

AME 526: ENGINEERING ANALYTICAL METHODS  
REFERENCE BOOK (NOT REQUIRED; **CLASS NOTES WILL BE ADEQUATE**): *Advanced Engineering Mathematics*  
by Peter O'Neil, CENGAGE Learning  
ISBN: 978-1111427412

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Lecture Time: Mondays & Wednesdays, 2:00-3:20 pm.  
Lecture Room: Olin Hall 132

Course Outline – Fall 2016

DATE	LECTURE NO.	TOPICS
August 22, 24	1, 2	Review of Ordinary Differential Equations. Solution of homogeneous equations with constant coefficients. Solution of nonhomogeneous equations by the method of undetermined coefficients.
August 29, 31 September, 7	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.
September 12, 14, 19	6, 7, 8	Introduction to Fourier series. Representation of piecewise continuous functions as sine and/or cosine series. Double and multiple Fourier series.
September 21, 26	9, 10	Fourier integrals and Fourier transforms
September 28, October 3	11, 12	Introduction to Partial Differential Equations. Classification of Partial Differential Equations -- parabolic, elliptic and hyperbolic equations. Boundary conditions.
October 5	13	Wave equation, D'Alembert's solution. The method of characteristics.
October 10	-	<i>Mid-term Examination</i>
October 12, 17, 19, 24	14, 15, 16, 17	The method of separation of variables. The diffusion equation. Application of Fourier series to partial differential equations.
October 26, 31	18, 19	Sturm-Liouville theory. Orthogonal eigenfunctions. Classification of boundary conditions for orthogonality.
November 2, 7	20, 21	Partial Differential Equations in cylindrical coordinates. Bessel functions. Fourier-Bessel series. Steady-state and time-dependent problems involving cylinders.
November 9, 14	22, 23	Problems in spherical geometry. Legendre polynomials. Fourier-Legendre series. Spherical Bessel functions for time-dependent problems.
November 16, 21, 28	24, 25, 26,	Non-homogeneous Partial Differential Equations. Problems in elasticity, heat conduction, electrostatics and fluid mechanics. The method of eigenfunction expansions. Solution to Poisson's equation in rectangular, cylindrical and spherical geometry.
November 30	27	Green's functions for partial differential equations.
December 9	—	<i>Final Examination, 2:00-4:00pm</i>

**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.***