numerical simulator to analyze performance of any pattern flood.

ABET Category
Engineering Science: 75%
Engineering Design: 25%

Revised by
Dr. S. A. Abu-Khamsin

Date
March 5, 2005
PETE 406: IMPROVED OIL RECOVERY (3-0-3)

Catalog Data
Introduction to current techniques of improved oil recovery. Basic thermal processes, chemical processes, and miscible gas displacement methods along with principles of performance prediction. Advantages and drawbacks of each displacement methods. Selection criteria for target reservoirs.

Textbook

References
None

Coordinator
None

Objective
An overview of the basis and applicability of various EOR processes with fundamental design computations.

Prerequisite
PETE 301: Reservoir Engineering

Course outline
1. Review of the world's oil scene
2. The concept of EOR
3. Thermal processes
   - Steam stimulation
   - Steam flooding
   - In-situ combustion
4. Chemical processes
   - Polymer flooding
   - Surfactant flooding
   - Caustic flooding
5. Miscible gas processes
   - Miscible hydrocarbon flooding
   - Carbon dioxide flooding
   - Inert gas injection
6. Selection criteria
7. Term Project:
   - Student predicts performance of an EOR project.
Design Activities / Projects:
Term Project: Forcasting the performance of an EOR process in a candidate reservoir and analyzing its economic and technical merits. Formal presentation of results stream-tube theory; and application of the simulator to design a pattern flood. Formal presentation of results.

Computer Usage: Use of computer is necessary to perform all the homework and design problems.

Evaluation Methods:
1. Major exams and a final exam
2. Homework assignments
3. Course project

Learning outcomes
1. Appreciate the role of interfacial and viscous forces in the entrapment of oil within porous rock.
2. Understand the mechanism of oil displacement by various EOR techniques.
3. Be able to select the most suitable EOR process for a candidate reservoir.
4. Apply standard methods to forecast the performance of an EOR process

ABET Category
Engineering Science: 33%
Engineering Design: 67%

Revised by
Dr. S. A. Abu-Khamsin

Date
March 5, 2005
PETE 408: SEMINAR (0-2-1)

Catalog Data
Communication of concepts and ideas is very important in any working environment. Lectures are presented on subjects related to preparation of technical presentations, use of visual aids, and platform and vocal techniques. Each student is then required, as a practice, to prepare and deliver a presentation on selected subjects. Each presentation is discussed and methods for improvements are highlighted. Finally, students are evaluated for their final presentations.

Textbook
Course handouts.

References
None

Coordinator
None

Objective
The course is designed to teach the techniques of preparation and delivery of an effective oral presentation.

Prerequisite
Junior standing

Course outline
1. Introduction to the Subject of Presentations
2. Preparation of an Effective Presentation
3. Organizing the Content
4. Rehearsal
5. Delivering the Presentation
6. Use of Visual Aids

Computer Usage:
Use of computer is necessary to perform PowerPoint presentation.

Evaluation Methods:
1. Preparation of a presentation
2. Delivery of a presentation

Learning outcomes
1. Understanding the importance of an effective presentation.
2. Identify key elements that will lead to an effective presentation.
3. Be able to deliver a good presentation

ABET Category
Others 100%

Revised by
Dr. Hasan Y. Al-Yousef

Date
November 20, 2004
PETE 409: ARTIFICIAL LIFT (3-0-3)

Catalog Data
Equipment and techniques of modern production operations. Analysis of inflow performance, multiphase flow and well performance. Artificial lift methods and applications including gas-lift, electric submersible pumping, and sucker rod pumping. Overview of off-shore production operations.

Textbook
Course handouts

References

Coordinator
None

Objective
Upon completion of the course, students will be able to select and design the appropriate artificial lift system for any given reservoir/well conditions.

