

Spring 2019 - CS323

Numerical Analysis and Computing

Lectures: TTh 1:40 pm -3:00 pm, CORE-101 BUS

Instructor: Wujun Zhang

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Office hours: Wednesday 3:00 pm - 4:00pm or by appointment

Webpage: <http://sites.math.rutgers.edu/~wz222/teaching/cs323.html>

Textbook

References

[1] K. Atkinson *Elementary Numerical Analysis*, (3rd edition), Wiley, 1989.

Additional material: The Book authors have a website that provides slides and matlab programs for the course– [CLICK HERE](#).

Prerequisites: CALC1, CALC2, Math 250 (linear algebra), ability to program in a high level language
Programs will be written in MATLAB language - [Matlab tutorial + links to other references](#)

Topics:

- \$1. Solution of nonlinear equation
- \$2. Solution of linear system
- \$3. Approximation by Polynomials and Piecewise Polynomials.
- \$4. Numerical Integration.
- \$5. Numerical Methods for Ordinary Differential Equations.

Course Description: This is a general survey of the basic topics in numerical analysis – the study and analysis of numerical algorithms for approximating the solution of a variety of generic problems which occur in applications. We will consider the numerical solution of nonlinear systems of equations, numerical solution of linear systems of equations, the approximation of functions by polynomials and piecewise polynomials, numerical integration, and the numerical solution of initial value problems for ordinary differential equations, and see how all these problems are related.

Despite the many solution techniques presented in elementary calculus and differential equations courses, mathematical models used in applications often do not have the simple forms required for using these methods. Hence, a quantitative understanding of the models requires the use of numerical approximation schemes. This course provides the mathematical background for understanding how such schemes are derived and when they are likely to work.

To illustrate the theory, in addition to the usual pencil and paper problems, some short computer programs will be assigned. To minimize the effort involved, however, the use of Python will be encouraged. This program has many built in features which make programming easy, even for those with very little prior programming experience.

Grading Policy:

Homework (20%): Once every four or five lectures.

Midterm Exams (20 %): Mar. 7, Apr 18 (tentative)

Final Exam (40 %): TBA

Make-up Exam Policy: Make-up exams will be given *only* in the case of an absence caused by illness, religious observance, participation in a University activity at the request of the University authorities, or compelling circumstances beyond the students' control. Convincing documentation such as a doctor's note will be required.

Late homework assignments are generally not allowed, although students with exceptional circumstances may be granted short extensions. Please see me as soon as a problem arises.

Academic Integrity: You are expected to abide by the University's policy on academic integrity. All cases of academic dishonesty will be referred to the Office of Student Conduct. Academic dishonesty includes cheating on quizzes and exams.

You may discuss homework problems with me or with other students. However, after you have finished discussing a problem, you must write your solution independently, not in concert with others. If you consult any source (such as a web page, solutions from a previous semester, etc.) in the preparation of homework, you must acknowledge this by citing that source; moreover, the work you turn in must be written up in your own words, not copied from a source. Failure to observe these restrictions will be treated as a violation of the Rutgers Academic Integrity Policy.

Student-Wellness Services:

Just In Case Web App

<http://codu.co/cee05e>

Access helpful mental health information and resources for yourself or a friend in a mental health crisis on your smartphone or tablet and easily contact CAPS or RUPD.

Counseling, ADAP & Psychiatric Services (CAPS)

(848) 932-7884 / 17 Senior Street, New Brunswick, NJ 08901/ www.rhscaps.rutgers.edu/

CAPS is a University mental health support service that includes counseling, alcohol and other drug assistance, and psychiatric services staffed by a team of professional within Rutgers Health services to support students' efforts to succeed at Rutgers University. CAPS offers a variety of services that include: individual therapy, group therapy and workshops, crisis intervention, referral to specialists in the community and consultation and collaboration with campus partners.

Violence Prevention & Victim Assistance (VPVA)

(848) 932-1181 / 3 Bartlett Street, New Brunswick, NJ 08901 / www.vpva.rutgers.edu/

The Office for Violence Prevention and Victim Assistance provides confidential crisis intervention, counseling and advocacy for victims of sexual and relationship violence and stalking to students, staff and faculty. To reach staff during office hours when the university is open or to reach an advocate after hours, call 848-932-1181.

Disability Services

(848) 445-6800 / Lucy Stone Hall, Suite A145, Livingston Campus, 54 Joyce Kilmer Avenue, Piscataway, NJ 08854 / <https://ods.rutgers.edu/>

Rutgers University welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact the appropriate disability services office at the campus where you are officially enrolled, participate in an intake interview, and provide documentation: <https://ods.rutgers.edu/students/documentation-guidelines>. If the documentation supports your request for reasonable accommodations, your campus's disability services office will provide you with a Letter of Accommodations. Please share this letter with your instructors and discuss the accommodations with them as early in your courses as possible. To begin this process, please complete the Registration form on the ODS web site at: <https://ods.rutgers.edu/students/registration-form>.

Scarlet Listeners

(732) 247-5555 / <http://www.scarletlisteners.com/>

Free and confidential peer counseling and referral hotline, providing a comforting and supportive safe space.