

**Subject: Simulation    Number: EBGN 526**

**Course Title: Stochastic Modeling**

**Section: A**

**Semester/year: Spring 2016**

**Instructor or Coordinator:** Steffen Rebennack

**Contact information (Office/Phone/Email):** EH 310 / 303-273-3925 / sreberra@mines.edu

**Office hours:** TBA and by appointment

**Class meeting days/times:** MW / 9:30 am – 10:45 am

**Class meeting location:** EH 211

**Web Page/Blackboard link (if applicable):** -

**Teaching Assistant (if applicable):** TBA

**Contact information (Office/Phone/Email):** TBA

**Office hours:** TBA

**Instructional activity:**  hours lecture     hours lab     semester hours

**Course designation:**  Common Core     Distributed Science or Engineering  
 Major requirement     Elective     Other (please describe \_\_\_\_\_)

**Course description from Bulletin:**

As a survey course in stochastic modeling, this course covers a range of topics including an introduction and review of probability models (e.g., sample spaces, events, conditional probabilities, Bayes' formula), and of random variables; and, some subset of the following topics: (i) Markov chains, (ii) Queuing Theory, (iii) Reliability Theory, (iv) Brownian motion, and (v) Simulation. Applications from a wide range of fields will be introduced including marketing, finance, production, logistics and distribution, energy and service systems. In addition to an intuitive understanding of the analytical techniques to model stochastic processes, the course emphasizes how to use related software packages for managerial decision-making.

**Textbook and/or other requirement materials:**

**Required text ("Arena" book):** *Operations Research: Applications and Algorithms*, by Wayne L. Winston, 4<sup>th</sup> edition, Cengage Learning

**Student learning outcomes: At the conclusion of the class students will...**

1. master the basics of probability theory,
2. identify, formulate and solve a stochastic model, and
3. interpret the results in a sound way.

**Brief list of topics covered:**

1. Deterministic Inventory Models
2. Probabilistic Inventory Models
3. Markov Chains
4. Deterministic Dynamic Programming
5. Probabilistic Dynamic Programming
6. Queuing Theory
7. Simulation

**Policy on academic integrity/misconduct:** The Colorado School of Mines affirms the principle that all individuals associated with the Mines academic community have a responsibility for establishing, maintaining an fostering an understanding and appreciation for academic integrity. In broad terms, this implies protecting the environment of mutual trust within which scholarly exchange occurs, supporting the ability of the faculty to fairly and effectively evaluate every student's academic achievements, and giving credence to the university's educational mission, its scholarly objectives and the substance of the degrees it awards. The protection of academic integrity requires there to be clear and consistent standards, as well as confrontation and sanctions when individuals violate those standards. The Colorado School of Mines desires an environment free of any and all forms of academic misconduct and expects students to act with integrity at all times.

Academic misconduct is the intentional act of fraud, in which an individual seeks to claim credit for the work and efforts of another without authorization, or uses unauthorized materials or fabricated information in any academic exercise. Student Academic Misconduct arises when a student violates the principle of academic integrity. Such behavior erodes mutual trust, distorts the fair evaluation of academic achievements, violates the ethical code of behavior upon which education and scholarship rest, and undermines the credibility of the university. Because of the serious institutional and individual ramifications, student misconduct arising from violations of academic integrity is not tolerated at Mines. If a student is found to have engaged in such misconduct sanctions such as change of a grade, loss of institutional privileges, or academic suspension or dismissal may be imposed.

The complete policy is [online](#).

**Grading Procedures:** The homework assignments count collectively for 25% of the grade. Homeworks are weighted equally.

We will have a Mid-Term exam counting for 35% of the grade, plus a final exam that will count for 40% of the grade. The final exam will be comprehensive and will cover all the material.

The final (letter) grade will be determined by considering absolute scores. Specifically, the final grades will be given according to the following table:

93 – 100%	A
90 – 92%	At least A-
87 – 89%	At least B+
83 – 86%	At least B
80 – 82%	At least B-
77 – 79%	At least C+
73 – 76%	At least C
70 – 72%	At least C-

**Coursework Return Policy:** All homework, exams and the project will be graded within 2 weeks.

**Absence Policy** (e.g., Sports/Activities Policy): Class attendance is voluntarily.

### Homework, Exam make-up:

- Homework must be turned in before it is due to be graded – plan ahead.
- There will be between 8-10 homework sets, usually due on a Wednesday beginning of class
- Teamwork is encouraged, but submission has to be individual.
- *Exams*: If you will be absent during a scheduled exam, you should schedule a make-up time before you leave.

**Common Exam Policy** (if applicable): n/a

### Detailed Course Schedule:

Date	Topic	HW
Wed. 01/13	Introduction	-
Mon. 01/18	Deterministic Inventory Models	-
Wed. 01/20	Deterministic Inventory Models	-
Mon. 01/25	Deterministic Inventory Models	-
Wed. 01/27	Deterministic Inventory Models	HW I due
Mon. 02/01	Deterministic Inventory Models	-
Wed. 02/03	Probabilistic Inventory Models	HW II due
Mon. 02/08	Probabilistic Inventory Models	-
Wed. 02/10	Probabilistic Inventory Models	HW III due
Mon. 02/15	Presidents' Day – no class	
Wed. 02/17	Probabilistic Inventory Models	-
Mon. 02/22	Probabilistic Inventory Models	-
Wed. 02/24	Probabilistic Inventory Models & review	HW IV due
Mon. 02/29	<i>Mid-term exam</i>	
Wed. 03/02	Markov Chains	-
Mon. 03/07	Markov Chains	-
Wed. 03/09	Markov Chains	-
Mon. 03/14	Spring break – no class	
Wed. 03/16	Spring break – no class	
Mon. 03/21	Deterministic Dynamic Programming	-
Wed. 03/23	Deterministic Dynamic Programming	HW V due
Mon. 03/28	Deterministic Dynamic Programming	-
Wed. 03/30	Probabilistic Dynamic Programming	HW VI due
Mon. 04/04	Probabilistic Dynamic Programming	-
Wed. 04/06	Probabilistic Dynamic Programming	HW VII due
Mon. 04/11	Queuing Theory	-
Wed. 04/13	Queuing Theory	HW VIII due
Mon. 04/18	Queuing Theory	-
Wed. 04/20	Queuing Theory	HW IX due
Mon. 04/25	Queuing Theory	-
Wed. 04/27	Simulation	HW X due
Mon. 05/02	Simulation	-
Wed. 05/04	Simulation	-
TBA	TBA	<i>Final exam</i>