FLORIDA POLYTECHNIC UNIVERSITY

Course Syllabus

Course Information

- **Course Number and Title**: EGN 3448 – Operations Research
- **Credit Hours**: 3 credits
- **Current Academic Term**: Spring 2026
- **Class Meeting**: TR– 08:00 AM – 09:15 AM (IST-1049)

Instructor Information

- **Instructor**: Dr. Parisa Hajibabaee
- **Office**: BARC-1107
- **Office Hours**: TR– 11:00AM -12:00 PM, T– 2:30 -3:30 PM or by appointment
- **Office Phone**: 863-874-8559
- **E-mail**: phajibabaee@floridapoly.edu

Course Details

- **Delivery Mode**: This course will be delivered face-to-face in room **IST-1049**. Please check the Canvas course website for all information, including announcements, discussions, assignments, quizzes, and supplementary material for topics covered in this course.

- **Course Website**: https://floridapolytechnic.instructure.com/courses/10124
- **Official Catalog Course Description**: Basic approaches for modeling and solving operation efficiency challenges and predicting and demonstrating cost-savings or other value-added gains.

- **Course Prerequisites**: MAC 2311 (or STA 2023) Analytics Geometry and Calculus 1 OR STA 3032 Probability and Statistics

- **Communication/Computation Skills Requirement (6A-10.030)**: No.

- **Required Textbooks**: An Introduction to Management Science: Quantitative Approaches to Decision Making

    - by Jeffrey D. Camm, James J. Cochran, Michael J. Fry, Jeffrey W. Ohlmann, David R. Anderson, Dennis J. Sweeney, Thomas A. Williams | 16th Edition | Copyright 2023

- **Equipment and Materials**: The format of the course will include lectures by the instructor, examples using excel spreadsheet and excel solver, Google Colab homework, quizzes, exams, final exam, and final project presentation and report submission.

        - **Software:** Office 365 with Excel, which are available at https://apps.floridapoly.edu/.

- **Course Objectives**: The primary purpose of this course is to provide you with a basic understanding of various operations research techniques, their underlying assumptions, the procedures for implementing them, and how to interpret them in the context of operational situations. During this course, we will cover decision-making and model building, optimization of resource allocation problems, and an introduction to network models and to multi-criteria decision making. The mathematical methods include the fundamentals of linear programming including computer-based solutions and sensitivity analysis, extensions and special cases of linear programming such as transportation and assignment problems. The emphasis will be on the correct use of these tools in engineering and management applications. A reasonable amount of theoretical foundation is required to avoid misapplications and incorrect decision implications.

- **Instructional Methods:** This course is delivered in face-to-face format. Please check the Canvas course website for all information, including announcements, discussions, and any supplementary material for topics covered in this course.

- **Course Learning Outcomes**:

  Upon completion of this course, students will be able to:

  1. Describe importance of operations research/management science in today's industrial environments (Comprehension)
  2. Apply operations research theories, practices and concepts utilizing case problems and problem-based learning situations (Application)
  3. Design solutions for operational challenges via computer-based optimization tools (Synthesis)
  4. Demonstrate the use of effective written and oral communications, critical thinking, team building and presentation skills as applied to business and engineering problems (Comprehension)

- **Alignment with Program Outcomes:**

	Course Learning Outcome and Learning Level*			
Data Science Program Student Outcome	1	2	3	4
(1) An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.			Synthesis	
(2) An ability to formulate or design a system, process, procedure, or program to meet desired needs.			Synthesis	
(3) An ability to develop and conduct experiments or test hypotheses, analyze, and interpret data and use scientific judgment to draw conclusions.				Comprehension

(4) An ability to communicate effectively with a range of audiences.		Application		
(5) An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.				
(6) An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.	Comprehension	Application		Comprehension

	Course Learning Outcome and Learning Level*			
Business Analytics Program Student Outcome	1	2	3	4
(1) Apply current business analytics concepts, techniques, and practices to solve business problems.	Comprehension	Application		
(2) Analyze a given business problem using appropriate analytics techniques to generate insights and solutions.			Synthesis	
(3) Communicate effectively insights, analysis, conclusions, and solutions to a diverse audience.				Comprehension

