

CSET 3150 Advanced Programming (4 semester credit hours)

**Current Catalog Description:**

This course covers object oriented programming and advanced algorithms. Topic includes C++ and OO concepts, algorithms and data structures as implemented in the C++ and Java programming languages. The final project will be implemented in Java. This course is programming intensive and serves to lay a firm foundation for student's OO programming skills.

**Textbooks:**

1. "C++ Primer Plus," 5th Edition, Stephen Prata, Sams. November 2004. ISBN 0672326973
2. "Data Structures and Algorithm Analysis in C++," 3rd Edition, Mark Alan Weiss, Addison-Wesley, ISBN 0-321-37531-9
3. "Core Java 2, Volume I—Fundamentals," 7th Edition, Cay Horstmann and Gary Cornell, Prentice Hall PTR, 2004. ISBN: 0131482025

**References:**

none

**Related Program Outcomes (a, b, d, f, and k):**

Upon successful completion of the Computer Science and Engineering Technology program, graduates will have:

- An understanding of the analytical and laboratory skills associated with computer science and engineering technology (outcome a), as evidenced by the ability to program, compile and debug OO programs.
- An ability to apply current knowledge and adapt to emerging applications of mathematics, science, engineering and technology (outcome b), as evidenced by the ability to use the current object oriented programming skill and to implement data structure and algorithms.
- An ability to apply creativity in the design of systems, components or processes appropriate to program objectives (outcome d), as evidenced by the ability to design data structure and algorithms use OO concepts.
- An ability to identify, analyze and solve technical problems (outcome f), as evidenced by the ability to identify and analyze data structure and algorithm problems and solve these problems using OO programming techniques.
- A commitment to quality, timeliness and continuous improvement (outcome k), as evidenced by performance on class research projects, finishing projects in a timely manner and by keeping abreast of current literature in this area.

**Course Objectives:**

After successful completion of this course, students will be able to:

- Understand fundamental concepts of Object Oriented Programming
  - objects, inheritance, virtual functions, abstract classes, polymorphism
- Understand algorithms and be able to program in the C++ language.
- Understand algorithms and be able to program in the Java language.
  - Java applets, Abstract Windowing Toolkit, Graphics, Image Processing, Threads, Servlets and Beans

**Major Topics Covered in the Course**

Topic	CC2001 Category	Core	Advanced
Overview of C++ and Object-Oriented Design	PL6	3	
Object Construction, Destruction and management		3	
Inheritance, abstract class, polymorphism and templates		9	
Fundamental computing algorithms	AL3	6	
Distributed algorithms	AL4	3	
Basic computability	AL5	6	
Java Basics		1.5	
I/O, Java objects		1.5	
Java Graphical programs, Swing		1.5	
Multithreading		3	
Java servlets		3	
EJB		1.5	

**Laboratory Projects:**

Students will have several laboratory projects/assignments using the C++ and Java programming languages.

**CAC Categories**

	Core	Advanced
Data Structures	0.5	
Algorithms	1.0	
Software Design	2.0	
Computer Organization and Architecture		
Concepts of Programming Languages	0.5	

**Oral and Written Communications**

- Oral presentation of project work.
- Written reports of projects.

With respect to oral presentations, Distance Learning students must do one of the following:

- submit a video-taped oral presentation for evaluation and feedback or
- come to UT or a partner community college and make their oral presentation in person, or
- submit completed evaluation forms for your oral presentation from an approved proctor or audience group

### **Social and Ethical Issues**

Social and ethical issues are emphasized in regards to copyright and proper acknowledgement in writing the term project report. Students are required to cite at least 5 references from published literature as a part of literature survey on the topic selected for the project. Students also grade the oral presentation of each fellow student. The grades are subject to 'moderation' by the Instructor, if deemed necessary. Students show fairness and honesty in grading their classmates. Other social and ethical issues are discussed as deemed necessary. Approximately ½ hour is spent on instructing the students on the importance of fairness and honesty in grading their fellow students.

### **Theoretical Content**

Fundamental algorithms and distributed algorithms will be discussed in the class and implemented in homework and projects.

- Overview of C++ and Object-Oriented Design (2 weeks)
- Object Construction, Destruction and Management (1 week)
- Inheritance, Abstract Class, Polymorphism and Templates (2 weeks)
- Fundamentals of Computing Algorithms (1 week)
- Distributed Algorithms (1 week)
- Basic Computability (1 week)
- Java Basics (1 week)
- I/O, Java Objects (2 weeks)
- Java Graphical Programs, Swing (1 week)
- Multithreading (1 week)
- Java Servlets (1 week)
- EJB (1 week)

### **Problem Analysis**

Students will develop ability to analyze existing as well as new algorithms in distributed systems. Both sequential and parallel algorithms will be analyzed with particular emphasis on computationally intensive algorithms.

### **Solution Design**

Students will use object-oriented concepts in the C++ and Java programming languages to solve problems relating to the design and solution of data structures and algorithms.

### **Course Coordinator:**

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2/27/07