

**Instructor**

**E-Mail**

**Personal Website**

**Office Hours and Location**

**Class Meeting Time and Location**

Dr. Yujie Hu

[yujiehu@ufl.edu](mailto:yujiehu@ufl.edu)

<https://people.clas.ufl.edu/yujiehu/>

Wed. to Fri. 1:00 pm – 2:00 pm; TUR 3120

Fri. 9:35 am – 12:35 pm; TUR 3006

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 **COURSE DESCRIPTION**

It is often the case that real-world systems can be represented as networks of many interacting components. Examples include information (the World Wide Web, citation), social (friendship, classmates), physical (transportation, distribution), biological (food chain, brain) systems, and so forth. Many of these networks are essentially spatial, meaning each vertex can be associated with a location somewhere in the real world. Based on recent advances in network science and GIScience, this course teaches the fundamental concepts, models, and techniques for describing, visualizing, measuring, and analyzing networks. It also introduces their applications in geography, transportation, social science, etc. A series of labs using the popular network analysis package Gephi and GIS software ArcGIS are also designed to help students gain hands-on experience in visualizing and analyzing networks.

 **COURSE OBJECTIVES**

After successful completion of this course students should be able to:

- Have a solid grasp of the vocabulary, central concepts, measures and techniques relating to networks;
- Conduct experiments within the Gephi and ArcGIS software environment;
- Apply their knowledge to visualize and analyze a real network data set of their choosing.

 **PREREQUISITES**

Entry level knowledge of statistics (STA2023, GEO3162C/6160, or equivalent), or the consent of the instructor. Prior knowledge or experience with ArcGIS is preferred, but not required.

 **TEXTBOOKS**

Recommended textbooks:

- Newman, M. (2010). *Networks: An Introduction*. [Oxford University Press](#).

- Scott, J. (2017). *Social Network Analysis* (4<sup>th</sup> ed.). [SAGE Publications](#).

## **EVALUATION**

### GRADE DISTRIBUTION

#### **For GIS 4113:**

- **In-class quizzes (2 points each – 10%)**

*Five* short quizzes will be administered throughout the course, in class. These may be in a form of multiple choice, short answer, or short essay responses. Each quiz is worth 2 points—*1 point for participation and 1 point for the question itself*.

- **Assignments (100 points each – 40%)**

*Ten* homework assignments and *ten* lab exercises will be given to help students understand the concepts and methods discussed in class. You have one week to complete each assignment.

- **Mid-term exam (100 points – 20%)**

A close-book exam, covering all course contents by the day of the test, will be administered in class. The exam will comprise a mix of short answer, short essay responses, and math problems. Bring a calculator.

- **Final individual project (100 points – 15%)**

Each student will select a topic (must be approved by instructor) and complete an independent project utilizing important skills you have acquired from the class. Each student needs to submit a report. Length is 3000 – 4000 words and must have proper references (a suggested format of the report will be provided). We will approach this in stages. The stages of report development will be graded and returned to the student to ensure progress: outline with details about data and methods – 5 points, final report – 10 points.

- **Final project presentation (100 points – 15%)**

Each student will prepare a 15-minute presentation (10-minute for presentation and 5-minute for Q&A) discussing his/her final project. Students will be provided with a rubric to guide their presentation. This usually takes place in the last two weeks of the class.

#### **For GIS 6104:**

- **In-class quizzes (2 points each – 5%)**

*Five* short quizzes will be administered throughout the course, in class. These may be in a form of multiple choice, short answer, or short essay responses. Each quiz is worth 2 points—*1 point for participation and 1 point for the question itself*.

- **Assignments (100 points each – 40%)**

*Ten* homework assignments and *ten* lab exercises will be given to help students understand the concepts and methods discussed in class. You have one week to complete each assignment.

- **Mid-term exam (100 points – 15%)**

A close-book exam, covering all course contents by the day of the test, will be administered in class. The exam will comprise a mix of short answer, short essay responses, and math problems. Bring a calculator.

