



## **Faculty of Computer Studies**

**M301 B: Software systems and their Development (Part B)**

### **Course Guide**

## **M301B: Software systems and their Development (Part B)**

**Credit Points / Credit Hours:** 30/ 8

### **Pre-Requisites:**

M301A

### **Short Description:**

In this course students study about the software engineering process, its stages, UML diagrams, quality assurance factors, testing techniques, and security issues.

### **Aims:**

The aims of this course are:

- to introduce the students to the software engineering process.
- to enable the students to understand UML notation and usage.
- to introduce the students to QA and security issues in software development

### **Learning Out comes of M301B:**

The Learning Outcomes of this course are given below:

#### **A. Knowledge and Understanding of:**

- A1.The stages of the software development life cycle and its importance in the process of developing software;
- A2.The use of different models in UML for analyzing and designing software.
- A3.The principles and techniques of implementing and testing software.
- A4.The issues, processes and techniques involved in managing and planning software development.
- A5.The quality issues involved in software products and processes.
- A6.The concepts and techniques covered in the course using a substantial case study.
- A7.Different algorithms used for computer security.

#### **B. Cognitive skills:**

To be able to:

- B1. Analyse, design, implement and test a system or change request according to sets of requirements.
- B2. Plan and allocate the resources required for a software project.
- B3. Critically evaluate the quality of a software product.
- B4. Apply the concept of design by contract to the analysis, design, implementation and testing of a software system.
- B5. Analyze various computer security issues.

#### **C. Key skills:**

To be able to:

- C1. Communicate knowledge and understanding of the course via assessment process, and communicate with peers via conferences informally.
- C2. Manage own learning through feedback, independent study, and by looking beyond the presented course material.
- C3. To draw on a wide variety of materials using case tools, websites.
- C4. Communicate in particular via a report, the work done in specifying and carrying out a detailed change request on the case study.
- C5. Communicate with peers via conferences.
- C6. Apply mathematical skills at a practical level to the specification software functionality.

#### **D. Practical and/or professional skills**

To be able to:

- D1. Develop or amend a given system according to a set of requirements.
- D2. Use CASE tools such as the Java IDE and the Modeling tool.
- D3. Critically evaluate a complex software product.
- D4. Analyze the professional/ethical issues involved in the development and use of software.
- D5. Document the software systems using notations appropriate to different stages of the software life cycle.
- D6. Perform analysis of different security issues.

#### **Course Structure:**

This course consists of 3 blocks of study each having a number of study units.

#### **Table of Contents:**

#### **Block 4 Basic Object-oriented Software Development with UML**

##### **Unit 4.1 Approaches to Software Development**

- 1 Study guide to Blocks 4 and 5
- 2 Software and software engineering
- 3 An introduction to software development
- 4 Modeling
- 5 Analyzing simple requirements
- 6 Introduction to the computer aided software engineering (CASE) tool
- 7 Summary of the unit

## **Unit 4.2 Use Cases**

- 1 Simple use case models
- 2 More details on use case models
- 3 Modeling users' routines
- 4 Getting users involved
- 5 Summary of the unit

## **Unit 4.3 Classes and Associations**

- 1 Simple class models with the UML
- 2 Precise modeling of associations
- 3 More modeling techniques
- 4 Constraining models
- 5 Summary of the unit

## **Unit 4.4 Interactions**

- 1 Design by Contract
- 2 Starting dynamic modeling
- 3 Working with interaction diagrams
- 4 Design decisions
- 5 Summary of the unit

## **Unit 4.5 States and Activities**

- 1 Capturing more complex interactions
- 2 Design issues
- 3 An introduction to state machines
- 4 Variation of events and actions
- 5 Packages
- 6 Summary of the unit

## **Block 5 Managing and Extending the OO Software Development Process**

### **Unit 5.1 From Model to implementation**

- 1 Moving towards implementation
- 2 From requirements to code
- 3 Controlling inheritance
- 4 Using tools to automate development
- 5 Modeling implementation and deployment
- 6 Summary of the unit

### **Unit 5.2 Components, Patterns and Architectures**

- 1 Components and Component Based Development
- 2 Architectures, frameworks and product lines
- 3 Patterns
- 4 Summary of the unit

### **Unit5.3 Product Quality: Metrics, Verification, Validation, Testing**

- 1 Introduction to software quality
- 2 Verification, validation and testing
- 3 Measuring software quality factors
- 4 Testing techniques

### **Unit 5.4 Process Quality Management, Human Resources, Quality Assurance**

- 1 Overview of process quality
- 2 Project management
- 3 Quality management
- 4 Configuration management
- 5 Summary of the unit

### **Unit 5.5 Human Factors and Professional Issues**

- 1 Designing and implementing the user interface
- 2 Usability analysis and evaluation
- 3 Introducing human and professional issues
- 4 Person-related factors
- 5 Task- and environment-related factors
- 6 Summary of the unit

## **Block 6 Integration**

### **Unit 6.1 Network Security**

- 1 Introduction to security
- 2 Cryptography
- 3 Security in action
- 4 Summary of the unit

### **Unit 6.2 Ethical and Legal Issues and the Case Study**

- 1 Ethical and legal issues
- 2 Professional bodies
- 3 Developing the Case Study
- 4 Summary of the unit

### **Assessment:**

- Tutor-marked assignments: 2 TMAs
- Quiz/Mid-term Assessment: 1 MTA
- Final Exam: 1 Final Exam

**Grade Distributions:**

- Tutor-marked assignments: 35%
- Quiz/MTA: 15%
- Final Exam: 50%

**Course Calendar** (Indicative Version):

There are 2 Tutor Marked Assignments, 1 Midterm Assessment and 1 Final Exam associated with this course. Course result is determined on the basis of student's scores in TMAs, Midterm Assessment and the Final Exam. To be sure of passing the course, the student needs to score at least 40% (at least 20% in TMA and Quiz/MTA and at least 20% in the final exam) in the above 3 components and achieve an overall average score of 50%.

Study Week	Study Block	Course text	Other Components/notes	Practical activity	Assignment/Assessments
					<b>TMA / MTA</b>
1	<b>BOLCK 4</b>	Unit 1	Modeling Tool +Hbk		
2		Unit 2	Modeling Tool +Hbk	Install Modeling Tool Case Study	
3		Unit 3	Modeling Tool +Hbk	Case Study	
4		Unit 4	Modeling Tool +Hbk	Case Study	
5		Unit 5	Modeling Tool + Handbook		
6	<b>BLOCK 5</b>	Unit 1	IDE Modeling Tool + Handbook	Case Study	
7		Unit 2	Budd Bacon	Case Study	
8		Unit 3	Testing Tool		TMA 01 due date Quiz / MTA
9		Unit 4			
10		Unit 5		Web browser	
11	<b>BLOCK 6</b>	Unit 1	Budd	Web browser	
12		Unit 2	IDE Modeling Tool	Case Study	
13		Unit 3	IDE Modeling Tool	Case Study	
14		Unit 4	IDE Modeling Tool	Case Study	
15		Unit 5	IDE Modeling Tool	Case Study	TMA 02 due date
16			Final Exam Period	<b>Will be announced</b>	

