

## Preliminary Schedule of Classes

### [MATH 720 – Fall 2007]

Date	Section	Subject	Homework
Aug. 24	1.3	Principles of modelling	p. 12 / 1, p.13 / 2
Aug. 27	1.3, 1.4	Conservation laws	p.13 / 3, 4
Aug. 29	2.2	Units and dimensions	p.21/1, p.25/10, p.26/12
Aug. 31	2.3	Electric fields and electrostatics	p.21/2, p.22/4, p.23/5
Sep. 5	3.1	Nondimensionalisation	p.42 / 1, p.43 / 2
Sep. 7	3.2	Navier–Stokes equations and Reynolds numbers	Subsection 3.1.3 (p. 34)
Sep. 10	3.3	Buckingham’s Pi-theorem	
Sep. 12	Case Studies	hair modelling and cable laying	
Sep. 14	Case Studies	the thermistor electrostatic painting	
Sep. 17	7.1-7.2	First-order quasilinear PDE	p.97/1, p.98/3, p.99/4
Sep. 19	7.3	Shocks	p. 100 / 5-6, p.101 / 7
Sep. 21	7.4	Chapitt’s method	p.102 / 8, 10
Sep. 24	7.5	Second-order linear equations in two variables	p.102 / 11 or 12
Sep. 26	Case Studies	traffic modelling	
Sep. 28	9.1-9.3	The delta and Heaviside functions	p.134 / 1-2
Oct. 1	9.4-9.5	Balancing singularities	
Oct. 3	9.6	Green’s functions	
Oct. 5	10.1-10.5	Theory of distributions	
Oct. 8	10.6	Extensions of the theory of distributions	
Oct. 10	Case Studies	the pantograph	
Oct. 15	12.1-12.2	Asymptotic expansions	
Oct. 17	12.3	Convergence and divergence	
Oct. 19	<b>EXAM</b>	<b>Midterm Exam</b>	
Oct. 22	13.1-13.2	Regular perturbation expansions	
Oct. 24	13.3-13.4	Linear stability	
Oct. 26	13.5-13.6	Small perturbations of a boundary	
Oct. 29	Case Studies	electrostatic painting	
Oct. 31	Case Studies	piano tuning	
Nov. 2	16.1-16.2	Functions with boundary layers	
Nov. 5	16.3-16.4	Boundary layers: examples from ODEs	
Nov. 7	16.5	Boundary layers: examples from PDEs	
Nov. 9	Case Studies	the thermistor	
Nov. 12	18	Lubrication theory’ analysis in long thin domains	
Nov. 14	18	Heat flows and advection–diffusion in a long thin domain	
Nov. 16	Case Studies	continuous casting of steel	
Nov. 19	20	Thin fluid layers: classical lubrication theory	
Nov. 26	20	Thin fluid sheets	
Nov. 28	Case Studies	turning of eggs during incubation	
Nov. 30	21	Multiple scales	
Dec. 3	23	Ray theory and the WKB method	
Dec. 5	Case Studies	<b>Presentations</b>	
Dec. 7	Case Studies	<b>Presentations</b>	

*Although the instructor will try to keep relatively close to this schedule, there could be changes both in the subject of the class and in the time it is presented. Check the web-page for the current version. The homework assignments will be added as the course progresses.*