SE 450 - Object-Oriented Software Development

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Summary of Course

The objective of this course is to teach the student the concepts and practice of object oriented software development. The purpose of studying object-oriented development is to acquaint students with the concepts and terminology required in the object-oriented community. The student's programming foundation will be enhanced by studying advanced concepts behind object orientation including role-based programming, advanced concepts of inheritance, interface creation & usage, design patterns, and unit testing. Using this foundation, the student will learn the real-world aspects of object orientation by putting the concepts into practice. The Java programming language will be used for source code examples and coursework.

Among the topics of the course are:

- Principles of object-orientation.
- Principles of object-oriented design.
- UML class diagrams.
- Testing methodologies.
- Design Patterns.
- Advanced Java Techniques.

Prerequisites

You *must* have taken the following:

- CSC 403 (Data Structures II). You should have experience with basic OO programming techniques, developing iterative and recursive solutions to problems, and using a wide variety of java collections.

- ***NOTE: This is not an introductory Java course.***

Grading Policy

Course Grade Evaluation:

Midterm	30%
Program	35%
Final	35%
Total	100%

Grading Scale

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A:	100 > total >= 93		C :	77 > total >= 73
A-:	93 > total >= 90		C-:	73 > total >= 70
B+:	90 > total >= 87		D+:	70 > total >= 67
B :	87 > total >= 83		D :	67 > total >= 63
B-:	83 > total >= 80		D-:	63 > total >= 60
C+:	80 > total >= 77		F :	60 > total

Course Attendance

Live-class students are expected to attend every class session; OL students are expected to view the recording of the class *as soon as possible*, usually within 1-2 Days of the in-class meeting.

Be advised that a significant amount of project and exam assistance is given in class/on recordings, and missing that assistance can severely compromise your ability to perform adequately in this course.

Textbooks and Printed Resources

- **Required Course Textbook:**
  - *Object-Oriented Design and Patterns*, 2nd Ed., by Cay S. Horstmann, Wiley, June 2005,
    - Online companion to the book:
      http://horstmann.com/design_and_patterns.html
 - *NOTE: Assigned readings will come from this text.*
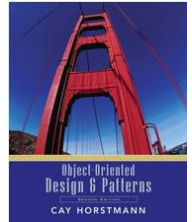
- Recommended (*optional*) Books on Design Patterns:

  - Head First Design Patterns, by Eric Freeman, Bert Bates, Kathy Sierra and Elisabeth Robson, O'Reilly, October 25, 2004).
    - Online companion to the book:
      http://www.oreilly.com/catalog/hfdesignpat/

  - Design Patterns Explained: A New Perspective on Object-Oriented Design, by Alan Shalloway & James R. Trott, Addison-Wesley Professional, 2nd

    Edition (October 22, 2004).
    - Online companion to the book:
      http://www.netobjectives.com/resources/books/design-patterns-explained/
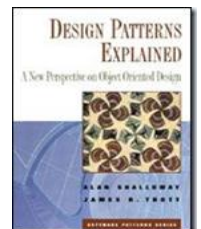
- Recommended (*optional*) Books emphasizing Java:

  - Java How to Program (Early Objects), 10th Ed, by Harvey M. Deitel & Paul J. Deitel, Prentice Hall, March 2011.
    - Online companion to the book:
      http://www.deitel.com/Books/Java/JavaHowtoProgram10eEarlyObjects/tabid/3656/Default.aspx
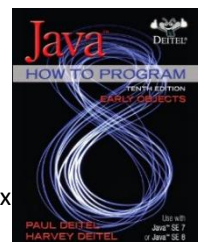
- *NOTE: I do not assign specific readings from the optional texts, but they can be useful in supporting your knowledge of Java and Design Patterns.*

Course Performance Requirements

Course grades are *solely* based upon the student's academic performance. This means a student's grade is based *only* upon their performance on the Midterm Exam, Programming Project, and Final Exam. No other factors will be considered. *THIS POLICY WILL BE STRICTLY ENFORCED. If you are not comfortable with this policy, please drop the class now.*

