

Washington State University
MAJOR CURRICULAR CHANGE FORM -- COURSE
(Submit original signed form and ten copies to the Registrar's Office, zip 1035.)

Future Effective Date: 08/15/2013 New course Temporary course Drop service course
(effective date cannot be retroactive) There is a course fee associated with this course (see instructions)

- Variable credit _____
- Increase credit (former credit _____)
- Number (former number _____)
- Crosslisting (between WSU departments)
(Must have both departmental signatures)
- Conjoint listing (400/500)
- Request to meet Writing in the Major [M] requirement (Must have All-University Writing Committee Approval)
- Request to meet GER in _____ (Must have GenEd Committee Approval) Fulfills GER lab (L) requirement
- Professional course (Pharmacy & Vet Med only) Graduate credit (professional programs only)
- Other (please list request) _____

- Repeat credit (cumulative maximum _____ hours)
- Lecture-lab ratio (former ratio _____)
- Prefix (former prefix _____)
- Cooperative listing (UI prefix and number _____)
taught by: WSU UI jointly taught
- S, F grading

MECH 529 EXPERIMENTAL METHODS FOR MECHANICAL ENGINEERING RESEARCH
course prefix course no. title

3	3	0	0	GRADUATE STANDING	
credit	lecture hrs per week	lab hrs per week	studio hrs per week		prerequisite

Description (20 words or less) Examination of research methods for mechanical engineers, including experimental design, techniques, analysis, and presentation

Instructor: Stephen Solovitz Phone number: (360) 546-9253 Email: stevesol@vancouver.wsu.edu
Contact: Stephen Solovitz Phone number: (360) 546-9253 Email: stevesol@vancouver.wsu.edu
Campus Zip Code: 98686

- Please attach rationale for your request, a current and complete syllabus, and explain how this impacts other units in Pullman and other branches (if applicable).
- Secure all required signatures and provide 10 copies to the Registrar's Office.

[Signature] 10/15/12 [Signature] 10/15/12 _____
 Chair/date Dean/date General Education Com/date

 Chair (if crosslisted/interdisciplinary)* Dean (if crosslisted/interdisciplinary)* Graduate Studies Com/date

 All-University Writing Com/date Academic Affairs Com/date Senate/date

***If the proposed change impacts or involves collaboration with other units, use the additional signature lines provided for each impacted unit and college.**

The MSME program at WSU Vancouver is currently designed with a broad scope. Each graduate student is required to complete the same number of graduate credits, but there are only two courses taken by every student: Math 540 (Applied Mathematics) and Mech 598 (Seminar). This allows flexibility for students with interests in disparate fields, such as heat transfer, controls, or failure analysis. However, many of these same students share more common goals, particularly in regard to research. Thus, we propose to create a new graduate level course in research methods, which would be applicable to all current MSME students.

The new course, Mech 529, considers a research project from beginning to end. The topics include: literature review, design of experiments, data analysis, uncertainty, and research presentation. These issues are critical to all MSME students, as they each must consider these in the completion of their theses. The latter third of the course focuses on common experimental techniques, including methods from different departmental disciplines. While only a subset of these techniques will be directly relevant to each student, the general concepts will provide broader context to their own studies. Finally, the students will complete an individual project over the last portion of the course. They will propose, design, and conduct a simple experiment, and then they will present their results to the class at the end of the semester. It is probable that students would choose projects directly related to their own thesis research, providing a boost to their initial studies.

