New Undergraduate Course Approval Cover Form
Montana State University

This four-page form collects basic information about the proposed new course, provides information on the approval process, and includes all required approvals. Additional information (see INFO sheet) is also required as part of the New Course Packet.

Proposed New Course Information

Requested Rubric, Course Number, Core Designation (if needed):

Example: PHL 361 RH

Check here if “Special Topics” x91 course:

Proposed New Course Information

Requested Rubric, Course Number, Core Designation (if needed): EMEC 361

Course Title:
Measurement and Instrumentation Laboratory
Measurement Lab

Abbreviated Course Title (≤ 30 chars):
Phil

First Semester to be Offered:
Spring 2014

Submitted by:
Ron June

x5941

Submitter’s Contact Info: Phone, Email:
rjune@me.montana.edu

Instructor:
Ron June

Department:
Mechanical and Industrial Engineering

College:
College of Engineering

New Course Review Process

Instructor completes the New Course Packet, with Core information if a Core designation is requested.

Instructor checks for “equivalent” course in the MUS system and recommends a common or unique course number.

Department Head’s signature indicates that course has been approved by the process used within the Department.

The Chair of the College Curriculum Committee signs to indicate College academic approval.

The College Dean signs to indicate that adequate resources are available to offer the course. Supporting information (Dean’s Statement) is typically required.

The New Course Packet (as PDF) is uploaded to the Provost’s Office server for distribution to other committees.

Course requests are sent to Curriculum and Program Committee (CPC). Core reviews are sent to appropriate Core subcommittee. Committees work in parallel when possible to speed approval process. Special topics courses (291,491) skip the CPC review (limited to two years.)

Provost’s Office reviews the new course request. New courses are submitted to MUS for Common Course Number (CCN) review. Dean and Department informed upon approval.

Approved new course sent to Registrar for inclusion in the Catalog and Schedule of Classes.

APPROVALS

Submitter *
Date

Department Head *
Date

Chair, College Curriculum Comm.
Date

Dean *
Date

Christine M. Foreman
Chair, Core Subcommittee (if app.)
Date

Chair, CPC
Date

Assoc. Provost *
Date

Note: This diagram illustrates the typical flow path, but at any review step there can be a request for additional information or modifications. Careful review in early steps is the best way to speed the overall process. * Special topics courses (x91) require fewer signatures, but cannot be offered more than two times without committee review.
INFORMATION NEEDED FOR COMMON COURSE NUMBERING

The process for identifying a common course number for a new course is as follows:

1. Course learning outcomes are prepared for the new course.
2. The person submitting the new course request looks at the CCN website to see if a course with similar outcomes already exists in the MUS system.
   
   www.mus.edu/Qtools/CCN/ccn_default.asp

   • If a course exists with at least 80% of the same outcomes, the course is considered “equivalent” to the proposed new course, and the new course should use the existing rubric and course number.
   • If no “equivalent” course is found, the person submitting the new course request should identify a unique course number that has not been used by any other course in the MUS system.

3. The requested rubric and course number are submitted as part of the new course packet.
4. The Provost’s Office submits the learning outcomes and the requested rubric and course number to the MUS to have a course number assigned to the course. (This will typically be the requested course number, but it could be changed.)
5. The assigned common course number is reported back to the person submitting the new course request.

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Requested Rubric, Course Number, Core Designation (if needed):

Course Title: EMEC 361
Abbrev. Course Title (≤ 30 char): Measurement and Instrumentation Laboratory
Credits: 1
Department Offering Course: Measurement Lab
College: Mechanical and Industrial Engineering
College of Engineering

Is this course “equivalent” to a course in the MUS System?: □ Yes □ No

Learning Outcomes for the Course:

Upon successful completion, students will have demonstrated an understanding of basic LabVIEW programming and comprehend the function, operation, response behavior, and sources of error in common transducers and sensors for measuring various physical quantities. Furthermore, students will be able to apply statistics and uncertainty analysis to measurement systems and acquired data. Finally, the student will be familiar with the proper instrumentation of test systems, appropriate collection of experimental test data, and interpretation and reporting of results.
INFORMATION REQUIRED BY THE REGISTRAR

The data needed to enter the new course into the MSU Catalog and Schedule of Classes is collected on this page. Once the new course has been approved, this page is automatically forwarded to the Registrar for data entry.