	Course Learning Outcome and Learning Level*			
Mechanical Engineering Program Student Outcome	1	2	3	4
(1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics				
(2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors		Application		
(3) an ability to communicate effectively with a range of audiences				Comprehension
(4) an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering				

solutions in global, economic, environmental, and societal contexts				
(5) an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives			Synthesis	Comprehension
(6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions			Synthesis	
(7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.	Comprehension	Application		

Academic Support Resources

- **Library**: Students can access the Florida Polytechnic University Library through the University website and Canvas, on and off campus. Students may direct questions to library@floridapoly.edu.
- **Tutoring and Learning Center**: The Tutoring and Learning Center (The TLC) provides tutoring to all Florida Poly students who may need additional academic support. The TLC is staffed by students who have excelled in the courses they tutor. They offer support by reviewing concepts and materials from class, clarifying points of confusion and providing assistance with learning strategies. While the focus of TLC is to provide support to students in freshman-level courses, upper-level courses are also tutored at the Center. The TLC is located in the IST Commons (second floor).
    - **Knack Tutoring**: Students looking for additional assistance outside of the classroom are advised to consider working with a peer tutor through Knack. Florida Polytechnic University has partnered with Knack to provide students with access to verified peer tutors who have previously aced this course. To view available tutors, visit floridapoly.joinknack.com and sign in with your student account.
- **Academic Success Coaches**: All students at Florida Poly are assigned an Academic Success Coach. Your Academic Success Coach can assist you with academic success strategies. Please visit the Student Success Center on the second floor of the IST building to meet with an Academic Success Coach.
- **Writing Center**: Located on the second floor of the IST (2059/2061), the Writing Center helps students to develop their writing and presentation skills. Consultations are available in person and virtually. For more detail, visit floridapoly.edu/writing center.

Course Policies

Attendance

- Students in **face-to-face (this includes labs and C-courses)** courses are expected "to attend all of their scheduled University classes and to satisfy all academic objectives as defined by the instructor" (University Policy, FPU-5.0010AP).
- Exceptions to any attendance requirements may be made on a case-by-case basis.

- Quizzes and class activities will only be graded if you are physically present in class. Students may not complete these activities remotely without prior approval. Exceptions will be announced in advance if applicable.
- Students are expected to arrive on time to each class session. Attendance will be recorded in Canvas at the beginning of class. You have up to **five minutes after class begins** to enter the attendance code.
- If you arrive late and miss the code entry, you may email the instructor **up to two times per semester** to request a manual attendance correction. After those two instances, any additional late arrivals without valid, documented reasons will be recorded as **"absent"** in Canvas.
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Participation

Students are expected to participate in the classroom experience. The use of earbuds/headphones during class is specifically not allowed and students who engage in this behavior may be asked to leave the class for the day (noting exceptions for authorized accommodations). In addition, students who routinely do not bring materials to class that are required for participation, will not be given credit for class attendance, and if this becomes a pattern of behavior, may be asked to leave the class for the day. Persistent problems with participation may result in a code of conduct referral.

Special Permissions/Requests:

Permissions/excuses due to medical emergencies will be given ONLY if the student turns in a medical note from the doctor within 2 weeks of being seen by the doctor.

The instructor will not be able respond to emails coming directly from students asking for special permissions or requests due to unforeseen circumstances. If students are experiencing some difficult situation due to unforeseen circumstances and are unable to focus on the coursework, they are asked to reach out to the CARE Services at Florida Poly. If the Case Manager approves their case, then the instructor will receive an email from the Case Manager attaching a memo from CARE Services on behalf of the student.

Late Work/Make-up work

Students are expected to turn their assignments in on or before the due date. Late assignments will suffer a 10% penalty for every 24-hour. For example, an assignment worth 100 points turned in 2 days late will receive a 20-point penalty. Assignments turned in 4 or more days after the due date will receive a grade of '0', but you can still have it graded and receive feedback.

