

AME 526: ENGINEERING ANALYTICAL METHODS
 TEXTBOOK: *Fourier Analysis, Eigenfunction Expansions and Differential Equations* – by SS Sadhal
 Publisher: Mathematics Education for Engineering (ISBN: 978-0-9913683-0-3).

Instructor: S.S. Sadhal, Olin Hall 400 G; (213) 740-0492; sadhal@usc.edu
 Lecture Time: Mondays & Wednesdays, 2:00-3:50 pm.
 Office Hours: MW 11:00 am-12:00 pm; 1:00-1:45 pm
 Lecture Room: RTH 217

Course Outline – Spring 2023

DATE	LECTURE NO.	TOPICS
January 9, 11	1, 2	Review of Ordinary Differential Equations. Solution of homogeneous equations with constant coefficients. Solution of nonhomogeneous equations by the method of undetermined coefficients.
January 18, 23, 25	3, 4, 5	Homogeneous and non-homogeneous Euler equation. The method of variation of parameters for general second order equations. Problems with variable coefficients. The method of Frobenius. Legendre's equation and Bessel's equation.
January 30, February 1, 6	6, 7, 8	Introduction to Fourier series. Representation of piecewise continuous functions as sine and/or cosine series. Double and multiple Fourier series. Fourier integrals and Fourier transforms
February 8, 13	9, 10	Introduction to Partial Differential Equations. Classification of Partial Differential Equations -- parabolic, elliptic and hyperbolic equations. Boundary conditions.
February 15, 22	11, 12	Wave equation, D'Alembert's solution. The method of characteristics.
February 27,	13, 14	The method of separation of variables. The diffusion equation. Application of Fourier series to partial differential equations.
March 1		<i>Mid-term Examination</i>
March 6, 8	15, 16	Sturm-Liouville theory. Orthogonal eigenfunctions. Classification of boundary conditions for orthogonality.
March 13-19		<i>Spring Break</i>
March 20, 22,	17, 18	Partial Differential Equations in cylindrical coordinates. Bessel functions. Fourier-Bessel series. Steady-state and time-dependent problems involving cylinders.
March 27, 29	19, 20	Problems in spherical geometry. Legendre polynomials. Fourier-Legendre series. Spherical Bessel functions for time-dependent problems.
April 3, 5	21, 22	Integral transform techniques: Fourier and Hankel transforms.
April 10, 12,	23, 24	Method of Laplace Transform for time-dependent PDEs
April 17, 19,	25, 26	Non-homogeneous Partial Differential Equations. Problems in elasticity, heat conduction, electrostatics and fluid mechanics. Further application of the method of eigenfunction expansions. Solution to Poisson's equation in rectangular, cylindrical and spherical geometry.
April 24, 26	27, 28	Green's functions for partial differential equations.
May 8, 2023		<i>Final Examination: 2:00-4:00 pm</i>

Grading Scheme: Mid-Term Examination35%
 Homework 15%
 Final Examination 50%
 TOTAL 100%

- **Final grade will depend entirely on the performance on the above components, and be independent of the financial support requirements (e.g., minimum grade requirement for tuition reimbursement).**
- **Please schedule your work-related travel during time periods outside of the mid-term and final exams. Accommodation to take exams on different dates will be made for only family emergencies and documented illness or health-related emergencies. Other exceptions will be considered on a case-by-case basis.**

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call

studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call

suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call

studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298

equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298

usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776

dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost’s Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.