

# Contents

## Part 1 Introduction to Software Engineering

### Chapter 1: Introduction

- 1.1 Professional software development
- 1.2 Software engineering ethics
- 1.3 Case studies

### Chapter 2: Software Processes

- 2.1 Software process models
- 2.2 Process activities
- 2.3 Coping with change
- 2.4 Process improvement

### Chapter 3: Agile Software Development

- 3.1 Agile methods
- 3.2 Agile development techniques
- 3.3 Agile project management
- 3.4 Scaling agile methods

### Chapter 4: Requirements Engineering

- 4.1 Functional and non-functional requirements
- 4.2 Requirements engineering processes
- 4.3 Requirements elicitation
- 4.4 Requirements specification
- 4.5 Requirements validation
- 4.6 Requirements change

### Chapter 5: System Modeling

- 5.1 Context models
- 5.2 Interaction models
- 5.3 Structural models
- 5.4 Behavioral models
- 5.5 Model-driven engineering

### Chapter 6: Architectural Design

- 6.1 Architectural design decisions
- 6.2 Architectural views
- 6.3 Architectural patterns
- 6.4 Application architectures

### Chapter 7: Design and Implementation

- 7.1 Object-oriented design using the UML

- 7.2 Design patterns
- 7.3 Implementation issues
- 7.4 Open source development

## Chapter 8: Software Testing

- 8.1 Development testing
- 8.2 Test-driven development
- 8.3 Release testing
- 8.4 User testing

## Chapter 9: Software Evolution

- 9.1 Evolution processes
- 9.2 Legacy systems
- 9.3 Software maintenance

# Part 2 System Dependability and Security

## Chapter 10: Dependable Systems

- 10.1 Dependability properties
- 10.2 Sociotechnical systems
- 10.3 Redundancy and diversity
- 10.4 Dependable processes
- 10.5 Formal methods and system dependability

## Chapter 11: Reliability Engineering

- 11.1 Reliability and availability
- 11.2 Reliability requirements
- 11.3 Fault-tolerant architectures
- 11.4 Programming for reliability
- 11.5 Reliability testing

## Chapter 12: Safety Engineering

- 12.1 Safety-critical systems
- 12.2 Safety requirements
- 12.3 Safety engineering processes
- 12.4 Safety cases

## Chapter 13: Security Engineering

- 13.1 Security and dependability
- 13.2 Security and organizations
- 13.3 Security requirements
- 13.4 Secure systems design
- 13.5 Security testing and assurance

## Chapter 14: Resilience Engineering

- 14.1 Cybersecurity
- 14.2 Sociotechnical resilience
- 14.3 Resilient systems design

## Part 3 Advanced Software Engineering

### Chapter 15: Software Reuse

- 15.1 The reuse landscape
- 15.2 Application frameworks
- 15.3 Software product lines
- 15.4 Application system reuse

### Chapter 16: Component-based Software Engineering

- 16.1 Components and component models
- 16.2 CBSE processes
- 16.3 Component composition

### Chapter 17: Distributed Software Engineering

- 17.1 Distributed systems
- 17.2 Client–server computing
- 17.3 Architectural patterns for distributed systems
- 17.4 Software as a service

### Chapter 18: Service-oriented Software Engineering

- 18.1 Service-oriented architectures
- 18.2 RESTful services
- 18.3 Service engineering
- 18.4 Service composition

### Chapter 19: Systems Engineering

- 19.1 Sociotechnical systems
- 19.2 Conceptual design
- 19.3 System procurement
- 19.4 System development
- 19.5 System operation and evolution

### Chapter 20: Systems of Systems

- 20.1 System complexity
- 20.2 Systems of systems classification
- 20.3 Reductionism and complex systems
- 20.4 Systems of systems engineering

20.5 Systems of systems architecture

## Chapter 21: Real-time Software Engineering

- 21.1 Embedded systems design
- 21.2 Architectural patterns for real-time systems
- 21.3 Timing analysis
- 21.4 Real-time operating systems

## Part 4 Software management

### Chapter 22: Project management

- 22.1 Risk management
- 22.2 Managing people
- 22.3 Teamwork

### Chapter 23: Project planning

- 23.1 Software pricing
- 23.2 Plan-driven development
- 23.3 Project scheduling
- 23.4 Agile planning
- 23.5 Estimation techniques
- 23.6 COCOMO cost modeling

### Chapter 24: Quality management

- 24.1 Software quality
- 24.2 Software standards
- 24.3 Reviews and inspections
- 24.4 Quality management and agile development
- 24.5 Software measurement

### Chapter 25: Configuration management

- 25.1 Version management
- 25.2 System building
- 25.3 Change management
- 25.4 Release management

## Glossary

## Index