Assigned Rubric, Course Number, Core Designation (if needed):

Course Title (for Catalog):

Course Title (for Schedule of Classes, **30 characters, max.**):

First Semester to be Offered:

Restricted Entry/Consent of Instructor Required:

Instructor’s GID (last 4 digits only):

Department Offering Course:

College:

Is the requested course number available? (x4155 to check):

Frequency of course offering:

Semester(s) offered (check all that apply):

Summer Options (check all that apply):

Credits by mode of instruction:  
Lecture: _______  
Seminar: _______  
Independent Study: _______  
Lab/Studio: _______  
Recitation/Discussion: _______  
TOTAL CREDITS: 1

Primary Mode(s) of Delivery:  
Face-to-face  
Web-Enhanced (small on-line comp.)  
On-Line Only  
Blended (significant on-line portion)

**Time and Location – Call the Registrar’s Office at x4155 to find a time and location for the course.**

Assigned Day(s):

Assigned Time(s):

Assigned Building:

Assigned Room:

Capacity (room capacity, or enrollment “cap”):

Co- and Pre-Requisites – **Courses numbered 200 and above are normally expected to have prerequisites. When listing multiple prerequisites, please separate courses with “and” if both are required, or “or” if only one is required.**

Prerequisite(s):

Co-Requisite(s):

Course Description – **Provide a course description of 40 words or less for the MSU Catalog.**

Application of engineering measurement concepts including: temperature, pressure, displacement and flow sensing; calibration; statistical and uncertainty analysis; sampling; signal conditioning; 1st and 2nd order dynamic response; emphasis of computerized data acquisition and analysis.
DEAN’S STATEMENT

The reviewing committees are being asked to take a closer look at the resources required for each proposed new course. In many cases new courses will replace existing courses and the new course request is effectively resource neutral, however that is not always the case. For example, a new elective course that would result in distributing an existing student population across a larger number of courses would represent a significant increase in expenditures for the new course, and no increase in total student credit hours. A funding mechanism for such a course would need to be identified. The Dean’s Statement is the place to document how the costs of the proposed new course will be covered.

The current course EMEC 360 “Measurement and Instrumentation” is a bottleneck within the Mechanical Engineering Curriculum. The waitlist has remained with ~10-18 students following each of the last 2 semesters. The department has recognized this bottleneck, and this separation of the EMEC 360 lecture from the EMEC 361 laboratory is designed to increase the number of students participating in both the lecture and the laboratory on an annual basis.

Currently, the course is offered twice a year for 3 lecture credits and 1 laboratory credit. Under this proposal, we will offer the lecture as EMEC 360 in the Fall and independently offer the laboratory component as EMEC 361. The laboratory component will require the lecture as a co-requisite. With this change we anticipate offering an additional laboratory sections in the Spring semester. We anticipate that these additional sections will accommodate our recent enrollment growth.

Under the current plan, we have no need for additional resources. Note that with current equipment, we can accommodate 4 groups of 4 students within each laboratory section. We have requested additional EFAC dollars to provide additional equipment to accommodate a 5th group. This will be necessary if Mechanical Engineering enrollments continue to grow.
New Undergraduate Course Narrative
Montana State University
Updated August 23, 2012

Please provide the following information in narrative format. Substantive responses to all criteria are required. Although not required, a draft syllabus can also be helpful to the committee in understanding the details of the proposed course.

General Course Information
1. Requested Rubric, Course Number, and Core Designation (if any)

> EMEC 361

2. Course Title

> Measurement and Instrumentation Laboratory

3. Provide a general description of the course explaining the need for the course, its goals, and its overall structure. This is the most important part of the application and should offer a good sense of what students will experience by taking this class.

