

Math 257/316: May 2017

<ul style="list-style-type: none">▪ Instructor: Professor Ian A. Frigaard MATX room 1103 frigaard@math.ubc.ca	<ul style="list-style-type: none">▪ Office hours: Tuesday & Thursdays at 2pm in MATX 1103 (some days I will not be available)
--	--

Web page for downloads etc: <http://blogs.ubc.ca/frigaard/teaching257and316/>

Regular schedule: Mon, Wed, 10.30-12.30 in LSK 201; Tu, Th, 12.30-14.00 in LSK 201

Text:

- This is an introductory course and the material can be found for free in many places online and/or in many textbooks that you may have used for Math 215/255 (e.g. Boyce & di Prima). **We will mostly follow the sequence** in chapters 4, 5 & 7 of “Diffy Qs: Differential Equations for Engineer” which may be downloaded for free at: <http://www.jirka.org/diffyqs/>
- Some additional aspects will be drawn from the lecture notes of Professor Peirce, which may be found here: http://www.math.ubc.ca/~peirce/math257_316_2015F.htm
This url also has excellent resources for the course and for exam preparation, going back many years.

Grading:

5 x in-class quizzes of 40 minutes on each topic (total 50%);

1 x final exam of 2.5 hours covering the entire course (50%).

- Quiz 1: Tuesday 23rd May: Fourier series
- Quiz 2: Tuesday 30th May: (Heat equation)
- Quiz 3: Tuesday 6th June: (Wave equation)
- Quiz 4: Tuesday 13th June: (Laplace’s equation)
- Quiz 5: Tuesday 20th June: (Sturm-Liouville BVPs)

Assignments: I will post assignments and solutions that you can treat as practice problems. The Summer semester is short and not easy to turnaround graded assignments on this timeframe.

Office hours: I usually do not respond to e-mail enquiries as I simply have insufficient time to do so. Please come either in office hours or see me directly after a lecture.

Schedule of lectures: all in LSK 201

15/5/17: (2hrs)	Introduction, review of DE's for IVP's and other pre-requisite math. Elementary boundary value problems
16/5/17: (1.5hrs)	Orthogonality, periodic functions. Fourier series and examples
17/5/17: (2hrs)	Convergence, Gibb's phenomenon. Odd and even functions. Sine and cosine series.
18/5/17: (1.5hrs)	Other symmetries & forms of series Application of Fourier series to simple BVPs
22/5/17:	Victoria day: university closed
23/5/17: (1.5hrs)	Application of Fourier series to IVPs Quiz 1: (on Fourier series: 40 minutes)
24/5/17: (2hrs)	Introduction to PDE's: 1 st order wave equation and conservation laws. 1D heat and diffusion equations. Separation of variables for linear equations
25/5/17: (1.5hrs)	Solving the 1D heat equation, with Dirichlet and Neumann conditions; examples
29/5/17: (2hrs)	1D heat equation: other choices of boundary conditions. Inhomogeneity, steady states.
30/5/17: (1.5hrs)	Further examples. Quiz 2: (on 1D heat equation: 40 minutes)
31/5/17: (2hrs)	Finite differences for the Heat Equation
1/6/17: (1.5hrs)	1D wave equation and d'Alembert's solution
5/6/17: (2hrs)	1D wave equation: separation of variables
6/6/17: (1.5hrs)	Finite differences for the Wave Equation Quiz 3: (on 1D wave equation: 40 minutes)
7/6/17: (2hrs)	Laplace's equation: separation of variables 1
8/6/17: (1.5hrs)	Laplace's equation: separation of variables 1
12/6/17: (2hrs)	Poisson kernel. Finite difference methods overview
13/6/17: (1.5hrs)	Quiz 4: (on Laplace's equation: 40 minutes) Sturm-Liouville BVP's: introduction
14/6/17: (2hrs)	Orthogonality & eigenfunction expansions revisited. Application examples.
15/6/17: (1.5hrs)	Examples of BVP's and further examples
19/6/17: (2hrs)	Regular power series solutions: introduction and convergence, examples
20/6/17: (1.5hrs)	Regular power series solutions: examples Quiz 5: (on Sturm-Liouville: 40 minutes)
21/6/17: (2hrs)	Method of Frobenius & examples
22/6/17: (1.5hrs)	Course review session