CEGE 4011/5180: Air Transportation Systems

Fall 2020


1 Instructor

Dr. Michael Levin
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Office hours: Zoom: (612) 301-7137 M 10–12pm, W 4–5pm, F 3–4pm or by appointment
Course website: https://canvas.umn.edu/courses/134421

Course meeting time: Zoom 921 8217 0659 M/W 2:30 PM–3:45 PM

2 Course description

This course provides an overview of the civil air transportation system design and operations. After completing this course, you should be able to describe the operations of civil transport aircraft from the pilot and company, and air traffic control perspectives; conduct basic economic analysis on airline operations and demand; conduct capacity analysis for airspace and airports; and conduct basic optimization for air transportation operations. This course will prepare students for working with the civil aviation industry.

3 Course format

3.1 Prerequisites

Students are expected to be familiar with the concepts and tools from the following courses:

- CEGE 3101 Computer Applications in Civil Engineering I
- MATH 2263 Multivariable Calculus
- PHYS 1301 Kinematics
- CEGE 3102 Probability & Statistics

If it has been some time since you have taken these classes, you may find it worthwhile to review them before the semester gets too busy.

3.2 Course materials

The required textbook for this course is *The Global Airline Industry*, 2nd edition, by Peter Belobaba, Amedeo Odoni, and Cynthia Barnhart. Readings will be assigned at the end of each lecture to supplement material covered in class.

Assessment

Grades will be determined by performance on the following items. Requests for regrading must be submitted no more than one week after grades are posted.

Category	Weight
Assignments	100%

The +/− grading system will be used. At the end of the course, I may apply a curve if needed to ensure a proper grade distribution. Please feel free to contact me at any time during the semester to discuss your progress to date.

Although attendance is not a component of the final grade, succeeding in this course requires full understanding of the concepts, and few students can achieve this without regular class attendance and participation. The class format (problem-based learning) is designed to force you to study and master the concepts during class. Students who are actively engaged during class tend to perform best on the homeworks and exams.

Assignments

As this is an elective class, instead of exams, your understanding will be assessed (and hopefully improved) by challenging homework assignments. These assignments will require significant time and effort. Do not wait until the night before to start! Understanding the engineering equations will not be sufficient to succeed on the homeworks; you must master the concepts to answer correctly. You are encouraged to work together on homeworks, but **you must write your solutions individually, in your own words**. You may use spreadsheets or other computer software on the homeworks. Turn in a printout of the spreadsheet, or email the file to me as part of the homework submission.

Homeworks will be assigned periodically. They will be posted on Canvas and announced in class. **Please upload your solutions to the assignment page on Canvas.** You may upload legible pictures of handwritten solutions or submit typed answers. If you have any issues, feel free to email me. Late homeworks will be penalized by 25% (maximum score 75%), and will only be accepted up to one week late so that I can post solutions online.

Schedule

A tentative class schedule is shown below, but dates and topics may change.

Monday	Wednesday
9/7 *Labor Day*	9/9 **1** Orientation
9/14 **2** Fundamentals of flight	9/16 **3** Fundamentals of flight
9/21 **4** Instrument navigation	9/23 **5** Instrument navigation
9/28 **6** Aircraft performance	9/30 **7** Aircraft performance
10/5 **8** Air traffic control system	10/7 **9** Safety analysis
10/12 **10** Airport markings	10/14 **11** Airport geometric design
10/19 **12** Airport geometric design	10/21 **13** Airport terminal design
10/26 **14** Airport capacity analysis	10/28 **15** Airport capacity analysis
11/2 **16** Airport capacity and delay	11/4 **17** Airline economics and demand estimation
11/9 **18** Airport design project	11/11 **19** Route scheduling
11/16 **20** Introduction to integer programming	11/18 **21** Introduction to integer programming
11/23 **22** Airport design project presentations	11/25 *Thanksgiving*
11/30 **23** Integer programming: computer lab	12/2 **24** Fleet scheduling
12/7 **25** Fleet scheduling: computer lab	12/9 **26** Airline crew scheduling
12/14 **27** Airline crew scheduling: computer lab	**28** Schedule recovery and robustness

4 Miscellania

The University of Minnesota provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, contact the Disability Resource Center at https://diversity.umn.edu/disability/.

Students who violate University rules on scholastic dishonesty are subject to disciplinary penalties, including failing the course and/or dismissal from the University. Since dishonesty harms the individual as well as other students, policies on scholastic dishonesty will be strictly enforced. For further information, see https://cse.umn.edu/r/scholastic-integrity/. At a minimum, students will receive a '0' for any plagiarized assignment.

Students may withdraw from a class within the first 2 weeks of class without penalty. Between 2 weeks and 10 weeks, students may 'W' drop a course without seeking approval. After 10 weeks, withdrawing requires an academic policy petition.