Prerequisite
PETE 302: Subsurface Production Engineering

Course outline
1. Introduction
2. Inflow Performance Relationships
3. Fundamentals of Multiphase Flow
4. Performance of Flowing Wells
5. Production Testing
6. Methods of Artificial Lift
7. Gas Lift:
   - Types of installation and operations
   - Gas lift valve mechanics
   - Continuous- and intermittent- flow GL design (analytical and graphical methods)
8. Electrical Submersible Pumping
   - Surface and subsurface equipment
   - Design of complete installations
9. Sucker Rod Pumping
   - Subsurface and surface equipment
   - API classifications
   - Basic design
10. Selection of Artificial Lift Systems
   - Technical considerations
   - Economic considerations
**Computer Usage:**  Use of computer is necessary to perform PowerPoint presentation.

**Evaluation Methods:**

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<th>ABET Category</th>
<th>Revised by</th>
<th>Date</th>
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<td></td>
<td>Engineering Design: 100%</td>
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PETE 410: **NATURAL GAS ENGINEERING (3-0-3)**

**Catalog Data**
Estimation of gas reserves using different forms of the general material balance equation for gas reservoir. Prediction of gas reservoir performance subject to water drive. Derivation of the basic flow equations for real gas and their solutions and applications for analyzing gas well testing. Analysis of hydraulically fractured gas well tests. Gas field development. Storage of natural gas.

**Textbook**
C. U. Ikoku, *Natural Gas Reservoir Engineering*, & Handouts

**References**

**Coordinator**
None

**Objective**
To expose the students to the concepts and applications of reservoir engineering principles essential to optimum development of natural gas reservoirs.

**Prerequisite**
PETE 301: Reservoir Engineering

**Course outline**
1. Introduction
   - Review and evaluation of gas properties.
2. Estimation of gas reserves using the general material balance equation for gas reservoirs.
4. Linearization and solution of the basic differential equation for radial flow of real gas.
5. Range and validity of the P and \( P^2 \) methods.
6. Analysis of hydraulically fractured gas well tests.
7. Gas well deliverability tests.
8. Gas field development
   - Average and total deliverability curves
   - Total system analysis - inflow/outflow performance
   - optimum development plan
   - Performance predictions
9. Storage of natural gas
   - Natural gas storage in pipelines
   - Underground storage of natural gas
Computer Usage: The students have to write computer programs to:
1. Determine the initial gas in place.
2. Predict gas reservoir performance subject to water-drive.
3. Evaluate the pseudopressure function by numerical integration.
4. Calculate the static and flowing bottom hole pressures.

Evaluation Methods:
1. Major Exams and Final Exam
2. Homeworks
3. Term project

Learning outcomes
ABET Category Engineering Science: 67%
               Engineering Design 33%
Revised by     Dr. Hasan S. Al-Hashim
Date           November 25, 2004
PETE 411: SENIOR DESIGN PROJECT (0-9-3)

Catalog Data
Theoretical and/or practical approaches with application of appropriate computer techniques to integrate various aspects of petroleum engineering in a comprehensive design experience. The project includes identification of a problem, formulation of solution, design of implementation procedures, preparation of specifications, and consideration of alternative feasible solutions. The work is performed individually or within a team under supervision of a faculty member. The student has to submit a detailed final project report and present his work.

Textbook
None

References
None

Coordinator
None

Objective
To provide the student with a design experience in which he assimilates much of his acquired knowledge and skills

Prerequisite
Senior Standing, ENGL 214 and approval of the advisor

Course outline
1. Faculty supervisor describes problem and available data
2. Students form a team
3. Team formulates plan of execution and obtains supervisor's approval
4. Team works on project
5. Team updates supervisor periodically on work progress and seeks advice
6. Team submits final report and presents results

Design Activities / Projects
9. Project initiation 2 weeks
10. Plan formulation 2 week
11. Project execution 8 weeks
12. Reporting and presentation 2 weeks

Computer Usage:
Heavy use of computer software to perform various aspects of analysis and design.
Evaluation Methods:
1. Progress reports during project execution
2. Final report
3. Oral presentation and discussion

Learning outcomes
1. Appreciate the relationship between various subspecialties of petroleum engineering.
2. Understand the role of a petroleum engineer in all phases of reservoir development and management efforts.
3. Apply engineering principles and techniques to design an economic and feasible solution to a problem.
4. Interact with other engineers and geoscientists in a team effort involving data collection, analysis, design, reporting, and presentation.

