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# **Object-Oriented Systems Design**

# **General Course Information:**

**Faculty:** Sam Sultan, Adjunct Assistant Professor

**Email:** [sam.sultan@nyu.edu](mailto:sam.sultan@nyu.edu)

**Course title/number:**  Object-Oriented Systems Design – MASY1-GC3530-100

**Credits:** 3 credits

**Semester/Year**: Summer 2016

**Class meeting/location:** May 24, 2016 – June 30, 2016,   
12 In-Person Sessions, Tuesday & Thursday at 6:00pm-9:00pm

**Class Location:** Midtown location, room number 1040

**Office Hours** Email me to request an appointment

# **Course Description:**

The course addresses the concepts, skills, methodologies, techniques, tools and perspectives essential for system analysts and designers to successfully develop information systems in the object-oriented context. The course presents the concepts of the object-oriented approach, and describes a systems development lifecycle framework that is applicable to the analysis and design of object-oriented application systems. An in-depth treatment of analysis and design are covered, followed by systems implementation and operation. Upon completion of this course, students are expected to be capable of analyzing IT system structures, model information processes, and designing/redesigning IT systems using object-oriented tools. The course utilizes a combination of lectures, hands-on computer lab exercises, group activities, and real-world projects to accomplish the learning process. Topics include: The object-oriented systems development environment; managing the object-oriented IT project; determining and structuring user requirements through use cases, conceptual data modeling,  and object relational modeling; design strategies; and physical design.

# **Course Structure/Method:**

This course will be delivered in-person, twice a week for 6 weeks. The class will encompass lectures, assignments, examples and demos, midterm and final exams, and a team project. All class content and assignments will be made available online via NYU Classes. Student should check the web site on a daily basis for any updates or announcements.

# **Course Learning Outcomes:**

By the end of this course, students will be able to:

* Distinguish between various system development methodologies
* Understand Object Oriented concepts, terms and principles
* Develop a project scope, and a project plan with feasibility analysis
* Recognize the importance of good requirement gathering and risk management
* Gain knowledge of object oriented systems analysis and design techniques and models
* Work with and use UML for object oriented modeling
* Develop use cases - both diagrams and narratives
* Model an overall system using UML class diagrams
* Model system functionality using UML sequence and collaboration diagrams
* Use cases, class diagram, sequence and activity diagrams
* Create a conceptual and a physical ER model for a database to support the system
* Understand system architecture in terms of single vs. multi-tier with thick/thin client
* Realize and appreciate system operation and ongoing support issues/concerns

# **Communication Policy:**

Credit students must use their NYU email to communicate. All email inquiries will be responded to within 24 hours during Monday through Friday 5pm. Email sent on Saturday or Sunday will not be responded to until Monday. I will respond to you using NYU email.

# **Course Expectations:**

Students are expected to participate in each class session by offering their understanding of the subject, sharing ideas or discussing/commenting on another students comment. In addition, students must complete and submit all assigned homework on time. Late submission of homework will either not be accepted, or will result in lower grade. Students are also expected to develop with and present a team project with other students, as well as take and pass a midterm exam and/or a final exam.

See full detail of expectations under “Assessment Strategy” below. Further information about specific assignments can also be found in the “Course Outline” section.

**Attendance:** Students are expected to attend all classes. Excused absences are granted in cases of documented serious illness, family emergency, religious observance, or civic obligation. In the case of religious observance or civic obligation, this should be reported in advance. Unexcused absences from sessions may have a negative impact on a student’s final grade. Students are responsible for assignments given during any absence. Each unexcused absence may result in a student’s grade being lowered by a letter grade. A student who has three unexcused absences may earn a Fail grade.

University Calendar Policy on Religious Holidays <https://www.nyu.edu/about/policies-guidelines-compliance/policies-and-guidelines/university-calendar-policy-on-religious-holidays.html>

**Class Participation:** To receive full credit for the course, you should attend all classes since much of the learning occurs during class lecture, presentation and class discussions. Please contact the instructor if you anticipate missing any part of the class. Please arrive on time so as not to disturb the flow of the lecture. Excessive lateness’s may result in lower overall grade.

