Academic Course Description

BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Electronics and Communication Engineering
BCS406 Objected Oriented Programming And Data Structures
Fourth Semester, 2016-17 (Even Semester)

Course (catalog) description

To provide a comprehensive introduction to Object Oriented Programming (OOP) uses C++ programming language. This course aims to teach OOP concepts, such as classes, interfaces, inheritance, and polymorphism. The course will also provide the techniques for analysis of complexity of the algorithms, and address the various algorithm design techniques. On completion of the course, the students would have gained Knowledge on Linear and Non-linear data structures , Techniques to design and analysis of algorithms to deploy the data structures.

Compulsory/Elective course : Compulsory for ECE students

Credit & Contact hours : 3 & 45

Course Coordinator : Dr.C.Nalini, Professor

Instructors :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr.C.Nalini	Second year ECE	SA block			12.45 - 1.15 PM
Dr. Karthik	Second year ECE	SA block		karthik.ece@bharathuniv.ac.in	12.45 - 1.15 PM

Relationship to other courses:

Pre –requisites : BCS101 Fundamentals of Computing and Programming

Assumed knowledge : Basic knowledge in C Programming

Following courses : -

Syllabus Contents

UNIT I DATA ABSTRACTION & OVERLOADING 9 HOURS

Overview of C++–Structures–Class Scope and Accessing Class Members –Reference Variables–Initialization–Constructors Destructors–Member Functions and Classes– Friend Function – Dynamic Memory Allocation – Static Class Members – Overloading: Function overloading and Operator Overloading.

UNIT II INHERITANCE & POLYMORPHISM 9 HOURS

Base Classes and Derived Classes–Protected Members–Overriding –Public,Protected and Private Inheritance –Constructors and Destructors in derived Classes–Implicit Derived– Class Object To Base–Class Object Conversion–Virtual functions–This Pointer–Abstract Base Classes and Concrete Classes– Virtual Destructors– Dynamic Binding.

UNIT III LINEAR DATA STRUCTURES 9 HOURS

Abstract Data Types(ADTs)–ListADT–array-base dimplementation– linked list implementation– singly linked lists–Polynomial Manipulation-Stack ADT – Queue ADT

UNIT IV NON-LINEAR DATA STRUCTURES 9 HOURS

Trees–Binary Trees–Binary tree representation and traversals–The Search Tree ADT– Graph and its representations–Graph Traversals–Breadth-first search–Depth-first search– Bi-connectivity.

UNIT V SORTINGANDSEARCHING 9 HOURS

Sorting algorithms:Insertion sort-Quick sort -Mergesort-Searching:Linear search –Binary Search

TOTAL : 45 HOURS

TEXT BOOK(S) AND/OR REQUIRED MATERIALS

Reference Books:

R1. Deitel and Deitel, —C++, How-to Program , Fifth Edition, Pearson Education, 2005.

R2. Bhushan Trivedi,—Programming with ANSIC++,A Step-By-Step approach , Oxford University Press, 2010.

R3. Goodrich, Michael T., Roberto Tamassia, David Mount, —Data Structures and Algorithms in C++ ,7th Edition, Wiley. 2004

R4. Thomas H. Cormen, CharlesE. Leiserson, RonaldL. Rivest andClifford Stein, "Introduction to Algorithms", Second Edition, McGraw Hill, 2002.

R5. BjarneStroustrup,—TheC++ProgrammingLanguage ,3rdEdition,Pearson Education,2007

R6. EllisHorowitz,SartajSahniandDineshMehta,—Fundamentals ofDataStructures inC++ , GalgotiaPublications, 2007.

Computer usage: Dev C++

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area : Communication| Signal Processing**|** Electronics | VLSI| **Embedded**

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	Feb 2nd week	Session 1 to 14	2 Periods
2	Cycle Test-2	Mar 2nd week	Session 15 to 28	2 Periods
3	Model Test	Apr 3rd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

This course is to develop a strong foundation in programming of C++. This course discusses class object concepts, inheritance and polymorphism. And also learn basic data structures and its operations.	Correlates to program outcome		
	H	**M**	**L**
1. Develop solutions to a given problems using class object concepts	b	a,f	
2. Illustrate overloading, inheritance and polymorphism concepts with example	d	a,e,i	
3. Explain the basic data structures and its operations		a,b,e	
4. Make use of basic data structures to solve problems		g	a
5. To develop programs using C++ which forms the basic for advanced programming	a,b	d,g,i,j	
6. Outline various searching and sorting algorithms	f	a	