ABET Category
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Revised by Dr. Sidqi A. Abu-Khamsin
Date March 5, 2005
APPENDIX (C-1)

Survey of Senior Graduating Students
SURVEY OF GRADUATING STUDENTS
(Questionnaire)

- **Senior Graduating Student information**

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<th>☐ APETE</th>
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- **Contribution of PETE program in your learning and development**

  *To what extent did the PETE program contribute to your knowledge, skills, and personal development in the following?*

1. Writing skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

2. Presentation skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

3. Ability to make ethically responsible decision
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

4. Engineering-problem solving skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

5. Mathematical skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

6. Computing skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

7. Experimentation skills
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

8. Ability to work in multidisciplinary teams
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

9. Ability to think critically and logically
   - ☐ Excellent
   - ☐ Very good
   - ☐ Good
   - ☐ Fair
   - ☐ Poor
   - ☐ No Opinion

10. Ability to design a system, a component, or a process
    - ☐ Excellent
    - ☐ Very good
    - ☐ Good
    - ☐ Fair
    - ☐ Poor
    - ☐ No Opinion

11. Understanding technology applications relevant to your field of study
    - ☐ Excellent
    - ☐ Very good
    - ☐ Good
    - ☐ Fair
    - ☐ Poor
    - ☐ No Opinion

12. Understanding the role of your discipline in the local industry
    - ☐ Excellent
    - ☐ Very good
    - ☐ Good
    - ☐ Fair
    - ☐ Poor
    - ☐ No Opinion
13. Commitment to lifelong learning
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

- Training (Coop/Summer)

Which type of training program did you complete?
   □ Coop training □ Summer training

To what extent did the coop/summer training program contribute to your knowledge, skills, and personal development in the following areas:

1. Understanding technology applications relevant to your field of study
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

2. Understanding the role of your discipline in the local industry
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

3. Ability to work in multi-disciplinary team
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

4. Ability to work with individuals from diverse backgrounds
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

5. Ability to make ethically responsible decisions
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

6. Ability to carry out tasks independently
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

7. Ability to participate in projects
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

8. Time management skills
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

9. Communication skills
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

10. Help you to identify your academic strengths and weaknesses
    □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

- Petroleum engineering facilities

Please rate each of the following facilities in the PTE department:

1. Computer Lab
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

2. Fluid properties Lab
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

3. Rock properties Lab
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion
4. Drilling fluid Lab
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

5. Drilling simulator Lab
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

6. Support from Technicians
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

7. Administrative staff
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

- Faculty of the department

To what extent did the instructors you have had in the PETE department do each of the following:

1. Set high expectations for you as a student
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

2. Encourage you to be active in learning
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

3. Capable of explaining critical concepts and ideas
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

4. Use different approaches (models, animation, computer software, lab demonstrations, ext) to explain important concepts
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

5. Encourage student-faculty interactions, in and outside the classroom
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

6. Incorporate teamwork as part of the learning process
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

7. Provide advising and consulting in your major
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

- University facilities, services and resources

Please rate each of the following at KFUPM:

1. Class Rooms
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

2. Counseling and Advising Center
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

3. Library
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

4. Internet Access
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion
5. Local Networking
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

6. Sports Facilities
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

7. Housing
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

8. Food Services
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

9. Health Services
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

10. Parking Services
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

11. Security Services
☐ Excellent  ☐ Very good  ☐ Good  ☐ Fair  ☐ Poor  ☐ No Opinion

- What are the best aspects (strengths) of PETE program?

- What aspects of PETE program (weaknesses) could be improved?