> This course is part of curriculum reform agreed upon by the Mechanical Engineering Faculty during Fall 2012. Currently, the department offers a 4 credit course, EMEC 360, which includes 3 credits for lecture and 1 credit for laboratory. To accommodate large enrollments, we need to offer additional laboratory sections. To do this, we will increase the lecture size and separate the laboratory component from the lecture to create additional laboratory sections.

We will offer EMEC 360 as a 3 credit lecture in the Fall semester (currently EMEC 360 is offered in both fall and spring). We will create additional laboratory sections for EMEC 361 in the Spring semester. With this adjustment, we anticipate increasing our annual student throughput by a minimum of 40 students per year (~40% increase), and potentially more pending equipment availability. This will accommodate our current and projected enrollment growth based on numbers from AY2012-2013.

The goals of this course will be identical to the current laboratory goals of EMEC 360: students will be expected to become proficient in making and analyzing engineering measurements including analog signal acquisition, sampling, data collection and processing, and measurement of various physical quantities including temperature, strain, load, thickness, and others.

The structure of the course will remain identical to the existing laboratory component of EMEC 360. Students will watch pre-lab videos available on D2L and complete a short quiz prior to each exercise. Students will work in instructor-assigned groups to complete each exercise, which will be summarized in a written report. Consistent with the longstanding culture and values of the ME department, exercises are led by a tenure-track faculty member with the support of a graduate teaching assistant. This is one of very few opportunities in the Mechanical Engineering curriculum for students to be trained in hands-on experimental skills, which are vital to many aspects of the field.
Finally, note that this structure of the course has been previously utilized within the Mechanical Engineering curriculum prior when MSU switched to semesters in 1991. The “just-in-time” offering was implemented in 1996, prior to the unprecedented Mechanical Engineering enrollment growth starting in 2008.

4. Based on what types of student work (e.g., tests, homework assignments, papers, performances, etc.) will grades be determined?

> Grades will be based upon (1) pre-lab quizzes, (2) performance during laboratory sessions, (3) laboratory reports, (4) laboratory projects, and (5) practical hands-on final.

5. Provide a course content outline containing all major topics plus a brief description of the material to be covered under each major topic heading.

> Data Handling
Students will characterize multiple sets of numerical data by finding the analytical function which best represents the data without excess free parameters. Skills include curvefitting and model evaluation.

Data Acquisition and Analog Signal Analysis
Students will setup hardware and write software to acquire analog voltage signals. Students will generate analog signals containing single and multiple frequency components for acquisition. Acquired signals will be examined and reconstructed using Fourier Analysis. Sampling theorem.

Temperature Measurement
Students will calibrate various temperature sensors (thermocouples, RTDs, etc) and make both static and dynamic measurements using these systems. Temperature compensation and bridge circuits will be utilized. Students will model dynamic temperature data collected via DAQ systems they implement. Depending upon resource availability, students will have the option of fabricating and testing their own thermocouples.

Displacement Measurement
Students will utilize and calibrate a Linear Variable Differential Transformer to measure displacement. Calibration curves will be constructed for various input voltages and displacements using an oscilloscope.

Thickness Measurement
Students will utilize piezoelectric transducers for non-destructive evaluation of thickness. Students will measure the unknown thickness profile of a mechanical part and construct a dimensioned drawing using their thickness data. This will involve understanding principles of ultrasound for making thickness calculations.

Load Measurement and Strain Gaging
Students will use theoretical concepts to analyze a cantilevered beam instrumented with strain gages. Based on theory, students will predict and calibrate the apparatus as a load cell. Using their load cell, they will determine the breaking strength of various-sized fly fishing tippets, which will be compared against the breaking strength specified by the manufacturer.

Instrument Control
Students will assemble a pneumatic displacement systems under PID control. Students will tune the system using theoretical principles and determine the maximum precision with which the system can be tuned. Finally, students will evaluate various sources of error within this system.

