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PROGRAM/DEGREE REQUIREMENT CHANGE (MAJOR/MINOR)

SUBMITTED BY:

Department	Mechanical Engineering	College/School	CEM
Prepared by	Chuen-Sen Lin	Phone	5126
Email Contact	clin@alaska.edu	Faculty Contact	Chuen-Sen Lin

See <http://www.uaf.edu/uafgov/faculty/cd> for a complete description of the rules governing curriculum & course changes.

PROGRAM IDENTIFICATION:

DEGREE PROGRAM

Mechanical Engineering

Degree Level: (i.e., Certificate, A.A., A.A.S., B.A., B.S., M.A., M.S., Ph.D.)

B.S.

A. CHANGE IN DEGREE REQUIREMENTS: (Brief statement of program/degree changes and objectives)

The changes include:

1. The addition of a 1-credit new degree requirement course. *ME F486 Senior Design*
2. The elimination of the general elective credits (2 credits).
3. A modification of the course requirement, to emphasize the petroleum engineering option.
4. The change of minimum credits required from 131 to 130.

The objectives of the changes are:

1. To improve the program by enhancing engineering design teaching.
2. To identify the PETE courses that the mechanical engineering (ME) students can take to complete an emphasis in petroleum engineering.
3. To benefit the students by reducing unnecessary burden.

B. CURRENT REQUIREMENTS AS IT APPEARS IN THE CATALOG:

Major – B.S. Degree:

1. Complete the general university requirements (See page 131. As part of the core curriculum requirements, complete MTH F200X, CHEM F105X and CHEM F106X)
2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X and PHYS F212X.)
3. Complete the following program (major) requirements: *

ES F101-Introduction to Engineering	3
ES F201-Computer Techniques	3
ES F209-Statics	3
ES F210-Dynamics	3
ES F301-Engineering Analysis	3
ES F307-Elements of Electrical Engineering	3
ES F331-Mechanics of Materials	3
ES F341-Fluid Mechanics	4
ES F346-Basic Thermodynamics	3
ESM F450W-Economic Analysis and Operations	3
MATH F202X-Calculus III	4
MATH F302-Differential Equations	3
ME F302-Dynamics of Machinery	4
ME F308-Measurement and Instrumentation	3
ME F313-Mechanical Engineering Thermodynamics	3
ME F321-Industrial Processes	3
ME F334-Elements of Material Science/Engineering	3
ME F403-Machine Design	3
ME F408-Mechanical Vibrations	3
ME F415W-Thermal Systems Laboratory	3
ME F441-Heat and Mass Transfer	3
ME F487W&O-Design project	3
ME electives**	6
Technical electives***	3

Electives 2

4. Minimum credits required 131

* *Students must earn a C grade (2.0) or better in each of the program (major) requirements, with exception of ES F101.*

** *Mechanical engineering course at F400-level or above.*

*** *Engineering course at F400-level or above.*

Note: Students electing to complete an emphasis in aerospace engineering must complete the sequence of aerospace courses (ME F450, F451, F452, and F453) as part of their program requirements and complete a senior design project that is related to aerospace engineering.

Note: Students electing to complete an emphasis in petroleum engineering must complete the sequence of petroleum courses (ME F409, F416 or equivalent, plus two F400-level PETE courses) as part of their program requirements and complete a senior design project that is related to petroleum engineering.

Note: Students must plan their elective courses in consultation with their mechanical engineering faculty advisor, and obtain the advisor's approval for all elective courses.

C. PROPOSED REQUIREMENTS AS IT WILL APPEAR IN THE CATALOG WITH THESE CHANGES:

(Underline new wording ~~strike-through old wording~~ and use complete catalog format)

Major – B.S. Degree:

1. Complete the general university requirements (See page 131. As part of the core curriculum requirements, complete MTH F200X, CHEM F105X and CHEM F106X)

2. Complete the B.S. degree requirements. (See page 136. As part of the B.S. degree requirements, complete MATH F201X, PHYS F211X and PHYS F212X.)