- Any further comments:
## SURVEY OF GRADUATING STUDENTS
(Responses & Analysis)

- **Contribution of PETE program in your learning and development**

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<td>2</td>
<td>2</td>
<td>3 2 0 0 0 2</td>
<td>2.39</td>
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<td>0</td>
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<td>3 2 0 0 0 3</td>
<td>3.11</td>
</tr>
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<td>10 Ability to design a system, a component, or a process</td>
<td>4</td>
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<td>7</td>
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### Contribution of PETE Program in Student Learning and Development

- **Excellent**: 20%
- **Very good**: 28%
- **Good**: 32%
- **Fair**: 7%
- **Poor**: 4%
- **No opinion**: 9%
## Training (Coop/Summer)

<table>
<thead>
<tr>
<th>List Number</th>
<th>Understanding technology applications relevant to your field of study</th>
<th>4</th>
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<th>Weighted average</th>
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</tr>
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<td>Understanding the role of your discipline in the local industry</td>
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<td>3</td>
<td>Ability to work in multi-disciplinary team</td>
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<td>0</td>
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<tr>
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<td>Ability to work with individuals from diverse backgrounds</td>
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<tr>
<td>5</td>
<td>Ability to make ethically responsible decisions</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>0</td>
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<tr>
<td>6</td>
<td>Ability to carry out tasks independently</td>
<td>7</td>
<td>4</td>
<td>5</td>
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<td>3</td>
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<tr>
<td>7</td>
<td>Ability to participate in projects</td>
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<td>2</td>
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<tr>
<td>10</td>
<td>Help you to identify your academic strengths and weaknesses</td>
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<td>5</td>
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<td>2</td>
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</table>

**Training (Coop/Summer)**

- Excellent: 37%
- Very good: 30%
- Good: 17%
- Fair: 5%
- Poor: 0%
- No opinion: 11%
### Petroleum engineering facilities

<table>
<thead>
<tr>
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<th>Lab</th>
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<th>Weighted average</th>
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<tr>
<td>1</td>
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<tr>
<td>2</td>
<td>Fluid properties Lab</td>
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<tr>
<td>3</td>
<td>Rock properties Lab</td>
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<td>3</td>
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<td>Drilling fluid Lab</td>
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<td>0</td>
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<td>Drilling simulator Lab</td>
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<td>2</td>
<td>0</td>
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<td>6</td>
<td>Support from Technicians</td>
<td>7</td>
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<td>5</td>
<td>1</td>
<td>1</td>
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<td>Administrative staff</td>
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<td>14</td>
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<td>20</td>
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**Petroleum Engineering Facilities**

- Excellent: 28%
- Very good: 23%
- Good: 18%
- Fair: 10%
- Poor: 7%
- No opinion: 14%
### Faculty of the department

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<thead>
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<td>1</td>
<td>Set high expectations for you as a student</td>
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<tr>
<td>2</td>
<td>Encourage you to be active in learning</td>
<td>2</td>
<td>9</td>
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<td>3</td>
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<td>3</td>
<td>Capable of explaining critical concepts and ideas</td>
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<td>10</td>
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<td>2</td>
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<tr>
<td>4</td>
<td>Use different approaches (models, animation, computer software, lab demonstrations, etc.) to explain important concepts</td>
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<td>5</td>
<td>Encourage student-faculty interactions, in and outside the classroom</td>
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<td>6</td>
<td>5</td>
<td>2</td>
<td>3</td>
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<tr>
<td>6</td>
<td>Incorporate teamwork as part of the learning process</td>
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<td>7</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1.68</td>
</tr>
<tr>
<td>7</td>
<td>Provide advising and consulting in your major</td>
<td>2</td>
<td>3</td>
<td>12</td>
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#### Faculty of the department

- **Excellent**: 13%
- **Very good**: 21%
- **Good**: 31%
- **Fair**: 14%
- **Poor**: 7%
- **No opinion**: 14%
## University facilities, services and resources

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<td>Counseling and Advising Center</td>
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<td>12</td>
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<td>Security Services</td>
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<td>1.19</td>
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<td><strong>30</strong></td>
<td><strong>28</strong></td>
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![University facilities, services and resources pie chart](chart.png)
APPENDIX (C-2)
Survey of Alumni
ALUMNI SURVEY
(Questionnaire)

