

Submit original with signatures + 1 copy + electronic copy to UAF Governance.

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

TRIAL COURSE OR NEW COURSE PROPOSAL

SUBMITTED BY:

Department	Mechanical Engineering	College/School	CEM
Prepared by	Gang (Sheng) Chen	Phone	5126 5649 (Gang Chen)
Email Contact	gsheng@alaska.edu	Faculty Contact	5126 5649 (Gang Chen)

1. ACTION DESIRED (CHECK ONE):

Trial Course	<input type="checkbox"/>	New Course	<input checked="" type="checkbox"/>
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2. COURSE IDENTIFICATION:

Dept	ME	Course #	486	No. of Credits	1
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Justify upper/lower division status & number of credits: This course needs one hour lecture per week in a semester, the total lecture time >800 minutes of semester

3. PROPOSED COURSE TITLE: Senior Design

4. To be CROSS LISTED? YES/NO

No	If yes, Dept:	Course #
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(Requires approval of both departments and deans involved. Add lines at end of form for such signatures.)

5. To be STACKED? YES/NO

No	If yes, Dept:	Course #
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6. FREQUENCY OF OFFERING:

Fall (Every Year)
Fall, Spring, Summer (Every, or Even-numbered Years, or Odd-numbered Years) — or As Demand Warrants

7. SEMESTER & YEAR OF FIRST OFFERING (if approved) Fall 2013

8. COURSE FORMAT:

NOTE: Course hours may not be compressed into fewer than three days per credit. Any course compressed into fewer than six weeks must be approved by the college or school's curriculum council. Furthermore, any core course compressed to less than six weeks must be approved by the core review committee.

COURSE FORMAT: (check all that apply)

<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5	<input checked="" type="checkbox"/> 6 weeks to full semester
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OTHER FORMAT (specify)

Mode of delivery (specify lecture, field trips, labs, etc) Lecture and projects

9. CONTACT HOURS PER WEEK:

1	LECTURE hours/weeks		LAB hours /week		PRACTICUM hours /week
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Note: # of credits are based on contact hours. 800 minutes of lecture=1 credit. 2400 minutes of lab in a science course=1 credit. 1600 minutes in non-science lab=1 credit. 2400-4800 minutes of practicum=1 credit. 2400-8000 minutes of internship=1 credit. This must match with the syllabus. See <http://www.uaf.edu/uafgov/faculty/cd/credits.html> for more information on number of credits.

OTHER HOURS (specify type) 3 (project)

10. COMPLETE CATALOG DESCRIPTION including dept., number, title and credits (50 words or less, if possible):

ME F486, Senior design, 1 credit

The course is focused on pursuing the design of a real or simulated project which is selected jointly by students, project advisors and/or the instructor. Emphasis will be on the design of practical engineering systems and/or components which integrate engineering knowledge and skills that students have acquired. The principles of design process will be introduced in lecture. Each design team is supposed to generate design concepts, select the best concept and work towards completing a design.

11. COURSE CLASSIFICATIONS: (undergraduate courses only. Use approved criteria found on Page 10 & 17 of the manual. If justification is needed, attach on separate sheet.)

H = Humanities

S = Social Sciences

Will this course be used to fulfill a requirement for the baccalaureate core?

YES

NO

IF YES, check which core requirements it could be used to fulfill:

O = Oral Intensive, Format 6

W = Writing Intensive, Format 7

Natural Science, Format 8

12. COURSE REPEATABILITY:

Is this course repeatable for credit?

YES

NO

Justification: Indicate why the course can be repeated (for example, the course follows a different theme each time).

How many times may the course be repeated for credit?

TIMES

If the course can be repeated with variable credit, what is the maximum number of credit hours that may be earned for this course?

