

Contents

	<i>Units</i>
Introduction	
1 Numerical Methods	
1.1 Fourier Transforms of Bessel Functions	6
1.6 Multigrid Methods	10
2 Waves	
2.2 Dispersion	7
2.11 Fisher's Equation for Population Dispersal Problems	9
3 Fluid and Solid Mechanics	
3.9 Viscous Flow in a Collapsible Channel	8
3.10 Smoke Rings	8
4 Dynamics	
4.5 Euler's Equations	8
5 Quantum Mechanics	
5.2 S-Wave Scattering	7
5.4 Monte Carlo Simulations in Particle Physics	8
6 Electromagnetism	
7 Mathematical Methods	
7.3 Minimisation Methods	8
7.4 Airy Functions and Stokes' Phenomenon	9
9 Dynamic Programming	
9.2 The Value Iteration Algorithm for a Stochastic Dynamic Programming Problem	10
9.4 Option Pricing in Mathematical Finance	8
10 Statistics	
10.7 Bayesian Regression using a Simulated Sample	7
10.10 Moving Blocks Bootstrap	5
11 Statistical Physics	
11.1 The Van der Waals Equation	7

12	Nonlinear Dynamics & Dynamical Systems	
12.3	The Lorenz Equations	10
12.6	Chaos and Shadowing	10
14	General Relativity	
14.5	Cosmological Distances	8
14.7	Gravitational Radiation from Point Masses in a Keplerian Orbit	8
15	Number Theory	
15.5	Reduction of Binary Quadratic Forms	10
15.6	Computing Roots Modulo p	8
16	Algebra	
16.5	Permutation Groups	7
16.9	Resultants and Resolvants	8
17	Combinatorics	
17.1	Graph Colouring	7
17.3	Hamiltonian Cycles	5
19	Communication Theory	
19.1	Random Codes	5
20	Probability	
20.5	Percolation and the Invasion Process	9
20.6	Loss Networks	9
23	Astrophysics	
23.5	Ionization of the Interstellar Gas near a Star	8
23.6	Accretion Discs	8

You may choose freely from the projects above, independently of whether you are studying the examinable courses with which your chosen projects are connected. For up-to-date information on the maximum credit for the Computational Projects in Part II and the total number of units required to achieve that maximum, please consult the Undergraduate Schedules. For more information on how credit is awarded, please see section 2.1.1 of the Introduction.