

**SCM 352      Production and Operations Management**  
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**OFFICE HOURS:** Tues. 11:15 to 1:00 and 6:15 P.M. to 7:00 P.M.. **All other times by appointment.** To schedule an appointment send an e-mail message. When leaving an e-mail message be sure to include your name. All e-mails will receive a reply. **Calls to my home will screened and ignored. The office answering machine often goes unchecked. E-mail is the most reliable form of contact.**

**TEXTBOOKS OR LEARNING RESOURCES:** **None assigned.** Two books are on reserve in the library. You are on your own to buy them or any other book(s) that give adequate coverage to help you achieve the outcomes listed below.

**COURSE OBJECTIVES:** To introduce the student to the concepts, tools, and methods used to solve production and operations problems encountered by managers. To develop problem solving skills, modeling skills, critical thinking skill and learning skills.

### **OUTCOMES, LEARNING ACTIVITIES, AND ASSESSMENT**

**Outcomes.** Desired outcomes will be given for the course and for each area to be learned. A student's grade will be derived from how well they are assessed to have mastered the outcomes.

**Learning Activities.** The learning activities for achieving the outcomes are in general the same for each set of outcomes and are as follows:

1. Read about the topics to be learned
2. Listen to the online lectures
3. Study the online application
4. Discuss the topics within the study group
5. Work assigned problems
6. Discuss the topics and problems in class

**Assessment.** The activities that will be used to assess outcomes are as follows:

1. Answers to questions on readings or online lecture and quality of discussion in class (5 percent of grade)
2. Work on assigned problems (5 percent of grade)
3. In class assessment exams (90 percent of grade)

For each assessment an evaluation is given that corresponds to one of the following levels.

1. Unsatisfactory ( F or D). The student is unable to demonstrate any understanding of the concepts beyond rote memory
2. Satisfactory ( C ). The student is able to demonstrate a minimum understanding of some (60%) of the concepts by answering basic questions and applying the

concepts to problems that are very similar to the concepts and application covered online and in class.

3. Good ( B ). The student is able to demonstrate a professional understanding of many ( 80% ) of the concepts by answering questions and applying the concepts to problems related to but are different to those covered online and in class.
4. Excellent ( A ). The student is able to demonstrate an expert understanding of the concepts by answering most ( 94% ) question or applying the concepts to most kinds of problem relate to the topic.

**GRADING POLICY:** No makeup test. *The final exam will be used to take missed exams or to retake test.* Each test will be of equal value. Grading for test and for the final will conform to the +/- grading system approved by the Board of Regents. Test scores will be translated to letter grades according to the following scale.

<u>Test score range</u>	<u>Equivalent Letter Grade</u>	<u>Grade Point Value</u>
94 - 100	A	4.0
90 - 93	A -	3.7
87 - 89	B +	3.3
83 - 86	B	3.0
80 - 82	B -	2.7
77 - 79	C +	2.3
73 - 76	C	2.0
70 - 72	C -	1.7
67 - 69	D +	1.3
63 - 66	D	1.0
58 - 62	D -	0.7
50 - 57	F+	0.0
0 - 49	F	-5.0

**Assessment Exams:** Assessment exam questions will be in problem form. The problems will have exact solutions. However, partial credit will be given in cases where the error was computational and not conceptual. There may be some true/false questions, multiple-choice questions, fill in the blank questions or essay questions. **Students may use calculators. Students may not use notes, books, notebook or laptop computers and definitely not the test work of another student.**

**Schedule**  
**Outcomes – Course**

1. Know the following concept, analytical tools and methods and how to apply them to problems.
  - a. Modeling
  - b. Linear Programming (LP)
  - c. Forecasting
  - d. Simulation
  - e. Statistical Process Control (SPC)
  - f. Inventory
  - g. Project Management
2. Know how to develop decision support models
3. Develop critical thinking skills
4. Develop analytical skills