All assignments in this course must be completed in a timely manner. For full credit on a given assignment, it must be submitted on time. Late assignments will be accepted with a 10% penalty per class period past the deadline. (i.e., turned in from 1 minute to 1 week late = 10% penalty, 1 minute past 1 week to 2 weeks late = 20% penalty, 1 minute past 2 week to 3 weeks late = 30% penalty, etc.). *THIS POLICY WILL BE STRICTLY ENFORCED. If you are not comfortable with this policy, please drop the class now.*

A quarter project and two examinations comprise the general requirements of the course. Assigned reading is essential to understand and appreciate the foundations and philosophy of object-oriented design and development. All assigned readings are expected to be completed in a timely manner. The project assignments are designed so the student can master the object-oriented programming concepts, as well as insure that the student leaves the course with a working knowledge of these concepts.

The dates/deadlines assigned to the various assignments and exams in this course are firm, and will not be changed. There are too many students in the course to tailor the schedule to each student's desires. If this will be a problem for you, you should not take this class.

The dates/deadlines assigned to the various assignments and exams in this course are firm. There will be no make-up exams nor extra credit assignments - please don't ask. If there is an extreme emergency and you must miss an exam, you must notify me and provide documented evidence of the emergency. *If you are not comfortable with this policy, please drop the class now.*

Instructor

Christopher Hield has been at the Chicago Board Options Exchange (CBOE) since 2001, and is currently the Director of Software Development & Testing. As director of Software Development & Testing for CBOE's state-of-the-art electronic financial trading system, he is responsible for the design, development and maintenance of the multi-tiered, serviced-based software used within the Systems Development Department.

Before joining CBOE, Christopher spent time working as a Senior Software Engineer and Business Consultant the Marketing, Systems and Development Division (MSD) of Hitachi Computer Products America. There he was involved in the design and development of object-based data mining and data exploration tools for the health care industry.

Prior to his position at Hitachi, Christopher spent 13 years in the Decision and Information Sciences Division at Argonne National Laboratory, where he served as Senior Software Engineer and Technical Lead in the Information Systems Section. His duties included the development of a variety of object-based information systems, as well as object-oriented frameworks to support distributed, multidisciplinary modeling, simulation, and visualization applications.

Since 1995, he has been teaching various courses in software analysis, design, development and testing, and project management concepts at the Illinois Institute of Technology, Northwestern University, and DePaul University.

The official office hours for this class are held in the classroom, from approximately 5:15 - 5:45 p.m. before class, and 9:00 - 10:00 pm after class.

Schedule of Topics

NOTE: Topic order and appearance are subject to change based upon actual class performance and instructor discretion.

Week 1 (3/30)
- Course Introduction
- OO Principles I
  - Abstraction
  - Separation
  - Encapsulation
  - Information Hiding
- OO Principles II
  - Inheritance
  - Polymorphism
  - Composition

Week 2 (4/6)
- OO Principles III
  - Interface
  - Interface Polymorphism
  - Delegation
- Design/Implement with Exceptions
- Design Pattern: Strategy
- Design Pattern: Factory
- Project Discussion

Week 3 (4/13)
- Design Pattern: Singleton
- UML Class Diagrams
- Object Oriented Foundations
  - Single Responsibility Principle
  - Open-Closed Principle
  - Liskov Substitution Principle
  - Dependency Inversion Principle
  - Interface Segregation Principle

Week 4 (4/20)
- Design Pattern: Façade
- Design Pattern: Data Transfer Object (DTO)
- Design Pattern: Null Object
- Project Discussion
- Midterm Review

Week 5 (4/27)
- MIDTERM EXAM

Week 6 (5/4)
- Design Pattern: Flyweight
- Designing for Concurrency & Multithreading
- JUnit
- Project Discussion

Week 7 (5/11)
- Javadoc
- Design Pattern: Monostate
- Design Pattern: PowerType
- Project Discussion