3. Complete the following program (major) requirements:*

ES F101-Introduction to Engineering	3
ES F201-Computer Techniques	3
ES F209-Statics	3
ES F210-Dynamics	3
ES F301-Engineering Analysis	3
ES F307-Elements of Electrical Engineering	3
ES F331-Mechanics of Materials	3
ES F341-Fluid Mechanics	4
ES F346-Basic Thermodynamics	3
ESM F450W-Economic Analysis and Operations	3
MATH F202X-Calculus III	4
MATH F302-Differential Equations	3
ME F302-Dynamics of Machinery	4
ME F308-Measurement and Instrumentation	3
ME F313-Mechanical Engineering Thermodynamics	3
ME F321-Industrial Processes	3
ME F334-Elements of Material Science/Engineering	3
ME F403-Machine Design	3
ME F408-Mechanical Vibrations	3
ME F415W-Thermal Systems Laboratory	3
ME F441-Heat and Mass Transfer	3
<u>ME F486- Senior Design</u>	<u>1</u>
ME F487W&O-Design project	3
ME electives**	6
Technical electives***	3
<u>Electives</u>	<u>2</u>

4. Minimum credits required ~~131~~ 130

* *Students must earn a C grade (2.0) or better in each of the program (major) requirements.*

** *Mechanical engineering course at F400-level or above.*

*** *Engineering course at F400-level or above.*

Note: Students electing to complete an emphasis in aerospace engineering must complete the sequence of aerospace courses (ME F450, F451, F452, and F453) as part of their program requirements and complete a senior design project that is related to aerospace engineering.

Note: Students electing to complete an emphasis in petroleum engineering must complete the sequence of petroleum courses (ME F409, F416, ~~and PETE F407 and F426 or equivalent plus two F400-level PETE courses~~) as part of their program requirements and complete a senior design project that is related to petroleum engineering.

Note: Students must plan their elective courses in consultation with their mechanical engineering faculty advisor, and obtain the advisor's approval for all elective courses.

D. ESTIMATED IMPACT

WHAT IMPACT, IF ANY, WILL THIS HAVE ON BUDGET, FACILITIES/SPACE, FACULTY, ETC.

No impact will result from adding the 1-credit Senior Design course, eliminating ME general electives, and changing minimum credits required from 131 to 130.

The UAF minimum credits required for BS is 120.

The expertise of the current ME faculty is able to cover the Senior Design course.

The impact from modifying course requirements for the petroleum engineering emphasis option will be that potentially more mechanical engineering students will take PETE F407 and PETE F426. Both courses are typically undersubscribed: 25 of 30 seats remained open in F407 (fall 2011) and 11 of 30 seats remained open in F426 (spring 2011). However, there may be little or no impact on enrollment since mechanical engineering students are already encouraged to take these courses by their advisors, and current enrollments may reflect the total number of ME students pursuing the petroleum engineering emphasis option.

E. IMPACTS ON PROGRAMS/DEPTS:

What programs/departments will be affected by this proposed action?

Include information on the Programs/Departments contacted (e.g., email, memo)

Adding the 1-credit Senior Design course, eliminating the general electives, and changing minimum credits required will not affect any programs/departments besides the Mechanical Engineering department.

The following individuals have been contacted regarding modification of the course requirement for the petroleum engineering emphasis option.

Petroleum Engineering – Catherine Hanks, Dept. Chair, 474-2668 chanks@gi.alaska.edu

Mechanical Engineering – Jonah Lee, Dept. Chair, 474-5160 jonah.lee@alaska.edu

F. IF MAJOR CHANGE - ASSESSMENT OF THE PROGRAM:

Description of the student learning outcomes assessment process.)

The Mechanical Engineering program will be continually assessed using the evaluation process agreed upon by the ME faculty.

JUSTIFICATION FOR ACTION REQUESTED

The purpose of the department and campus-wide curriculum committees is to scrutinize program/degree change applications to make sure that the quality of UAF education is not lowered as a result of the proposed change.

Please address this in your response. This section needs to be self-explanatory. If you drop a course, is it because the material is covered elsewhere? Use as much space as needed to fully justify the proposed change and explain what has been done to ensure that the quality of the program is not compromised as a result.

The objectives of the changes are:

1. To improve the program by enhancing engineering design teaching.
2. To identify the PETE courses that ME students must take to complete an emphasis in petroleum engineering.
3. To benefit the students by reducing unnecessary burden.

Justification:

1. The current program has only one required course, which is dedicated completely to design project. This is a one-semester, 3-credit design course (ME487 Design Project). Students are required to complete group design projects (on average, 3 students per group). Each group project spans the whole design process, from design definition to prototype fabrication. Based on the previous experience of faculty members and students, one semester is not enough time for students to finish their projects with the desired quality of work for every design step within the whole design process. This is even more critical in the success or failure of projects which involve sophisticated tasks, creative ideas, significant procurements, etc.

