MAT 600 – Markov Chains and Mixing Times – Spring 2018

Course Description   This course is an an introduction to the modern theory of finite Markov chains, and in particular to the notion of "mixing." The mixing time of a Markov chain is the time it takes the chain to reach its equilibrium distribution, approximately. The study of mixing times is currently an active area of research in probability theory. After a brief introduction to finite Markov chains, we will develop mathematical tools as needed to analyze important examples. These tools are taken from linear algebra, elementary graph theory, electrical networks and other areas, but whenever possible, a probabilistic approach will be used. Many of the important examples are naturally viewed as random walks on finite connected graphs. A key issue in these cases is to understand how the associated mixing times depend on properties of the underlying graphs.

Prerequisites MAT 601, MAT 631 and an undergraduate course in probability.

Instructor   Prof. JT Cox, 311B Carnegie, 443-1488, jtcox@syr.edu

Class Time and Location Tu/Thur 3:30-4:50, Carnegie 115

Office Hours Held in **Carnegie 311B**
- TBA
- and at other times by appointment

Text

> Markov chains and Mixing Times, Second Edition by Levin, Peres and Wilmer, AMS. The text is freely available on line at: http://pages.uoregon.edu/dlevin/MARKOV.

Attendance You are expected to attend every class and every exam. You are expected to arrive on time for every class. *Please do not take this course if you cannot arrive on time every day.* If you do miss a class, it is your responsibility to obtain a copy of the lecture notes for that class from another student. You are also responsible for any announcements about changes to the course schedule, the exam schedule or the course requirements made during a missed class.

Homework/Reading There will be daily reading assignments and occasional homework assignments.

Class Presentations There will be occasional class presentation assignments.

Grading The course grade will be based on homework and class participation.

Disability-Related Accommodations If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), http://disabilityservices.syr.edu, located in Room 309 of 804 University Avenue, or call (315) 443-4498, TDD: (315) 443-1371 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, #as appropriate. Since accommodations may require early planning and generally are not provided retroactively, **please contact ODS as soon as possible.**

Academic Integrity. Syracuse University's academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first instance of academic dishonesty by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of academic integrity policy. The presumptive penalty for a first instance of academic dishonesty by a graduate student is suspension or expulsion. SU students are required to read an online summary of the university's academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and the complete policy, see http://academicintegrity.syr.edu/. For more precise details, see
- One page guide: AI at SU
- 10 things all students need to know about AI

Religious observances policy SU religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holidays according to their tradition. Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to are religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice (Student Services -> Enrollment -> My Religious Observances) f**rom the first day of class until the end of the second week of class.**