

MA780, Spring 2019: Syllabus

Instructor information

- Pierre Gremaud
- Contact: SAS Hall 3214, gremaud@ncsu.edu, <http://www.math.ncsu.edu/~gremaud>, 919-515-3085
- Office hours: TBA
- Lectures: MWF: 9:35-10:25, 215 Park Shops
- Course webpage: <https://moodle-courses1819.wolfware.ncsu.edu/course/view.php?id=7028>

Prerequisites

MA 580 (preferred but not required)

Student learning outcomes

- familiarity with approximation theory in one and several dimensions; ability to choose, implement and use state-of-the-art approximation algorithms;
- familiarity with one and multi-dimensional quadrature methods; analysis and implementation of adaptive Newton-Cotes and Gaussian quadratures;
- understanding of numerical methods for the resolution of systems of ordinary differential equations, including analysis, implementation and use in practical cases;
- working knowledge of continuous and discrete Fourier transforms, including FFTs.

Textbook

Walter Gautschi, *Numerical Analysis*, Birkhäuser, 2012, available online for free from the NC State library (requires NC State login).

Overview/course catalog

Approximation and interpolation, Fast Fourier Transform, numerical differentiation and integration, numerical solution of initial value problems for ordinary differential equations. Additional topics (time permitting): sparse grids, sensitivity analysis, Monte Carlo integration.

Structure

Lectures. The students will have to complete about 6 projects during the semester. The projects will be introduced in class.

Schedule

Approximation (2-3 weeks); quadratures (2 weeks); numerical ODEs (4 weeks); Fourier (3 weeks).

Transportation

Transportation is not required for the class. The class meets on campus.

Safety

Projects in this class require the use of brain, computers, pencils and paper.

Grades

- Final grade: determined by 5 projects during the semester (55%), a mid-term (date TBA, 15%), a final exam (8:00-11:00, Wed., May 1, 20%). The remaining 10% will be determined by short quizzes during the semester. The students are welcome to think about the projects in group, but redaction and submission should be done individually. The use of TeX is very strongly encouraged but not required. Hand drawn figures are not acceptable. Late submissions will be not accepted. The exams are individual and closed book.
- The course will use the standard NC State letter grading.

Policy in incomplete grades and late assignments

If an extended deadline is not authorized by the instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-3>.

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 Disability Services for Students at 1900 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 (REG 02.20.01).

Policy on attendance

For complete attendance and excused absence policies, please see <http://policies.ncsu.edu/regulation/reg-02-20-03>

- attendance policy: attendance is mandatory;
- absence policy: to be discussed on case by case basis;
- make-up work policy: no make-up for late work (and grade of 0);

N.C. State University policies, regulations and rules (PRR)

Students are responsible for reviewing the PRRs which pertain to their course rights and responsibilities. These include: <http://policies.ncsu.edu/policy/pol-04-25-05> (Equal Opportunity and Non-Discrimination Policy Statement), <https://oied.ncsu.edu/divweb/policies/> (Office for Institutional Equity and Diversity), <http://policies.ncsu.edu/policy/pol-11-35-01> (Code of Student Conduct), and <http://policies.ncsu.edu/regulation/reg-02-50-03> (Grades and Grade Point Average).