### **Knowledge Requirements**

*The student must have passed Accounting 201 & 202, Economics 101 & 102, Economics 261 & 262(Statistics), CIS 201& 202, Math 124 & 176( Algebra & Calculus). **Concepts covered in these courses such as marginal analysis, probability distributions, spreadsheets and personal computers, matrices and systems of equations, the derivative of a function are the foundations of the methods and concepts used to analyze and build management decision models in production and operations. Students are expected to bring to the course a current knowledge of these basic concepts.** The schedule of the course does not provide time to review concepts and methods already presented in the prerequisite courses.*

**Week 1 - 2 (Aug. 24 –**

**Sept.2)**

Introduction and Orientation

### **Outcomes – Introduction and Orientation**

1. Student assigned to a group
2. Email address is added to class list
3. Student understands what is expected

**Week 3 - 4 (Sept. 7 – Sept. 16)**

Modeling and Linear Programming

### **Outcomes – Modeling**

4. Learn how to understand a verbal model
  - a. recognize what decision are to be made
  - b. determine the objective of making the decision
  - c. identify the constraints that limit the decision values
5. Translate a verbal model into a mathematical model

- a. define the decision variables
  - b. create the objective function in terms of the decision variables
  - c. write the constraints as mathematical expressions using the decision variables
6. Select the appropriate mathematical tools to determine model values
    - a. list the possible mathematical tools that could be used
    - b. choose the tool(s) that satisfy all of the conditions of the model
    - c. apply the tool
    - d. interpret the result

#### **Outcomes – Linear Programming**

1. Know how to recognize the structure of a linear programming model
2. Know how to find the solution to a linear programming model using Excel and Solver
3. Know how to do a sensitivity analysis and determine shadow prices

#### **Knowledge Requirements**

*Algebra, Accounting, Economic, Translating Verbal Model to Math Models*

### **Week 5 – 6 (Sept 21 – Sept 30)**

**Assessment Exam**, Forecasting

#### **Outcomes – Forecasting**

1. Know methods for forecasting time series
  - a. Naïve
  - b. Weighted Moving Average (WMA)
  - c. Exponential Smoothing (ES)
  - d. Trend Analysis (TA)
2. Know how to determine which method best fits the given sample
  - a. Mean Square Error (MSE)
  - b. Mean Absolute Difference (MAD)

#### **Knowledge Requirements**

*Algebra, Probability, Statistics, Spreadsheets, Regression Analysis*

### **Week 7 – 8 (Oct. 5 – Oct. 14)**

Simulation, Statistical Process Control

#### **Outcomes – Simulation**

1. Know how to build a simple simulation model
2. Know how to build a simulation model for a queue
3. Know how to build a simulation model for inventory management

#### **Knowledge Requirements**

*Probability, Statistics, Spreadsheets, Uniform distribution*

#### **Outcomes – Statistical Process Control (SPC)**

1. Know how to create a p-chart
2. Know how to create a c- chart
3. Know how to create a  $\bar{x}$  – chart
4. Know how to create a R-chart

5. Know how to determine which chart to use

**Knowledge Requirements**

*Confidence Intervals, Binomial, Poisson, Normal and Z distributions*

**Week 9 – 10 (Oct 19 – Oct 28)**

Layout, Assembly Line Balancing, **Assessment Exam**

**Outcomes -- Assembly Line Balancing**

1. Be able to construct an task table and network graph
2. Be able to balance an assembly line

**Knowledge Requirements**

*Algebra*

**Week 11 – 12 (Nov. 2 – Nov. 16)**

Inventory Management

**Outcomes – Inventory Management**

1. Know when to and how to apply the following inventory models for minimizing total annual cost.
  - a. Economic Order Quantity (EOQ)
  - b. Production
  - c. Discount for both fixed and variable holding cost
2. Know when to and how to apply the following inventory models for to meet a service level or fill rate requirement
  - a. Constant demand and lead time
  - b. Discrete distribution of demand over lead time
  - c. Normal distribution of demand and constant lead time
  - d. Normal distribution of demand over lead time
3. Know how to manage dependent demand with MRP I
  - a. How to draw a product schematic
  - b. Be able to create a MRP I for any component in the bill of material

