Instructor: Estie Arkin, Math Tower P-134B, 632-8363, esther.arkin@stonybrook.edu,

Office hours: Tentative: Monday 12-1, Thursday 10-12. and by appointment. You may also stop by whenever you have a question. I also welcome questions by email.

TA: Anthony Xiang, Anthony.Xiang@stonybrook.edu office hours Wednesday 9-11am. Michael Farber, michael.farber@stonybrook.edu office hours Monday 10-12. Yue Zhao Yue.Zhao.4@stonybrook.edu office hours Thursday 3-5. Chris Yi, chris.yi@stonybrook.edu office hours Wednesday 12-2. All TA office hours will be in Harriman 132.

Lectures: Monday, Wednesday 2:30-3:50, Engineering 145


Homeworks: Homework will be assigned weekly (approximately), posted on blackboard, to be turned in via blackboard before the due date and time. Each homework must be submitted through Blackboard as a single PDF file. **Homework that does not meet these expectations will not be graded and will not receive credit.** There will be approximately 10 homework sets, equally weighted, and I will drop the **lowest two** scores before computing your average.

Homework cover sheet: Each homework must have a cover sheet (available on blackboard) which should be filled out and included with the homework. Homeworks turned in without a cover sheet will **not** be graded.

No late homework will be accepted. (Since I drop the 2 lowest scores, missing a homework due to illness should not be a problem.) You may discuss homework problems with other students taking the course, with the TA, and with the instructor. But the work that you turn in should always be your own write-up, and you should show that you personally understand everything that you write. **Please make certain that your writing is neat and clear, and that you have expressed your reasoning, not just the final answer.**

Exams: There will be three exams. The first two midterms will be in class, tentatively Wednesday February 26, and Monday April 13. The third exam (final) is Tuesday May 12, 5:30-7:00, and is non cumulative. All exams are closed notes and book, however, you will be allowed a “cheat sheet”. This is a 4 by 6 index card that must be hand written by you (not typed, not xeroxed), and it will be turned in with your exam. All cell phones must be turned off during exams, and placed inside you bag! No calculators are allowed.

Grades: Your total average score will be computed based on 10% homework, 30% per midterm. Please note that there will be **no extra credit** option. I will use your total average score to assign a letter grade; about 30% A’s, 35% B’s, 25% C’s, and 10% D’s and F’s.

Course Outline:

**Graph Theory** Basic definitions, models, isomorphism, Planar graphs, Euler, Hamilton circuits, coloring, Trees, Shortest paths, minimum spanning trees, traveling salesperson.

**Enumeration and Counting:** Basic counting principles; Arrangements and selections, Binomial coefficients, permutations, combinations, Generating functions, Recurrence relations/Divide and conquer, Inclusion-Exclusion formulas.

Learning Outcomes

1.) Strengthen logical reasoning skills to solve combinatorial problems using:

- elements of propositional calculus;
- proof by contradiction;
- logical consequences of assumptions.

2.) Learn to find multiple (equally valid) ways to solve a combinatorics problem:

- apply a top-down strategy (breaking a problem into parts and subparts);
- apply a bottom-up strategy (solving special subcases and building up);
- learn to solve problems from first principles, rather than looking for existing templates or formulas.
• solve a complementary problem;
• use different strategies to categorize subcases of a problem;
• use different techniques (e.g., generating functions, inclusion-exclusion).

3.) Learn basic graph theory results and apply them in problem-solving:
• isomorphism;
• planar graphs;
• Hamilton circuits and Euler cycles;
• graph coloring;
• trees and ways to search them.

4.) Use formulas for counting basic combinatorial outcomes to construct solutions to more complex combinatorial enumeration problems:
• permutations, with and without repetition;
• combinations, with and without repetition.

5.) Apply counting strategies to solve discrete probability problems.

6.) Use specialized techniques to solve combinatorial enumeration problems:
• generating functions;
• recurrence relations;
• inclusion-exclusion principle.

Student Accessibility Support Center Statement: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.
https://www.stonybrook.edu/commcms/studentaffairs/sasc/facstaff/syllabus.php
Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website:

Academic Integrity Statement: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person’s work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology and Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at:
http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical Incident Management Statement: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students’ ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.

Academic Success and Tutoring Center: Free academic support services including one-on-one and small group course-based tutoring, one-on-one skill-based tutoring, peer assisted learning (Supplemental Instruction), and public speaking courses are available for undergraduate students. Learn more about these services by visiting www.stonybrook.edu/tutoring.