# 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 Help 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**

| Assignment Category | Number of Graded Items | Point Value per Item | Total Points |
|---|---|---|---|
| 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 |
| | | | **Total Course Points:** 1,000 |

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**

| Grade | Numerical Equivalent | Points |
|---|---|---|
| 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 | Introduction to Operations Research and Linear Programming Problems<br>*Operations Research: An Introduction,* Chapters 1 and 2<br>1-1 Discussion: Linear Programming Scenarios<br>1-2 Quiz: Module One<br>1-3 Problem Set: Module One<br>1-4 Final Project Review |
| 2 | The Simplex Solution Method for Linear Programming Problems<br>*Operations Research: An Introduction,* Chapter 3 (Section 3.1, LP Model in Equation Form, through Section 3.3, The Simplex Model)<br>2-1 Discussion: The Simplex Method<br>2-2 Quiz: Module Two<br>2-3 Problem Set: Module Two |
| 3 | Sensitivity Analysis of Linear Programming Problems<br>*Operations Research: An Introduction,* Chapter 3 (Section 3.4, Artificial Starting Solution, through Section 3.6, Sensitivity Analysis)<br>3-1 Discussion: The Significance of Sensitivity Analysis<br>3-2 Quiz: Module Three<br>3-3 Problem Set: Module Three<br>3-4 Final Project Milestone One |

| Module | Topics and Assignments |
|--------|------------------------|
| 4 | Duality and Its Economic Interpretations<br><br>*Operations Research: An Introduction,* Chapter 4<br><br>4-1 Discussion: The Dual Problem<br><br>4-2 Quiz: Module Four<br><br>4-3 Problem Set: Module Four |
| 5 | Transportation and Transhipment Models<br><br>*Operations Research: An Introduction,* 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)<br><br>5-1 Discussion: The Transportation Model<br><br>5-2 Quiz: Module Five<br><br>5-3 Problem Set: Module Five<br><br>5-4 Final Project: Milestone Two |
| 6 | Integer and Nonlinear Programming, an Introduction<br><br>*Operations Research: An Introduction,* Chapters 9 (Section 9.1, Illustrative Applications) and 21<br><br>6-1 Discussion: Economic Opportunity via Collaboration<br><br>6-2 Quiz: Module Six<br><br>6-3 Model Selection Project: Submission |
| 7 | Network Models<br><br>*Operations Research: An Introduction,* Chapter 6<br><br>7-1 Discussion: A Network Model<br><br>7-2 Quiz: Module Seven<br><br>7-3 Final Project Submission: Final Report |
| 8 | Advanced Linear Programming and the Revised Simplex Algorithm<br><br>*Textbook: Operations Research: An Introduction,* Chapter 7 (Section 7.1, Simplex Method Fundamentals, through Section 7.4, Duality)<br><br>8-1 Discussion: The Linear Programming Theory<br><br>8-2 Quiz: Module Eight |

**Attendance Policy**

Online students are required to submit a graded assignment/discussion during the first week of class. If a student does not submit a graded assignment/discussion during the first week of class, the student is automatically dropped from the course for non-participation. Review the full attendance policy.

**Late Assignments Policy**

Meeting assigned due dates is critical for demonstrating progress and ensuring appropriate time for instructor feedback on assignments. Students are expected to submit their assignments on or before the due date. Review the full late assignment policy.

**SNHU 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 this policy to provide for prompt and equitable resolution of complaints regarding any action prohibited by Section 504, the ADA, or the ADAAA.

For questions about **support services, documentation guidelines, general disability issues, or pregnancy accommodations**, please visit the [Online Accessibility Center](#) (OAC).

As a student, you must complete an interactive intake process, with supporting documentation, in order to be granted accommodations. Once reasonable accommodations are approved by the OAC, you will receive an accommodations letter. You are then responsible for sharing the letter with your instructor. Accommodations are not retroactive.

If you feel you've been subject to discrimination on the basis of disability, by any party, you may file a complaint or grievance. For more information on the ADA/504 Grievance Policy, go to the [Disability and Accessibility Services](#) website.

**Academic Honesty 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 honesty 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](#).

**SNHU Withdrawal Policy**
Review the [full withdrawal policy](#).

**Southern New Hampshire University Policies**
More information about SNHU policies can be found on the [policy page](#).