Math 445 Schedule, Fall 2022

General features:

- The official book is *"Advanced Engineering Mathematics"* by E. Kreyszig, (Wiley, a special custom USC edition, but any edition will work). The book "Mathematics of Physics and Engineering" by Edward K. Blum and Sergey V. Lototsky, World Scientific, 2006, can also work.
- 11 homeworks (usually due on Tuesdays) 15% total.
- 10 quizzes (usually on Thursdays): 15% total.
- Two computer projects (due Friday, October 25 and Friday, December 6): 5% each.
- 2 midterms (Wednesday, October 9 and Wednesday, November 20): 15% each.
- 1 comprehensive final exam (Wednesday, December 18): 30%.

Exams and quizzes are your individual effort; with homeworks and computer projects you are welcome to use any help whatsoever. All exams and quizzes are closed book, no calculators.

August 26. Vectors.
August 27. Vectors.
August 28. Curves and Kepler's Laws.
August 29. Vectors and curves.
August 30. Applications to mechanics: tumbling box.

`September 2.` *Labor Day, no class.*
September 3. Integration and differentiation of functions of several variables. HW1 is due.
September 4. Integration and differentiation of functions of several variables.
September 5. Integration and differentiation of functions of several variables. QUIZ 1.
September 6. Examples.

September 9. The three theorems.
September 10. Examples. HW2 is due.
September 11. Applications to physics: continuity, transport, Maxwell's equations and more.
September 12. Examples. QUIZ 2.
September 13. Algebra of complex numbers. **Last chance to drop without a "W" and with refund.**

September 16. Functions of a complex variable: Cauchy-Riemann equations.
September 17. Complex numbers. HW3 is due.
September 18. Functions of a complex variable: two theorems of Cauchy and more.
September 19. Functions of a complex variable. QUIZ 3.
September 20. Conformal mappings.

September 23. Series of complex numbers.
September 24. Functions of a complex variable. HW4 is due.
September 25. Taylor and Laurent expansions.
September 26. Series of complex numbers. QUIZ 4.
September 27. Series solution of ordinary differential equations: regular case.

September 30. Series solution of ODEs: Fuchs-Frobenius theory, Bessel functions.
October 1. Series of complex numbers. HW5 is due.
October 2. Residue integration: theory.
October 3. Residue integration. QUIZ 5 .
October 4. Residue integration: examples.

October 7. Midterm review.
October 8. Midterm review. HW6 is due.
October 9. Midterm Exam 1. Covers what we did so far.
`October 10,11.` *Fall break, no classes.*
October 11. **Last chance to drop without a 'W', BUT WITH NO refund.**

October 14. Different ways a series of functions can converge.
October 15. Different ways a series of functions can converge.
October 16. Fourier series.
October 17. Fourier series. HW7 is due.
October 18. Computing the Fourier series.

October 21. Fourier transform.
October 22. Fourier transform.
October 23. Computing the Fourier transform.
October 24. Computing the Fourier transform. QUIZ 6.
October 25. Applications to signal processing. Computer project 1 is due.

October 28. Classification of PDEs.
October 29. Classification of PDEs. HW8 is due.
October 30. The transport, heat, and wave equations on the line.
October 31. The transport, heat, and wave equations on the line. QUIZ 7.
November 1. The heat equation on the interval.

November 4. Separation of variables and variation of parameters.
November 5. The heat equation on the interval. HW9 is due.
November 6. Wave equation on the interval and in higher dimensions.
November 7. Examples. QUIZ 8.
November 8. Laplace's and Poisson's equations.

`November 11.` *Veterans Day, no class.*
November 12. Numerical methods. HW10 is due.
November 13. Numerical methods.
November 14. Midterm review. QUIZ 9.
November 15. Telegraph equation and the transatlantic cable.
Last chance to drop with a "W".

November 18. Midterm review.
November 19. Midterm review. HW11 is due.
November 20. Midterm Exam 2. Covers what we did after Midterm Exam 1.
November 21. Discussion of the exam and computer project 2. QUIZ 10 (based on the exam).
November 22. Discussion of the exam and computer project 2.

November 21. Some fun topics.
November 22. Some fun topics.
`November 27, 28, 29.` *Thanksgiving break, no classes.*

December 2. The Weierstrass approximation theorem.
December 3. Final review.
December 4. Schrodinger's equation: quantum harmonic oscillator and the hydrogen atom.
December 5. Final review.
December 6. Final review. Computer project 2 is due.

Wednesday, December 18. Final Exam, 11am–1 pm.
Covers everything we studied. Contributes 30% to the final grade.