Math 470-Fall 2018

Analytic Combinatorics

General information

Location: Cupples I Room 215
Time: TTh 10:00am-11:30am
Professor: Greg Knese
Office location: Cupples I room 214
Office hours: M 2-3pm, Tu 1:30-2:30pm, W 10-11am
Email: geknese at wustl dot edu

Course description

Analytic combinatorics is the study of large structured combinatorial configurations. The course will be broken into two components. First, generating functions will be used to encapsulate counting sequences and their recurrence structures with a formal power series. Second, analytic methods will be used to obtain the precise asymptotic behavior of counting sequences. The informal prerequisites are: familiarity with basic discrete math objects: sets, permutations, combinations, graphs; power series; mathematical maturity (e.g. the ability to write rigorous proofs and to absorb new definitions quickly). Formal Prerequisites: Math 310.

Textbook

Analytic Combinatorics by Philippe Flajolet and Robert Sedgewick.
Available here: http://ac.cs.princeton.edu/home/AC.pdf

Exams

The midterm exam is in class **October 11, 2018**.
The final exam is **December 18, 2018, 6-8pm**.

Homework

There will be weekly homework assignments. These should be written up clearly and in detail.

Collaboration: You may discuss the homework verbally with other students provided you have already given the homework a serious attempt. If you have already solved a problem and someone asks you about it, then any help you provide should consist of hints or suggestions and never complete solutions. In particular, homework should be written up independently and it should not be possible to tell who worked with whom. Do not search or post requests for solutions to HW. Do not post any course materials online.

Grade breakdown

Homework: 30%
Midterm exam: 30%
Final exam: 40%
Letter grade breakdown: A+=(97,100], A=(93,97], A-=[90,93], similar for B,C,D, F=[0,60).

Course plan

Chapter I: Combinatorial structures and ordinary generating functions. (Unlabelled universe)
Chapter II: Labelled structures and exponential generating functions.
Chapter IV: Complex analysis, rational and meromorphic asymptotics
Selections of Chapters V, VI, VII, VIII depending on time.

Supplementary resources

The authors of the book have an extensive website:
http://ac.cs.princeton.edu/home/
which includes videos and lecture slides:
http://ac.cs.princeton.edu/online/