Grading Scale: (See also University Grading Policy).
Grades will be determined according to the following scale:

93 to 100	A	73 to 75.99	C
90 to 92.99	A-	70 to 72.99	C-
86 to 89.99	B+	66 to 69.99	D+
83 to 85.99	B	63 to 65.99	D
80 to 82.99	B-	60 to 62.99	D-
76 to 79.99	C+	Below 59.99	F

Assignment/Evaluation Methods:

Evaluation Method	*Percentage*
Attendance	5%
Homework	10%

Class Activities/Quizzes	15%
Exams	60%
Project	10%
Total	100%

Course participation:

- Consists of active and respectful involvement in class discussions, presentations, peer feedback, postings, replies, projects, and other interactions. The course grade considers quality, quantity, and timeliness of student participation.

- Note that students are expected to read the course textbook and assigned chapter(s) **prior to the class lectures** to be able to participate during class discussions. Participation in all course activities is a very important element of this course, is a basic expectation, and counts for part of your grade.

Quizzes/Exams/Homework:

The homework problems are critical to developing understanding of the material and preparing for the examinations. Students must submit all assignments in a timely manner, attempt your best, and show your work.

Homework, Exams must be completed independently without consultation or collaboration with other students unless otherwise directed. Violating this will be considered as a violation to academic integrity and will be penalized in accordance with university policies.

All students must take the exams and complete assignments on the designated date and time. No student will be allowed to take the exams earlier or later. Please make the necessary arrangements at work/home.

Open-Book Class Quizzes

Quizzes are mostly designed as *in-class learning activities* rather than traditional exams. You may use your notes, lecture slides, and textbook while answering. You are also encouraged to discuss ideas with your classmates to deepen understanding.

However, **do not use Google, ChatGPT, or any other AI tools.** The goal is to apply what you have learned in class and demonstrate your own reasoning and understanding of the concepts.

Exam Procedures and Expectations

Exam Review Session

If time permits, a review session may be held before each exam. Students who actively participate in the review and prepare by studying the relevant chapters may receive a small bonus on that exam.

To ensure fairness and consistency in grading, please follow these rules for all exams:

- **Show your work:** For quantitative questions, show all steps and calculations leading to your final answer. Partial credit will be awarded based on the work shown.

- **Formula sheet policy:** You may bring *one page* of handwritten formulas. It should include only formulas—no text explanations, worked examples, or complete solutions.
- **Bring required materials:** You are responsible for bringing your own formula sheet, calculator, and scratch paper.
- **Legible submissions:** If you submit handwritten work, make sure it is neat, well-organized, and easy to read. Illegible work may lose partial credit.
- **Spot checks:** You are not required to submit your formula sheet, but I may conduct random checks during the exam to ensure the policy is followed.

Final Project Policy

- The course final project will be a group effort. In the final project, each group should apply a combination of operations research topics and techniques to model and solve problem in any area/field of interest.

- **Project Report** - Each group must submit a cohesive project report that conveys that you have mastered the techniques and best principles discussed during the semester.

- **Project Presentation** - An important aspect of operations research is taking time to share your findings with others. Each group will create a 10-15 minute presentation to summarize and present the findings to other students.
- Students are responsible for forming their own project groups and adding group information to the Excel file I will provide later in the semester. Failure to do so will result in a deduction of points.
- A **discussion board** will be created on Canvas to help students who have not yet formed a group connect with classmates.
- Each group member must actively contribute to the project and participate in the class presentation. Be punctual on the day of your presentation—lateness or absence will result in a grade deduction for that individual, though it will not affect the grades of group members.

Lecture Expectations:

- Lecture meets for 75 minutes, two times per week in person. The intent of lecture time is for you to develop your conceptual understanding and practice problem-solving. The lecture will be interactive - you are expected, at appropriate times, to work with your neighbor, express your thoughts, ask and answer questions, discuss ideas, patiently listen to and respect other's ideas.