**Knowledge Requirements**

*Economics Algebra, Calculus*

**Week 13 – 14 (Nov. 18 – Dec. 2)**

Project Management, **Assessment Exam**

**Outcomes – Project Management**

1. Be able to construct a project management table and network graph from completion times and precedence relationships
2. Be able to find the critical path and project completion time
  - a. CPM
  - b. PERT
3. Be able to crash a project by a given number of days

**Knowledge Requirements**

*Accounting, Algebra, Probability, Mean, Variance, Normal and Z distributions*

**Week 15 (Dec. 7 – Dec. 10)**

## Final Assessment

### LEARNING TIPS:

Tip 1. Read the material to be covered in lecture before the scheduled lecture session. By reading ahead you will know the parts of the subject matter that need clarification and will have questions prepare to ask when that subject is being presented. As soon as possible after the lecture, review the class notes and read the material in the book again. If you understand the material, then you should be able to quickly cover the material. Any topics that are not completely understood after the second reading should be read and re-read until understanding is achieved. Technical reading can be slow. It

can read like a novel written in foreign language which requires tedious translation. Until the concepts become part of your working thought process, learning and reading will be slow. **So, be patient.**

Reading more than one textbook can be very helpful. Since authors differ on style and interest, reading a second or third text has the advantage of offering a different presentation for the each reading. Usually the important concepts will be found in all books. Only the examples will change from author. Therefore, by using several texts you will be able to more easily see which concepts are important and you will see them presented in more than one way.

Given the cost of owning one textbook, how can you afford to use several books? **Borrow books from the library.**

Tip 2. Do not attempt to work a problems by mimicking examples in the book. Instead, try to identify the class of problems to which the problem you are

trying to solve belongs and the method used to solve problems of that class.

**Problem solving starts with pattern recognition.** Learn to look at the overall pattern of the information given in a problem rather than the details of the problem.

Identify the class of problems to which your problem belongs Then, select the appropriate method for solving problems of that class. Finally, apply the method correctly.

Tip 3. When choosing problems for practice, select problems for which the solution is not apparent.

Avoid picking problems that you can easily solve. Especially avoid wasting time by working out these easy problems in details. You learn by attempting problems that you are not sure you know how to solve. By solving in detail problems you can easily solve, you will not be learning anything you do not already know. **More will be learned by trying problems that you may not be able to solve.**

Tip 4. **Study with others.** Often what you are having difficulty understanding may be clear to some one in a study group. Someone else may be able to make clear in minutes what it may take you hours to figure out on your own.

Study groups can act as a sounding board for you. If you think you understand a concept or how to work a problem but are not certain, explaining the material or problem to others can often reveal whether or not you know what you are doing.

Tip 5. **Ask questions when you don't know something** you feel you should know. Do not be embarrassed to ask questions in class. You will probably be doing other classmates a favor by asking your question. Very often you will not be the only one in class that would like the question answered.

Tip 6. Assume responsibility for your own learning and performance. How ever much time it takes for you to learn the concepts and methods and to become proficient at applying them is how much time you must spend. You cannot reasonably expect to master the material by only attending lecture and watching. Attending lecture and asking questions is only a small part of the learning process. Total learning requires that you read on your own , perhaps more than one source, and practice problem solving on you own.

Tip 7. To learn a technical or an applied subject requires practice. It is like learning to ski or cook or paint. You can read a book. You can see a film. You can attend a lecture. These are all necessary but not sufficient conditions for learning. Until you actually do what you have seen done you can only believe you can do it. Believing you can do something and doing it is the difference between fantasy and reality. Remember, your job as well as your grade will depend on what you can show and not on what you think you know.

Tip 8. Try to visualize how you might use the information, concepts and methods you must learn. It is easier to remember ideas that have a personal meaning than it is to remember random symbols. Look for situations at work, at home, or in your major field of study that are potential applications for what you are studying. Create your own examples.

Tip 9. Learn to learn rather than learn to be taught. Learning is something you do for yourself. Teaching makes you dependent on others. Teaching is a form of programming. If you can be programmed then so can a computer. Then who needs you for a job.

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