MODULE	**OBJECT ORIENTED PROGRAMMING WITH DESIGN PATTERNS**	
CODE	BSCH-3-2-09	
STAGE	III	
NUMBER OF CREDITS	4 semester credits / 6 quarter units	
STATUS	ALTERNATIVE	
THEMES	Software Development	
ASSESSMENT	Continuous Assessment Examination	50% 50%

Aims

This module aims to: provide the student with an understanding and practical experience of modern Object Oriented Programming using the Unified Modelling Language, with a focus on the use of Design Patterns. The module aims to provide the student with an understanding of Software Design problems and how they are addressed by the use of Design Patterns. The student will also be given practical experience of implementing Design Patterns in software development.

Learning Outcomes

On completion of this module students will be able to:

- Apply Object Oriented Design using UML to real world software development.
- Choose appropriate design patterns to address real world software design problems.
- Compare and contrast design patterns used in software development.
- Appropriately apply Design Patterns to real world software design problems.
- Produce high quality software using the techniques outlined.
- Express the structure of Design Patterns using UML.

Indicative Content

Topic	Description
Overview of UML	Review of concepts of UML and the structure of the language; development of UML models; use of UML in Object Oriented Design Methodologies;
Design Patterns	Abstraction and Reuse. History of design patterns; description of structure of design patterns; Pattern languages; Case studies showing use of design patterns in

	software development
Pattern Catalog	GoF three groupings Creational, Structural, Behavioral; Other groupings – Fundamental, Creational, Partitioning, Structural, Behavioural, Concurrency (Grand); Creational, Behavioural, Structural, System (Stelting); Interface, Responsibility, Construction, Operation, Extension (Metsker)
Use of Design Patterns	Introduction and explanation of representative sample of Design Patterns of each of the main types; Use of these in practical ways; Case studies of current usage; Practical implementation to software solutions; Use in both procedural and concurrent situations. Control of threads. Abstract Factory, Factory Method, Singleton; Adapter, Decorator, Façade; Iterator, Observer, Template Method; Interface, Producer-Consumer.
Analysis of Design Pattern Use	Current developments in Design Pattern usage; Case Studies of Design Pattern usage in industry; Refactoring and anti-patterns;
Frameworks	Software reuse through the use of Frameworks; Framework architectures; The use of Design Patterns in Framework construction;

Teaching and Learning Methods

Students will be taught using a combination of lectures, tutorials and practicals. Practical sessions will be based on lab workbooks. This will involve implementing code using Design Patterns. A number of graded assignments will also be given as part of the course. Case studies relating to existing usage / research will be used to explore the practical implications of the use of Design Patterns.

Assessment Methods

Assessment will use both a continuous component and an end of semester examination. The continuous assessment component is used to develop practical skills and will be based both on the lab workbooks and graded assignments / in class tests. Emphasis will be on practical programming and usage of Design Patterns.
Students will be asked to:

- Design software solutions using UML.
- Apply appropriate Design Patterns in the design.
- Implement software solutions using Design Patterns.
- Analyse Design Pattern usage in Case Studies.
- Describe Design Pattern usage, history and future trends.

Primary Reading List

Title	Author	Publisher
Design Patterns Explained: A new perspective on Object Oriented Design	Shalloway A, Trott J.	Addison Wesley 2001
Design Patterns : Elements of Reusable Object-Oriented Software	Gamma, Helms, Johnson, Vlissides	Addison Wesley 1995

Recommended Reading List

Title	Author	Publisher
Patterns in Java : Volume 1	Grand M.	Wiley 1998
Design Patterns Java Workbook	Metsker, S.J.	Addison Wesley 2001
Applied Java Patterns	Stelting and Maason	Prentice Hall 2001
Applying UML and Patterns : A Introduction to Object Oriented Analysis and Design, and the Unified Process 2^{nd} Edition.	Larman C.	Prentice Hall 2001