CANVAS Policy:

- Assignments, announcements, and information will be posted on CANVAS. **Students are responsible for checking CANVAS regularly to be aware of their assignments** and other class information. Please see the end of this document for guidelines for submission of assignments.

Email Policy:

- All students are required to use **studentuserID@floridapoly.edu** email system (most preferable) OR the CANVAS e-mail system to communicate with the instructor. On occasion, email may be used to disseminate important class-related assignments, announcements, and information. Students are responsible for any information or assignments given in e-mail. **In your email, please start by introducing yourself and mentioning the course title in the first line.**

University Policies

Reasonable Accommodations

The University is committed to ensuring equal access to all educational opportunities. The Office of Disability Services (ODS), facilitates reasonable accommodations for students with disabilities and documented eligibility. It is the student's responsibility to self-identify as a student with disabilities and register with ODS to request accommodations. If you have already registered with ODS, please ensure that you have requested an accommodation letter for this course through the ODS student portal, and communicate with your instructor about your approved accommodations as soon as possible. Arrangements for testing accommodations must be made in advance. Accommodations are not retroactive. If you are not registered with ODS but believe you have a temporary health condition or permanent disability requiring an accommodation, please contact ODS as soon as possible: DisabilityServices@floridapoly.edu; (863) 874-8770; www.floridapoly.edy/disability.

Accommodations for Religious Observances, Practices and Beliefs

The University will reasonably accommodate the religious observances, practices, and beliefs of individuals in regard to admissions, class attendance, and the scheduling of examinations and work assignments. (See University Policy.)

Title IX

Florida Polytechnic University is committed to ensuring a safe, productive learning environment on our campus that prohibits sex discrimination and sexual misconduct, including sexual harassment, sexual assault, dating violence, domestic violence and stalking. Resources are available if you or someone you know needs assistance. Any faculty or staff member you speak to is required to report the incident to the Title IX Coordinator. Please know, however, that your information will be kept private to the greatest extent possible. You will not be required to share your experience. If you want to speak to someone who is permitted to keep your disclosure confidential, please seek assistance from the Florida Polytechnic University Ombuds Office, BayCare's Student Assistance Program, 1-800-878-5470 and locally within the community at Peace River Center, 863-413-2707 (24-hour hotline) or 863-413-2708 to schedule an appointment. The Title IX Coordinator is available for any questions to discuss resources and options available.

Academic Integrity

Violations of academic integrity regulation include actions such as cheating, plagiarism, use of unauthorized resources (including but not limited to use of Artificial Intelligence tools), illegal use of intellectual property, and inappropriately aiding other students. Such actions undermine the central mission of the university and negatively impact the value of your Florida Poly degree. Suspected violations will be fully investigated, possibly resulting in sanctions up to and including expulsion from the university.

Recording Lectures

Students may, without prior notice, record video or audio of a class lecture for a class in which the student is enrolled for their own personal educational use. Recordings may not be used as a substitute for class participation or class attendance. Recordings may not be published or shared in any way, either intentionally or accidentally, without the written consent of the faculty member. Failure to adhere to these requirements is a violation of state law (subject to civil penalty) and the student code of conduct (subject to disciplinary action). *Recording class activities including, but not limited to, lab sessions, student presentations (whether individually or part of a group), class discussion (except when incidental to and incorporated within a class lecture), and invited guest speakers is* ***prohibited****.*

Course Schedule

- Important Dates: https://floridapoly.edu/academics/academic-calendar/index.php
- A tentative course calendar is included below.

