

## COURSE DESCRIPTION

Dept., Number	CS445	Course Title	Object Oriented Design and Programming
Semester hours	3	Course Coordinator	Dr. Bogdan Korel, Associate Professor

### Current Catalog Description

Introduction to methodologies for object-oriented design and programming. Examines the object model and how it is realized in various object-oriented languages. Focuses on methods for developing and implementing object-oriented systems. Prerequisite: CS 331 or CS 401 or CS 403 (3-0-3) (T)

### Textbook

Head First Object-Oriented Analysis & Design, Brett D. McLaughlin, Gary Pollice & David West, Addison Wesley, ISBN: 0-596-00867-8, 2006

Test-Driven Development by Example, Kent Beck, Addison Wesley, ISBN: 0-321-14653-0, 2002

### References

See <http://www.cs.iit.edu/~cs445>

### Course Outcomes

Students should be able to:

- Explain and justify the principles of Object Oriented concepts (review abstraction & abstract data types, encapsulation, inheritance, polymorphism, aggregation)
- Analyze and identify the strengths (and weaknesses) of in-depth areas of the Object Oriented paradigm.
- Analyze, explain, & compare the qualities of Object Oriented languages and how well they support the object model.
- Explain and analyze the key points of Object Oriented analysis.
- Explain and analyze the key points of Object Oriented design.
- Design, implement, test and debug multi-phased Object Oriented application.
- Explain and utilize contemporary Object Oriented methodologies (data-driven methodology and behavior-driven methodology)
- Utilize contemporary notation (Unified Modeling Language) to express the artifacts of Object Oriented Analysis & Design (class design, class relationships, object interaction, object states, etc.)
- Perform Object Oriented Analysis & Design on a real-world problem.
- Explain and Utilize Complex Design Patterns.

- Create an implementation of the resultant Object Oriented design.
- Examine new & contemporary concepts in Object Orientation.
- Communicate the deliverables of a software development project.

#### Relationship between Course Outcomes and Program Outcomes

The following Program Outcomes are supported by the above Course Outcomes:

- b. An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution
- c. An ability to design, implement and evaluate a computer-based system, process, component, or program to meet desired needs
- f. An ability to communicate effectively with a range of audiences.
- i. An ability to use current techniques, skills, and tools necessary for computing practices.
- j. An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems in a way that demonstrates comprehension of the tradeoffs involved in design choices
- k. An ability to apply design and development principles in the construction of software systems of varying complexity.

#### Prerequisites by Topic

Strong object-oriented programming experience.

#### Major Topics Covered in the Course

1.	Review of The Terminology And Fundamentals Of Object Oriented Concepts	1.0 hours
2.	Abstractions/Abstract Data Types/Encapsulation/Information Hiding/Coupling/Cohesion	3.5 hours
3.	Object Oriented Hierarchies - Advances Topics on Inheritance/Polymorphism/Dynamic Binding/Aggregations	3.5 hours
4.	"Interface" Class Concepts	2 hours
5.	Object Oriented Languages – Survey, Features	2.5 hours
6.	Characteristics of Objects (Object Relationships, Object Interactions, Instantiation, etc.)	2.5 hours
7.	Object Oriented Analysis & Design - Concepts, Methodologies, Unified Modeling Language	6 hours
8.	Structural Modeling (Class Diagram)	3 hours
9.	Behavioral Modeling (Interaction Diagram, State Diagram)	2 hours
10.	Object-Oriented Design Patterns - Understanding & Usage	3.5 hours
11.	End-To-End Case Study of Object-Oriented Analysis & Design	3 hours
12.	Object Oriented Detailed Design	2 hours
13.	Object Oriented Analysis & Design in Large Scale Projects	2 hours
14.	Use Of Persistence & Databases In an Object Oriented Application	2 hours
15.	Contemporary Object Oriented Topics, Including Multi-Threaded Objects	4 hours
16.	Course Administration & Mid-Term Exam	2.5 hours
17.	Final Exam	-
		45 hours

#### Assessment Plan for the Course

End of every semester Course Objective Assessments by CS department. End of semester Course Evaluations by IIT. Reviewed every Spring semester by CS Undergraduate Studies Committee for possible updates in the following Fall. Once every 4-5 years a detailed review of all materials for the course is made by the CS Undergraduate Studies Committee.

How Data in the Course is Used to Assess Program Outcomes (unless adequately covered already in the assessment discussion under Criterion 4)

See the assessment discussion under Criterion 4

*For a computer science program*

Estimate Curriculum Category Content (Semester hours)

Area	Core	Advanced	Area	Core	Advanced
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Algorithms			Software design		
Data structures			Concepts of programming languages		3