6. List required texts or other required references.


7. What are the estimated enrollment and student credit hour (SCH) production?

> Based upon current Mechanical Engineering enrollment, we anticipate enrolling 80-100 students in S2014 for production of 80-100 credit hours. Note that this is an increase of ~90% from the 47 credit-hours produced in S2013.

8. Will there be an enrollment cap that restricts enrollment below the level of student demand? If so, what is the enrollment cap and why is it necessary?

> Currently, each lab section is capped at 16 students due to equipment availability. We have requested EFAC funds to increase the per-section enrollment to 20 students.

9. Will course be a “restricted enrollment” course? If so, why is restricted enrollment necessary?

> Yes. For at least the first 3 semesters, this course will be offered as a restricted entry course. During the restricted entry phase, we will analyze enrollment to ensure that students who need the course for progress to graduation are able to enroll in a timely manner. The restricted entry process is very effective for examining (1) enrollment demand, (2) student preparedness, and (3) student progress toward degree. It will insure that students with priority needs are allowed into the course, while students who have additional terms to complete the course are allowed to register on a space-available basis only.

10. Describe how the success of the course will be evaluated? (“End-of-semester student evaluations” is not the answer to this question. How will the instructor determine if the learning outcomes are being met, and how will the department determine if the course is fulfilling its intended purpose?)

> As with previous semesters, student performance on the hands-on laboratory final will be the primary measure for evaluating the success of the course. However, Dr. June will also solicit a faculty review once each semester as he currently does with EMEC 360.

11. Is the instructor a member of the regular faculty (i.e., tenured or tenure-track)? If no, please describe the instructor’s qualifications, attach a Vita, and provide a separate letter of support, signed by the department head (or appropriate unit director), addressing the instructor’s qualifications to teach this course.

> The current instructor is a tenure-track faculty member. Within the last 6 years, this course has always been taught by tenure-track faculty members.
Level of Offering
12. Has the course been offered previously under 280/291 or 480/491? If so, when? Under what number? What was the enrollment? What level of students took the course?

> No. This course has been offered for >20 years in the Mechanical Engineering curriculum. During this period, there have been shifts between concurrent and separate lab/lecture offerings. Recent enrollment has been 47 students each semester (AY 2012-2013) with remaining waitlists of 10-15 students. Junior and Seniors in Mechanical Engineering have taken the course.

13. Justify the level of course offering.

> This course requires substantial background information including material from EELE 250, a pre-requisite course, and EGEN 350, a co-requisite course. Additionally, per curriculum policy, students must complete all 100 and 200 level courses prior to enrolling.

Relationship to other Courses, Curricula, and Departments
14. Does this course build on or interrelate with other courses in your curriculum or related curricula? If so, which ones?

> This course builds upon several courses in the curriculum. The specific measurement techniques involve include material from the following required courses: EMAT 251/252, EMEC 203/320/321/326/341/342/425. Furthermore, this is a crucial component required for completion of the Capstone Design Project in EMEC 489/499.

15. Do the topics in the proposed course duplicate or reiterate those in other courses in this or any other department? If so, how do the coverage and educational experience differ and how is this duplication or reiteration justified? Also, what liaison (which is expected in cases of apparent overlap) has been conducted with other departments? Report reactions, both favorable and unfavorable.

> This course does not duplicate material from any other course in the College of Engineering with the following exception: partial duplication of some of the material from the 3 credit (2 lecture, 1 laboratory) course of ETME 360. Due to departmental curriculum reform, ETME 360 was separated from EMEC 360 starting in Spring 2012. This separation is necessary to resolve a credit differential between the Mechanical Engineering and Mechanical Engineering Technology program requirements.

16. What programs (departments, colleges) will be impacted by the SCH production of this course? That is, where do you think the SCH in the proposed course are likely to come from? If the expected SCH production of the proposed course is greater than 1000, and the SCH are expected to come from other colleges, what steps have been taken to make the other units aware of the potential loss of SCH? Report reactions, both favorable and unfavorable.