Week	*Topic*	
Week 1 |	Ch01: Introduction to Management Science • Problem Solving and Decision Making • Quantitative Analysis and Decision Making • Models of Cost, Revenue, and profit • Management Science Techniques	
Week 2 |	Ch02: Introduction to Linear Programming • A simple Maximization Problem • Graphical Solution Procedure • Extreme Points and the optimal Solution	• Homework 1 • Quiz 1
Week 3 |	Ch02: Introduction to Linear Programming • A simple Minimization Problem • Special Cases • General Linear Programming Notation	• Homework 2 • Quiz 2
Week 4 |	Ch03: Linear Programming: Sensitivity Analysis and Interpretation of Solution • Introduction to Sensitivity Analysis • Graphical Sensitivity Analysis • Sensitivity Analysis: Computer Solution	
Week 5 |	Ch03: Linear Programming: Sensitivity Analysis and Interpretation of Solution • Limitations of Classical Sensitivity Analysis • The Electronic Communications Problem	• Homework 3 • Quiz 3
Week 6 |	Ch06: Distribution and Network Models • Supply Chain Models • Assignment Problem	• Exam 1 (Ch 01, 02, 03)
Week 7 |	Ch06: Distribution and Network Models • Shortest-Route Problem • Maximal Flow Problem • A Production and Inventory Application	
Week 8 |	Ch06: Distribution and Network Models • Class Activities • Excel Templates	• Homework 4 • Quiz 4
Week 9 |	**Spring Break**	
Week 10 |	Ch07: Integer Linear Programming • Types of Integer Linear Programming Models • Graphical and Computer Solution • Applications Involving 0-1 Variables • Modeling Flexibility Provided by 0-1 Integer Variables • Class Activities • Excel Templates	• Homework 5 • Quiz 5

Week 11|	Ch 08: Nonlinear Optimization Models • A Production Application • Constructing an Index Fund • Markowitz Portfolio Model • Blending: The Pooling Problem • Forecasting Adoption of a new Product	• Exam 2 (Ch 06, 07)
Week 12 |	Ch 11: Waiting Line Models • Structure of a Waiting Line System • Single-Server Waiting Line Model with Poisson Arrivals and Exponential Service Times • Multiple-Server Waiting Line Model with Poisson Arrivals and Exponential Service Times	• Homework6 • Quiz 6
Week 13 |	Ch 13: Decision Analysis • Problem Formulation • Decision Making without Probabilities	
Week 14 |	Ch 13: Decision Analysis • Decision Making with Probabilities • Risk Analysis and Sensitivity Analysis	• Homework 7 • Quiz 7
Week 15 |	Project Presentation	• Quiz 8
Week 16 |	Review and Reading Days	• Final Exam

I reserve the right to modify this schedule as required by the progression of the class.

Tentative Rubric for project Report and Presentation

Project Final Report Rubric

Objective	**Category**	**Below Expectations**	**Weak**	**Average**	**Good**	**Excellent**
	Score	**1**	**2**	**3**	**4**	**5**
	Introduction	Opening is off- topic and inappropriate to the purpose, not concise and no clarity	Opening is somewhat related to the topic and appropriate to the purpose but is not concise and clear	Opening is related to the topic and appropriate to the purpose. Somewhat clear and concise	Opening is related to the topic and appropriate to the purpose. Clear and concise	Strong opening that is clear and concise
	Organization	Disorganized; incorrect format; unclear direction	Somewhat organized; incorrect format; unclear direction	Organized; correct format; unclear direction	Organized; correct format; clear direction	Correct formatting, strong clarity and organization in the development

						of main points
Students can write professional quality documents	Literature Review	Does not present information from any source	Presents information from irrelevant sources representing limited points of view/approaches	Presents information from relevant sources representing limited points of view/approaches	Presents in-depth information from relevant sources representing limited points of view/approaches	Synthesizes in- depth information from relevant sources representing limited points of view/approaches
	Research Design (weighted twice)	Does not provide information on research design	Inquiry design demonstrates misunderstanding of the methodology or theoretical framework	Critical elements of the methodology or theoretical framework are missing, incorrectly developed or unfocused	Critical elements of the methodology or theoretical framework are appropriately developed however, more subtle elements are ignored or unaccounted for	All elements of the methodology or theoretical framework are skillfully developed and may be synthesized from across disciplines or relevant subdisciplines
	Analysis (weighted twice)	Incorrect, Irrelevant, no supporting evidence	Correct, irrelevant, no supporting evidence	Correct, relevant, no supporting evidence	Relevant and correct with supporting evidence	Relevant, correct, complete, incorporates innovative insights
	Next Steps	Missing or content does not support conclusion	Conclusion irrelevant to the findings	Conclusion somewhat relevant to the findings	Conclusion relevant to the findings	Strong conclusion that is clear, complete and compelling
	Grammar & Spelling	Uses language that often impedes	Uses language that often sometimes	Uses language that generally conveys meaning to readers with	Uses straightforward language that conveys meaning to readers.	Uses graceful language that communicates meaning

