Math 319 Syllabus, Spring 2020
Techniques in Ordinary Differential Equations, Lecture 1

Course Information
Techniques in Ordinary Differential Equations: Math 319, Lecture 1 (3 Credits)  Spring 2020
Location and Schedule  B239 Van Vleck Hall  MWF 12:05pm-12:55pm
Instructor: Dr. Sharad Chandarana (chandara@wisc.edu), B127 Van Vleck Hall
Office hours: Wednesday 10:45am-11:35am in B325 Van Vleck Hall
Tuesday, Thursday  9:30am-10:20am in B341 Van Vleck Hall
by Boyce & DiPrima, Wiley

Class Website: https://canvas.wisc.edu/courses/183719

Description
First and second order linear differential equations and their applications, solutions using the Laplace transform, systems of first order linear equations, boundary value problems, Fourier series (and their applications, time permitting)

Prerequisite(s)  MATH 222 or 276 or graduate/professional standing

Course Designations
Level Advanced, L&S Credit - Counts as Liberal Arts and Science credit in L&S
Instruction Mode Classroom Instruction

Department MATHEMATICS
College Letters and Science

How the Credit Hours are Met
This class meets four days of the week (50 minutes on Mondays, Wednesdays and Fridays for lectures, and 50 minutes on Tuesdays or Thursdays for discussions) over the Spring semester (1-21-2020 through 5-1-2020) and carries the expectation that students will work on course learning activities (reading, writing, problem sets, studying, etc) for about 2-3 hours outside of classroom for every class hour.

Teaching Assistants and their Office hours
Yida Ding, 318 Van Vleck Hall (yding54@wisc.edu)
Tu, Th 12:00pm-1:00pm
Dionel Jamie, 416 Van Vleck Hall (djaime@wisc.edu)
Tu, Th 4:00pm-5:00pm

GRADING

Exam Dates
Exam 1: Monday, February 24, in class
Exam 2: Monday, April 13, in class
Final Exam: Sunday, May 3, 2:45pm to 4:45pm

Grading
Exam 1: 25%; Exam 2: 25%; Final Exam: 35%; Homework: 15%;
Course Learning Outcomes

We expect that a student can do all of these after taking this course:

1. **First Order Differential Equations**
   - Solve the following: first order linear differential equations using integrating factors; separable equations; homogeneous equations.
   - Applications of first order linear differential equations.
   - Know the difference between linear and nonlinear equations; solve Bernoulli equations, exact equations.

2. **Second Order Differential Equations**
   - Solve second order homogeneous equations with constant coefficients; use the Wronskian, the principle of superposition of solutions, and Abel’s theorem to solve second order homogeneous equations.
   - Solve equations whose characteristic equations have complex and repeated roots; solve equations by method of reduction of order.
   - Solve second order nonhomogeneous equations using the method of undetermined coefficients and variation of parameters and apply them to study problems of mechanical vibrations.

3. **Laplace Transform**
   - Compute the Laplace transform and the inverse Laplace transform of various functions; solve second order initial value problems using the Laplace transform; solve systems of equations using the Laplace transform; solve differential equations with discontinuous forcing functions and forcing functions containing impulse functions; solve equations using the convolution integral.

4. **Systems of First Order Linear Equations**
   - Solve systems of two first order linear equations by transforming them into a single equation of second order; find eigenvalues and eigenvectors of matrices; solve systems of first order linear equations using eigenvalues and eigenvectors where the eigenvalues may be real, complex or repeated.

5. **Boundary Value Problems**
   - Solve homogeneous and nonhomogeneous boundary value problems; solve eigenvalue problems.

6. **Fourier Series**
   - Find Fourier series of various functions; solve problems of heat conduction in a bar using Fourier series (time permitting).

ACADEMIC POLICIES

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison’s community of scholars in which everyone’s academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to https://conduct.students.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: “The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071)
require that students with disabilities be reasonably accommodated in instruction and campus life. Reason-
able accommodations for students with disabilities is a shared faculty and student responsibility. Students
are expected to inform faculty [me] of their need for instructional accommodations by the end of the third
week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty
[I], will work either directly with the student [you] or in coordination with the McBurney Center to iden-
tify and provide reasonable instructional accommodations. Disability information, including instructional
accommodations as part of a student’s educational record, is confidential and protected under FERPA.”
http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php

DIVERSITY & INCLUSION

Institutional statement on diversity: “Diversity is a source of strength, creativity, and innovation for UW-
Madison. We value the contributions of each person and respect the profound ways their identity, culture,
background, experience, status, abilities, and opinion enrich the university community. We commit ourselves
to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive com-
munity for people from every background – people who as students, faculty, and staff serve Wisconsin and
the world.” https://diversity.wisc.edu/