- **Alumnus Information**

<p>| | |</p>
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<td>Name (optional)</td>
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<td></td>
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<tr>
<td>Position in Organization</td>
<td></td>
</tr>
<tr>
<td>Year of Graduation</td>
<td></td>
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- **Knowledge**

1. Math, Science and Engineering Skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

2. Problem formulation and solving skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

3. Data collection analysis and interpretation skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

4. Ability to plan and improve utilization of resources
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

5. Apply optimal decision making in company projects using quantitative tools
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

6. Ability to identify, examine, stabilize and control processes
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

7. Ability to design a system or process to meet desired specifications
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

8. Effective use of computer knowledge and skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

- **Communication Skills**

1. Oral communication
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

2. Report writing
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

3. Presentation skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

- **Interpersonal Skills**

1. Ability to work in teams
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion
2. Leadership
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

3. Independent thinking
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

4. Motivation and inspirational abilities
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

5. Reliability
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

6. Appreciation of the legal, ethical and professional values and lifelong learning ability
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

- Work Skills

1. Time management skills
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

2. Judgment
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

3. Discipline
   □ Excellent □ Very good □ Good □ Fair □ Poor □ No Opinion

- Program administration and learning

Please rate the Program administration and learning environment:

1. The work load in the program is reasonable and induces a fair level of pressure.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

2. The program administration is effective in supporting learning.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

3. The learning environment within the department is challenging and stimulating.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

4. The academic advising in the program is adequate in supporting students' needs.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

5. The co-op or senior project advising within the program is very effective.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

6. The course offering in the program is adequate to meet students' needs.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree

7. The faculty members within the department are highly accessible and cooperative.
   □ Strongly Agree □ Agree □ Neutral □ Disagree □ Strongly Disagree
8. The quality of support from the administration and staff is adequate.

[ ] Strongly Agree  [ ] Agree  [ ] Neutral  [ ] Disagree  [ ] Strongly Disagree

**Program content**

*Please indicate how much of each of the following groups of knowledge units you received from your BS degree in KFUPM. Also indicate how important you think those knowledge units are, as they affect your working career.*

<table>
<thead>
<tr>
<th>Knowledge Units</th>
<th>How much of these you received in your BS?</th>
<th>How important do you believe they are</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Too much</td>
<td>Too little</td>
</tr>
<tr>
<td>a. Basic petroleum engineering.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Drilling engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Formation evaluation</td>
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<td>d. Production engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. Reservoir engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. Other math &amp; engineering</td>
<td></td>
<td></td>
</tr>
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</table>

**General comments**

*Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of future engineers with a high competence level. (What do you think are the strengths and weaknesses of your education?)*

…………………………………………………………………………………………..
…………………………………………………………………………………………..
…………………………………………………………………………………………..
…………………………………………………………………………………………..
…………………………………………………………………………………………..
…………………………………………………………………………………………..
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## Knowledge

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<th>Good</th>
<th>Fair</th>
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<td>Problem formulation and solving skills</td>
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<td>Data collection analysis and interpretation skills</td>
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<td>2.68</td>
</tr>
<tr>
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<td>Ability to plan and improve utilization of resources</td>
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<td>11</td>
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<td>Apply optimal decision making in company projects using quantitative tools</td>
<td>2</td>
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<td>6</td>
<td>2</td>
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<td>2.23</td>
</tr>
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<td>6</td>
<td>Ability to identify, examine, stabilize and control processes</td>
<td>1</td>
<td>18</td>
<td>12</td>
<td>3</td>
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<td>2.30</td>
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<tr>
<td>7</td>
<td>Ability to design a system or process to meet desired specifications</td>
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<td>1</td>
<td>2.17</td>
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<td>Effective use of computer knowledge and skills</td>
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<td><strong>11</strong></td>
<td><strong>3</strong></td>
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### Knowledge Distribution

- Very good: 44%
- Excellent: 13%
- Good: 29%
- Fair: 9%
- Poor: 4%
- No opinion: 1%