Taking a 1-credit Senior Design course before the Design Project course would let students learn more about the design process and design tools, and select and prepare their design projects earlier. By extending a one semester design project to two semesters, it is expected that students will benefit by having more time to learn about design technology and then perform better on their design projects.

2. Adding 1 credit to the ME design course will improve students' background and result in improved project design quality. This benefits the students, and also reflects well on the ME program in regards to the ABET outcomes requirement of students' abilities in design. The ME faculty unanimously approved this change.
3. Eliminating the 2-credit general electives (which is not within any specific topics) and changing minimum credits required from 131 to 130 will benefit the students by reducing unnecessary burden.
4. The current course requirement (for PETE emphasis) is too vague, resulting in two problems. First, without a credit requirement, some students attempt to satisfy the emphasis requirement by taking 1- or 2-credit seminar courses. This lowers the minimum standard of the ME program. It can also let a student technically satisfy all

course requirements, but not fulfill the 131-credit requirement for a ME B.S. degree.

The second issue is that the two proposed PETE courses (407 Petroleum Production Engineering, 426 Drilling Engineering) are the only 400-level courses for which a ME student typically has the pre-requisites (specifically ES331, ES341, ES346; all ME program requirements). Without clearly requiring the two proposed courses, ME students may attempt to plan for and/or register for courses for which they do not have the pre-requisites.

APPROVALS:

See attached signatures

	Date	
Signature, Chair, Program/Department of:		

	Date	
Signature, Chair, College/School Curriculum Council for:		

	Date	
Signature, Dean, College/School of:		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		

The objectives of the changes are:

1. To improve the program by enhancing engineering design teaching.
2. To identify the PETE courses that ME students must take to complete an emphasis in petroleum engineering.

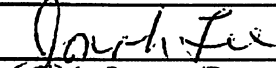
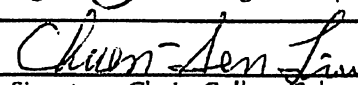
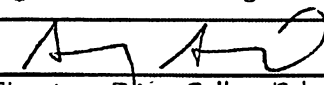
1. The current program has only one required course, which is dedicated completely to design project. This is a one-semester, 3-credit design course (ME487 Design Project). Students are required to complete group design projects (on average, 3 students per group). Each group project spans the whole design process, from design definition to prototype fabrication. Based on the previous experience of faculty members and students, one semester is not enough time for students to finish their projects with the desired quality of work for every design step within the whole design process. This is even more critical in the success or failure of projects which involve sophisticated tasks, creative ideas, significant procurements, etc.

Taking a 1-credit Senior Design course before the Design Project course would let students learn more about the design process and design tools, and select and prepare their design projects earlier. By extending a one semester design project to two semesters, it is expected that students will benefit by having more time to learn about design technology and then perform better on their design projects.

2. Shifting 1 credit from the ME general electives to the ME design course will improve students' background and result in improved project design quality. This benefits the students, and also reflects well on the ME program in regards to the ABET outcomes requirement of students' abilities in design. The ME faculty unanimously approved this change.
3. The current requirement is too vague, resulting in two problems. First, without a credit requirement, some students attempt to satisfy the emphasis requirement by taking 1- or 2-credit seminar courses. This lowers the minimum standard of the ME program. It can also let a student technically satisfy all course requirements, but not fulfill the 131-credit requirement for a ME B.S. degree.

The second issue is that the two proposed PETE courses (407 Petroleum Production Engineering, 426 Drilling Engineering) are the only 400-level courses for which a ME student typically has the pre-requisites (specifically ES331, ES341, ES346; all ME program requirements). Without clearly requiring the two proposed courses, ME students may attempt to plan for and/or register for courses for which they do not have the pre-requisites.

APPROVALS:

	Date	5/16/2012
Signature, Chair, Program/Department of: <u>Mechanical Engineering</u>		
	Date	09/05/2012
Signature, Chair, College/School Curriculum Council for: <u>CEM</u>		
	Date	9/6/12
Signature, Dean, College/School of: <u>CEM</u>		

ALL SIGNATURES MUST BE OBTAINED PRIOR TO SUBMISSION TO THE GOVERNANCE OFFICE

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		