> Based on 4 semesters of enrollment data, we anticipate >90% of the SCH generated by this course to be generated by students in the Mechanical Engineering Program. We anticipate the majority of the remainder of the SCH to be generated by the Mechanical Engineering Technology Program with the minority coming from foreign exchange programs.
17. If this proposed course has a significant interdisciplinary component, please explain briefly. Otherwise, indicate n/a.

> n/a

**Students Served**
18. Does the proposed course serve majors only? Non-majors only? Both majors and non-majors? What other majors might be interested in this course? State areas or disciplines to be served and indicate the specific efforts that will be made to make the course material relevant to all disciplines served.

> This course serves primarily majors. However, when space is available we have previously offered it to foreign students. This course may be of interest to students focused on laboratory measurements and instrumentation.

**Resources**
19. What additional resources (e.g., additional instructional FTE, required technologies), if any, will be required to offer this course? Are there any resource issues for the students who will take the course (e.g., required technologies, travel, on-line access requirements)? Will there be an additional fee charged to students taking this course? Please explain.

> Currently no additional resources are needed to offer this course. We have requested EFAC funds to expand the equipment in the lab to accommodate our enrollment growth.

20. What existing information resources – print (books, journals, documents), audiovisual (videos, DVDs, CDs or other), and/or electronic (e-books, databases, electronic journals and web sites) – provided by the MSU Libraries will be used by students in this course? Provide examples as well as descriptive information. If additional information resources are necessary, please discuss those acquisitions with the library (x6549 Collection Development) at least three months prior to the beginning of the semester in which this course will be taught.

> Student projects for this course involve scientific and engineering journals currently provided online by the library. A partial list of journals based on previous semesters is: Science, Nature, Journal of Mechanics and Physics of Solids, Physical Review Letters, and Journal of Biomechanics.

**Other Supporting Material**
21. Include any additional information you feel is needed to support this request.

> n/a.
EMEC 361: Measurement and Instrumentation Laboratory

Catalog Data
Application of engineering measurement concepts including: temperature, pressure, displacement and flow sensing; calibration; statistical and uncertainty analysis; sampling; signal conditioning; 1st and 2nd order dynamic response; emphasis of computerized data acquisition and feedback-based actuation and control. Hands-on laboratory experience.

Textbook

Instructor
Dr. Ron June, Roberts Hall 201F. S14 office hours Tuesday and Thursday from 10:30 - 11:30. Email rjune@me.montana.edu for an appointment if you are unable to make office hours.

Entrance Expectations
PREREQUISITE: All 200 level courses for ME majors, particularly EELE 250
COREQUISITE: EGEN 350; EMEC 360

Students are expected to be familiar with basic statistics and probability, algebra and differential equations, solid mechanics, thermodynamics, fluid mechanics, heat transfer, materials science, and electronic circuits, as well as have a working understanding of computer software. This course requires completion of group laboratory exercises and reports, as well as sufficient performance hands-on practical examinations.

Prior to laboratory, students must (1) read through the laboratory handouts (2) watch any associated laboratory videos available on D2L (3) complete prelab exercises and submit on D2L and (4) outline and write any relevant LabVIEW code to be used during the laboratory. Students are expected to come to the laboratory prepared to setup equipment and complete the laboratory exercises described in the lab handout.

Class participation as measured by iClickers counts for 10% of the final grade in this course. Students are expected to register and use iClickers regularly during lectures.

Course Objectives and Outcomes
The purpose of EMEC 361 is to introduce students to the methods for conducting experimental work in an engineering lab or industrial setting. The course will cover data handling, statistics, measurement errors, dynamic systems / system response, basic LabVIEW training, experimental planning, electronic circuits (e.g. Wheatstone Bridge), computerized data acquisition, calibration, measurement of temperature, pressure, flow, displacement, piezoelectrics (ultrasonic NDE, pressure, accelerometer measurements), and strain gages (load cells).

