

MATH330

STUDENT WARNING: This course syllabus is from a previous semester archive and serves only as a preparatory reference. Please use this syllabus as a reference only until the professor opens the classroom and you have access to the updated course syllabus. Please do NOT purchase any books or start any work based on this syllabus; this syllabus may NOT be the one that your individual instructor uses for a course that has not yet started. If you need to verify course textbooks, please refer to the online course description through your student portal. This syllabus is proprietary material of APUS.

Course Summary

Course : LW542 **Title :** Linear Optimization

Length of Course : 8 Charles White

Prerequisites : **Credit Hours :** 3

Description

Course Description: This course examines various linear optimization concepts and problem solving techniques commonly found in manufacturing, transportation, and military operations. The goal of optimization is to find the best possible solution to a problem given a number of constraints. The emphasis of this course is problem solving. This course includes the construction and analysis of real world problems and the application of various linear optimization techniques to find an optimal solution. An optimization software package will also be presented and used to solve problems. This course covers a wide range of linear optimization techniques. Topics include linear programming; the simplex algorithm and goal programming; sensitivity analysis and duality; problems in transportation and transshipment; network models; and integer programming. (Prerequisite: MATH220)

Course Scope:

MATH 330 Linear Optimization is delivered via distance learning technologies. The course introduces students to linear optimization and is designed to be an introductory course to operations research. The focus of this course lies in the application of linear optimization as opposed to the theory. It covers a variety of operations research concepts and techniques relevant to the field. Topics that are covered include linear programming; the simplex algorithm and goal programming; sensitivity analysis and duality; problems in transportation and transshipment; network models; and integer programming. Practical applications are provided and emphasized throughout the course.

Objectives

After completing the course, the student should be able to accomplish the following Course Objectives (CO):

CO-1: Model problems using basic linear programming methods.

CO-2: Apply the simplex algorithm and goal programming to real world problems.

CO-3: Explain how the sensitivity analysis relates to the problem and solution.

CO-4: Demonstrate the purpose of duality and how it relates to the problem and solution.

CO-5: Model problems involving transportation and transshipment.

CO-6: Apply techniques used in project management by solving network model problems.

CO-7: Model integer programming problems used in real world applications.

Outline

Week 1: Unit 1: What Is Operations Research? Modeling with Linear Programming

Learning Objectives

CO-1: Model problems using basic linear programming methods.

Reading And Study

Textbook Chapters: **1 and 2**

Assignment

Unit 1 Forum: Introductions

Project Selected

Homework

Week 2: Unit 2: The Simplex Method and Sensitivity Analysis

Learning Objectives

CO-2: Apply the simplex algorithm and goal programming to real world problems.

CO-3: Explain how the sensitivity analysis relates to the problem and solution provided by the optimization software used in the course.

Reading And Study

Textbook Chapter: **3**

Assignment

Unit 2 Forum: Sensitivity Analysis

Homework

Week 3: Unit 3: Duality and Post-Optimal Analysis

Learning Objectives

CO-4: Demonstrate the purpose of duality and how it relates to the problem and solution.

Reading And Study

Textbook Chapter: **4**

Assignment

Unit 3 Forum: Duality

Homework

Week 4: Unit 4: Review of Units 1, 2, and 3

Learning Objectives

CO-1: Model problems using basic linear programming methods.

CO-2: Apply the simplex algorithm and goal programming to real world problems.

CO-3: Explain how the sensitivity analysis relates to the problem and solution provided by the optimization software used in the course.

CO-4: Demonstrate the purpose of duality and how it relates to the problem and solution.

Reading And Study

Midterm Exam Covers Textbook Chapters: **2, 3, and 4**

Assignment

Unit 4 Forum: Tools of Linear Optimization

Midterm Exam

Week 5: Unit 5: Transportation Model and Its Variants

Learning Objectives

CO-5: Model problems involving transportation and transshipment.

Reading And Study

Textbook Chapter: **5**

Assignment

Unit 5 Forum: Online Operations Research Resources

Homework

Week 6: Unit 6: Network Models

Learning Objectives

CO-6: Apply techniques used in project management by solving network model problems.

Reading And Study

Textbook Chapter: **6**

Assignment

Unit 6 Forum: Careers in Operations Research

Homework

Week 7: Unit 7: Integer Linear Programming

Learning Objectives

CO-7: Model integer programming problems used in real world applications.

Reading And Study

Textbook Chapter: **9**

Assignment

Unit 7 Forum: Uses of Linear Optimization

Homework

Project Due

Week 8: Review of Units 5, 6, and 7

Learning Objectives

CO-5: Model problems involving transportation and transshipment.

CO-6: Apply techniques used in project management by solving network model problems.

CO-7: Model integer programming problems used in real world applications.

Reading And Study

Final Exam Covers Textbook Chapters: **5, 6, and 9**

Assignment

Unit 8 Forum: Course Reflection

Final Exam

No Homework Assigned

Evaluation

Forum Assignments: The University requires weekly contact from each student. This requirement can be met by taking the Unit Tests and by participating in the Forums. A total of 10% of the final grade will be based on participation in the Forums. Forum postings are expected to be written in complete sentences using correct grammar and spelling. Any posting which requires research must be accompanied by a citation of the references used.

Project: The project will count as 24% of the final grade. It will be assigned during week 1 and will be due at the end of week 7. You are permitted to consult with others to complete your project, but the work you submit must be your own.

Midterm Exam: The midterm exam will count as 30% of the final grade. It will be a three hour, online, open-book, open-note exam. You may not consult with any other person while taking the exam. It will be given during week 4 and will cover all of the material covered in the first three weeks of the course. You will not need a proctor to take this exam.

