MA 493: Combinatorial Game Theory
Fall 2017

Location:
SAS Hall 2106
TH 10:15–11:30

Instructor:
Ricky Liu
riliu@ncsu.edu
SAS Hall 3264

Office hours:
TH 11:30–12:30 (tentative) or by appointment

Prerequisites:
MA 225 or permission of the instructor

Required textbook:

- Albert, Nowakowski, Wolfe, *Lessons in Play: An Introduction to Combinatorial Game Theory*, AK Peters/CRC Press, 1st edition, 2007.

Optional supplementary texts:

- Berlekamp, Conway, Guy, *Winning Ways for Your Mathematical Plays: Volume 1*, AK Peters/CRC Press, 2nd edition, 2001.

- Conway, *On Numbers and Games*, AK Peters/CRC Press, 2nd edition, 2000.

Course webpage:
http://www4.ncsu.edu/~riliu/493
The course webpage contains useful information about the course, including the syllabus, assignments, and schedule (tentative).

About the course:
Combinatorial game theory is the study of games of no chance and perfect information, such as chess, checkers, or go. We will study such games from a mathematical perspective starting from first principles. In particular, we will discuss the mathematical framework for partisan games developed by Berlekamp, Conway, and Guy; the theory of impartial games as developed by Sprague and Grundy; and Conway's construction of surreal numbers.

Topics include: basic strategies, outcome classes, the arithmetic of games, canonical forms, surreal numbers, impartial games, temperature, all-small games.

Grading:
Grades will be based on homework (50%), quizzes (25%), and a final project (25%).

Homework:
Homework will be assigned every 1–2 weeks, due at the beginning of class. Homework will not be accepted through email without prior approval. Late assignments will not be accepted. Collaboration is encouraged, but you are expected to write up your solutions independently. Use of outside resources is not allowed. (Violation of these rules will result in a 0 on the assignment and possible disciplinary action.)

Quizzes:
There will be short quizzes (≤ 20 min) every 2–3 weeks to test basic understanding of the material. Quiz dates will be announced during the previous class as well as on the course website.

Final project:
The final project will be a short expository paper (≈ 5 pages). It will be due on December 7 by 11am.

Attendance:
Students are expected to attend every course meeting. No accommodations for missed assignments or exams will be made except as described by NC State regulations at `http://policies.ncsu.edu/regulation/reg-02-20-03`.

Academic integrity:
Students are expected to follow the ethical standards described by the Code of Student Conduct policy and Pack Pledge at `http://policies.ncsu.edu/policy/pol-11-35-01` with respect to completion of homework assignments and exams.

Statement for students with disabilities:
Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Services Office at Suite 2221, Student Health Center, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation at `http://policies.ncsu.edu/regulation/reg-02-20-01`.

N.C. State Policies, Regulations, and Rules (PRR):
Students are responsible for reviewing the NC State University PRR's located at `http://oucc.ncsu.edu/course-rights-and-responsibilities` which pertains to their course rights and responsibilities.