



Faculty of Computer Studies

M301 A: Software systems and their Development (Part A)

Course Guide

M301A: Software systems and their Development (Part A)

Credit Points / Credit Hours: 30/8

Pre-Requisites:

MT262A

Short Description:

In this course students study about Object Oriented (OO) programming principles using Borland Java. Students also study about various concepts of concurrent systems such as IPC, semaphores, synchronization etc.

Aims:

The aims of the course are:

- to enable students to grasp Object Oriented Programming concepts using Java.
- to introduce students to Concurrent systems.
- to enable students to understand various concurrency issues such as IPC and synchronization.

Learning Out comes of M301A:

The Learning Outcomes of this course are given below:

A. Knowledge and Understanding of:

- A1. The principles, concepts and techniques of Object Oriented programming.
- A2. The understanding of the design and programming processes using Java.
- A3. The principles of event-programming language using Java.
- A4. The principles and concepts associated with distributed concurrent systems
- A5. The difference contexts in which distributed systems are used and how users interact with them.
- A6. The syntactic structures of Java which are central to the implementation of large Concurrent and distributed systems.

A. Cognitive skills:

To be able to:

- B1. Describe and apply key concepts and techniques in Object Oriented design and development.
- B2. Analyze some written java projects and see how they work and how they should be applied.
- B3. Use Java libraries

- B4. Use Java developed projects.
- B5. Correct errors and update developed projects.
- B6. Reason about the core issues within distributed concurrent systems at an abstract level as well as their implementation using Java.
- B7. Critically evaluate a range of techniques for dealing with problems occurring in concurrent distributed systems.

B. Key skills:

To be able to:

- C1. Interact effectively within a group using electronic conferencing techniques.
- C2. Contribute to discussions on a conference.
- C3. Apply appropriate problem-solving techniques to concurrent and distributed systems.
- C4. Communicate in generating their knowledge and understanding of the course via assessment process, and interacting with peers via conferences informally.
- C5. Manage own learning through feedback, independent study, and by looking beyond the presented course material.
- C6. Exchange ideas in particular via a report, the work done in specifying and carrying out a detailed change request on the case study.
- C7. Perform networking with peers via conferences.

C. Practical and/or professional skills:

To be able to:

- D1. Effectively use the Borland Java IDE.
- D2. Program in the Java language in an object-oriented manner.
- D3. Modify a given system according to new requirements and construct programs with the use of Borland Java.
- D4. Make professional judgment in issues related to the design of concurrent and distributed systems, using specialist language.

Course Structure:

This course consists of 3 blocks of study having 5 units each.

Table of Contents:

Block 1 Introduction to Java

Unit 1.1 Introduction and the IDE

- 1 Introduction to the course
- 2 Introduction to the Integrated Development Environment (IDE)
- 3 First program in Java
- 4 Summary of the unit

Unit 1.2 Basic Constructs in Java

- 1 Developing a simple Java program using JBuilder 3.5
- 2 Ball worlds: Swing classes, constructors and inheritance
- 3 Cannon game: events, inner classes and interfaces
- 4 Summary of the unit

Unit 1.5 Swing, AWT and Applets

- 1 Swing and AWT packages
- 2 Applets
- 3 Input and output streams
- 4 Summary of the unit

Block 2 Concurrency 1

Unit 2.1 Describing Concurrent Systems

- 1 Study Guide to Blocks 2 and 3
- 2 Features of a typical uniprocessor
- 3 What is a concurrent system?
- 4 System structure and dynamic execution
- 5 Summary of the unit

Unit 2.2 Processes

- 1 The hardware interface
- 2 Support for processes
- 3 Processes and threads
- 4 Processes in language systems
- 5 Processes in Java
- 6 Summary of the unit

Unit 2.3 Distributed Systems and Storage Management

- 1 Fundamentals of distributed systems
- 2 Memory and file management
- 3 Summary of the unit

Unit 2.4 IPC in Shared Memory: Low-level Primitives

- 1 Process interaction and system structure
- 2 Implementing synchronization primitives
- 3 Semaphores
- 4 Summary of the unit

Unit 2.5 IPC in Shared Memory: Classical Problems and Language Primitives

- 1 Use of semaphores in classical problems
- 2 Language primitives for shared memory
- 3 Synchronization at the granularity of operations
- 4 Summary of the unit

Block 3 Concurrency 2

Unit 3.1 IPC in Non-shared Memory (I)

- 1 Inter-process Communication (IPC)
- 2 Distributed IPC
- 3 Network programming
- 4 Summary of the unit

Unit 3.2 IPC in Non-Shared Memory (II)

- 1 RPC AND Java's RMI mechanism
- 2 Using Java's RMI mechanism
- 3 Summary of the unit

Unit 3.3 Composite Actions

- 1 Crash resilience and persistent data
- 2 Decomposable abstract operations
- 3 Resource allocation and deadlock
- 4 Summary of the unit

Unit 3.4 Managing Transactions

- 1 Transactions
- 2 Concurrency control
- 3 Distributed transactions
- 4 Summary of the unit

Unit 3.5 Middleware

- 1 Middleware: CORBA

- 2 Case study
- 3 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 Activates	Assignment/Assessments
			For details of Specific readings Please refer to the course web site		TMA / MTA
1	Prep Block 1	Unit 1	Course Guide Budd Guide to Electronic Tuition ETMA Guide for Students IDE + Handbook	Access Web site-download TMA01 conferences Case Study Killer Robot Case Study Test eTMA system Install IDE Killer Robot Case Study Case Study	
2		Unit 2	Budd IDE + Handbook	Case Study	
3		Unit 3	Budd IDE + Handbook Glossary	Case Study	
4		Unit 4	Budd IDE + Handbook Glossary	Case Study	
5		Unit 5	Budd IDE + Handbook		Quiz / MTA
6	BLOCK 2	Unit 1	Bacon		
7		Unit 2	IDE Bacon Budd		
8		Unit 3	Bacon	Web browser Case Study	
9		Unit 4	Bacon		TMA01 due date
10		Unit 5	Bacon Budd IDE		
11	BLOCK 3	Unit 1	Bacon Budd IDE + Handbook	Case Study	
12		Unit 2	Bacon IDE + Handbook	Case Study	
13		Unit 3	Bacon	Scheduling Tool (optional) Case Study	
14		Unit 4	Bacon		TMA02 due date
15		Unit 5	Bacon	Case Study	
16			Final Exam Period	Will be announced	