- **Annotated bibliography (100 points – 10%)**  
Each student will read *ten* articles of his/her choice and write an annotated bibliography for each article. The ten articles should cover one specific topic of the student’s interest in network analysis. The bibliography should briefly describe: 1) the reference of the article, 2) the purpose of the study, 3) the data collection in the study, 4) the methods used for network analysis and/or visualization, and 5) your evaluation of the study. Length is 250 – 300 words for each article. Students may refer to this [link](#) for a good sample.
- **Final individual project (100 points – 15%)**  
Each student will select a topic (must be approved by instructor) and complete an independent project utilizing important skills you have acquired from the class. Each student needs to submit a report. Length is 3000 – 4000 words and must have proper references (a suggested format of the report will be provided). We will approach this in stages. The stages of report development will be graded and returned to the student to ensure progress: outline with details about data and methods – 5 points, final report – 10 points.
- **Final project presentation (100 points – 15%)**  
Each student will prepare a 15-minute presentation (10-minute for presentation and 5-minute for Q&A) discussing his/her final project. Students will be provided with a rubric to guide their presentation. This usually takes place in the last two weeks of the class.

#### GRADING SCALE (&GPA EQUIVALENT)

| A   | A-    | B+    | B     | B-    | C+    | C     | C-    | D+    | D     | D-    | E   |
|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|
| 93+ | 92-90 | 89-87 | 86-83 | 82-80 | 79-77 | 76-73 | 72-70 | 69-67 | 66-63 | 62-60 | 59- |
| 4.0 | 3.67  | 3.33  | 3.0   | 2.67  | 2.33  | 2.0   | 1.67  | 1.33  | 1.0   | 0.67  | 0   |

**Note:** A grade of C- is not a qualifying grade for major, minor, Gen Ed, or College Basic distribution credit. For further information on UF's Grading Policy, see: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx#hgrades>.

#### **CLASSROOM POLICIES**

- **Attendance & makeup:** Attendance is mandatory for all students. Absences may be excused if they are documentable and the instructor is notified two business days in advance. See the university attendance policies for more detail: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>.
- **Cell phone and texting:** To encourage uninterrupted participation in class, it is expected that students turn cell phones to silent mode before coming to class.
- **Late submissions:** Late submissions of the final project report will not be accepted. Late submissions of assignments (including annotated bibliography) can be accepted, but 10% of the points will be deducted per day after the due date.

- **Grade disputes:** Should a student wish to dispute any grade received in this class (other than simple addition errors), the dispute must be in writing and be submitted to the instructor within a week of receiving the grade. The dispute should set out very clearly, the grade that the student believes the assignment should have received as well as why he or she believes that he or she should have received such a grade.

## **OTHER INFORMATION**

- **Academic honesty:** UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.
- **Accommodations for students with disabilities:** Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation. Contact the Disability Resources Center (<http://www.dso.ufl.edu/drc/>) for information about available resources for students with disabilities.
- **Counseling and mental health resources:** Students facing difficulties completing the course or who are in need of counseling or urgent help should contact the on-campus Counseling and Wellness Center (352-392-1575; <http://www.counseling.ufl.edu/cwc/>).
- **Online course evaluation process:** Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

## SUGGESTED COURSE SCHEDULE

Students should note that there may be changes to the class schedule.

| Weeks | Dates    | Lectures                                 | Labs                       |
|-------|----------|--|----------------------------|
| 1     | 08/23/19 | Course overview and syllabus walkthrough |                            |
| 2     | 08/30/19 | Intro to networks                        | Create networks            |
| 3     | 09/06/19 | Concepts in networks                     | Visualize networks         |
| 4     | 09/13/19 | Concepts in networks                     | Bipartite networks         |
| 5     | 09/20/19 | Network measures                         | Measure networks           |
| 6     | 09/27/19 | Network measures                         | Measure networks (spatial) |
| 7     | 10/04/19 | <b>NO CLASS</b>                          |                            |
| 8     | 10/11/19 | Mid-term exam                            |                            |
| 9     | 10/18/19 | Network measures                         | Measure networks (spatial) |
| 10    | 10/25/19 | Structure of real-world networks         | Dynamic networks           |
| 11    | 11/01/19 | Network models                           | Generate networks          |
| 12    | 11/08/19 | Network communities                      |                            |
| 13    | 11/15/19 | Final project presentation               |                            |
| 14    | 11/22/19 | Final project presentation               |                            |
| 15    | 11/29/19 | <b>NO CLASS</b>                          |                            |
| 16    | 12/06/19 | <b>NO CLASS</b>                          |                            |

## IMPORTANT DATES TO REMEMBER

- Mid-term exam: 10/11/2019
- Final project topic: determined by 10/25/2019
- Annotated bibliography (only applies to GIS 6104): submitted by 11/08/2019
- Final project report outline: submitted by 11/01/2019
- Final project report: submitted by 12/13/2019