

**Course Outline for Mathematics 257/316 (3 credits) Term 1, Sept.-Dec., 2012**  
**Partial Differential Equations**

<b><u>Prerequisites:</u></b>	One of Math 215, 255, 265.
<b><u>Credit:</u></b>	3 Credits. Credit only given for one of Math 256, 257, 316.
<b><u>Instructor:</u></b>	Anthony Peirce, <b><u>Office:</u></b> Mathematics Building 108
<b><u>Home Page:</u></b>	<a href="http://www.math.ubc.ca/~peirce">http://www.math.ubc.ca/~peirce</a>
<b><u>Office Hours:</u></b>	Monday: 5-6 pm, Wed: 5-6, Fri: 3 pm-3:55 pm.
<b><u>Assessment:</u></b>	The final grades will be based on homework (15%) (including EXCEL/MATLAB projects), two in class midterm exams (35%) and one final exam (50%). <b>Assignments are to be submitted in hard-copy from at the designated class – no late assignments can be accepted. There will be no make-up midterms.</b>
<b><u>Test Dates:</u></b>	Monday, October 22 <sup>nd</sup> , Friday, November 16 <sup>th</sup> .
<b><u>Text:</u></b>	Elementary Differential Equations and Boundary Value Problems
(recommended reading).	(9 <sup>th</sup> Ed), W.E. Boyce and R.C. DiPrima (John Wiley & Sons) 2006

<b><u>Other References:</u></b>	1. Partial Differential Equations with Fourier Series and Boundary Value Problems (2 <sup>nd</sup> Ed), by N.H. Asmar, (Pearson), 2004.
	2. Applied Partial Differential Equations with Fourier Series and Boundary Value Problems (4 <sup>th</sup> Ed), R. Haberman, (Pearson), 2004.
	3. <a href="http://www.math.ubc.ca/~rfroese/notes/Lecs316.pdf">http://www.math.ubc.ca/~rfroese/notes/Lecs316.pdf</a> , Richard Froese, Partial Differential Equations, UBC M257/316 lecture notes free on the web.

<b><u>Topics:</u></b>	<b>Approx Time</b>
<b>1. Review of techniques to solve ODEs</b>	1 hr
<b>2. Series Solutions of variable coefficient ODEs (Chapter 5)</b>	
a. Series solutions at ordinary points (5.1-5.3)	3 hrs
b. Regular singular points (5.4-5.7, 5.8 briefly)	4 hrs
<b>3. Introduction to Partial differential equations (Chapter 10)</b>	
The heat equation (10.5), the wave equation (10.7), Laplace's equation (10.8)	2 hrs
<b>4. Introduction computation using spread sheets</b>	1 hr
<b>5. Fourier Series and Separation of Variables (Chapter 10)</b>	
a. The heat equation and Fourier Series (10.1-10.6)	11 hrs
b. The wave equation (10.7)	3 hrs
c. Laplace's equation (10.8)	5 hrs
<b>6. Boundary Value Problems and Sturm-Liouville Theory (Chapter 11)</b>	
a. Eigenfunctions and eigenvalues (11.1)	1 hr
b. Sturm-Liouville boundary value problems (11.2)	1 hr
c. Nonhomogeneous boundary value problems (11.3)	2 hrs
Tests	<u>2 hrs</u>
	36 hrs