EIND 464
Operations Research II
Spring 2017

Instructor: David Claudio, Ph.D., PE, CPIM
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Office Hours: M, W, Th 11:01 AM -12:00 PM, or by appointment

TA: Sara Fischer
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Office Hours: T, W, 3:00-4:00 PM, or by appointment

Class: T TH 9:25-10:40, 312A Roberts Hall

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

Credits: 3 credits lecture


Prerequisites: EIND 354: Engineering Probability and Statistics I.
EIND 364: Operations Research I.

Objectives:
Modeling approaches and fundamental solution methodologies will be emphasized. We will learn a variety of ways in which deterministic and stochastic models in Operations Research can be used and applied to solve practical problems. We will cover topics such as network models, integer programming, dynamic programming, Markov chains and Queueing theory.

Rules:
2. Be an active learner - Participate. Ask questions. Engage the material.
3. Be honest.
4. Hand assignments in on time.

Course Listserv:
An email listserv has been created for this class. Since I will periodically post messages to the listserv (such as clarifications to homework 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 EIND464001
    QUIT

You should receive a message from the listserv manager that you’ve been successfully added to the EIND 464 listserv.
Sending an Email:
When sending an email, please make sure you comply with the following:
1. In the subject heading, start the message with the title: EIND 464- Then the subject title
2. Please be respectful and courteous. Address the professor with respect. For example, start the message with: Dr. Claudio, Professor Claudio, Dear Dr. Claudio, Dear Professor, or any similar heading.
3. Note: If you start a message with “Hey”, I will not respond.

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

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Weight</th>
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<tbody>
<tr>
<td>15%</td>
<td>Homework</td>
</tr>
<tr>
<td>75%</td>
<td>Midterm Exams (25% each)</td>
</tr>
<tr>
<td>10%</td>
<td>Class Participation and Attendance</td>
</tr>
</tbody>
</table>

A letter grade will be assessed according to the following table. Plus/minus grades may be assigned for the high/low end of each grade category.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
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<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>
</tr>
</tbody>
</table>

Examinations:
Midterm exams will probably be held during class time. Exact time and dates will be determined the prior week or earlier.

Homework:
Homework assignments are due at the beginning of the class period. Even though homework is worth a small portion of your final grade, it is imperative that you do the homework diligently for learning purposes.

When completing homework problems, show all intermediate calculations. It is more important to me that you understand the concepts than it is that you arrived at “the right” answer. Answer review questions as completely as possible. Convince me that you really understand the concept or idea in question. Remember, this is practice for exam time.

You may work with a partner or in a study group (in fact, some assignments may require it), but anything you hand in must be your own work. If you find that you relied too heavily on someone else, and that the work does not represent what you did personally or what you know, you have two ethical choices: a) don’t turn it in, or b) tear it up and start over. The best way to avoid this situation is to work the problem through on your own before discussing with others.

Teaching Assistants:
This class is fortunate to have the support of a graduate student teaching assistant (GTA) to assist and facilitate with student learning. These TAs should be treated with respect and all interactions should be professional. The MSU Student Code of Conduct (http://www.montana.edu/policy/student_conduct/#codeofconduet) requires this of all students. Violations of this policy with TAs (or anyone else) will not be tolerated and will be handled according to the procedures described in the policy.
Policies:

- The use of electronic communication devices is not permitted during class or examination unless otherwise specified.
- No phone calculators during the exams.
- 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.
- We will have three evening midterm examinations. 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://www.montana.edu/policy/student_conduct/), 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://www.montana.edu/policy/student_conduct/).
Topics to be covered:

**Part I: Deterministic Models (~5.5 weeks)**
- **A. Network Models**
  8.1 Basic Definitions Review
  8.3 Maximum-Flow Problems
  8.4 CPM and PERT
- **B. Integer Programming (IP)**
  9.1 Introduction to IP
  9.2 Formulating IP
  9.3 Branch-and-Bound Method for Pure IP problems
  9.4 Branch-and-Bound Method for Mixed IP problems
  9.5 Solving Knapsack Problems by the Branch-and-Bound Method
- **C. Dynamic Programming**
  18.2 A Network Problem
  18.3 An Inventory Problem
  18.4 Resource-Allocation Problems
- **D. Travel Sales person**

Exam 1

**Part II: Stochastic Models (~ 4.5 weeks)**
- **A. Markov Chains**
  17.1 What is a Stochastic Process?
  17.2 What is a Markov Chain?
  17.3 n-Step Transition Probabilities
  17.4 Classification of States in Markov Chain
  17.5 Steady-State Probabilities and Mean First Passage Times
  17.6 Absorbing Chains
- **B. Queuing Theory**

Exam 2

**Part III: Decision Making (~ 3.0 weeks)**
- **A. Multi-attribute Decision Making in the Absence of Uncertainty**
  4.16 Goal Programming
- **B. Decision Making Under Uncertainty**
  13.7 Analytic Hierarchy Process

**Part IV: Sequencing (~2 weeks)- if time allows**

Exam 3: May 4th 12:00-1:50 PM