AME 526: ENGINEERING ANALYTICAL METHODS

TEXTBOOK (NOT REQUIRED**; CLASS NOTES WILL BE ADEQUATE**): *Advanced Engineering Mathematics* by Peter O'Neil, CENGAGE Learning

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Lecture Time: Mondays & Wednesdays, 5:00-6:15 pm.

Lecture Room: Olin Hall 132

Course Outline – Spring 2016

DATE	LECTURE NO.	TOPICS
January 11, 13	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 20, 25, 27	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.
February 1, 3, 8	6, 7, 8	Introduction to Fourier series. Representation of piecewise continuous functions as sine and/or cosine series. Double and multiple Fourier series.
February 10, 17	9, 10	Fourier integrals and Fourier transforms
February 22, 24	11, 12	Introduction to Partial Differential Equations. Classification of Partial Differential Equations -- parabolic, elliptic and hyperbolic equations. Boundary conditions.
February 29, March 2	13, 14	Wave equation, D'Alembert's solution. The method of characteristics.
March 7	-	*Mid-term Examination*
March 9	15	The method of separation of variables. The diffusion equation.
March 14-18		*Spring Break*
March 21, 23	16, 17	Application of Fourier series to partial differential equations.
March 28, 30	18, 19	Sturm-Liouville theory. Orthogonal eigenfunctions. Classification of boundary conditions for orthogonality.
April 4, 6	20, 21	Partial Differential Equations in cylindrical coordinates. Bessel functions. Fourier-Bessel series. Steady-state and time-dependent problems involving cylinders.
April 11, 13	22, 23	Problems in spherical geometry. Legendre polynomials. Fourier-Legendre series. Spherical Bessel functions for time-dependent problems.
April 18, 20, 25	24, 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 27,	27	Green's functions for partial differential equations.
May 4, 2015	4:30-6:30 pm	*Final Examination*

Grading Scheme: Mid-Term Examination ……35%
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.***