


AMOU UNIVERSITY
“A Vehicle for Peace and Development”
AMOU UNIVERSITY



FACULTY OF COMPUTING AND ICT

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY PROGRAMME

ACADEMIC YEAR 2015/ 2016

COURSE DESCRIPTION

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| BIT 314 | Data Structures and Algorithms |
| Contact Hours | 52 |
| Pre-requisite | BIT 225 Programming Methodology (C) |
| Purpose/Aim | This course introduces data, file and object structures in an object-oriented programming language. |
| Course Objective (Indicative Learning Outcomes) | <ul style="list-style-type: none"> • The learner can design and develop object structures. • The learner can implement object structures in an object-oriented programming language. |
| Course Content | <ul style="list-style-type: none"> • Programming Strategies and Overview <p>Basic Terminology; Objects and ADTS; Objects and Destructors; Data Structures; Data Structure Operations; Methods; Pre and Post Conditions</p> <ul style="list-style-type: none"> • Data Structures <p>Array Records and Pointers (Linear Array, Sorting Bubble sort, Searching, Linear Search, Binary search); Lists(Linked lists, Representation of linked lists in memory, traversing a linked list, Searching a linked list, Memory allocation, Insertion into a linked list, Deletion from a linked list); Stacks; Quick-sort and application of stacks; Recursion</p> <ul style="list-style-type: none"> • Searching <p>Sequential Searches; Binary; Trees; Complexity Analysis</p> <ul style="list-style-type: none"> • Queues <p>Priority queues; Heaps</p> <ul style="list-style-type: none"> • Sorting(insertion, selection, merging, hashing) <p>Bubble; Heap; Quick; Binary</p> <ul style="list-style-type: none"> • Dynamic algorithms <p>Fibonacci; Binomial coefficients; optimal binary searches</p> <ul style="list-style-type: none"> • Trees and Graphs <p>Binary Tree, Representation of binary tree in memory, Traversing binary Tree; Binary Search Tree, Deleting in a Binary Search Tree, Heap and Heap-sort; Minimum Spanning tree; Dijkstra’s Algorithm; Graph Theory Terminology, Sequential Representation of graph, Operations on graph</p> <p>Practical Content</p> <p><u>Lab 1</u></p> |



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| | <p>Use of stack queues and other data structures in an application e.g. backtracking, parsing, discrete simulation, etc</p> <p>Lab 2 Inspection of tradeoffs among different implementation strategy such as arrays v/s linked lists</p> <p>Lab 3 Designing and implementing different data structure e.g. arrays, Linked lists, stacks, queues etc.</p> <p>Lab 4 Examining recursive functions, observing changes of values of local variables and parameters.</p> <p>Lab 5 Develop a recursive solution to common programming problems</p> <p>Lab 6 Corroboration of theoretical complexity of selected sorting and searching algorithms by experimental methods, identifying difference among best average in worst-case behaviours</p> | | |
| Learning & Teaching Methodologies | Lectures, tutorials and computer laboratory exercises | | |
| Instructional Materials/Equipment | Classroom with audio visual aids Computer laboratory Java language and development environment | | |
| Course Assessment | Type | Weighting (%) | |
| | Final Examination | 50 | |
| | Mid Term Examination | 30 | |
| | Assignment | 10 | |
| | Attendance | 10 | |
| | Total | 100 | |
| Recommended Reading | Title | Author | Publisher |
| | Data Structures and Algorithms in Java (2nd Edition) | Robert Lafore | Sams, 2 edition (2002) |
| | Data Structure | Schaum’s Outline Series | Schaum’s Outline of theory and problems of Data Structure In 1986 |
| | <i>Data Structures and Algorithms in c program</i> (2nd ed) | Boston: Thomson | Adam Drozdek [2005]. |
| Other Support Material | A variety of multimedia systems and electronic information resources as prescribed by the lecturer. Various application manuals and articles, URL search and journals. | | |