

Syllabus/Course Policies for Math 331: Computer-Assisted Mathematical Problem Solving, Spring 2019

Tue, Thurs 11:30am-12:50pm

Classroom: Mathematics S235S (SINC site in basement of Math Tower)

Last updated: Jan 28, 2019

Course webpage: <http://www.math.stonybrook.edu/~bdozier/mat331-spr19/>

Instructor:

Dr. Benjamin Dozier

Office: *Math Tower 3116*

Email: benjamin.dozier@stonybrook.edu

Office hours in office: **Tue 1:30-2:30pm, Fri 1:30-2:30pm**

MLC office hour: **Thurs 1:30-2:30pm** (either in MLC or S235S, which is next door)

TA/Grader:

Mu Zhao

Office: *Math Tower 2106*

Email: muzhao@math.stonybrook.edu

Office hour in office: **Wed 2:30-3:30pm**

MLC office hours: **Mon 1-3pm**

Prerequisites: Multivariable calculus: C or higher in MAT 203 or 205 or 307 or AMS 261. (Most parts of the course will not actually directly use calculus). You do NOT need to have prior experience programming. You will gain such experience by taking this course.

Course Description:

From Course Bulletin: “Exploration of the use of the computer as a tool to gain insight into complex mathematical problems through a project-oriented approach. Students learn both the relevant mathematical concepts and ways that the computer can be used (and sometimes misused) to understand them. The particular problems may vary by semester; past topics have included cryptography, fractals and recursion, modeling the flight of a glider, curve fitting, the Brachistochrone, and computer graphics. No previous experience with computers is required.”

The mathematical topics this semester may include:

- Probability (Law of Large Numbers, Central Limit Theorem, etc.)
- Prime numbers
- Cryptology: making and breaking codes (one-time pads, public-key cryptography, etc.)
- Interpolation
- Fractals and stochastic processes (random walks, diffusion limited aggregation, Laplacian growth, etc)
- Root finding and Newton’s method
- Numerically solving differential equations

Software: We will use SageMath, a free, open-source, cross-platform mathematics software system. It is based on Python, which is a flexible, widely-used, general-purpose programming language. Sage's functionality is similar to that of commercial packages such as Mathematica, Maple, or Matlab, but its open-source nature gives it several advantages. In class we will primarily use Sage via the interactive Jupyter notebook.

Projects and Homework: There will be no exams in this course. Your grade will be based on homework and projects. There will be three projects, each of which will have programming and writing components. There will be homework due every week, except for the weeks the projects are due. Each homework assignment will be posted on Tuesday and will be due the next Tuesday.

Grading:

- Homework will count for 25% of your grade. Your lowest homework score will be dropped.
- The three projects will each count for 25%.

Since some solutions will be posted, late work will generally not be accepted.

MAT 459 Write Effectively in Mathematics: You may in conjunction enroll in the 0-credit course MAT 459 in order to fulfill a writing requirement for certain majors. In this case, for each of the three projects you will receive a PASS/FAIL grade on the writing component. Students who receive a PASS for writing on at least two of the three projects will receive a PASS for MAT 459.

University mandated syllabus statements:

Student Accessibility Support Center (SASC) Statement: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact the Student Accessibility Support Center (SASC), 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.

[In addition, this statement on emergency evacuation is often included, but not required: Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and the staff at the Student Accessibility Support Center (SASC). For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>]

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 are required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & 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 Judicial Affairs 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.