CREDITS

13. GRADING SYSTEM: Specify only one.

LETTER:

PASS/FAIL:

RESTRICTIONS ON ENROLLMENT (if any)

14. PREREQUISITES

COMM F131X or COMM F141X; ENGL F111X; ENGL F211X or ENGL F213X; Co-requisite: ME441, ME F403; or permission of instructor; senior standing.

These will be required before the student is allowed to enroll in the course.

15. SPECIAL RESTRICTIONS, CONDITIONS

no

16. PROPOSED COURSE FEES

s no

Has a memo been submitted through your dean to the Provost & VCAS for fee approval?

Yes/No

17. PREVIOUS HISTORY

Has the course been offered as special topics or trial course previously?

Yes/No

No

If yes, give semester, year, course #, etc.:

18. ESTIMATED IMPACT

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

There is no negative impact to be caused by this action.

19. LIBRARY COLLECTIONS

Have you contacted the library collection development officer (kljensen@alaska.edu, 474-6695) with regard to the adequacy of library/media collections, equipment, and services available for the proposed course? If so, give date of contact and resolution. If not, explain why not.

No

Yes

There is no need to improve the library/media collections, equipment, and services for the proposed course.

20. 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)

The program/ME department will not be affected by this action.

21. POSITIVE AND NEGATIVE IMPACTS

Please specify positive and negative impacts on other courses, programs and departments resulting from the proposed action.

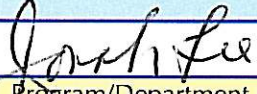
The estimated positive impact is to allow students to have sufficient time to complete preliminary design. The total number of credits to graduate will not change. There is no negative impact to students.

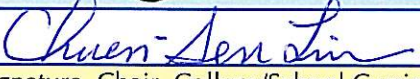
JUSTIFICATION FOR ACTION REQUESTED


The purpose of the department and campus-wide curriculum committees is to scrutinize course change and new course 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. Use as much space as needed to fully justify the proposed course.

- For capstone design course, the past experience shows that it needs longer time than one semester for many students to complete a full design process, which includes project definition, specification, concept design, development, fabrication and test.
- ME department once had a meeting discussing this issue in Nov. 2010, and a consensus was reached: one new course (senior design ME486) should be offered before student's capstone design course (ME487 design project, or capstone design or senior design), so as to allow students to have sufficient time and preparation to conduct a comprehensive capstone design.
- The research shows many other universities (for example, Clemson University, RIT) use the structures of senior design I & II, to enable students to conduct design and complete prototype and testing using two semesters.
- This proposal is to add a course of preliminary senior design. This course will allow students to have sufficient time to select a proper project, conduct conceptual designs, complete designs, evaluate and select design in a semester time. This course will allow students to be well prepared for taking capstone design course (ME487).

APPROVALS:

	Date	5/16/2012
Signature, Chair, Program/Department of: Mechanical Engineering		

	Date	09/05/2012
Signature, Chair, College/School Curriculum Council for: CEM		

	Date	9/6/12
Signature, Dean, College/School of: CEM		

	Date	
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Signature of Provost (if applicable)

Offerings above the level of approved programs must be approved in advance by the Provost.

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

	Date	
Signature, Chair, UAF Faculty Senate Curriculum Review Committee		

ADDITIONAL SIGNATURES: (As needed for cross-listing and/or stacking)

	Date	
Signature, Chair, Program/Department of:		

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

	Date	
Signature, Dean, College/School of:		

ME F486 Senior Design

Senior Design - ME F486 F01 CRN:
University of Alaska Fairbanks
Mechanical Engineering Department
Fall 2013

Instructor: Dr. Gang (Sheng) Chen
Office: Duckering 349C
Phone: (907) 474-5649
E-mail: gsheng@alaska.edu
Course Meetings: one hour, DUCK 252.
Office Hours: three hours or by Appointment
Class Web: UAF Blackboard (<https://classes.uaf.edu/>)

Prerequisites

Senior standing
ENGL 111X, COMM131X or 141X, ENGL 211X or ENGL 213X, Co-requisite: ME F403, ME441, or permission of instructor

Course Goals

The course seeks to provide senior student with an integrated and summative design experience. It incorporates the disciplines of mechanical engineering in one project. The course is to understand and exercise design processes and skills for implementing design projects on one hand, and to practice professional and ethical responsibilities on the other. The introduction to the principles of actual design processes will be presented. In addition, throughout this course we will be dedicated to inspiration of life-long learning.

