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UNIVERSITY OF CONNECTICUT  
CE 4210: OPERATIONS RESEARCH IN CIVIL & ENVIRONMENTAL ENGINEERING  
SPRING 2021 COURSE SYLLABUS

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**COURSE DAY/TIME:** Tu/Th 9:30 – 10:45 AM      **CLASSROOM:** UTEB 175 and Blackboard Collaborate (“Virtual Classroom”) and/or Posted Videos.

**INSTRUCTOR:** Nicholas E. Lownes, Ph.D., P.E.  
Office: CAST 318  
Email: [nicholas.lownes@uconn.edu](mailto:nicholas.lownes@uconn.edu)  
Phone: (860) 486-2717  
Office hours: Tuesdays 1:00 – 2:30 PM & by appointment (email to set up time)

**TEACHING ASSISTANT:** Sruthi Mantri      Email: [sruthi.mantri@uconn.edu](mailto:sruthi.mantri@uconn.edu)  
Office hours: Mon: 2 – 4PM, Wed: 9 – 11AM  
Office location: <https://uconn-cmr.webex.com/meet/srm18002>

**COURSE DESCRIPTION:** Prerequisites: CE 2251, MATH 2110Q. Topics include modeling civil and environmental engineering problems; linear programming models and solution methods, integer programming models and solution methods, network flow models, critical path method for scheduling and managing engineering tasks and multi-criteria decision making.

**COURSE OBJECTIVE:** This course can be used to meet the professional requirements for the BS in Civil Engineering. The purpose of the course is to introduce students to operations research tools such as linear programming, integer programming, network analysis, and activity scheduling to problems and situations that are encountered in the design and construction of civil engineering projects.

**WEBSITES:**

HuskyCT: <http://lms.uconn.edu>

**OPTIONAL TEXT:**

Taylor, B.W. *Introduction to Management Science*, 11<sup>th</sup> Edition, Pearson, 2018. ISBN 978-0134730660

**COMMUNICATIONS:** HuskyCT will be the center for communications for this course. Please check your email and the message board at HuskyCT regularly, as I will regularly post announcements.

**GRADE SCALE**

A	≥ 93%	C-	70 – 72.9
A-	90 – 92.9	D+	67 – 69.9
B+	87 – 89.9	D	63 – 66.9
B	83 – 86.9	D-	60 – 62.9
B-	80 – 82.9	F	<60%
C+	77 – 79.9		
C	73 – 76.9		

ELEMENTS OF COURSE AND CONTRIBUTION TO FINAL GRADE:

Labs/Homework 35%	Homework will be assigned and collected in 10 sets during the labs indicated on the syllabus. <u>No late homework will be accepted.</u> Lab/Homework assignments will be posted on HuskyCT. It is expected that homework is typed or neatly written and includes a discussion of the results from the lab portion and the homework assignment elements. Assignments will be submitted electronically. Your lowest lab/homework grade will be dropped.
Mid-term Exam 30 %	There will be one mid-term examination covering material through Lab 5. It will be a take-home exam with extended time given to all students. Students are free to use any resources to respond to the exam questions. Responses to the exam should be structured as a lab report similar to the template posted on HuskyCT.
Final Project 30 %	The Final Project will be a real-world application of operations research to a civil engineering problem. The final project should be constructed similar to a lab report with further amplification to be posted on HuskyCT.
Class Participation 5%	Participation in class activities & quizzes from the first half of the semester.

**UConn Final Exam Policy:** Final exam week for Spring 2021 takes place from Monday May 3<sup>rd</sup> through Saturday, May 8<sup>th</sup>. Students are required to be available for their exam during the stated time. If you have a conflict with this time you must visit the Office of Student Services and Advocacy to discuss the possibility of rescheduling this exam. Please note that vacations, previously purchased tickets or reservations, graduations, social events, misreading the exam schedule and over-sleeping are not viable excuses for missing a final exam. If you think that your situation warrants permission to reschedule, please contact the Office of Student Services and Advocacy with any questions. Thank you in advance for your cooperation.

**CE 4210 SPRING 2021 SCHEDULE**

**Please Note: All classes will be broadcast remotely on Blackboard Collaborate Ultra even when the session is being presented in person after the first two weeks of the semester. I will record all sessions so that you can review them afterwards if desired.**

CLASS	DATE	TOPIC	DUE
1	Jan 19	Introduction to ORMS	
2	Jan 21	Lab 1: Intro to GAMS	
3	Jan 26	Linear Programming (LP)	
4	Jan 28	Lab 2: Solving an LP in GAMS	Lab 1
5	Feb 2	LP – Simplex Method	
6	Feb 4	Lab 3: Pavement Mix Problem	Lab 2
7	Feb 9	Sensitivity Analysis	
8	Feb 11	Lab 4: Sensitivity Analysis	Lab 3

9	Feb 16	Integer Programming (IP): Branch & Bound	
10	Feb 18	Lab 4 Continued	
11	Feb 23	Mixed Integer Programming (MIP)	
12	Feb 25	Lab 5: Crew Scheduling	Lab 4
13	Mar 2	Review	
14	Mar 4	Mid-term take home exam	Lab 5
15	Mar 9	Network Flow Problems – SP & MCF	
16	Mar 11	Network Flow Problems – SP & MCF	
17	Mar 16	Transportation & Assignment Problems	
18	Mar 18	Lab 6: Network models in GAMS	
19	Mar 23	Facility Location	
20	Mar 25	Lab 7: Supply Chain Logistics	Lab 6
21	Mar 30	Traveling Salesman Problem (TSP)	
22	Apr 1	Lab 8: TSP	Lab 7
23	Apr 6	Project Management - CPM	
24	Apr 8	Lab 9: CPM activity (no GAMS)	Lab 8
	Apr 13	<i>Spring Recess</i>	
	Apr 15	<i>Spring Recess</i>	
25	Apr 20	Project Management – CPM & PERT	
26	Apr 22	Lab 10: PERT and project crashing	Lab 9
27	Apr 27	Probabilistic Activity times	
28	Apr 29	Exam review	Lab 10
	TBD	FINAL EXAM	