

**MA 402: Mathematics of Scientific Computing
Spring 2019**

Instructor: Prof. Arvind K. Saibaba

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Lecture: MW 3:00-4:15, 2106 SAS Hall

Office: SAS Hall 3118.

Office Hours: MW 9-10:30 AM.

Website: <https://pages.github.ncsu.edu/asaibab/ma402/>

Topics covered: This course will provide an overview of methods to solve quantitative problems and analyze data. The tools to be introduced are mathematical in nature and have links to Algebra, Analysis, Geometry, Graph Theory, Probability and Topology. Students will acquire an appreciation of (I) the fundamental role played by mathematics in countless applications and (II) the exciting challenges in mathematical research that lie ahead in the analysis of large data and uncertainties. Students will work on a project for each unit. While this is not a programming class, the students will do some programming through their projects. This course is divided into 5 major units:

1. Round-off error, conditioning, and norms
2. Singular Value Decomposition
3. Least-Squares
4. Monte Carlo Methods
5. Fourier analysis

Prerequisite: (MA 341 or MA 405) and programming proficiency (MATLAB, Python, C/C++, Fortran, or other appropriate languages). While this is not a programming course, the projects will involve a substantial programming component.

Course Text: There is no required textbook. The instructor will draw the course material from a variety of sources including lecture notes and online textbooks (see website).

Course Website: All the homework, solutions, and practice problems will be posted on the class website. Moodle will be used only for recording raw scores. Additionally, course announcements will be sent to your NCSU e-mail account on a regular basis.

Course Grade: Final grade for this class will be determined on the basis of homework assignments, 2 midterms, and a final exam, with each category weighted as follows:

Problem Sessions:	10%
Homework:	50% (5 projects, 10% each)
Mid-term:	15%
Final Exam:	25%

Problem sessions: There will be a problem session for each of the 5 units in the course. During this session, I expect you to work through a problem sheet in groups of 2-3 (this is both open book and open notes). At the end of each problem session, I will collect these problem sheets from

each group. Each submission will receive a grade in the range 0-3, 3 denoting excellent and all members of the group will receive the same grade. The problem sessions will be announced in advance. If you miss a problem session you can turn it in after two days after it was held.

Projects: Five project assignments will be posted on the course website in PDF form. You may work in groups of 2-3, but each member of the group will receive the same grade. These projects are an important part of the course; each project submission should be a professional looking document. Thinking of how to best present your results (for instance, what quantity to plot and how) is part of the assignment. These projects are due on the designated day by 5pm Eastern time; feel free to submit assignments ahead of the due date and time.

Midterms: There will be 1 midterm which is in-class and closed book. Study guides and practice problems will be posted in advance. If you miss the midterm and need to retake it, I need written documentation. Examples for missed exams include family emergency, illness, religious observance or university sponsored event. It is your responsibility to follow-up with the instructor to schedule for the make-up exam.

Final Exam: The final exam will be comprehensive and held on Monday, April 29 (1-4 PM). The final exam cannot be rescheduled for any reason. Please be aware of this before making travel plans.

Grading scale: The final grade will be assigned based on the total score as:

A+: => 97	B+: 87-89.99	C+: 77-79.99	D+: 67-79.99
A : 93-96.99	B : 83-86.99	C : 73-76.99	D : 63-66.99
A- : 90-92.99	B-: 80-82.99	C-: 70-72.99	D-: 60-62.99
F : < 60			

Academic integrity: “Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that student's record or academic career.” The entire code of conduct is available here <https://studentconduct.dasa.ncsu.edu/academic-integrity-overview/>.

Students with Disabilities Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, student must register with the Disability Services Office (<https://dro.dasa.ncsu.edu/>), 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>.