Upon successful completion, students will have demonstrated an understanding of basic LabVIEW programming and comprehend the function, operation, response behavior, and sources of error in common transducers and sensors for measuring various physical quantities. Furthermore, students
will be able to apply statistics and uncertainty analysis to measurement systems and acquired data. Finally, the student will be familiar with the proper instrumentation of test systems, appropriate collection of experimental test data, and interpretation and reporting of results.

Schedule
LAB
Tuesdays, EPS 008F.

ASSIGNMENTS
See D2L for list of assignments and course schedule.

In addition to the D2L calendar, a tentative course schedule is posted on D2L including: reading assignments, exam times, and laboratory assignments. Homework will be assigned in class. Students are expected to check this schedule weekly for changes and updates.

Course Website
All course information will be posted on Desire2Learn (D2L). D2L announcements and MSU email accounts will serve as the official university means of communication. Per MSU policy, students are expected to check their email at least twice weekly to stay current with University-related communications. Certain communications (e.g. scheduling) may be time-sensitive. Failure to process your email effectively is not an acceptable excuse for missing official communications.

Computer and Laboratory Usage
Students will be expected to learn the LabVIEW software package during the laboratory exercises. LabVIEW is an essential engineering tool widely used throughout both industry and academia.

Labs meet weekly per the semester Laboratory schedule found on D2L. Handouts describing each lab exercise will be available on the web prior to the lab exercise. Students are required to watch video lectures posted on D2L prior to attending laboratory. Each student is responsible for preparation in advance of the scheduled lab.

Lab Sections will be divided into groups of ~4 students for all laboratory experiments, and students will remain within the same group for the entirety of the class. Lab attendance is mandatory, and student’s missing a lab will receive an incomplete (I). Experiments generally involve setting up apparatus and gathering data in a cooperative group effort. For most labs, data can be obtained within the two hour slated period. Once all required data is acquired, students may leave the laboratory with consent of the instructor or teaching assistant. Laboratory reports will be completed as a team activity and a single grade will be given to the entire group. Laboratory reports will be submitted to D2L via electronic dropboxes. No reports will be accepted after the stated deadlines. Graded reports will be available as scheduled on the course calendar.

LabVIEW software will be utilized several times during the course, as well as on the laboratory final. Note that the computers in EPS 134 and any ME Department computers having the CAD lab image have copies of LabVIEW installed for students to practice outside of scheduled laboratory periods. To practice, setup a simulated device in Measurement and Automation Explorer.
Special Needs Information
Students with special needs or requiring special accommodations should contact the instructor or the campus Disabled Student Services Office at (406) 994-2824 at their earliest opportunity.

Student Conduct
Students are expected to conduct themselves in accordance with the MSU Student Conduct Guidelines with particular attention to the areas of academic honesty, behavior, and responsibilities. As mentioned above and in conjunction with Section 310 of the Student Handbook, students are expected to be prompt and prepared for class. Late work will not be accepted.

Assessment and Evaluation
The course outcomes will be evaluated based upon homework assignments, lab reports, and exams and the final letter grades will be weighted as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tr>
<td>Pre-Lab Quizzes</td>
<td>10%</td>
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<tr>
<td>Lab Performance</td>
<td>10%</td>
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<tr>
<td>Reports</td>
<td>30%</td>
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<tr>
<td>Project</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>30%</td>
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(Note that the final will be an INDIVIDUAL exercise.)

In conjunction with MSU policies, students will only be excused from laboratory if representing MSU in an official capacity (e.g. sports participation). Any student with an MSU-approved excuse must contact Dr. June at least 1 week prior to the absence to reschedule. Late lab reports will not be accepted. Point totals required to receive a particular letter grade will be determined by the instructor at the conclusion of the course, and the use of plus and minus grades will be at the discretion of the instructor. Inappropriate conduct, late arrival to labs, poor group performance, class participation, cheating, and plagiarism will affect the final grade.