Final Exam: The final exam will count as 30% of the final grade. It will be a three hour, online, open-book, open-note exam. You may not consult with any other person while taking the exam. This examination will be based on all material covered during the semester. The questions will require computations and application

of the material covered during the semester. Please coordinate with the professor for any special arrangements. Unless the professor approves alternate arrangements, students should plan to take the final examination during the last week of the course. You will not need a proctor to take this exam.

Please see the [Student Handbook](#) to reference the University's [grading scale](#).

Grading:

Name	Grade %
Academic Integrity	1.00 %
Academic Integrity - Honor Pledge	1.00 %
Forums	16.00 %
Unit 1 Forum: Introductions	2.00 %
Unit 2 Forum: Sensitivity Analysis	2.00 %
Unit 3 Forum: Duality	2.00 %
Unit 4 Forum: Tools Used In Linear Optimization	2.00 %
Unit 5 Forum: Online Operations Research Resources	2.00 %
Unit 6 Forum: Careers on Operations Research	2.00 %
Unit 7 Forum: Readings in Linear Optimization	2.00 %
Unit 8 Forum: Course Reflections	2.00 %
Project	24.00 %
Project Plan & Paper	24.00 %
Exams	60.00 %
Mid Term Exam	0.00 %
Final Exam	30.00 %
Homework - Extra Credit	5.00 %
Homework Extra Credit	5.00 %

Materials

Book Title: Operations Research: An Introduction, 9th Ed - The VitalSource e-book is provided via the APUS Bookstore

Author: Taha

Publication Info: Pearson

ISBN: 9780132555937

Book Title: You must validate your cart to get access to your VitalSource e-book(s). If needed, instructions are available here - <http://apus.libguides.com/bookstore/undergraduate>

Author: N/A

Publication Info: N/A

ISBN: N/A

You must validate your cart to get access to your VitalSource e-book(s). If needed, instructions are available at <http://apus.libguides.com/bookstore/undergraduate>.

Homework problems are not a part your final grade but they are an important factor in your success at mastering the subject. Math is not a spectator sport - one learns math by putting the pencil to the paper!

Students will need a scientific calculator – at a minimum – to successfully complete this course. At the student's discretion, a scientific calculator or a computer spreadsheet program like Microsoft Excel may be used. Students may make use of the above for all graded assignments during the course.

Course Guidelines

Citation and Reference Style

- Attention Please: Students will follow the APA Format as the sole citation and reference style used in written work submitted as part of coursework to the University. Assignments completed in a narrative essay or composition format must follow the citation style cited in the APA Format.

Tutoring

- [Tutor.com](https://www.tutor.com) offers online homework help and learning resources by connecting students to certified tutors for one-on-one help. AMU and APU students are eligible for 10 free hours* of tutoring provided by APUS. Tutors are available 24/7 unless otherwise noted. Tutor.com also has a SkillCenter Resource Library offering educational resources, worksheets, videos, websites and career help. Accessing these resources does not count against tutoring hours and is also available 24/7. Please visit the APUS Library and search for 'Tutor' to create an account.

Late Assignments

- Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The due date for each assignment is listed under each Assignment.
- Generally speaking, late work may result in a deduction up to 15% of the grade for each day late, not to exceed 5 days.
- As a working adult I know your time is limited and often out of your control. Faculty may be more flexible if they know ahead of time of any potential late assignments.

Turn It In

- Faculty may require assignments be submitted to Turnitin.com. Turnitin.com will analyze a paper and report instances of potential plagiarism for the student to edit before submitting it for a grade. In some cases professors may require students to use Turnitin.com. This is automatically processed through the Assignments area of the course.

Academic Dishonesty

- Academic Dishonesty incorporates more than plagiarism, which is using the work of others without citation. Academic dishonesty includes any use of content purchased or retrieved from web services such as CourseHero.com. Additionally, allowing your work to be placed on such web services is academic dishonesty, as it is enabling the dishonesty of others. The copy and pasting of content from any web page, without citation as a direct quote, is academic dishonesty. When in doubt, do not copy/paste, and always cite.

Submission Guidelines

- Some assignments may have very specific requirements for formatting (such as font, margins, etc) and submission file type (such as .docx, .pdf, etc) See the assignment instructions for details. In general, standard file types such as those associated with Microsoft Office are preferred, unless otherwise specified.

Disclaimer Statement

- Course content may vary from the outline to meet the needs of this particular group.

Communicating on the Forum

- Forums are the heart of the interaction in this course. The more engaged and lively the exchanges, the more interesting and fun the course will be. Only substantive comments will receive credit. Although there is a final posting time after which the instructor will grade comments, it is not sufficient to wait until the last day to contribute your comments/questions on the forum. The purpose of the forums is to actively participate in an on-going discussion about the assigned content.
- “Substantive” means comments that contribute something new and hopefully important to the discussion. Thus a message that simply says “I agree” is not substantive. A substantive comment contributes a new idea or perspective, a good follow-up question to a point made, offers a response to a question, provides an example or illustration of a key point, points out an inconsistency in an argument, etc.
- As a class, if we run into conflicting view points, we must respect each individual's own opinion. Hateful and hurtful comments towards other individuals, students, groups, peoples, and/or societies will not be tolerated.

University Policies

[Student Handbook](#)

- [Drop/Withdrawal policy](#)
- [Extension Requests](#)
- [Academic Probation](#)
- [Appeals](#)
- [Disability Accommodations](#)

The mission of American Public University System is to provide high quality higher education with emphasis on educating the nation’s military and public service communities by offering respected, relevant, accessible, affordable, and student-focused online programs that prepare students for service and leadership in a diverse, global society.

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