![Knowledge Distribution Pie Chart]
### Communication Skills

<table>
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<th>0</th>
<th>N</th>
<th>Weighted average</th>
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<tr>
<td>1 Oral communication</td>
<td>Excellent</td>
<td>8</td>
<td>13</td>
<td>10</td>
<td>3</td>
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<td>2 Report writing</td>
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<td>5</td>
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<tr>
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<td>Fair</td>
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</table>

- **Excellent**: 37%
- **Very good**: 17%
- **Good**: 33%
- **Fair**: 7%
- **Poor**: 6%
- **No opinion**: 0%

### Interpersonal Skills

<table>
<thead>
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<th>Weighted average</th>
</tr>
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<tbody>
<tr>
<td>1 Ability to work in teams</td>
<td>Excellent</td>
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<td>13</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3.24</td>
</tr>
<tr>
<td>2 Leadership</td>
<td>Very good</td>
<td>8</td>
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<td>5</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2.77</td>
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<td>3 Independent thinking</td>
<td>Good</td>
<td>11</td>
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<td>7</td>
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<td>0</td>
<td>1</td>
<td>3.00</td>
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<tr>
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<td>8</td>
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<td>1</td>
<td>1</td>
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<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td>6 Appreciation of the legal, ethical and professional values and lifelong learning ability</td>
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### Interpersonal Skills

- **Excellent**: 34%
- **Very good**: 38%
- **Good**: 18%
- **Fair**: 6%
- **Poor**: 2%
- **No opinion**: 2%

### Work Skills

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<thead>
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<th>Discipline</th>
<th>Total</th>
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<table>
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<tr>
<td>2.65</td>
</tr>
<tr>
<td>3.11</td>
</tr>
<tr>
<td>2.75</td>
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---

### Work Skills

- **Excellent**: 18%
- **Very good**: 50%
- **Good**: 22%
- **Fair**: 5%
- **Poor**: 4%
- **No opinion**: 1%
### Program administration and learning

<table>
<thead>
<tr>
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<th>Description</th>
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<th>1</th>
<th>0</th>
<th>N</th>
<th>Weighted average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The work load in the program is reasonable and induces a fair level of pressure.</td>
<td>2</td>
<td>20</td>
<td>9</td>
<td>4</td>
<td>2</td>
<td>0</td>
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</tr>
<tr>
<td>2</td>
<td>The program administration is effective in supporting learning.</td>
<td>2</td>
<td>21</td>
<td>12</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2.57</td>
</tr>
<tr>
<td>3</td>
<td>The learning environment within the department is challenging and stimulating.</td>
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<td>18</td>
<td>9</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>2.43</td>
</tr>
<tr>
<td>4</td>
<td>The academic advising in the program is adequate in supporting students' needs.</td>
<td>4</td>
<td>15</td>
<td>9</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2.36</td>
</tr>
<tr>
<td>5</td>
<td>The co-op or senior project advising within the program is very effective.</td>
<td>5</td>
<td>11</td>
<td>10</td>
<td>6</td>
<td>4</td>
<td>1</td>
<td>2.19</td>
</tr>
<tr>
<td>6</td>
<td>The course offering in the program is adequate to meet students' needs.</td>
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<td>6</td>
<td>1</td>
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<tr>
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<td>The faculty members within the department are highly accessible and cooperative.</td>
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<td>2</td>
<td>2</td>
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</tr>
<tr>
<td>8</td>
<td>The quality of support from the administration and staff is adequate.</td>
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</table>

![Program administration and learning chart](chart.png)

- Excellent: 14%
- Very good: 37%
- Good: 27%
- Fair: 14%
- Poor: 6%
- No opinion: 2%
### Program content

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<thead>
<tr>
<th>List Number</th>
<th>Basic petroleum engineering.</th>
<th>Drilling engineering</th>
<th>Formation evaluation</th>
<th>Production engineering</th>
<th>Reservoir engineering</th>
<th>Other math &amp; engineering</th>
<th>Basic petroleum engineering.</th>
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<tr>
<td><strong>Total</strong></td>
<td><strong>34</strong></td>
<td><strong>67</strong></td>
<td><strong>109</strong></td>
<td><strong>12</strong></td>
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</table>

