MTH 5361 SYLLABUS (tentative)

↠ APPLIED MATHEMATICS II ↠

Spring 2019

↬ Section 01: MWF 12:20 PM–1:10 PM, SR 203

Instructor: Professor Qin "Tim" Sheng
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TEXTS:

- *A First Course in the Numerical Analysis of Differential Equations* by A. Iserles, Cambridge University Press, 2nd Edition (December 2008). **ISBN-10**: 0521734908; **ISBN-13**: 978-0521734905.
- *My Lecture Notes.*
- *Numerical Methods in Finance and Economics: A MATLAB-Based Introduction* by P. Brandimarte, Wiley-Interscience; 2nd edition, **ISBN-10**: 0471745030; **ISBN-13**: 978-0471745037.

COURSE DESCRIPTION: Applied mathematics presents different faces to the world. For mathematicians it is a bona fide mathematical theory with an applicable flavor. For scientists and engineers it is a practical, applicable tool, part of the standard repertoire of modeling and computational techniques. For computer scientists it is a theory on the interplay of computer architecture and algorithms for real-number calculations. The tension between these standpoints is the driving force of this class, which presents a rigorous account of the fundamentals of applied and numerical analysis of both ordinary and partial differential equations. Our exposition maintains a balance between theoretical, algorithmic and practical aspects. This exciting course will includes new ideas on emerging subject areas: exponential splitting, adaptations in finite difference methods and financial computations. Traditional topics covered in MTH 5361 includes numerical ODEs and numerical PDEs; and a variety of strategies for solving large, sparse algebraic systems. Matlab is the hands-on computer software package encouraged to use throughout this advanced course in applied and computational mathematics.

OUTLINE OF THE TOPICS:

1. Single and multi-step methods
2. Runge-Kutta methods
3. Stiffness and stability
4. Error estimates and control
5. Finite difference methods for elliptic PDEs
6. Spectral and finite element methods
7. Direct and indirect methods for large linear systems
8. Basic numerical methods for parabolic PDEs
9. ADI, LOD and splitting strategies

10. Basic numerical methods for hyperbolic PDEs
11. Numerical methods in finance and economics

CLASS ARRANGEMENT: We meet 3 times per week. Additional evening review sessions may be arranged if needed. Our classroom will be SR 203 which is digitalized with required software for all students.

HOMEWORK: As we go along section by section for the covered materials in the textbook, students are required to complete all suggested exercises in time. You are required to keep a notebook solely for this homework. If you have questions please see me either during my office hours or by making an appointment.

Homework will not be collected or graded directly.

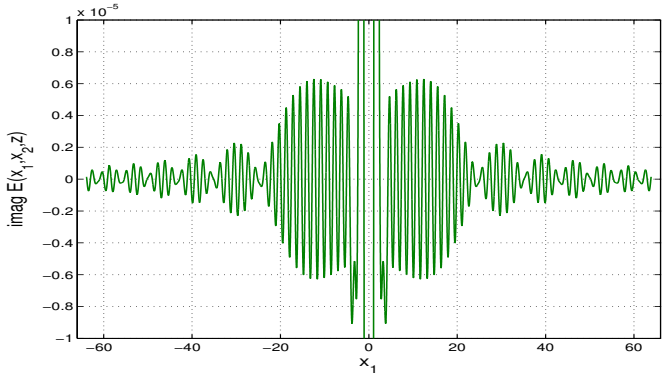
PROJECT ASSIGNMENTS, QUIZZES AND GRADING POLICIES: Two theoretical and computational assignments will be given. Quizzes will be given on Wednesdays and there will be one final exam.

The Method of Evaluation is:

- 2 assignments, each one counts 30% toward your final (no makeup tests without justified reasons);
- 1 final comprehensive exam, 40%

↪ **Grading Scale:** A 90-100%, B+ 85-89%, B 80-84%, C+ 75-79%, C 70-74%, D 60-69%, F below 60%

ACCESSING CLASS INFORMATION VIA INTERNET: The standard syllabus, and classroom notes/announcements and help links will be posed on *Canvas.*



An Oscillatory Wave

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Academic Success: We as faculty members have high academic expectations of you and believe every student who has been admitted to Baylor can be successful. I am a vigilant professor and will notice if you are struggling in my course. If your academic performance in this class is substandard, I will submit an Academic Progress Report to the Success Center during the sixth week of the

semester. I will work to help you get the help you need to learn more fully, and I can assist you in finding the resources you need beyond my course. Familiarize yourself with the culture of success we have at Baylor by stopping by the Paul L. Foster Success Center in Sid Richardson or by going to: http://www.baylor.edu/successcenter/. Even if you don't need help, you can get involved by tutoring other students in the future or by telling a hall mate how and where to get help.

Office Hours: One of the best ways to take full advantage of learning in my course is by coming to my office hours. I look forward to guiding you in your academic pursuits. Take advantage of the hours listed above or email me for an appointment.

Academic Integrity: Plagiarism or any form of cheating involves a breach of student-teacher trust. This means that any work submitted under your name is expected to be your own, neither composed by anyone else as a whole or in part, nor handed over to another person for complete or partial revision. Be sure to document all ideas that are not your own. Instances of plagiarism or any other act of academic dishonesty will be reported to the Honor Council and may result in failure of the course. Not understanding plagiarism is not an excuse. As a Baylor student, I expect you to be intimately familiar with the Honor Code at: http://www.baylor.edu/honorcode/

Students Needing Accommodations: Any student who needs academic accommodations related to a documented disability should inform me immediately at the beginning of the semester. You are required to obtain appropriate documentation and information regarding accommodations from the Office of Access and Learning Accommodation (OALA). Contact Information: (254) 710-3605 – Paul L. Foster Success Center, 1st floor on the East Wing of Sid Richardson.

Title IX Office – Title IX Coordinator, Kristan Tucker: Baylor University does not discriminate on the basis of sex or gender in any of its education or employment programs and activities, and it does not tolerate discrimination or harassment on the basis of sex or gender. If you or someone you know would like help related to an experience involving sexual or gender-based harassment, sexual assault, sexual exploitation, stalking, intimate partner violence, or retaliation for reporting one of these type of prohibited conduct, please contact the Title IX Office at (254)710-8454 or report online at http://www.baylor.edu/titleix.

The Title IX office understands the sensitive nature of these situations and can provide information about available on- and off-campus resources, such as counseling and psychological services, medical treatment, academic support, university housing, and other forms of assistance that may be available. Staff members at the office can also explain your rights and procedural options if you contact the Title IX Office. You will not be required to share your experience. If you or someone you know feels unsafe or may be in imminent danger, please call the Baylor Police Department (254-710-2222) or Waco Police Department (9-1-1) immediately. For more information on the Title IX Office, the Sexual and Gender-Based Harassment and Interpersonal Violence policy, reporting, and resources available, please visit the website provided above.

Military Student Advisory: Veterans and active duty military personnel are welcomed and encouraged to communicate, in advance if possible, any special circumstances (e.g., upcoming deployment, drill requirements, disability accommodations). You are also encouraged to visit the VETS Program Office with any questions at (254) 710-7264.
