

MODULE **PROGRAMMING & INFORMATION PROCESSING**

CODE	BSCH-1-2-09
STAGE	I
NUMBER OF CREDITS	4 semester credits / 6 quarter units
STATUS	CORE
THEMES	Software Development
ASSESSMENT	Continuous Assessment 50%
	Examination 50%

Aims

To show students how to model and manage real world data. This will include an introduction to different file organisation methods and how to process data stored in this manner. The student will be given an ability to apply error handling routines and corrective action to programs. Students will also acquire an ability to appraise the behaviour of different abstract data types.

Learning Outcomes

On completion of this module students will be able to:

- Discuss the efficient design of procedures and functions within programs.
- Demonstrate the ability to implement effective and efficient error handling.
- Explain and implement the creation of a record structure using classes and objects.
- Explain how to use a dynamic data structure for record storage.
- Define how to retrieve and save data to a file.
- Demonstrate the use of file management through programs.
- Demonstrate the efficient processing of two-dimensional arrays.
- Critically evaluate the behaviour of different abstract data types.
- Design and implement a medium sized application in an object-oriented language.

Indicative Content

Topic	Description
Error Handling	The understanding of error handling; the use of exceptions and recover action.
Searching and Sorting Algorithms	Theory and practical implementations of algorithms; Linear Search; Binary Search; Sorting Algorithms: Selection, Bubble, Insertion;
Introduction to Data Structures	Array processing: declaration, assignment, methodology, initialisation, sample solutions and practical implementations; Processing Tables: declaration, processing, sample solutions and practical implementations;
Classes and Objects	Distinguish between data structures and data types; Abstract data types; User defined types; Modelling real world objects; Creating record structures in the form of objects; Processing collections of objects using arrays and Dynamic data structures; Processing primitive data types as objects;
Utilities and the collection framework	Dynamic data structures; Introduce the collections framework; Class Arrays; Lists; Class Collections; Algorithms for manipulating collection elements;
Records and Files	File types: Text and Binary; Storage and Retrieval; Text Files: Streaming, reading text files; Binary files: sequential files, appending, deleting, writing and reading (numeric values, strings, classes); Retrieving and saving data to and from binary and text files; Using sequential access and random access processing.
Developing Software Applications	Design of software systems; Design and implementation using an outlined design strategy;

Teaching and Learning Methods

Students will be taught using a combination of lectures, tutorials and practicals. Practical sessions will be based on lab workbooks. These will contain many small programming assignments to help the students understand the numerous programming constructs being introduced. A number of graded assignments will also be given as part of the course.

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 of programming techniques and will be based both on the lab workbooks and graded assignments / in class tests. Students will be expected to develop efficient, well-documented code, meeting accepted standards of quality.

Primary Reading List

Title	Author	Publisher
A First Course in Programming Java	Tony Mullins	Mullins 2000
Java – How to Program	Deitel and Deitel	Prentice – Hall

Recommended Reading List

Title	Author	Publisher
Thinking in Java	Bruce Eckel	Prentice - Hall
Learning Java	Patrick Niemeyer Jonathan Knudson	O'Reily 2002
How to Solve it by Computer	Dromey	Prentice – Hall 1982