- Too much: 30%
- Too little: 15%
- Just right: 50%
- Don't know: 5%
- Total: 100%
APPENDIX (C-3)

Survey of Employer
Employer Survey
(Questionnaire)

Organization Information

<table>
<thead>
<tr>
<th>Name of Organization</th>
<th>Type of Business</th>
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</thead>
<tbody>
<tr>
<td>Organization Size (Number of employees)</td>
<td></td>
</tr>
<tr>
<td>Number of Petroleum Engineering Graduates in your Organization</td>
<td></td>
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</table>

- **Knowledge**

1. Math, Science and Engineering Skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

2. Problem formulation and solving skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

3. Ability to relate theory to practice
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

4. Data collection analysis and interpretation skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

5. Ability to plan and improve utilization of resources
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

6. Apply optimal decision making in company projects using quantitative tools
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

7. Ability to identify, examine, stabilize and control processes
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

8. Ability to design a system or process to meet desired specifications
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

9. Effective use of computer knowledge and skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

- **Communication Skills**

1. Oral communication
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

2. Report writing
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion

3. Presentation skills
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor
   - [ ] No Opinion
- **Interpersonal Skills**
  1. Ability to work in teams.
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  2. Leadership.
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  3. Independent thinking.
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  5. Reliability.
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  6. Appreciation of the legal, ethical and professional values and lifelong learning ability.
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion

- **Work Skills**
  1. Time management skills
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  2. Judgment
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion
  3. Discipline
     - [ ] Excellent  [ ] Very good  [ ] Good  [ ] Fair  [ ] Poor  [ ] No Opinion

- **General comments**

> Please make any additional comments or suggestions, which you think would help strengthen our programs for the preparation of future engineers with a high competence level. *(What do you think are the strengths and weaknesses of our education?)*

> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
> ……………………………………………………………………………………………………………………………..
## Knowledge

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<td>27</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>2.83</td>
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</tbody>
</table>

**Knowledge Distribution:**
- Excellent: 16%
- Very good: 54%
- Good: 25%
- Fair: 4%
- Poor: 0%
- No opinion: 1%
### Communication Skills

<table>
<thead>
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</table>

| Weighted average | 2.67 | 2.33 | 2.25 | 2.42 |

**Communicational Skills**

- Excellent: 14%
- Very good: 25%
- Good: 50%
- Fair: 11%
- Poor: 0%
- No opinion: 0%

![Communicational Skills Pie Chart](chart.png)
### Interpersonal Skills

<table>
<thead>
<tr>
<th>List Number</th>
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<th>Leadership</th>
<th>Independent thinking</th>
<th>Motivation and inspirational abilities</th>
<th>Reliability</th>
<th>Appreciation of the legal, ethical and professional values and lifelong learning ability</th>
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<th>Interpersonal Skills</th>
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<tbody>
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<td>Excellent: 18%</td>
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<td>Good: 21%</td>
</tr>
<tr>
<td>Fair: 3%</td>
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<td>Poor: 0%</td>
</tr>
<tr>
<td>No opinion: 0%</td>
</tr>
</tbody>
</table>

### Work Skills

<table>
<thead>
<tr>
<th>List Number</th>
<th>Time management skills</th>
<th>Judgment</th>
<th>Discipline</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>8</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>10</td>
<td>2</td>
<td>24</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6</strong></td>
<td><strong>24</strong></td>
<td><strong>6</strong></td>
<td><strong>30</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Work Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent: 28.33%</td>
</tr>
<tr>
<td>Very good: 80%</td>
</tr>
<tr>
<td>Good: 1.67%</td>
</tr>
<tr>
<td>Fair: 0%</td>
</tr>
<tr>
<td>Poor: 0%</td>
</tr>
<tr>
<td>No opinion: 0%</td>
</tr>
</tbody>
</table>
Work Skills

