DSBA 6520, HCIP 6520, ITIS 6520/8520: Network Science
Fall 2019
Mirsad Hadzikadic

Contact Information:
Web page: http://www.sis.uncc.edu/~mirsad
Email: mirsad at uncc.edu
Office: Online
Phone: 704-340-0062
Office Hours: Upon request

Credits, Days/Time, Location: 3 Graduate Credits Wednesdays 5:30-8:15pm online

Catalog Description: Network Science helps students design faster, more resilient communication networks; revise infrastructure systems such as electrical power grids, telecommunications networks, and airline routes; model market dynamics; understand synchronization in biological systems; and analyze social interactions among people. It examines the various kinds of networks (regular, random, small-world, influence, scale-free, and social) and applies network processes and behaviors to emergence, epidemics, synchrony, and risk. This course integrates concepts across computer science, biology, physics, social network analysis, economics, and marketing.

Prerequisites: Consent of the Instructor

Course Objectives: Networks are all around us, including natural and man-made systems. Examples include rivers, trees, arteries, highways, brain, economy, social connections, military, energy distribution, cyber attacks, terrorist networks, epidemics, Internet, and Facebook. Students will learn (a) the basic principles, concepts, and principles of networks; (b) how and why network structures and properties determine the performance and sustainability of any system; (c) how to measure and evaluate network-based systems; (d) how to utilize networks for the benefit of their organizations and society; and (e) how to utilize and design tools for understanding, visualizing, and applying the principles of networks.

Teaching Strategies: Materials presented in this course will be covered through lectures, projects, and in-class exercises. Every topic will be covered in the following: class, class preparations, in-class conversations among students, and project-based hands-on experience. In the end, students will have both the theoretical understanding of network concepts and concrete experience of putting such concepts and principles into practice.

Textbook:
Course Outline

1. The empirical study of networks
   a. Technological networks
   b. Networks of information
   c. Social networks
   d. Biological networks

2. Fundamentals of network theory
   a. Mathematics of networks
   b. Measures and metrics
   c. Computer algorithms
   d. Network statistics and measurement error
   e. The structure of real-world networks

3. Network models
   a. Random graphs
   b. The configuration model
   c. Models of network formation

4. Applications
   a. Community structures
   b. Percolation and network resilience
   c. Epidemics on networks
   d. Dynamical systems on networks
   e. Network search

Course Requirements and Grading Policy:

<table>
<thead>
<tr>
<th>Requirement</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>40%</td>
</tr>
<tr>
<td>Midterm Exam</td>
<td>30%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>0%</td>
</tr>
</tbody>
</table>

Attendance: Students are expected to attend all class meetings and to arrive before the class starts. Class topics are integrated, with each week building on prior weeks. Failure to attend or to arrive on time can adversely affect both individual performance, ability to contribute to the group project, and the earned letter grade. If a student misses a class due to work or other reasons, it is their responsibility to get notes from peers; instructors do not hold extra repeat class sessions.

Students will be allowed to miss no more than 3 classes without affecting their final grade. For every 3 absences the final grade will be lowered by one letter grade.

Grade Discussions: The instructor will discuss grades only in person (and not via telephone or e-mail) and only with the student (not with parents, spouses, etc). Office hours are listed in the syllabus.

Electronic Devices: Students are not allowed to use any electronic devices during the class, unless otherwise instructed by the instructor.

Academic Integrity: All students are expected to adhere to the UNC Charlotte Code of Student Academic Integrity (http://legal.uncc.edu/policies/ps-105.html) as specified in the current
Catalog (http://catalog.uncc.edu/). Among other things, this code forbids cheating, fabrication or falsification of information, multiple submission of academic work, plagiarism, abuse of academic materials, and complicity in academic dishonesty.

Diversity Statement: All students and the instructor are expected to engage with each other respectfully. Unwelcome conduct directed toward another person based upon that person’s actual or perceived race, actual or perceived gender, color, religion, age, national origin, ethnicity, disability, or veteran status, or for any other reason, may constitute a violation of University Policy 406, The Code of Student Responsibility. Any student suspected of engaging in such conduct will be referred to the Office of Student Conduct for possible conduct action.

Inclement Weather: University Policy Statement #13 states the University is open unless the Chancellor announces that the University is closed. The inclement weather hotline number to call is 704-786-2877. In the event of inclement weather, check your email the morning of class. The instructors will use their best judgment as to whether class should be held understanding that some of you commute from far away and the instructors will notify you by email if class is cancelled.

UNIVERSITY, COLLEGE AND DEPARTMENTAL POLICIES

University Policies:

Code of Student Responsibility: “The UNC Charlotte Code of Student Responsibility (the Code) sets forth certain rights and responsibilities in matters of student discipline. The Code defines these responsibilities and guarantees you certain rights that ensure your protection from unjust imposition of disciplinary penalties. You should familiarize yourself with the provisions and procedures of the Code” (Introductory statement from the UNC Charlotte brochure about the Code of Student Responsibility). The entire document may be found at this Internet address: http://legal.uncc.edu/policies/ps-104.html

Academic Integrity: All students are required to read and abide by the Code of Student Academic Integrity. Violations of the Code of Student Academic Integrity, including plagiarism, will result in disciplinary action as provided in the Code. Students are expected to submit their own work, either as individuals or contributors to a group assignment. Definitions and examples of plagiarism and other violations are set forth in the Code. The Code is available from the Dean of Students Office or online at: http://www.legal.uncc.edu/policies/ps-105.html.

Faculty may ask students to produce identification at examinations and may require students to demonstrate that graded assignments completed outside of class are their own work.

Course Credit Workload: This 3-credit course requires 3 hours of classroom or direct faculty instruction and 6-7 hours of out-of-class student work each week for approximately 15 weeks. Out-of-class work may include but is not limited to: required reading, library research, written assignments, programming/project based assignments, and studying for quizzes and exams.
Special Needs: If you have a documented disability and require accommodation in this course, contact Disability Services, Fretwell 230, phone: 687 4355 voice/TDD) the first week of the semester. Information about available services may be found at http://legal.uncc.edu/policies/ps-51.html. Accommodations for learning will be arranged by that office and communicated to the Instructor. If you speak English as a second language, please inform the instructor.

Diversity Statement: UNC Charlotte strives to create an academic climate in which the dignity of all individuals is respected and maintained. Therefore, we celebrate diversity that includes, but is not limited to ability/disability, age, culture, ethnicity, gender, language, race, religion, sexual orientation, and socio-economic status. All students are required to abide by the UNC Charlotte Sexual Harassment Policy (http://www.legal.uncc.edu/policies/ps-61.html) and the policy on Responsible Use of University Computing and Electronic Communication Resources (http://www.legal.uncc.edu/policies/ps-66.html). Sexual harassment, as defined in the UNC Charlotte Sexual Harassment Policy, is prohibited, even when carried out through computers or other electronic communications systems, including course-based chat rooms or message boards.

Religious Accommodation: It is the obligation of students to provide faculty with reasonable notice of the dates of religious observances on which they will be absent by submitting a Request for Religious Accommodation Form to their instructor prior to the census date for enrollment for a given semester http://legal.uncc.edu/policies/ps-134.html. The census date for each semester (typically the tenth day of instruction) can be found in UNC Charlotte’s Academic Calendar (http://registrar.uncc.edu/calendars/calendar.htm).