Week 8 (5/18)
- Design Pattern: Memento
- Java Serialization
- Anti-Patterns
- Design & Development Topics
- Project Discussion

Week 9 (5/25)
- Design Pattern: Composite
- Design Pattern: Observer
- Java Reflection
- Design & Development Topics
- Project Discussion

Week 10 (6/1)
- Design Pattern: Decorator
- Design & Development Topics
- Final Exam Review

Final Exam: 6/8

Changes to Syllabus

This syllabus is subject to change as necessary during the quarter. If a change occurs, it will be thoroughly addressed during class, posted under Announcements in D2L and sent via email.

Student Guidelines

- Be on time for class.
- Take an active role in class discussions and activities.
- Be a respectful participant by keeping phones in silent mode.
- Please keep eyes up (and off your electronic devices) when attention should be paid to the group discussion or presentation. It is unprofessional and disrespectful to the instructor and other students to be surfing the internet, chatting, or checking social media.
- Practice professionalism in your communications (face-to-face, emails, etc.) with the professor and fellow students.

A professional and academic attitude is expected throughout this course. Measurable examples of non-academic or unprofessional attitude include but are not limited to: talking to others when the instructor is speaking, mocking another's opinion, cell phones ringing, emailing, texting, or using the internet whether on a phone, tablet, or computer. If continuing issues arise, a student may be asked to leave the classroom. The professor will partner with the Dean of Students Office to assist in managing such issues.

DePaul University is a community that thrives on open discourse that challenges students, both intellectually and personally, to be Socially Responsible Leaders. It is the expectation that all dialogue in this course is civil and respectful of the dignity of each student. Any instances of disrespect or hostility can jeopardize a student's ability to be successful in the course. The professor will partner with the Dean of Students Office to assist in managing such issues.

Academic Integrity and Plagiarism

This course will be subject to the university's academic integrity policy. More information can be found at http://academicintegrity.depaul.edu/. If you have any questions, be sure to consult with your professor.

The university and school policy on plagiarism can be summarized as follows: Students in this course should be aware of the strong sanctions that can be imposed against someone guilty of plagiarism. If proven, a charge of plagiarism could result in an automatic grade of 'F' in the course and possible expulsion. The strongest of sanctions will be imposed on anyone who submits as his/her own work any assignment which has been prepared by someone else.

All assignment submissions to D2L are subjected to automated plagiarism analysis tools.

Academic Policies

All students are required to manage their class schedules each term in accordance with the deadlines for enrolling and withdrawing as indicated in the University Academic Calendar. Students who withdraw from the course do so by using the Campus Connection system (http://campusconnect.depaul.edu. Withdrawals processed via this system are effective the day on which they are made. Simply ceasing to attend, or notifying the instructor, or nonpayment of tuition, does not constitute an official withdrawal from class and will result in academic as well as financial penalty.

Students with Disabilities

Students who feel they may need an accommodation based on the impact of a disability should contact the instructor privately to discuss their specific needs. All discussions will remain confidential.

To ensure that you receive the most appropriate accommodation based on your needs, contact the instructor as early as possible in the quarter (preferably within the first week of class), and make sure that you have contacted the Center for Students with Disabilities (CSD) at: csd@depaul.edu.

Lewis Center 1420, 25 E. Jackson Blvd.
Phone number: (312)362-8002
Fax: (312)362-6544
TTY: (773)325.7296

Online Teaching Evaluation

Evaluations are a way for students to provide valuable feedback regarding their instructor and the course. Detailed feedback will enable the instructor to continuously tailor teaching methods and course content to meet the learning goals of the course and the academic needs of the students. They are a requirement of the course and are key to continue to provide you with the highest quality of teaching. The evaluations are anonymous; the instructor and administration do not track who entered what responses. A program is used to check if the student completed the evaluations, but the evaluation is completely separate from the student's identity. Since 100% participation is our goal, students are sent periodic reminders over three weeks. Students do not receive reminders once they complete the evaluation.