- Very good: 66%
- Excellent: 17%
- Good: 0%
- Fair: 0%
- Poor: 0%
- No opinion: 0%
APPENDIX (C-4)

Survey of Faculty
### FACULTY SURVEY
(Questionnaire)

1. **Your mix of research, teaching and community service.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

2. **Intellectual stimulation of your work.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

3. **Level of teaching/research you currently do.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

4. **Your interaction with students.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

5. **Cooperation you receive from colleagues.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

6. **The mentoring available to you.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

7. **Administrative support from the department.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

8. **Clarity of the faculty promotion process.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

9. **Your prospects for advancement through academic ranks.**
   - Very Satisfied
   - Satisfied
   - Neutral
   - Dissatisfied
   - Very Dissatisfied

10. **Salary and compensation package.**
    - Very Satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very Dissatisfied

11. **Job security and stability with the department.**
    - Very Satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very Dissatisfied

12. **Amount of time you have for yourself and family.**
    - Very Satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very Dissatisfied

13. **The overall climate at the department.**
    - Very Satisfied
    - Satisfied
    - Neutral
    - Dissatisfied
    - Very Dissatisfied

- What are the best environmental elements currently available in the department that enhance your motivation and job satisfaction?

..........................................................................................................................................................
..........................................................................................................................................................
What aspects of the environment could be improved?

Please make any additional comments or suggestions, which you think would help strengthen our program to graduate engineers with a high competence level. (OR what do you think are the strengths and weaknesses of our program?)

Information about faculty member.

- Academic rank:
  - [ ] Professor
  - [ ] Associate Prof.
  - [ ] Assistant Prof.
  - [ ] Lecturer

- Years of service:
  - [ ] 1-5
  - [ ] 6-10
  - [ ] 11-15
  - [ ] 16-20
  - [ ] >20
### FACULTY SURVEY
(Responses & Analysis)

- **Interpersonal Skills**

<table>
<thead>
<tr>
<th>List Number</th>
<th>Question</th>
<th>Very Satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Dissatisfied</th>
<th>Very Dissatisfied</th>
<th>No Answer</th>
<th>Weighted average</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Your mix of research, teaching and community service.</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2.75</td>
</tr>
<tr>
<td>2</td>
<td>Intellectual stimulation of your work.</td>
<td>0</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.00</td>
</tr>
<tr>
<td>3</td>
<td>Level of teaching/research you currently do.</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2.67</td>
</tr>
<tr>
<td>4</td>
<td>Your interaction with students.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.25</td>
</tr>
<tr>
<td>5</td>
<td>Cooperation you receive from colleagues.</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.50</td>
</tr>
<tr>
<td>6</td>
<td>The mentoring available to you.</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>3.00</td>
</tr>
<tr>
<td>7</td>
<td>Administrative support from the department.</td>
<td>0</td>
<td>3</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.75</td>
</tr>
<tr>
<td>8</td>
<td>Clarity of the faculty promotion process.</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.25</td>
</tr>
<tr>
<td>9</td>
<td>Your prospects for advancement through academic ranks.</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.00</td>
</tr>
<tr>
<td>10</td>
<td>Salary and compensation package.</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1.75</td>
</tr>
<tr>
<td>11</td>
<td>Job security and stability with the department.</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.50</td>
</tr>
<tr>
<td>12</td>
<td>Amount of time you have for yourself and family.</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1.75</td>
</tr>
<tr>
<td>13</td>
<td>The over all climate at the department.</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3.25</td>
</tr>
</tbody>
</table>

**Total** 12 26 7 4 1 2 2.88

**Faculty satisfaction**

- **Very Satisfied**: 24%
- **Satisfied**: 52%
- **Neutral**: 14%
- **Dissatisfied**: 8%
- **very dissatisfied**: 2%
- **Very Dissatisfied**: 2%

**Faculty satisfaction**

2% Very dissatisfied

14% Neutral

52% Satisfied

8% Dissatisfied

2% very dissatisfied

24% Very Satisfied