1. Calendar Information

ENMF 517 Experimental Design and Analysis
Introduction to statistical Design of Experiments (DOE) techniques for efficient data collection, analysis and interpretation. Analysis of Variance (ANOVA), including blocking and nesting, in full and fractional factorial designs to understand sources of variation in performance. Robust design, including classical response surface and Taguchi techniques, to minimize effects of environmental factors on performance variability. Applications to product and process improvement.
Course Hours: H(3-2)
Calendar Reference:
http://www.ucalgary.ca/pubs/calendar/current/manufacturing-engineering.html#7938

2. Learning Outcomes
At the end of this course, you will be able to:

- Learn to set up structured experiments for product and process design and improvement.
- Learn techniques for evaluating sources of variation, improving robustness and optimizing product and process performance.
- Learn to use state-of-the-art DOE software.
- Develop practical skills to implement DOE and Robust Design in a variety of industries and functions; such as R&D, design, testing and quality assurance.

3. Timetable

<table>
<thead>
<tr>
<th>Section</th>
<th>Days of the Week</th>
<th>Start Time</th>
<th>Duration (Minutes)</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>L01</td>
<td>MWF</td>
<td>11:00</td>
<td>50</td>
<td>SA 145</td>
</tr>
<tr>
<td>B01</td>
<td>T</td>
<td>16:00</td>
<td>110</td>
<td>ME 323</td>
</tr>
</tbody>
</table>

4. Course Instructors

Course Instructor

<table>
<thead>
<tr>
<th>Section</th>
<th>Name</th>
<th>Phone</th>
<th>Office</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>L01, B01</td>
<td>S. T. Enns</td>
<td>(403) 220-5802</td>
<td>ME 318</td>
<td><a href="mailto:enns@ucalgary.ca">enns@ucalgary.ca</a></td>
</tr>
</tbody>
</table>

Teaching Assistants

<table>
<thead>
<tr>
<th>Section</th>
<th>Name</th>
<th>Phone</th>
<th>Office</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>
5. Examinations
The following examinations will be held in this course:

- There will be three term tests conducted during the lab time slot. All tests will be closed book and closed notes.

**Note:** The timetable for Registrar Scheduled exams can be found at the University’s Enrolment Services website, http://www.ucalgary.ca/registrar/.

6. Use of Calculators in Examinations
- Non-programmable calculators, without formulae storage and / or text display features, may be used during tests (e.g. SSE standard calculator).

7. Final Grade Determination
The final grade in this course will be based on the following components:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignments / Labs</td>
<td>40 %</td>
</tr>
<tr>
<td>Test #1 - Oct. 19</td>
<td>25 %</td>
</tr>
<tr>
<td>Test #2 - Nov. 16</td>
<td>25 %</td>
</tr>
<tr>
<td>Test #3 - Dec. 7</td>
<td>10 %</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td>100 %</td>
</tr>
</tbody>
</table>

8. Textbook
The following textbook is required for this course:

<table>
<thead>
<tr>
<th>Title</th>
<th>Design and Analysis of Experiments, with Design Expert Software® (Bundled)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Author(s)</td>
<td>D.C. Montgomery</td>
</tr>
<tr>
<td>Publisher</td>
<td>John Wiley</td>
</tr>
</tbody>
</table>

9. Course Policies
All Schulich School of Engineering students and instructors have a responsibility to familiarize themselves with the policies described in the Schulich School of Engineering Advising Syllabus available at:

http://schulich.ucalgary.ca/undergraduate/advising
10. Additional Course Information

- Note this course is cross-listed with the graduate course ENMF 609.
- Copies of class notes (approx. 200 pages) will be made available on the Blackboard site for ENMF 517.
- Minitab (Version 15) software will be used extensively and is available in ME computer labs.
- Assignments may be done individually or in groups of two. Late assignments will receive a 10% penalty per day. No late assignments will be accepted once grading has commenced.
The eighth edition of Design and Analysis of Experiments continues to provide extensive and in-depth information on engineering, business, and statistics as well as informative ways to help readers design and analyze experiments for improving the quality, efficiency and performance of working systems. Get A Copy. Amazon. Online Stores â–¼. Audible Barnes & Noble Walmart eBooks Apple Books Google Play Abebooks Book Depository Alibris Indigo Better World Books IndieBound. Libraries. Unknown Binding, Fourth Edition. Design of Experiments deals with planning, conducting, analyzing and interpreting controlled tests to evaluate the factors that control the value of a parameter. Learn more at ASQ.org. DOE is a powerful data collection and analysis tool that can be used in a variety of experimental situations. It allows for multiple input factors to be manipulated, determining their effect on a desired output (response). By manipulating multiple inputs at the same time, DOE can identify important interactions that may be missed when experimenting with one factor at a time. All possible combinations can be investigated (full factorial) or only a portion of the possible combinations (fractional factorial). Design of Experiments (DOE) is also referred to as Designed Experiments or Experimental Design - all of the terms have the same meaning. Experimental design can be used at the point of greatest leverage to reduce design costs by speeding up the design process, reducing late engineering design changes, and reducing product material and labor complexity. This Toolbox module includes a general overview of Experimental Design and links and other resources to assist you in conducting designed experiments. Summary. Designed experiments are an advanced and powerful analysis tool during projects. An effective experimenter can filter out noise and discover significant process factors.