**Required Material:**

* Object-Oriented Systems Analysis and Design (2nd Edition)
* **Authors** - George, Batra, Valacich and Hoffer
* **Publisher** - Pearson/Prentice Hall
* Available at Amazon.com, or
* You can obtain an e-version of the book at <http://www.coursesmart.com/0132279053>

**Recommended Material:**

* UML for Java Programmers
* **Author** - Robert Martin
* **Publisher** - Pearson

**Assessment Strategy:**

Contributing factors for determining your course grade include:

* Class Participation - **15%** *(Attendance is a prerequisite to participation)*
* Homework - **10%**
* Team Project - **15%**  *(Team members will weigh in on each other's contribution toward the final project)*
* Midterm Exam - **30%**
* Final Exam - **30%**

* **Class Participation:** To receive full credit for the course, you should attend all classes since much of the learning occurs during class lecture, presentation and class discussions. Please contact the instructor if you anticipate missing any part of the class. Please arrive on time so as not to disturb the flow of the lecture. Excessive lateness’s may result in lower overall grade. Participation grades will be based on:
* Involvement in class discussions and activities
* Participation which demonstrates integration of reading, class work, relevance and application.
* Willingness to learn by accepting feedback, trying new skills and approaches, etc.
* Quality/quantity of providing effective and balanced feedback.
* **Homework:** Homework assignments must be submitted on time within 1 week of date assigned (unless otherwise instructed). Late submission will severely impact your homework grade, or may not be accepted altogether at instructor’s discretion. All homework pages must be stapled together (paper clips not accepted).
* **Group/Team Project:** There will be a group/team class project. The project will be a culmination of written, visual and proper presentation skills. It will include the culmination of topics, concepts and competencies learned in this class. The group project grade will be based on:
* Student level of participation in the team project
* Fulfilment of all requirements stated for the project
* **Midterm Exam:** There will be a midterm exam. The exam will be an open book, open notes/internet style exam. The exam will test the student's acquisition of topics, concepts and competencies learned in this class up to mid-term.
* **Final Exam:** There will be a final exam. The exam will be an open book, open notes/internet style exam. The exam will test the student's acquisition of topics, concepts and competencies learned in this class. The final exam will only cover material covered in the second half of the term.

**NYUSPS Policies:**

“NYUSPS policies regarding the Family Educational Rights and Privacy Act (FERPA), Academic Integrity and Plagiarism, Students with Disabilities Statement, and Standards of Classroom Behavior among others can be found on the NYU Classes Academic Policies tab for all course sites as well as on the University and NYUSPS websites.   
Every student is responsible for reading, understanding, and complying with all of these policies.”

The full list of policies can be found at the web links below:

* University: <http://www.nyu.edu/about/policies-guidelines-compliance.html>
* NYUSPS: <http://sps.nyu.edu/academics/academic-policies-and-procedures.html>

**School Grading Policies:**

**NYUSPS Graduate**

<http://sps.nyu.edu/academics/academic-policies-and-procedures/graduate-academic-policies-and-procedures.html#Grades>

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### **Course Outline:**

**Session 1, Week 1, Systems Analysis and Design**

* Systems Analysis and Design
* What is a System? Characteristics of a System
* Type of systems, OLTP, MIS, DSS
* The Role of the Systems Analyst
* System Development Life Cycle (SDLC)
* Planning, Analysis, Design, Implementation and Operation
* Evolution of Development Methodologies
* The Object Oriented Systems Development Methodology
* The Interative and Incremental Approach
* The Rational Unified Process (RUP)

Inception, Elaboration, Construction, Transition

* **Assignments (due in the next session):**
* **Reading:** Chapter 1 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 2, Week 1, Object Oriented Terminologies**

* Object Orientation
* What is an Object? What is a Class?
* What is an Attribute? What is a Method?
* What is Encapsulation?
* Superclasses and Subclasses
* What is a Message?
* What is Polymorphism? What is an Interface?
* What is Component? What is a Package?
* Associations and Relationships
* Multiplicities
* System Modeling and the Unified Modeling Language
* **Assignments (due in the next session):**
* **Reading:** Chapter 2 (Object-Oriented Systems Analysis and Design (2nd Edition)
* **Homework:** Object Oriented terminologies matching

**Session 3, Week 2, Project Management and Planning**

* Project Management and Planning
* Identifying and Selecting a Project
* System Service Request
* Classifying and Ranking Projects
* Project Initiation and Planning
* Feasibility Studies
* Cost-Benefit, NPV, ROI, Break-Even Analysis
* Developing a Baseline Project Plan
* A Project Scope Statement
* A Statement Of Work document
* Structured Walkthroughs
* **Assignments (due in the next session):**
* **Reading:** Chapter 4 (Object-Oriented Systems Analysis and Design (2nd Edition)
* **Homework:** Planning financial feasibility case study

