**Spring 2018**
Social Processes and Networks
**Instructor**: Jianxi Gao
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**Textbooks**:
1. Network Science, Albert-László Barabási
2. Networks, Crowds, and Markets, Reasoning about a Highly Connected World, David Easley, Jon Kleinberg
3. Related papers reading

**Course description**
This course is an interdisciplinary introduction to social processes and network science. Classes will interchangeably present the chapters from these textbooks with emphasis on the current active research related to graph theory, random networks, game theory, and information cascades. Topics to be covered include the network theory, dynamical systems, data analysis, and applications to biology, ecology, sociology, technology, and other fields. Students will learn about the ongoing research in the field, and ultimately apply their knowledge to conduct their own analysis of a real network data set of their choosing as part of the final project.

**Prerequisites**
Junior or senior level standing; some familiarity with probability, linear algebra, and calculus; or permission of the instructor.

**Course Content**
- Graph theory
- Random networks
- Scale-free networks
- Evolving networks
- Strong and weak ties,
- Positive and negative relationships,
- Information cascades
- Epidemics

**Evaluation and grading**
1) Homework: 20%
2) Progress presentations: 40%
3) Final project presentation: 10%
4) Final project report: 30%
   There is no midterm or final exam. The progress presentations will be graded 0 or 1 (progress made, and effectively communicated). To get an A you need 95%, A– you need 90%, B+ you need 85%, etc.

**Student Learning Outcomes**
1. Understand the structures and dynamics of networked systems;
2. Apply the concept of network of networks to real systems in different fields;

3. Develop an understanding of social processes which operate on massive social graphs
4. Build the computer programming skills for social network analysis and network visualization;
5. Cultivate the ability to implement a variety of social processes efficiently on large social networks.
6. Read, analyze, and critique published literature in the field of network science and social systems

**Course Assessment Measures**
(1) Final project assignment: students will collect data representing a real complex networked system and analyze the structures or dynamics using the computational tools introduced in class.
(2) Homework assignments.
(3) Contributions to in-class discussions.

**Academic Integrity**
Student-teacher relationships are built on trust. For example, students must trust that teachers have made appropriate decisions about the structure and content of the courses they teach, and teachers must trust that the assignments that students turn in are their own. Acts, which violate this trust, undermine the educational process. The Rensselaer Handbook of Student Rights and Responsibilities defines various forms of Academic Dishonesty and all students should make themselves familiar with these.
In this class, all assignments that are turned in for a grade must represent the student's own work. Submission of any assignment that is in violation of this policy will result in a penalty of 0 points for assignment and failing of the course in case of repetition.
If you have any question concerning this policy, please ask for clarification before preparing or submitting an assignment.
The penalty for not adhering to these academic integrity rules is a failing grade for the assignment on the first offense, then failing the course and potential disciplinary actions by the Institute on any subsequent offenses.

**Changes to syllabus and student responsibilities**
The instructor reserves the right to modify this syllabus as deemed necessary any time during the semester. Emendations to the syllabus will be discussed with students during a class period. Students are responsible for information given in class. There may be also details about this course not covered in this syllabus.
Do not assume something just because it is not specified in the syllabus. If you are unsure about anything related to the rules guiding this course, consult with the instructor.