CONTENTS

	Preface		ii
Part 1	Introduct	tion to Software Engineering	1
Chapter 1	Introduction	on	3
	1.1 Professi	onal software development	5
	1.2 Softwar	e engineering ethics	14
	1.3 Case stu	udies	17
Chapter 2	Software _l	processes	27
	2.1 Softwar	e process models	29
	2.2 Process	activities	36
	2.3 Coping	with change	43
	2.4 The rati	onal unified process	50
Chapter 3	Chapter 3 Agile software development		56
	3.1 Agile m	ethods	58
	3.2 Plan-dri	ven and agile development	62

	3.3	Extreme programming	64
	3.4	Agile project management	72
	3.5	Scaling agile methods	74
Chapter 4	Re	quirements engineering	82
	4.1	Functional and non-functional requirements	84
	4.2	The software requirements document	9
	4.3	Requirements specification	94
	4.4	Requirements engineering processes	99
	4.5	Requirements elicitation and analysis	100
	4.6	Requirements validation	110
	4.7	Requirements management	111
Chapter 5 System modeling		118	
	5.1	Context models	12
	5.2	Interaction models	124
	5.3	Structural models	129
	5.4	Behavioral models	133
	5.5	Model-driven engineering	138
Chapter 6	Arc	chitectural design	147
	6.1	Architectural design decisions	151
	6.2	Architectural views	153
	6.3	Architectural patterns	155
	6.4	Application architectures	164
Chapter 7	De	sign and implementation	176
	7.1	Object-oriented design using the UML	178
	7.2	Design patterns	189

		Contents x
	7.3 Implementation issues	193
	7.4 Open source development	198
Chapter 8	Software testing	205
	8.1 Development testing	210
	8.2 Test-driven development	221
	8.3 Release testing	224
	8.4 User testing	228
Chapter 9	Software evolution	234
	9.1 Evolution processes	237
	9.2 Program evolution dynamics	240
	9.3 Software maintenance	242
	9.4 Legacy system management	252
Part 2	Dependability and Security	261
Chapter 10	Sociotechnical systems	263
	10.1 Complex systems	266
	10.2 Systems engineering	273
	10.3 System procurement	275
	10.4 System development	278
	10.5 System operation	281
Chapter 11	Dependability and security	289
	11.1 Dependability properties	291
	11.2 Availability and reliability	295
	11.3 Safety	299
	11.4 Security	302

Chapter 12	Dependability and security specification	309
	12.1 Risk-driven requirements specification	311
	12.2 Safety specification	313
	12.3 Reliability specification	320
	12.4 Security specification	329
	12.5 Formal specification	333
Chapter 13	Dependability engineering	341
	13.1 Redundancy and diversity	343
	13.2 Dependable processes	345
	13.3 Dependable system architectures	348
	13.4 Dependable programming	355
Chapter 14	Security engineering	366
	14.1 Security risk management	369
	14.2 Design for security	375
	14.3 System survivability	386
Chapter 15	Dependability and security assurance	393
	15.1 Static analysis	395
	15.2 Reliability testing	401
	15.3 Security testing	404
	15.4 Process assurance	406
	15.5 Safety and dependability cases	410
Part 3	Advanced Software Engineering	423
Chapter 16	Software reuse	425
	16.1 The reuse landscape	428

431

16.2 Application frameworks

		Contents xii i
	16.3 Software product lines	434
	16.4 COTS product reuse	440
Chapter 17	Component-based software engineering	452
	17.1 Components and component models	455
	17.2 CBSE processes	461
	17.3 Component composition	468
Chapter 18	Distributed software engineering	479
	18.1 Distributed systems issues	481
	18.2 Client–server computing	488
	18.3 Architectural patterns for distributed systems	490
	18.4 Software as a service	501
Chapter 19	Service-oriented architecture	508
	19.1 Services as reusable components	514
	19.2 Service engineering	518
	19.3 Software development with services	527
Chapter 20	Embedded software	537
	20.1 Embedded systems design	540
	20.2 Architectural patterns	547
	20.3 Timing analysis	554
	20.4 Real-time operating systems	558
Chapter 21	Aspect-oriented software engineering	565
	21.1 The separation of concerns	567
	21.2 Aspects, join points and pointcuts	571
	21.3 Software engineering with aspects	576

Part 4	Software Management	591
Chapter 22	Project management	593
	22.1 Risk management	595
	22.2 Managing people	602
	22.3 Teamwork	607
Chapter 23	Project planning	618
	23.1 Software pricing	621
	23.2 Plan-driven development	623
	23.3 Project scheduling	626
	23.4 Agile planning	631
	23.5 Estimation techniques	633
Chapter 24	Quality management	651
	24.1 Software quality	655
	24.2 Software standards	657
	24.3 Reviews and inspections	663
	24.4 Software measurement and metrics	668
Chapter 25	Configuration management	681
	25.1 Change management	685
	25.2 Version management	690
	25.3 System building	693
	25.4 Release management	699
Chapter 26	Process improvement	705
	26.1 The process improvement process	708

26.2 Process measurement

711

	Contents xv
26.3 Process analysis	715
26.4 Process change	718
26.5 The CMMI process improvement framework	721
Glossary	733
Subject Index	749
Author Index	767