Course Description

The course is focused on pursuing the integrated design of projects which are selected jointly by students, project advisors and/or the instructor. Emphasis will be on the design of practical engineering systems and/or components which integrate engineering knowledge and skills students have acquired. In the course, 2-4 person teams are formed. Each team is supposed to select a project; discover customer's needs; benchmark the best practices for each desired function; generate design concepts and select the best concept.

The course curriculum provides students a highly interactive environment in design. Course activities include regular lectures; students' practice in project implementation, preparation of technical reports; and students' practice in interpersonal communications with team members and advisors. The course will try to provide a realistic industrial management structure and professional background for the design project activities.

The course will likely be presented in a combined lecture style (e.g., in-class group discussions, office visit and discussion with the instructor, etc.) by comprising two parts – the lecture topics and discussions. Every week the lecture topics will focus on the introduction to the fundamentals of design processes.

Objectives (ABET's outcome criteria)

1. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. an ability to function on multi-disciplinary teams
3. an ability to communicate effectively
4. an appreciation of significant engineering issues in the North

References

1. G. Dieter, L. Schmidt, *Engineering Design*, McGraw-Hill, 2009,
2. P. G. Dominick, J. T. Demel, W. M. Lawbaugh, R. J. Freuler, G. Kinzel, and E. Fromm, "Tools and Tactics of Design," John Wiley & Sons, Inc, 2001.
3. J. Knutson, *Succeeding in Project-Driven Organizations*, John Wiley & Sons, Inc., 2001.

Course Contents

- Course outline, team formation, projects selection, and find project advisors.
- Overview of the design process, problem statement / definition.
- Design Process 1: Pre-concept; Concept; Formulation of a Design Problem; Customer needs and global perspective, Define project/specifications; Design/development.
- Design Process 2: Design/project management, performance tracking, balance from different levels, functional requirements and analysis, solution processes, evaluation and decision making.

Project Selection Criteria

An eligible project for *Senior Design* must meet **all** of the following criteria:

- Having essential integration of knowledge of mathematics, science, and engineering.
- Having essential achievements and/or vision to satisfy the needs of economy, society, environment, health, safety, security, science, technology, northern issues and/or intellectuality.
- Having essential practice of problem definition, solution formulation, prototyping, and engineering skills.
- Having essential practice of working ethics, team work, project management, communication, etc.

The projects should be peer defined or reviewed:

- a. Real projects from industry companies or public organizations should be defined/sponsored by experienced engineers/managers.
- b. Club projects should be one of national or regional competitions. The published rules defined by competition peer review committee will be complied.
- c. Faculty defined project that is directly relevant to faculty's research is acceptable and the publications are encouraged.
- d. Student self-defined project should have strong recommendation from adviser who is a peer in the project area or is directly working in the project area.

Course Activities

(1) Class Events

- A schedule of class activities is distributed with this syllabus at the first meeting of the class. It lists the events we will go through during this semester. They include selecting / proposing a design project, forming a team, identifying project advisors, giving presentations, and submitting reports, etc.
- Two reports and several in-class presentations will be completed.
- Class participation is mandatory. **Notice of absence is required.** (If you will be participating in some events like the Engineering Week, you need to be cautious of balancing your schedules between your course burdens and your role duties.)

