



## Undergraduate Course Syllabus

### **MAT 410: Operations Research**

Center: Online

#### **Course Prerequisites**

MAT 375 with a grade of C or better

#### **Course Description**

This course introduces students to deterministic modeling in the field of operations research. Using a scenario-based approach, students will explore linear, integer, and nonlinear programming as applied to classical and contemporary optimization problems.

#### **Course Outcomes**

- Build linear programming models that successfully address real-world operations research scenarios
- Optimize linear objective functions using the simplex method and applying duality theory
- Interpret the results of sensitivity analyses to investigate how changes in the parameters of a linear programming problem affect its optimal solution
- Analyze real-world problems to determine the appropriate linear, nonlinear, and integer models for application
- Communicate operations research and mathematical concepts effectively to a variety of audiences

#### **Required Materials**

Using your learning resources is critical to your success in this course. Please purchase directly through the [SNHU Online Bookstore](#) rather than any other vendor. Purchasing directly from the bookstore ensures that you will obtain the correct materials and that the IT Service Desk, your advisor, and the instructor can provide you with support if you have problems.

*Operations Research: An Introduction*

Hamdy A. Taha

Prentice Hall, Inc.

Tenth Edition

2017

ISBN: 978-0-13-444401-7

#### **Diversity, Equity, and Inclusion**

As indicated in our core values, SNHU is committed to “embrace diversity where we encourage and respect diverse identities, ideas, and perspectives by honoring difference, amplifying belonging, engaging civilly, and breaking down barriers to bring our mission to life.”

This may or will be reflected in SNHU's curriculum as we embrace and practice diversity, equity, and inclusion (DEI) to provide the most transformative experience for our students, faculty, and staff. Because topics pertaining to DEI can be sensitive, please remember that embodying and practicing diversity, equity, and inclusion is one of our core values that you will encounter throughout the academic experience. In higher education, we are expected to think and engage critically. Use a growth mindset to embrace the diverse readings, course assignments, and experiences of your peers and faculty.

For more information about DEI at SNHU, please visit our website at the [Office of Diversity and Inclusion](#).

### **Instructor Availability and Response Time**

Your class interaction with the instructor and your classmates will take place on a regular, ongoing basis. Your instructor will be actively engaged within the course throughout the week. You will normally communicate with your instructor in the weekly discussions or the General Questions discussion topic so that your questions and the instructor's answers benefit the entire class. You should feel free, however, to communicate with your instructor via SNHU email at any time, particularly when you want to discuss something of a personal or sensitive nature. Your instructor will generally provide a response within 24 hours.

### **Grade Distribution**

<b>Assignment Category</b>	<b>Number of Graded Items</b>	<b>Point Value per Item</b>	<b>Total Points</b>
Discussions	8	15	120
Quizzes	8	35	280
Problem Sets	5	30	150
Final Project			
Milestone One	1	50	50
Milestone Two	1	100	100
Final Submission	1	200	200
Model Selection Project	1	100	100
			<b>Total Course Points: 1,000</b>

This course may also contain practice activities. The purpose of these non-graded activities is to assist you in mastering the learning outcomes in the graded activity items listed above.

### **University Grading System: Undergraduate**

<b>Grade</b>	<b>Numerical Equivalent</b>	<b>Points</b>
A	93–100	4
A-	90–92	3.67
B+	87–89	3.33
B	83–86	3
B-	80–82	2.67
C+	77–79	2.33
C	73–76	2

Grade	Numerical Equivalent	Points
C-	70–72	1.67
D+	67–69	1.33
D	60–66	1
F	0–59	0
I	Incomplete	
IF	Incomplete/Failure *	
IP	In Progress (past end of term)	
W	Withdrawn	

\* Please refer to the [policy page](#) for information on the incomplete grade process.

### Grading Guides

Specific activity directions, grading guides, posting requirements, and additional deadlines can be found in the Assignment Guidelines and Rubrics section of the course.

### Weekly Assignment Schedule

All reading and assignment information can be found within each module of the course. Assignments and discussion posts during the first week of each term are due by 11:59 p.m. Eastern Time. Assignments and discussion posts for the remainder of the term are due by 11:59 p.m. of the student's local time zone.

In addition to the textbook readings that are listed, there may be additional required resources within each module.

Module	Topics and Assignments
1	<p>Introduction to Operations Research and Linear Programming Problems</p> <p><i>Operations Research: An Introduction</i>, Chapters 1 and 2</p> <p>1-1 Discussion: Linear Programming Scenarios</p> <p>1-2 Quiz: Module One</p> <p>1-3 Problem Set: Module One</p> <p>1-4 Final Project Review</p>
2	<p>The Simplex Solution Method for Linear Programming Problems</p> <p><i>Operations Research: An Introduction</i>, Chapter 3 (Section 3.1, LP Model in Equation Form, through Section 3.3, The Simplex Model)</p> <p>2-1 Discussion: The Simplex Method</p> <p>2-2 Quiz: Module Two</p> <p>2-3 Problem Set: Module Two</p>

