

# MTH/CSI 4322 SYLLABUS

~ NUMERICAL ANALYSIS ~

Spring 2020

**INSTRUCTOR:** Professor Qin “Tim” Sheng

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**URL:** <http://www.baylor.edu/math/index.php?id=54019>

**OFFICE:** Sid Richardson Science Building 302.F

**OFFICE HOURS:** MWF: 11:00-12:00; W: 14:15-16:00

## TEXTS:

- *Numerical Analysis* (10th Ed.) by Richard L. Burden, J. Douglas Faires, Annette M. Burden

**COURSE DESCRIPTION:** This is a general numerical analysis course at the entrance level. Materials to be studied in the course include number representation and errors, numerical linear algebra, basic approximation theory and methods, linear and nonlinear systems, and numerical integration. Topics in the latest research will be introduced to broad views of the students. Students are expected to build their interests, solid foundation and to govern the basic concepts, theory and methods in numerical computations by the end of the course. They are expected to possess the ability in understanding practical problems in the correct ways and to develop new computational methods for solving various problems after this study. Computer programming skills are not required in the beginning of this course. My latest lecture notes will also be used.

## OUTLINE OF THE TENTATIVE TOPICS:

1. *Preliminaries:* error definitions and floating-point numbers, review of advanced calculus.
2. *Detailed number representations and errors:* different bases, floating-point arithmetic.
3. *Numerical solution of nonlinear equations:* bisection method, Newton’s method, secant method.
4. *Basic approximation skills and numerical differentiation:* polynomial interpolations, error and controls, Richardson extrapolation, recent trends and advances.
5. *Numerical integration:* definite integral, trapezoid rule, adaptive methods, Gaussian quadratures, recent trends and advances.
6. *Systems of linear equations:* direct and iterative methods, matrix eigenvalues, recent trends and advances.
7. *Basic numerical methods for solving ordinary differential equations.*
8. *Basic numerical methods for solving partial differential equations.*
9. *Basic concepts in machine learning and neural networks.*

**ATTENDANCE:** Excellent attendance is expected. You should be aware of the attendance policy as stated in the Baylor catalog. Should you miss a class for whatever reason, you are still responsible for the materials discussed and any assignments made. Also, please get to class on time and have your cell phone in silent mode during the class.

**EXAM AND GRADING POLICIES:** Multiple in-semester quizzes, one midterm exam and one final exam will be required.

**PROJECT ASSIGNMENTS AND FINAL REPORT:** Three project assignments will be a given and one final exam is required.

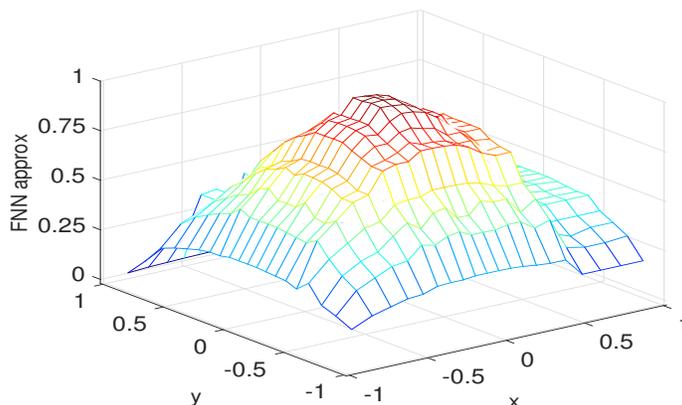
The Method of Evaluation (tentatively) is:

- multiple quizzes, 30%
- 1 midterm exam, 20%
- 1 computational project, 25%
- 1 final exam, 25%

**FINAL EXAM SCHEDULE:**

*Grading Scale:* 91-100 A; 89-90 A-; 87-88 B+; 81-86 B; 79-80 B-; 77-78 C+; 71-76 C; 69-70 C-; 67-68 D+; 61-66 D; 59-60 D-; Lower F.

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



A SURFACE APPROXIMATION VIA FEEDFORWARD NEURAL NETWORK

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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.