

## IE 532 – Analysis of Network Data

### Section AN, Fall 2019

#### Meeting times

Component	Section	Meeting time	Meeting place
Lecture	AN	TR, 2.00pm–3.20pm	<b>PSYCH 29</b>

#### Course information

<b>Credit hours:</b>	4
<b>Instructor:</b>	Chrysafis Vogiatzis
<b>Email:</b>	chrys@illinois.edu
<b>Course website:</b>	compass2g.illinois.edu
<b>Office:</b>	201A Transportation Building
<b>Office hours:</b>	TR 12.30pm–1.30pm

Office hours are also available by appointment. Online office hours will also be provided before exams.

#### Course communication

All communication of announcements, assignments, and other materials will be done through the course website on compass2g.illinois.edu. You can also email the instructor; when doing so, please begin your email subject line with [IE 532]. This helps with class organization and will ensure a faster reply.

#### Textbooks

1. **Network Flows: Theory, Algorithms, and Applications** by Ravindra K. Ahuja, Thomas L. Magnanti, and James B. Orlin, ISBN-13: 978-0136175490, ISBN-10: 013617549X.
2. **Networks, Crowds, and Markets: Reasoning about a Highly Connected World** by David Easley and Jon Kleinberg, ISBN-13: 978-0521195331, ISBN-10: 0521195330. A pre-publication version is also available at <https://www.cs.cornell.edu/home/kleinber/networks-book/>.
3. **Integer Programming** by Laurence A. Wolsey, 1st edition, ISBN-13: 978-0471283669, ISBN-10: 0471283665.

While the textbooks are not required, they come highly recommended for their reference value. All materials necessary for the students in the classroom will be provided by the instructor.

#### Course description

This course will focus on statistical aspects analyzing network data. It will review illustrative problems relating to aggregation of information, decision-making, and inference tasks over various graphical models and networks. ISE graduate students and students enrolled in the Master of Science in Advanced Analytics (MSAA) are eligible to take the course.

## Prerequisites

MATH 412 Introduction to Graph Theory.

## Exams

There are two exams in the class: a midterm and a final exam. The final exam will be cumulative and will be given (as designated by the University of Illinois) on **Wednesday, December 18, 2019 8.00am–11.00am**. Both exams will contribute 30% towards the final grade of a student. Make-up exams will **only** be provided if notified at least three days prior to the exam date. In the case of an emergency, a make-up exam will be provided with the proper and appropriate documentation justifying your absence no later than one week from the date of the exam.

## Quizzes

There will be 5-6 small quizzes throughout the course of the semester. All quizzes will be announced one class before the quiz is set to take place. An announcement before every quiz will also be posted on the class website. Information specific to each quiz (open or closed books/notes, calculator availability, topics, format) will be announced as needed before every quiz. The lowest quiz grade of every student will be dropped. No make-up quizzes are going to be given. Quizzes will count towards 10% of a student's grade.

## Homework assignments

There will be 5-6 homework assignments throughout the course of the semester. Homework assignments will be announced and submitted online through the course website. The deadlines will be end of day (11.59pm) unless otherwise posted. You are encouraged to work with other students on an assignment, however copying violates the honor code and is not allowed under any circumstances. If you use outside sources for a homework assignment (other book/textbook, scientific or other publication, website, etc.) please acknowledge it by citing the source. Late homework assignments will be accepted with a penalty of 20% plus an extra penalty of 10% for every day late. As an example, a homework assignment submitted the day after it was due will receive a maximum grade of an 80, whereas a homework assignment submitted two days after it was due will receive a maximum grade of a 70. No homework assignment will be accepted after the fourth day after it was due. For example, if the deadline was on Monday, August 26 (end of day), you are only allowed to submit it by Friday, August 30 (end of day) for a maximum grade of a 50. Homework assignments will count towards 20% of a student's final grade in the class.

## Class project

A class project requiring network analysis and the use of proper Python packages and other software will be given. The project details will be announced later in the semester. Projects are individual (i.e., no group projects). Students will be asked to present their analysis and findings in the last week of classes. The project (both the report and the presentation) contribute towards 10% of a student's grade in the class.

## Re-grade policy

If you believe that an exam, quiz, or homework assignment was graded incorrectly, please reach out to me at the latest one week after the announcement of the result. In your email requesting

the re-grade, please add an explanation of where and why a re-grade is desired.

## Attendance

While attendance is not mandatory, it is highly recommended. Students will be responsible for all of the material taught in the classroom. Important discussions and in-class activities will take place during class.

## General class policies

- Be courteous and kind to others (including me and the teaching assistants!).
- Please silence your cell phones and other electronic devices.

## Grading policy

A: [93, 100], A-: [90, 93), B+: [87, 90), B: [83, 87), B-: [80, 83), C+: [77, 80), C: [73, 77), C-: [70, 73), D+: [67, 70), D: [63, 67), D-: [60, 63), F: [0, 60).

Homework assignments	20%
Midterm exam	30%
Quizzes	10%
Class project	10%
Final exam	30%
<b>Total</b>	<b>100%</b>

## Class topics

The class is designed so as to provide a general overview of network theory, network optimization, and network analysis. It will also provide hands-on experience with the handling and analysis of network data. The topics that will be covered in the semester include:

- Fundamentals of networks;
- Network optimization;
- Shortest paths, maximum flow/minimum cut, cut problems, spanning trees;
- Minimum cost network flows;
- Lagrangian relaxation and Benders decomposition.
- Centrality and other graph characteristics.
- Cliques and clique relaxations.

## Academic integrity

We will follow articles 1-401 through 1-406 of the Student Code (you can find the articles beginning at <http://studentcode.illinois.edu/article1/part4/1-401/>). This rule defines infractions of academic integrity, which include but are not limited to cheating, fabrication, and plagiarism. You are responsible for following these guidelines. If you have any questions about whether something would be an infraction, consult with the instructor before proceeding.

**Request for special accommodations**

To obtain disability-related adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES, you may visit 1207 S. Oak St., Champaign, call 217.333.4603, email [disability@illinois.edu](mailto:disability@illinois.edu), or go to the DRES website (at <http://disability.illinois.edu>).

**Run > Hide > Fight**

Emergencies can happen anywhere and at any time. It is important that we take a minute to prepare for a situation in which our safety or even our lives could depend on our ability to react quickly. When we're faced with almost any kind of emergency – like severe weather or if someone is trying to hurt you – we have three options: Run, hide or fight. Please consult the provided attachment to the syllabus for more information.

**Updates to the syllabus**

The contents of the syllabus and the policies described are subject to change. If that happens, all the changes will be announced and described on the course website.

**Prepared by:**  
**Last updated:**

Chrysafis Vogiatzis  
08/27/2019