

**The University of Iowa
The College of Liberal Arts and Sciences
Spring 2024**

Title of Course: MATH:3800:0101 Introduction to Numerical Methods (cross-listed as CS:3700:0101).

Course meeting time and place: 11:30A - 12:20P MWF 117 MLH

Department of Mathematics: <https://math.uiowa.edu/>

Course ICON site: To access the course site, log into [Iowa Courses Online \(ICON\)](#) using your Hawk ID and password.

Course Home

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the “second-grade only” option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

Instructor Contact Information

Office location: 25G MLH

Student drop-in hours: MW 2:00-3:30 in 25G MLH. *Students are invited to drop by during these hours to discuss questions about the course material or concerns. I am also available by appointment via Zoom if you are unable to attend my drop-in hours*

Phone: (319) 335-0787

E-mail: bruce-ayati@uiowa.edu

DEO: *Ryan Kinser, 14 MLH, ryan-kinser@uiowa.edu*

Description of Course

This course is intended to be a first introduction to numerical analysis. Topics to be covered include

- Numerical linear algebra and computer arithmetic
- Roots of nonlinear equations, including a review of Taylor’s Theorem
- Polynomial interpolation and approximation
- Numerical integration
- Numerical methods for ordinary differential equations.

Each topic will cover several numerical methods, the mathematical analysis of those methods, and some illustrative computations using the Julia programming language. Julia is a high-level programming language and will be taught continuously and as needed throughout the course. **NO PRIOR KNOWLEDGE OF JULIA IS NEEDED.**

Learning Objectives

The aim of this course is to teach students how to derive, analyze and implement numerical methods for solving mathematical problems. Students will gain experience with the programming language Julia, which will be used to implement methods using existing programs. This course plan may be modified during the semester. Such

modifications will be announced in advance during class periods; the student is responsible for keeping abreast of such changes.

Textbook/Materials

The required textbook for this course is:

- Title: *Fundamentals of Numerical Computation: Julia Edition*
- ISBN: 9781611977004
- Authors: Tobin A. Driscoll and Richard J. Braun
- Publisher: Society for Industrial and Applied Mathematics
- Copyright 2022

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the [CLAS Code of Academic Honesty](#). Undergraduate academic misconduct must be reported by instructors to CLAS according to [these procedures](#). Graduate academic misconduct must be reported to the Graduate College according to Section F of the [Graduate College Manual](#).

Group work on homework is encouraged. However, you each need to write up the homework solutions on your own. Exams are expected to be done by yourself with no communications with others besides the instructor, using only materials that have been preapproved.

Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the Director or Chair of the school, department, or program offering the course.

Undergraduate students should contact [CLAS Undergraduate Programs](#) for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS [Associate Dean for Graduate Education and Outreach and Engagement](#) when additional support is needed.

Drop Deadline for this Course

You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the [drop deadline for this course](#) here. When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the [Registrar's website](#). Undergraduate students can find policies on dropping CLAS courses [here](#). Graduate students should adhere to the [academic deadlines](#) and policies set by the Graduate College.

Grading System and the Use of +/-

I will use the +/- grading system. Cutoffs for the letter grade are expected to follow the recommended scale given by CLAS below. You should not view this as a

predetermined grade scale for assigning the final grade, but rather as a guaranteed minimum grading scale.

**A [100,93]; A- [90,93);
 B+ [87,90); B [83,87); B- [80,83);
 C+ [77,80); C [73,77); C- [70,73);
 D+ [67,70); D [63,67); D- [40,63);
 F [0, 40);**

The grade of A+ will be awarded in extremely rare circumstances only for truly exceptional performance in the class.

Let's say you finished the course with 89%. This guarantees a B+. However, based on various factors such as material difficulty, the performance of the entire class in the course, etc., the grade brackets may be adjusted in a way that the 89% corresponds to a grade of A-. But 89% will never be lower than a B+. In other words, any type of "curving" in this class is designed to only help you. If you are curious about your standing in the class or your potential grade, please contact me.

Course Grades

Final course grades will be assessed based on your performance in the following activities:

- Homework assignments will consist of theoretical problems and computer problems. Assignments will be posted on Fridays on ICON and are due at the **beginning of class** the following Friday. **Homework in total will be worth 30%** of the grade for the course.
- There will be two Midterm Exams. **Midterm Exams in total will be worth 35%** of the grade for the course.
- **The final exam will be worth 35%** of the grade for the course.

Date and Time of the Final Exam

The [final examination date and time](#) will be announced by the Registrar generally by the fifth week of classes and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to Registrar's final exam policy, students **have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams in one day (see the [policy](#) here).

Calendar of Course Assignments and Exams

- Assignments, when one is assigned, will be posted on Fridays on ICON and are due at the beginning of class the following Friday, unless the due date has been extended.
- The Midterm Exams will be in class during normally scheduled lecture class time on Friday, March 1, 2024, and Friday, April 19, 2024, unless they need to be rescheduled later. You will be notified of any such changes.
- As mentioned above, the Final Exam time and place will be announced later in the course.

Attendance and Absences

[University regulations require that students be allowed to make up examinations](#) that have been missed due to illness, religious holy days, military service obligations (including service-related medical appointments), or other unavoidable circumstances or University-sponsored activities. Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Students with other personal reasons for missing class should discuss the absence with me in advance.

Other Expectations of Student Performance

Please remain civil behavior and refrain from disturbing the class. Students have the right to a distraction-free learning environment. Students are expected to help each other learn and contribute to the course's learning environment. Arriving prepared for class is part of this expectation.

Communication: UI Email

Students are responsible for all official correspondence sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Where to Get Academic Support for this Course

I am available for assistance during office hours, by appointment via Zoom, and you can ask questions via email, and I will attempt to get back to you as soon as I can.

Mental Health Resources and Student Support

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found

at counseling.uiowa.edu. Find out more about UI mental health services at mentalhealth.uiowa.edu.

[Student Care and Assistance](#) provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

University Policies

Accommodations for Students with Disabilities

The University is committed to providing an educational experience that is accessible to all. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through [Student Disability Services](#) (SDS). SDS is responsible for making Letters of Accommodation (LOA) available. **The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated.** The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the [SDS website](#).

Free Speech and Expression

Absences for Religious Holy Days

Classroom Expectations

Non-discrimination

Sexual Harassment/Misconduct and Supportive Measures

Sharing of Class Recordings (if appropriate)