**Instructor:** Dr. Hristo V. Kojouharov

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**Faculty Profile:** [https://www.uta.edu/profiles/hristo-kojouharov](https://www.uta.edu/profiles/hristo-kojouharov)

**Office Hours:** TuTh 11:00AM – 11:50AM; or by appointment

**Section Information:** MATH 5373 – 001

**Time and Place of Class Meetings:** TuTh 2:00PM – 3:20PM; Trimble Hall (TH), Room 216

**Description of Course Content:** Numerical methods for approximating solutions of initial value problems, including linear multistep methods and Runge-Kutta methods.

**Course Prerequisites:** MATH 5300, 3319 or consent of instructor.

**Student Learning Outcomes:** Students will be able to understand the major mathematical ideas behind the numerical methods for solving ordinary differential equations. Students will have acquired a range of skills in the subject, both for analyzing methods and for applying them. Students will be able to assess the reliability of their answers; and be able to make a good choice of a numerical method (or methods) for a particular problem. Students will be able to apply numerical methods to solve real-world problems that involve ordinary differential equations/systems; to discuss the advantages and disadvantages of the implemented methods; and to write and present a short report (term paper) in front of an audience of peers/classmates. Students will be able to use the numerical MATrix LABoratory language (MATLAB) for solving ordinary differential equations/systems.


**Requirements:** Students will need access to a computer with the program MATLAB installed. UT Arlington computing facilities with MATLAB access, such as (1) University Center Computer Lab, 2nd floor; and (2) Engineering Lab Building, Room 256. Students will need access to a computer with an internet connection and web browser to obtain various course materials.

**Supplementary Material:** The instructor will make additional readings available to students as needed.

**Course web page:** [http://www.uta.edu/math/faculty/hristo/teaching/math5373F15.html](http://www.uta.edu/math/faculty/hristo/teaching/math5373F15.html)
Schedule of Lecture Topics: We will try to cover the following topics during the semester:

- Mathematical preliminaries
  - Sources of error in computational models
  - Machine representation of numbers
  - Stability of problems and numerical methods
  - Polynomial interpolation
  - Numerical differentiation and integration
  - Locating roots of equations [AI-7]
  - Iterative solutions of linear systems [AI-12]

- Numerical differential equations/systems
  - Euler's method and beyond [AI-1]
  - Multistep methods [AI-2]
  - Runge-Kutta methods [AI-3]
  - Stiff equations [AI-4]
  - Error control and adaptive algorithms [AI-6]
  - Finite difference schemes [AI-8]
  - Nonstandard finite difference (NSFD) methods

“As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. —Hristo V. Kojouharov.”

Grading Policy: Grades are based on two course projects (Project 1: 40%; Project 2: 60%). There is no extra credit and no make-ups.

Grading Scale: A = 90+; B = 80-89; C = 70-79; D = 60-69; F = 59-

Descriptions of major assignments and examinations with due dates:

- Project 1 (40%): A short report about one of the build-in functions in MATLAB: ODE Initial Value Problem Solvers. The report should address the kinds of differential equations problems that the MATLAB ODE solver is designed to solve, the numerical method(s) that it uses, and the advantages/disadvantages of the solver. In addition to a hardcopy submission, the report should be orally presented in class. A tentative scheduled day for the presentation of the project is Thursday, October 22, 2015.

- Project 2 (60%): A short report discussing the numerical solution and the interpretation of the results of a project. It should be about a real-world problem that is modeled by a differential equation or a system of differential equations. Ideally, the differential model will be related to the thesis/dissertation topic of the student (or will be a problem of a special research interest to the student). The project must be submitted at least one week before the last day of classes and orally presented in class during the last week of classes.

Attendance Policy: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I expect you to attend class regularly.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically
dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/aao/fao/).

Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including The Americans with Disabilities Act (ADA), The Americans with Disabilities Amendments Act (ADAAA), and Section 504 of the Rehabilitation Act. All instructors at UT Arlington are required by law to provide “reasonable accommodations” to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a letter certified by the Office for Students with Disabilities (OSD). Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

**The Office for Students with Disabilities, (OSD)**  www.uta.edu/disability or calling 817-272-3364.  
**Counseling and Psychological Services, (CAPS)**  www.uta.edu/caps/ or calling 817-272-3671.

Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

**Title IX:** The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos. For information regarding Title IX, visit www.uta.edu/titleIX.

**Academic Integrity:** Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

   I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

   I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System Regents’ Rule 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

**Electronic Communication:** UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

**Student Feedback Survey:** At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters
the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

**Final Review Week:** A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

**Emergency Exit Procedures:** Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located outside of the classroom. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.