(2) Team Work

- Students need to form a team with 2~4 members to work on a project through the semester. I recommend forming a 2-3 person team. **Any 1-person team is discouraged but allowable – talk to instructor first. (1-person team is not allowed if class enrollment is above the maximum (15))**
- Forming a team has to be finished by the second week after course starts. Any further change / exchange of the team members are not recommended, since practice of the team membership is part of the class activities.
- **Any change in team member and project topic after the third week is not allowed.**

(3) Selection, Content, and Progress of Project

- Students are encouraged to work on funded and/or real projects. No financial support is available from the instructor or the department. Students are encouraged to develop their own funding connections.
- The instructor will introduce several project problems at the first meeting.

- Students may pursue their existing project, which must meet some criteria [see Project Selection Criteria above].
 - The selected project must have design contents in nature. You must avoid choosing inappropriate projects (like web page designs, pure analysis/simulations, pure testing, lab equipment setup and testing, or pure manufacturing).
- (4) Supervision of Project
- Find one advisor (the instructor, any other faculty advisor at UAF, and/or one professional engineer/technician, etc.).
 - Each team keeps the instructor updated every week about your work progress.
 - Each team is suggested (but not required) to have a weekly meeting with their advisors to update the design progress.
- (5) Reports
- One proposal and one design report are to be collected. The report format will be distributed by the instructor.
 - After the proposal is submitted, each team is committed to implement your project by closely following the schedule you make in the proposal to achieve the goal you set. As time goes by and you would expect that your schedule will need a substantial change and/or you have to revise the goal for your project, you must inform the instructor and submit a revised proposal in one week.
- (6) Presentations
- Two formal presentations will be given by each team in this semester.
 - Weekly informal presentation will be asked from each team to update their work progress.
- (7) Ownership of the Intellectual Property (IP)
- Students own the intellectual properties of their finished project.
 - Talk to the instructor if you want to pursue IP issues.
 - Talk to individual advisors for their interests of sharing/waiving the ownership of the intellectual properties (usually depends on how much the advisor has involved in the project).
 - For the teaching purpose only, the instructor holds a right to collect reports and presentation materials. The instructor will post students' projects on the class webpage. Address any intellectual property issues to the instructor if you have concerns about the posting.

Grading Policy

- All students must pledge to work hard toward design completion.
- Attendance is mandatory. One absence without advance notice will take 2 points off from your final grade until 10 points in maximum are accumulated.
- A late turn-in report will be under a penalty of 2 points/day from the final grade of each team member.
- The evaluations will be conducted using evaluation forms with grading criteria.

	Proposal report 35%	Design report 65%
Report	25%	55%
Presentation	10%	10%

A(90-100%), B(80-89%), C(70-79%), D(60-69%), F (<60%)

Campus Resources

1. Office of Intellectual Property & Licensing

The Office of Intellectual Property works with UA employees to facilitate and protect UA's innovative activities and bring the results into public use through commercialization. The Office of Intellectual Property assists UA faculty and departments with IP, patent, copyright, trademark and licensing issues, and contractual issues regarding intellectual property and technology transfer. The Office of Intellectual Property also processes patent applications, markets inventions to the private sector, markets UA trademarks and service marks to the private sector, manages

income from IP licensing, and actively seeks new opportunities for UA and private industry collaboration. The office locates at 212 West Ridge Research Building, 474-7765.

2. Disabilities Services

The Office of Disability Services implements the Americans with Disabilities Act (ADA), and insures that UAF students have equal access to the campus and course materials. The instructor will work with the Office of Disabilities Services (208 WHIT,474-5655) to provide reasonable accommodation to students with disabilities. Contact: Mary Matthews, Disability Services, fmkm@uaf.edu, x5655.

3. Writing Center

The Writing Center is a student-staffed, student-oriented service of the English Department. They collaborate with each student on a one-to-one basis, and work with students at any phase of the writing process -- planning, drafting, and revising. They also help writers discover ways of improving grammar, mechanics, and punctuation. Contact: UAF Writing Center, 907-474-5314, 801 Gruening Blod., PO. Box 755720, Fairbanks, Alaska 99775-5720.