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	**Topics**	**Problem solving (Yes/No)**	**Text / Chapter**
UNIT I			
1.	OverviewofC++–Structures	No	[R1]Chapter-9 [R1]Chapter-10 [R1]Chapter-6 [R1]Chapter-11
2.	Class Scope and Accessing Class Members –Reference Variables	No	
3.	Initialization–Constructors	No	
4.	Destructors	No	
5.	Member Functions and Classes	No	
6.	Friend Function – Dynamic Memory Allocation	No	
7.	Static Class Members	No	
8.	Overloading: Function overloading	No	
9.	Operator Overloading	No	
UNIT II			
10.	Base Classes and Derived Classes–	No	[R2]Chapter-9,10
11.	Protected Members–Overriding –Public,Protected and Private	No	
12.	Inheritance –Constructors and Destructors in derived Classes–	No	
13.	Implicit Derived– Class Object To Base–	No	
14.	Class Object Conversion–	No	
15.	Virtual functions–This Pointer–	No	
16.	Abstract Base Classes	No	
17.	Concrete Classes– Virtual Destructors–	No	
18.	Dynamic Binding	No	

UNIT III			
19.	Abstract Data Types(ADTs)	No	[R3]Chapter-3,6
20.	ListADT	No	
21.	array-base dimplementation	No	
22.	linked list implementation	No	
23.	singly linked lists	No	
24.	Polynomial Manipulation	No	
25.	Stack ADT	No	
26.	Queue ADT	No	
UNIT IV			
27.	Trees	No	[R3]Chapter-7
28.	BinaryTrees	No	
29.	Binary tree representation and traversals.	No	
30.	The Search Tree ADT	No	
31.	Graph and its representations	No	
32.	Graph Traversals	No	
33.	Breadth-first search	No	
34.	Depth-first search	No	
35.	Bi-connectivity	No	
UNIT V			
36.	Sorting algorithms:	No	[R1]Chapter-7,8,19,20
37.	Insertion sort-	No	
38.	Quick sort -	No	
39.	Mergesort- h	No	
40.	Searching:Linear search –	No	
41.	Binary Search	No	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures
- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.
- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.
- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	10%
Assignments/Seminar/online test/quiz	-	5%
Attendance	-	5%
Final exam	-	70%

Prepared by: Dr C.Nalini, Professor , Department of ECE **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / ECE / program by the time that they graduate:

a) An ability to apply knowledge of mathematics, science, and engineering

b) An ability to design and conduct experiments, as well as to analyze and interpret data

c) An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability

d) An ability to function on multidisciplinary teams

e) An ability to identify, formulate, and solve engineering problems

f) An understanding of professional and ethical responsibility

g) An ability to communicate effectively

h) The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context

i) A recognition of the need for, and an ability to engage in life-long learning

j) A knowledge of contemporary issues

k) An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Electronics Engineering graduates are provided with a strong foundation to passionately apply the fundamental principles of mathematics, science, and engineering knowledge to solve technical problems and also to combine fundamental knowledge of engineering principles with modern techniques to solve realistic, unstructured problems that arise in the field of Engineering and non-engineering efficiently and cost effectively.

PEO2: CORE COMPETENCE

Electronics engineering graduates have proficiency to enhance the skills and experience to apply their engineering knowledge, critical thinking and problem solving abilities in professional engineering practice for a wide variety of technical applications, including the design and usage of modern tools for improvement in the field of Electronics and Communication Engineering.

PEO3: PROFESSIONALISM Electronics Engineering Graduates will be expected to pursue life-long learning by successfully participating in post graduate or any other professional program for continuous improvement which is a requisite for a successful engineer to become a leader in the work force or educational sector.

PEO4: SKILL

Electronics Engineering Graduates will become skilled in soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, interpersonal relationship, group discussion and leadership ability to become a better professional.

PEO5: ETHICS

Electronics Engineering Graduates are morally boosted to make decisions that are ethical, safe and environmentally-responsible and also to innovate continuously for societal improvement.

Course Teacher	**Signature**
Dr.C.NALINI	
Dr. B. KARTHIK	

Course Coordinator **HOD/ECE**