General Background Information
The accurate measurement of physical quantities is a necessary tool for both engineers and scientists. Experimental testing methods utilize measurement systems and various types of instrumentation to design, evaluate, and control diverse systems and testing equipment. Standard engineering practice includes validation testing – the use of measurement and instrumentation techniques – to confirm analytical results. An engineering test is often the only substitute, and frequently the fastest option, for verifying analysis in cases where a purely analytical approach would be inaccurate or impossible. The objective of this course is to give students baseline knowledge of the practice of measurement and instrumentation in order to support their present and future needs in engineering testing and research. This course will involve the application of theory and hands-on experimental setup and testing to provide students with the ability to setup, perform, and analyze experiments with proper engineering and scientific rigor.

The curriculum contains aspects of many engineering disciplines including: solid mechanics, fluid mechanics, dynamics, mathematics, electronics, and materials science.
Laboratory Safety

Engineering experimentation can be dangerous. As a professional engineer or scientist, laboratory safety will be a primary responsibility. Therefore the following rules apply: no loose or baggy clothing, no open toed shoes, no sandals, and no bare feet. Students with long hair must tie it back prior to the beginning of the laboratory. Failure to demonstrate standard laboratory safety protocols can directly impair your safety and that of your labmates and may impact your final grade. Additional safety measures for the laboratory and group projects will be detailed during the lab sections.
In the spaces below, please indicate only the changes from the current on-line catalog. Please attach a separate sheet indicating the reasons for any substantive (i.e., non-editorial) changes and clarifying anything that might be unclear from this cover sheet.

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<thead>
<tr>
<th>Course Title (for catalog)</th>
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<tr>
<th>Course Title (for schedule – maximum of 22 characters)</th>
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<tr>
<th>Frequency Offered:</th>
<th>☐ Annual</th>
<th>☐ Alternate Years</th>
<th>☐ if alternate, starting year:</th>
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<tr>
<td>Semesters(s) Offered:</td>
<td>☐ Summer</td>
<td>☒ Fall</td>
<td>☐ Spring</td>
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<tr>
<td>Credits by Mode of Instruction:</td>
<td>Lecture: 3</td>
<td>Seminar:</td>
<td>Independent Study:</td>
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<tr>
<td>Total Credits:</td>
<td>3</td>
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Prerequisite course(s) *(When listing multiple prerequisites, please be clear about whether the courses are all required (separated by “and”) or if only one is required (separated by “or”): ME Majors: Completion of all 100-200 level required courses. MET Majors: EELE 250

Co requisite Courses:
EGEN 350: MET Majors: EGEN 324

Course Description (40 word limit): *If there is a change in the course description, please attach the *typed* edited copy in which deletions are shown with a *strikethrough* (or highlighted in red) and additions are in *bold* (or highlighted in yellow).

Person Initiating this Request: Ron June  e-mail: rjune@me.montana.edu  Phone: 5941

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**Approval**

You only need to obtain the 2 which are indicated with an asterisk(*).

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<th>Department Head</th>
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<th>College Dean or Assistant Dean</th>
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<th>Chair, Undergraduate Studies Committee</th>
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EMEC 360
Reasons for Substantive Changes

This course is part of curriculum reform agreed upon by the Mechanical Engineering Faculty during Fall 2012. Currently, the department offers a 4 credit course, EMEC 360, which includes 3 credits for lecture and 1 credit for laboratory. To accommodate large enrollments, we need to offer additional laboratory sections. To do this, we will increase the lecture size and separate the laboratory component from the lecture to create additional laboratory sections. The proposed laboratory course will be EMEC 361, and the lecture will remain EMEC 360.

We will offer EMEC 360 as a 3 credit lecture, with a doubled capacity to accommodate AY demand, starting in the Fall 2014 semester. (However, the change should be made concurrently with the addition of the EMEC 361 labs, which begin in Spring 2014.) EMEC 360 will be offered Fall semester only. (Currently EMEC 360 is offered in both Fall and Spring). We will create additional laboratory sections of EMEC 361 in the Spring semester. With this adjustment, we anticipate increasing our annual student throughput by a minimum of 40 students per year (~40% increase), and potentially more pending equipment availability. This will accommodate our current and projected enrollment growth based on numbers from AY2012-2013.