SA305 SYLLABUS—*APPROXIMATE TOPIC SCHEDULE*

SPRING 2021

Week	Dates	Topics (reading)	Homework
1	**1/19-1/22**	Introduction, course policies, modeling definitions (1.1,1.2, handout 1), resource allocation (2.1)	Handout 1 (modeling definitions), 2.1, 2.3, 2.4
2	**1/25-1/29**	Install Pyomo and initial model (Labs 0 and 1), work scheduling (2.2)	2.6, 2.7
3	**2/1-2/5**	Blending models (2.3), sets, summations, for quantifiers (handout 2 (parameterized problems), 2.3, A. 1)	2.11, 2.12, 2.13, 2.14, 2.16
4	**2/8-2/12**	Redux of resource allocation, work scheduling, blending, multiperiod models (2.6)	Handout 2 (parameterized problems), 2.20, 2.22, 2.24
5	**2/16-2/19**	Pyomo with index sets and parameters (Lab 2), production process (2.5)	2.9, 2.10
6	**2/22-2/26**	**Review and test 1**	
7	**3/1-3/5**	Simplex definitions (handout 4 (simplex definitions)), graphical solutions to optimization models (1.2), improving search (6.1)	1.1(a,b,c,d),1.2, handout 3 (graphical homework), handout 5 (geometry definitions)
8	**3/8-3/12**	Improving directions (6.2), convexity (6.3, A.3), geometry and algebra of corner points (7.1)	6.1,6.2,6.8,6.9, 6.14,6.18, Pyomo for 2.6
9	**3/15-3/19**	Extreme points, fundamental theorem of LP (7.2), reformulating LPs (2.8), canonical form basic solutions (7.3)	7.2,7.3,7.4, 7.14, 7.15, 7.16
10	**3/22-3/26**	Simplex (8.1), Convergence (8.3),	8.1, 8.2, 8.3, 8.7, 8.8, Pyomo for 2.11
11	**3/29-4/2**	**Review and test 2**	
12	**4/6-4/9**	Two phase (8.4)	8.11(a,b), 8.12(a),
13	**4/12-4/16**	Dual LP (9.1), Duality (9.2)	9.1, 9.2, 9.3, 9.4, 9.5, 9.6, Pyomo for 2.22
14	**4/19-4/23**	Complementary slackness (9.3)	9.7, 9.8
15	**4/26-4/30**	Pyomo guided project	
16	**5/3-5/5**	Pyomo guided project, review for the final exam	

SA305 SYLLABUS—COURSE OBJECTIVES

SPRING 2021

1. **Linear optimization formulations:** Students are expected to be able to model real-life problems as linear optimization problems as well as interpret the outcomes of solving linear optimization problems.

2. **Fundamental understanding of simplex and linear optimization problems**: Students are expected to understand how to solve linear optimization problems with the simplex method as well as linear optimization duality.

3. **Fundamental understanding of Pyomo**: Students are expected to code and solve linear optimization problems using Pyomo, a library of Python.

4. **Optimization language skills**: Students are expected to be able to communicate the details and results of their linear optimization models both orally and in writing using correct technical definitions. Professional communication should be succinct, formal, and at an appropriate technical level for the intended audience.

5. **Metacognition skills**: Students are expected to improve their ability to be critical of their learning process, to be able to effectively accomplish class tasks, and to learn effective strategies to gain knowledge on their own.

6. **Effective collaboration**: Students are expected to improve their ability to work together, to critique effectively, and to actively listen.

Course textbook

Deterministic operations research: Models and methods in linear optimization by D. Rader

This is the course text for SA405 so do not sell it if you are going to take that course!