CONTENTS

Preface viii
Acknowledgements x
List of Figures and Tables xi

Part I: Computer Science

1 The Elements of Computer Science 3

2 Software 7
2.1 Programming 7
2.2 Comparative Programming Languages 14
2.3 Compilers and Syntax-Directed Tools 23
2.4 Computer Vision and Image Processing 26
2.5 Programming Fundamentals 30
2.6 Software Engineering 32

3 Hardware 36
3.1 Computer Architecture 36
3.2 Computer Hardware Engineering 41

4 Communication and Interaction 45
4.1 Computer Communications 45
4.2 Computer Networks 46
4.3 Concurrency and Parallelism 49
4.4 Information Retrieval 51
4.5 Distributed Computer Systems 53
4.6 Document Processing 57
4.7 Graphics and Sound 60
4.8 Operating Systems 65
4.9 Middleware 67
4.10 Natural Language Computing 69

4.11 Multimedia 72
4.12 Human-Computer Interaction (HCI) 73

5 Practice 77
5.1 E-commerce 77
5.2 Professionalism 79
5.3 Simulation and Modelling 82
5.4 Developing Technologies 85
5.5 Web-based Computing 90

6 Theory 95
6.1 Artificial Intelligence 95
6.2 Intelligent Information Systems Technologies 98
6.3 Data Structures and Algorithms 100
6.4 Theoretical Computing 102

7 Systems 110
7.1 Computer-Based Systems 110
7.2 Databases 112
7.3 Systems Analysis and Design 117
7.4 Information Systems 119
7.5 Security and Privacy 120

Part II: Thinking of a Computer Science Degree

8 Preparation 125
8.1 Computer Science, Studies, IT . . . ? 125
8.2 Employment Prospects 131
8.3 Choosing your 'A' levels or Highers 132
8.4 Choosing your University 133
8.5 Choosing your Department 137

9 Applying to University 143
9.1 The Admissions Process 145
9.2 Gap Year 149
9.3 The UCAS Personal Statement 150
9.4 Reference 153

9.5 Are Girls Allowed? 153
9.6 I have a Disability 155

Part III: Study Skills

10 Eat Well, Work Hard and Get to Bed Early 161

11 Teaching and Learning Methods 164
11.1 Lectures 164
11.2 Labs 165
11.3 Exercises 166
11.4 Novel Teaching 166
11.5 Revision 167
11.6 Projects 167
11.7 Group Work 173

12 Assessment 174
12.1 Marks and Standards 174
12.2 Exams 176
12.3 *Viva voce* Examinations 180
12.4 Coursework 181

Glossary 184
References 188
Index 192