**EIND 509: Systems Simulation**  
*Fall 2013*

**Instructor:** David Claudio, Ph.D., PE, CPIM  
304 Roberts Hall, 406-994-5943, [david.claudio@ie.montana.edu](mailto:david.claudio@ie.montana.edu)  
Office Hours: M, W, and Th 9:00 -10:00 AM or by appointment (Note: not available on Tuesdays)

**Class:**  
T and Th 10:50 AM-12:05 PM RH 401

**Course Web:** Desire 2 Learn (D2L): [https://ecat.montana.edu/](https://ecat.montana.edu/)

**Credits:**  
3 credits lecture

**Required Texts:**  

**Additional Texts (optional):**  

**Course Objective:**  
Systems exhibiting randomness are modeled and statistically analyzed using a state-of-the-art simulation language. Graphical model animation, and advanced output analysis are emphasized. Applications include improvement of existing and design of new production and service systems. Stochastic simulation model development, verification, validation, and output analysis is covered with emphasis on statistical and system design and a research oriented focus.

**Learning Outcomes:**
- Applications and limitations of discrete event simulation.  
- Mechanisms used for simulation state description, time advance and event scheduling.  
- Designing and programming simulation models using a simulation language.  
- Selecting an appropriate distribution for sample data and calculation of goodness of fit.  
- Identification and correction of errors in simulation models.  
- Analysis of simulation output data and calculation of confidence intervals on system performance.  
- Statistical comparisons of multiple systems.  
- Design of experiments using simulation.
Rules:
1. Be considerate of others — Be on time. Pay attention. Listen. **Turn cell phones off.**
2. Be an active learner — Participate. Ask questions. Engage the material.
3. Be honest.
4. Hand assignments in on time.
5. Have fun.

Course Listserv:
An email listserv has been created for this class. Since I will periodically post messages to the listserv (such as clarifications to home work assignments), please make sure the email address you regularly use is on the listserv, and check your email frequently.

All registered students will have their MSU email address added to the listserv automatically. If you’d like to add another address to the listserv, send a message from that account to listserv@listserv.montana.edu with the following as the only text in the body of the message:

```
SUBSCRIBE EIND509001
QUIT
```

You should receive a message from the listserv manager that you’ve been successfully added to the EIND 509 listserv.

Grading:
Grades will be determined by each student’s percentage score, according to the following weights:

<table>
<thead>
<tr>
<th>Weight</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>Exams (1 exam)</td>
</tr>
<tr>
<td>25%</td>
<td>Homework</td>
</tr>
<tr>
<td>35%</td>
<td>Class Project (Paper)</td>
</tr>
<tr>
<td>10%</td>
<td>Class Participation</td>
</tr>
</tbody>
</table>

A letter grade will be assessed according to the following table. Grades will not be “curved.” I may lower the standard for a grade category, but I will not raise the standard (i.e., in theory, everyone could earn A’s!).

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
</tr>
<tr>
<td>B</td>
<td>80-89%</td>
</tr>
<tr>
<td>C</td>
<td>70-79%</td>
</tr>
<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>Below 60%</td>
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</table>

Reading:
As assigned; refer to the course web page frequently for reading lectures and materials.
Homework:

A minimum of 6 assignments will be made during the semester. Assignments will be collected at the beginning of the period. Late papers will be penalized 20% of the total points per day!

All group or team assignments will be identified as such. Collaboration on homework that involves sharing solutions, dividing the problem, solving as a group, etc. are strictly forbidden unless otherwise specified.

Policies:

- Assignments are due at the start of class on the assigned due date. I do not accept late work. Exceptions may be granted for extenuating circumstances at my discretion.

- There will be no make-up exams unless you notify me before exam day. Exceptions may be granted for extenuating circumstances.

- The final exam time is set by the registrar’s office. Attendance is mandatory.

- I expect each student to make full effort to attend every class. If you miss class, you are still responsible to get assignments in on time and for knowing the material covered in class that day. If you know you will miss class, try to see me beforehand.

- If you have a documented disability for which you are or may be requesting special accommodation, please contact Disabled Student Services as soon as possible, and discuss your specific situation with the instructor before the first exam.

- Students who entered MSU in Fall 2005 or later, or who plan to graduate under the 2006-2008 or later catalog, are subject to the University’s minimum competency requirement. According to the policy, a grade of C- or better is required for any course needed to complete a major, minor, or certificate program and for all core requirements.

- All records related to this course are confidential and will not be shared with anyone, including parents, without a signed, written release. Before giving such authorization, you should understand the purpose of the release, to whom, and for how long the information is authorized for release.

- Chronic tardiness is unprofessional and unacceptable, and may result in you being asked to leave class. The same holds for disruptive or disrespectful behavior.

- ACADEMIC EXPECTATIONS: According to the MSU Conduct Guidelines and Grievance Procedures for Students, (http://www2.montana.edu/policy/student_conduct/#academicexpect), under section 310.00, students must:
  A. be prompt and regular in attending classes;
  B. be well prepared for classes;
  C. submit required assignments in a timely manner;
  D. take exams when scheduled, unless rescheduled under 310.01;
  E. act in a respectful manner toward other students and the instructor and in a way that does not detract from the learning experience; and
  F. make and keep appointments when necessary to meet with the instructor. In addition to the above items, students are expected to meet any additional course and behavioral standards as defined by the instructor and listed in the syllabus.

- Lying, cheating, plagiarism, or any other form of dishonesty will not be tolerated. Students who engage in such behavior will be subject to the severest sanction allowed under University policy, even for a first offense. Students should familiarize themselves with MSU Student Conduct Guidelines, particularly sections 300, 400, and 600 (see: http://www2.montana.edu/policy/student_conduct/student_conduct-code_2008-2009.htm).
**Tentative course outline**

The following is a general outline of the order of the chapters. “DESS” refers to the book entitled “Discrete-Event System Simulation”, whereas “SWA” refers to “Simulation with Arena” and “FlexSim” refers to “Applied Simulation: Modeling and Analysis using FlexSim”.

<table>
<thead>
<tr>
<th>Week (Week starting on)</th>
<th>Topic(s)</th>
<th>Book(s)</th>
<th>Ch</th>
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<tbody>
<tr>
<td>1 (08/25)</td>
<td>Intro to simulation/ Queuing Theory Review</td>
<td>DESS</td>
<td>1,3, 6</td>
</tr>
<tr>
<td>2 (09/01)</td>
<td>Queuing Theory Review(cont.) Input Analysis</td>
<td>DESS, SWA</td>
<td>6, 4</td>
</tr>
<tr>
<td>3-7 (09/08-10/06)</td>
<td>Arena</td>
<td>SWA</td>
<td>4-5, 7-8</td>
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<tr>
<td>8-9 (10/13-10/20)</td>
<td>Statistical Analysis Output Analysis Comparison of Two Systems</td>
<td>SWA, DESS</td>
<td>6, 11, 12</td>
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<tr>
<td>10-13 (10/27-11/17)</td>
<td>Intro to FlexSim and FlexSim HC</td>
<td>FlexSim</td>
<td>6-11</td>
</tr>
<tr>
<td>14 (11/24-Thanksgiving week)</td>
<td>Catch up day!</td>
<td></td>
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</tr>
<tr>
<td>15 (12/01)</td>
<td>Comparing Arena vs. FlexSim</td>
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Final Period/Date: December 11, 4:00-5:50PM. A presentation for the final paper will take place during that time period. Final paper is due December 10th before 5PM.

*This is a tentative schedule and is subject to change.*