MATH 488/688: Numerical Analysis I — Fall 2021, 3 credits

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Web	`https://www.ndsu.edu/pubweb/~novozhil/` `https://www.ndsu.edu/pubweb/~novozhil/Teaching/math488.html`
Lecture hours	MWF 10:00am–10:50am, NDSU Elect & Comp Eng, Rm 243
Office hours	MWF 9:00am–10:00am (or by appointment). We can meet either in my office or remotely, through Zoom.
Textbook	Detailed lecture notes will be provided. You can also use Sullivan, Eric, Numerical Methods: An Inquiry-Based Approach With Python, see `https://numericalmethodssullivan.github.io/`
Prerequisites	Math 266
Course Description	Numerical solution of nonlinear equations, interpolation, numerical integration and differentiation, numerical solution of initial value problems for ordinary differential equations.
Course Objectives	To understand and master the basic principles of the numerical analysis — error analysis, quality of approximation, complexity of an algorithm — by studying model examples from nonlinear equations, numerical linear algebra, interpolation and approximation, and the initial value problem for ODE.
Class Attendance	According to NDSU Policy 333 (`www.ndsu.edu/fileadmin/policy/333.pdf`), attendance in classes is expected. The students are solely responsible for missed handouts or announcements made during the lectures.
Homework	Approximately every two weeks there will be a homework assigned, in which both computational and theoretical aspects of the course material will be tested. Students taking 688 section of the course will be assigned additional problems.
Quizzes	During the semester there will be five to six quizzes (10-15 minutes long). There will be no make-up for the quizzes, and the lowest result will be dropped before the final grading.
Projects	During the semester there will be (tentatively and subject to a change) four or five projects, the main output of which is a working realization of some numerical algorithm in Python. These projects will be defended in person.
Grading	The grading of the course will be based on the grade throughout the semester [homework (30%), quizzes (20%), and projects (50%)]. The final grade will be A/B/C/D/F with the thresholds 90/80/70/60.

Academic Responsibility and Conduct

The academic community is operated on the basis of honesty, integrity, and fair play. NDSU Policy 335: Code of Academic Responsibility and Conduct applies to cases in which cheating, plagiarism, or other academic misconduct have occurred in an instructional context. Students found guilty of academic misconduct are subject to penalties, up to and possibly including suspension and/or expulsion. Student academic misconduct records are maintained by the Office of Registration and Records. Informational resources about academic honesty for students and instructional staff members can be found at `www.ndsu.edu/academichonesty`.

Any student found guilty of academic dishonesty will receive a grade of 0 for the homework assignment, or quiz, or test, or exam in question. In addition, every such student will be reported to the Chair of Mathematics, the Dean of their major college, the Dean of the College of Science and Mathematics, the Provost, and the Registrar. The Registrar will add any such student to NDSU's Student Academic Misconduct Database. (Multiple entries in this database may result in additional sanctions from NDSU.)

Special Needs

Any students with disabilities or other special needs, who need special accommodations in this course, are invited to share these concerns or requests with the instructor and contact the Disability Services Office (`www.ndsu.edu/disabilityservices`) as soon as possible.

COVID-19

If you feel any of the symptoms and/or have a fever of 100.4 or higher, self-isolate and do not come to the class.

Schedule

Note: This is a tentative schedule and subject to a change.

Weeks 1-2. Introduction to Python programming.

Weeks 3-5. Root finding. Ideas, algorithms, theory. First project is due.

Weeks 6-8. Solving linear algebraic equations. Second project is due.

Weeks 9-10. Integration. Interpolation. Theory and implementation. Third project is due.

Weeks 11-14. Solving ODE numerically. Fourth project is due.

Weeks 15-16. Additional topics as time permits.

Week 17. Final exam (December 14th, Tuesday, 8am). Fifth project defence.