**Session 4, Week 2, Requirement Gathering**

* Systems Analysis - Requirement Gathering
* What is a Requirement?
* Characteristic of Good Requirement Gathering
* Deliverables and Artifacts of Requirement Gathering
* The Interview Process
* Guidelines for Effective Interview
* Questionnaires and Surveys
* Designing a Good Questionnaire
* Direct Observation. Shadowing Client
* Document Analysis
* Joint Application Design (JAD)
* Prototyping
* **Assignments (due in the next session):**
* **Reading:** Chapter 5 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 5, Week 3, Use Cases**

* Systems Analysis - Use Cases
* What is a Use Case?
* What is a Scenario or a Sequence?
* What is an Actor?
* Use Case Deliverables and Artifacts
* Use Case Diagrams
* Definition and Symbols
* Boundary, Relationship, <<include>>, <<extend>>
* Generalization, Abstraction
* Use Case Description/Narrative
* Components of a use case Narrative
* Why use Use Cases?
* **Assignments (due in the next session):**
* **Reading:** Chapter 6 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 6, Week 3, Conceptual Data Modeling**

* Systems Analysis - Conceptual Data Modeling
* What is a Class Diagram?
* Elements of a Class Diagram
* Class, Attributes, Operations, Relationships
* Identifier, Multi-Valued and Composite Attributes
* Guideliness for Choosing a Good Identifier
* Relationship Multiplicities
* Associative Classes
* Aggregation and Composition Relationships
* Generalization Relationships
* **Assignments (due in the next session):**
* **Reading:** Chapter 7 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 7, Week 4, Midterm Exam**

* **Midterm Exam**
* **Assignments (due in the next session):**
* **Reading:** Chapter 8 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 8, Week 4, Object Relational Modeling**

* Systems Analysis - Object Relational Modeling
* Entity Relational Data Model
* Data Normalization
* What is Functional Dependencies?
* First, Second, Third Normal Form
* Benefits of Data Normalization
* Primary and Foreign Keys
* Referential Integrity
* Object Oriented Extensions to Relational Model
* Translating a Class Diagram to a Relational Model
* **Assignments (due in the next session):**
* **Reading:** Chapter 8 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 9, Week 5, Analysis Classes**

* Systems Analysis - Analysis Classes
* Interaction Diagrams
* Sequence Diagrams
* Entity, Boundary and Control Classes
* What is a Message?
* Elements of a Sequence Diagram
* Collaboration Diagrams
* Activity Diagrams
* Elements of an Activity Diagram
* State Diagrams
* What are Business Rules?
* Type of Business Rules
* **Assignments (due in the next session):**
* **Reading:** Chapter 9 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 10, Week 5, Physical Database Design**

* Systems Design - Physical Database Design
* Physical Database Design
* Structured Query Language (SQL)
* Why Relational?
* Elements of a Relational Database
* Tables, Rows, Columns, Relationships, indexes, views
* DDL - Data Definition language
* DML - Data Manipulation language
* DQL - Data Quesry language?
* Joining Tables
* Designing Fields and Composite Attributes
* Normalization vs. Denormalization
* Controlling Data Integrity
* File and Index Organization
* **Assignments (due in the next session):**
* **Reading:** Chapter 11 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 11, Week 6, System Architecture**

* Systems Design - Architecture
* What is System Architecture?
* The Goal of Good Architecture
* Tiered architecture
* Single-tier, two-tier, three-tier, n-tier
* What is a component?
* Standard Middleware
* COM/DCOM, CORBA, EJB
* XML and SOAP
* What are Frameworks? .NET, J2EE
* Mapping classes from Analysis to Design
* Creating Packages
* **Assignments (due in the next session):**
* **Reading:** Chapter 12 (Object-Oriented Systems Analysis and Design (2nd Edition)

**Session 12, Week 6, Systems Implementation & Operation**

* Systems Implementation & Operation
* Program Coding
* Code Reuse and Components
* Unit, Integration, System, and UAT Testing
* Installation and Deployment
* System and User Documentation
* Training and Support
* Maintenance
* Measuring and Controlling Maintenance
* Maintenance Cost Factors
* Maintenance as a mini SDLC
* **Final Exam**
* **Team Project Due**
* **Assignments:**
* **Reading:** Chapter 14 (Object-Oriented Systems Analysis and Design (2nd Edition)