		meaning due to errors	meaning due to errors	clarity, although writing includes some errors	Language has few errors	to readers with clarity and fluency and is virtually error free
	Reference Style (APA)	Did not follow APA style	Numerous errors in APA style, did not cite sources correctly, formatting issues	Some errors in APA style, cited correctly but formatting issues persist	Minimum errors in style and formatting but does not detract from readability	No errors in APA style
Total points for Report = 50						

Presentation Rubric

Objective	Category	Below Expectations	Weak	Average	Good	Excellent
	Score	**1**	**2**	**3**	**4**	**5**
Students can demonstrate mastery of communication technology	Use of Media	Lack of media detracts from the presentation objective	Misuse of media that detracts from the presentation objective	Use of media barely supports and contributes to the presentation objective	Use of media supports and contributes to the presentation objective	Use of media supports, clarifies and reinforces the presentation objective
	Quality of Slides	Very poor quality. Not enough or too much colors, fonts and animations that detract from project objective	Poor quality. Not enough or too much colors, fonts and animations that detract from project objective	Fonts, colors and animations barely support the presentation objective	Fonts, colors and animations support the presentation objective	Fonts, colors and animations support, clarify and reinforce the presentation objective
	Opening statement	Opening is off- topic and inappropriate to the purpose, not concise and no clarity	Opening is somewhat related to the topic and appropriate to the purpose but is not concise and clear	Opening is related to the topic and appropriate to the purpose. Somewhat clear and concise	Opening is related to the topic and appropriate to the purpose. Clear and concise	Strong opening that is clear and concise

Students can develop and deliver a compelling oral talk with relevant facts and information	Organization	Disorganized; incorrect format; unclear direction	Somewhat organized; incorrect format; unclear direction	Organized; correct format; unclear direction	Organized; correct format; clear direction	Correct formatting, strong clarity and organization in the development of main points
	Literature Review	Does not present information from any source	Presents information from irrelevant sources representing limited points of view/approaches	Presents information from relevant sources representing limited points of view/approaches	Presents in-depth information from relevant sources representing limited points of view/approaches	Synthesizes in- depth information from relevant sources representing limited points of view/approaches
	Analysis	Incorrect, Irrelevant, no supporting evidence	Correct, irrelevant, no supporting evidence	Correct, relevant, no supporting evidence	Relevant and correct with supporting evidence	Relevant, correct, complete, incorporates innovative insights
	Next Steps	Missing or content does not support conclusion	Conclusion irrelevant to the findings	Conclusion somewhat relevant to the findings	Conclusion relevant to the findings	Strong conclusion that is clear, complete and compelling
	Timing	Presentation is too short, insufficient coverage of material	Presentation is too long. Unable to cover all the material	Able to cover all the material within five extra minutes	Utilizes allotted time to provide sufficient coverage of material	Well-paced coverage of material within the allotted time
Students can deliver an oral talk with clarity and appropriate poise	Delivery Techniques	Does not participate in the oral presentation	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) detract from the understanda	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation understanda	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation interesting,	Delivery techniques (posture, gesture, eye contact, and vocal expressiveness) make the presentation

			bility of the presentation, and speaker appears uncomfortable.	ble, and speaker appears tentative.	and speaker appears comfortable.	compelling, and speaker appears polished and confident.
	Peer Evaluation	5 points				
Total Points for presentation = 50						