Experimental Methods for Mechanical Engineering Research

- Instructor:** Stephen Solovitz, Assistant Professor, ENCS
VSCI 301P
stevesol@vancouver.wsu.edu
360-546-9253
- Lecture Hours:** Tuesdays/Thursdays from 12 p.m. – 1:15 p.m.
Location: VSCI 18
Office Hours: Tuesdays/Thursdays from 2:00 p.m. – 3:00 p.m.
and by appointment
- Text:** Experimental Methods for Engineers, 7th Edition, by J. P. Holman
- Prerequisites:** Graduate standing
- Homework:** Problem sets will be assigned over the course of the quarter, approximately one every two weeks. You are encouraged to work along with your colleagues, but each of you must provide your own individual solution set. Plagiarism will result in a zero for that set.
- Project:** You will complete an individual project as part of this course. This will involve the design, performance, and analysis of a laboratory experiment. You will write a final report detailing your results, and you will present your findings to the class.
- Exams:** There will be a midterm and a comprehensive final exam. Each will be open book and notes.
- Grading:**
- | | |
|------------|-----|
| Homework | 20% |
| Project | 25% |
| Midterm | 20% |
| Final exam | 35% |
- Website:** Class updates and homework will be provided via the on-line Angel website (lms.wsu.edu).
- Academic Integrity:** Academic integrity is the cornerstone of the university and will be strongly enforced in this course. Any student caught cheating on any assignment will be strongly reprimanded for the course and will be referred to the Office of Student Conduct.
- Disabilities:** Accommodations may be available if you need them in order to fully participate in this class because of a disability. Accommodations may take some time to implement so it is critical that you contact Disability Services as soon as possible. All accommodations must be approved through Disability Services, located in the Student Resource Center on the Lower Level of Student Services Center (360) 546-9138.

Emergencies:

WSU has made an emergency notification system available for faculty, students and staff. Detailed information is located at the following links:

- WSU Vancouver Campus Safety Plan:

<http://www.vancouver.wsu.edu/safety-plan>
 - Comprehensive listing of university policies, procedures, statistics, and information relating to campus safety, emergency management, and the health and welfare of the campus community.

- WSU Vancouver Public Safety web site:

<http://www.vancouver.wsu.edu/police>

- WSU Vancouver ALERTS web site:

<http://www.vancouver.wsu.edu/alerts/>
 - Information about emergencies and other issues affecting WSU Vancouver.

- ZZUSIS portal:

<http://zzusis.wsu.edu>
 - Register/update your emergency contact information for the Crisis Communication System (CCS). Enter your network ID and password and you will be taken to the zzusis portal page. Look for the Vancouver Emergency Info box on the left side of the page and click on "update your emergency contact information" where you can enter your cell, landline, and email contact information.

Course Outcomes:

1. Design and conduct a well-formulated experiment, and consider its impact within the context of other research.
2. Use data analysis methods, including statistics, curve fitting, and uncertainty analysis.
3. Understand the function of typical measurement devices.
4. Deliver well-organized, informative oral presentations.

Outcome Evaluation:

<i>WSU Learning Outcome</i>	<i>At the end of this course, students should be able to:</i>	<i>Course topics that address these learning outcomes</i>	<i>This outcome will be evaluated primarily by:</i>
ENCS-GO-1	Use data analysis methods and understand typical measurement devices.	Data acquisition (weeks 4-5), Uncertainty analysis (week 6), Data analysis and statistics (weeks 7-8), Common experimental devices (weeks 10-14)	Homework problems, Exams
ENCS-GO-2	Design and conduct a well-formulated experiment, and consider its impact within the context of other research.	Literature review (week 2), Design of experiments (week 3), Class project (weeks 10-15)	Project report
ENCS-GO-3	Deliver well-organized, informative oral presentations.	Report writing and presentations (week 9), Research project presentation (week 15)	Project presentations

Course Calendar

Week	Topics	Homework/Notes
8/20	Introduction (Ch. 1), Basic concepts (Ch. 2)	
8/27	Literature review (class notes)	HW1 due
9/3	Design of experiments (Ch. 16)	
9/10	Data acquisition (Ch. 14)	HW2 due
9/17	Dynamic measurements (Ch. 2)	
9/24	Uncertainty analysis (Ch. 3)	HW3 due
10/1	Statistics and probability (Ch. 3)	
10/8	Data analysis and curve fitting (Ch. 3)	HW4 due
10/15	Report writing and presentations (Ch. 15)	Midterm in class
10/22	Electric measurements, Transducers (Ch. 4)	HW5 due; Project assigned
10/29	Pressure measurements (Ch. 6)	
11/5	Flow measurements (Ch. 7)	HW6 due
11/12	Temperature measurements (Ch. 8)	
11/19	Thanksgiving – no class!	
11/26	Force/torque/strain measurements (Ch. 10)	HW7 due
12/3	Final presentations, review	Project presentations
12/10	Final exam	FINAL EXAM (Comprehensive)