Module	Topics and Assignments
3	<p>Sensitivity Analysis of Linear Programming Problems</p> <p><i>Operations Research: An Introduction</i>, Chapter 3 (Section 3.4, Artificial Starting Solution, through Section 3.6, Sensitivity Analysis)</p> <p>3-1 Discussion: The Significance of Sensitivity Analysis</p> <p>3-2 Quiz: Module Three</p> <p>3-3 Problem Set: Module Three</p> <p>3-4 Final Project Milestone One</p>
4	<p>Duality and Its Economic Interpretations</p> <p><i>Operations Research: An Introduction</i>, Chapter 4</p> <p>4-1 Discussion: The Dual Problem</p> <p>4-2 Quiz: Module Four</p> <p>4-3 Problem Set: Module Four</p>
5	<p>Transportation and Transshipment Models</p> <p><i>Operations Research: An Introduction</i>, Chapters 5 and 22, pages 22.12 - 22.13 (available via download using the companion website access code located in the beginning of the textbook)</p> <p>5-1 Discussion: The Transportation Model</p> <p>5-2 Quiz: Module Five</p> <p>5-3 Problem Set: Module Five</p> <p>5-4 Final Project: Milestone Two</p>
6	<p>Integer and Nonlinear Programming, an Introduction</p> <p><i>Operations Research: An Introduction</i>, Chapters 9 (Section 9.1, Illustrative Applications) and 21</p> <p>6-1 Discussion: Economic Opportunity via Collaboration</p> <p>6-2 Quiz: Module Six</p> <p>6-3 Model Selection Project: Submission</p>
7	<p>Network Models</p> <p><i>Operations Research: An Introduction</i>, Chapter 6</p> <p>7-1 Discussion: A Network Model</p> <p>7-2 Quiz: Module Seven</p> <p>7-3 Final Project Submission: Final Report</p>
8	<p>Advanced Linear Programming and the Revised Simplex Algorithm</p> <p><i>Textbook: Operations Research: An Introduction</i>, Chapter 7 (Section 7.1, Simplex Method Fundamentals, through Section 7.4, Duality)</p> <p>8-1 Discussion: The Linear Programming Theory</p> <p>8-2 Quiz: Module Eight</p>

### Course Participation

Course participation is required within the first week of the term for all online courses. *Participation* in this context is defined as completing one graded assignment during the first week of the course. Otherwise, students will be administratively removed for nonparticipation. Students who do not participate during the first week may forfeit their rights to be reinstated into the course. Students who stop attending a course after the first week and who do not officially withdraw will receive a grade calculated based on all submitted and missed graded assignments for the course. Missed assignments will earn a grade of zero. See the [course withdrawal policy](#) and the [full attendance policy](#) for further information.

## Late Assignments

Students who need extra time may submit assignments (excluding discussion board postings) up to one week after the assignment due date. Discussion board submissions will not be accepted for credit after the deadline except in extenuating circumstances.

- A penalty of 10 percent of the total value of the assignment will be applied to the grade achieved on the late assignment regardless of the day of the week on which the work is submitted.
- Students who submit assignments more than one week late will receive a grade of zero on the assignment unless they have made prior arrangements with the instructor.

Students must submit all assignments no later than 11:59 p.m. (in their own time zone) on the last day of the term. No assignments are accepted after the last day of the term unless an incomplete has been submitted. See the [incomplete grades policy](#).

There may be times an instructor makes an exception to the late assignment policy. Instructors may accept late work, including discussion board posts, with or without prior arrangement.

- Exceptions to the late policy on these grounds are left to the instructor's discretion, including whether the late penalty is applied or waived. Students should not assume that they will be allowed to submit assignments after the due dates.
- If an instructor finds that they are unable to determine whether an exception to the late policy would be appropriate without documentation, the collection and review of student documentation should be handled through the Dispute Resolution team in order to protect the student's privacy. In these cases, students should file a [Student Concern Dispute form](#) to have the circumstances reviewed.

If a student is experiencing (or knows they will experience) a circumstance, including pregnancy, that is protected under the Americans with Disabilities Act or Title IX, they are encouraged to contact the [Online Accessibility Center \(OAC\)](#) as soon as possible to explore what academic accommodations might be offered. Instructors must honor all deadlines established through the OAC.

## Student Handbook

Review the [student handbook](#).

## ADA/504 Compliance Statement

Southern New Hampshire University (SNHU) is dedicated to providing equal access to individuals with disabilities in accordance with Section 504 of the Rehabilitation Act of 1973 and with Title III of the Americans with Disabilities Act (ADA) of 1990, as amended by the Americans with Disabilities Act Amendments Act (ADAAA) of 2008.

SNHU prohibits unlawful discrimination on the basis of disability and takes action to prevent such discrimination by providing reasonable accommodations to eligible individuals with disabilities. The university has adopted the [ADA/504 Grievances Policy](#) (version 1.2 effective October 16, 2017), providing for prompt and equitable resolution of complaints regarding any action prohibited by Section 504 or the ADA.

For further information on accessibility support and services, visit the [Disability and Accessibility Services](#) webpage.

**Academic Integrity Policy**

Southern New Hampshire University requires all students to adhere to high standards of integrity in their academic work. Activities such as plagiarism and cheating are not condoned by the university. Review the [full academic integrity policy](#).

**Copyright Policy**

Southern New Hampshire University abides by the provisions of United States Copyright Act (Title 17 of the United States Code). Any person who infringes the copyright law is liable. Review the [full copyright policy](#).

**Withdrawal Policy**

Review the [full withdrawal policy](#).

**Southern New Hampshire University Policies**

More information about SNHU policies can be found on the [policy page](#).