CSCI-C 322 Object-Oriented Software Methods
Spring 2023

Last revised January 8, 2023

1 Course information

1.1 Course overview

The goal of this course is for students to be introduced to the main paradigms used in modern software engineering to design and develop complex software systems. The course covers the object-oriented design patterns in mainstream use today. It also serves as a first introduction to microservice architecture.It covers basic classical pattern language, decomposition, messaging, communication, querying, security and deployment patterns.

1.2 Topics

We will cover the following topics, in roughly this order:

- Basic Java Review: OOP and Event-Driven Progamming
- Observer, Decorator, Factory, Singleton and Command patterns
- Adapter, Template, Iterator, State, Proxy and Compound patterns
- Application architecture
- Decomposition patterns
- Messaging style patterns
- Reliable communications patterns
- Service discovery patterns
- Data consistency patterns
- Business logic design patterns
- Security patterns
- Deployment patterns

1.3 Prerequisites

Required: CSCI-C 212

1.4 Times and locations

This course will meet Monday and Wednesday at **4:45 PM - 6:00 PM** in **Woodburn Hall 111**.

1.5 Instructor

Professor: Hamidrreza Bahramian
Contact: habahram@iu.edu
Office: Luddy Hall 2022
Office Hours: Fridays 10am - 11:45am, or by appointment

1.6 Associate Instructors

TBD
TBD

1.7 Slack

As a supplementary communication and discussion channel, we will use a Slack workspace this semester. You will receive an invitation to join the workspace shortly after the semester begins.

1.8 Classroom policies, attendance, and participation

1.8.1 Attendance and class participation

Participating in the course and attending lectures, labs and other course events are vital to the learning process. As such, attendance is expected at all course meetings. Absences may affect a student's final course grade. If you anticipate being absent, are unexpectedly absent, or are unable to participate in class activities, please contact me as soon as possible. To request a disability-related accommodation to this attendance policy, please contact the Office of Disability Services at (812) 855-7578 or iubdss@indiana.edu. If you are experiencing unexpected barriers to your success in your courses, the Dean of Students Office is a central support resource for all students and may be helpful. The Dean of Students Office is located in the Indiana Memorial Union M088, or call 812-855-8187.

1.8.2 Classroom behavior

Students are expected to abide by the University Student Code of Conduct (`https://studentaffairs.indiana.edu/student-conduct/policies/index.html`). Disrespectful or harassing behavior will not be tolerated.

2 Course Materials

2.1 Reading Materials

The required textbooks:

- "Head First Design Patterns: Building Extensible and Maintainable Object-Oriented Software" (2020 Edition)
  by: Eric Freeman and Elisabeth Robson

https://www.oreilly.com/library/view/head-first-design/9781492077992/
ISBN-13: 9781492078005 (2020 Edition)
source code repository: https://wickedlysmart.com/head-first-design-patterns/

- "Microservices Patterns"
  by: Chris Richardson
  https://www.manning.com/books/microservices-patterns
  ISBN: 9781617294549
  source code repository: https://github.com/microservices-patterns/ftgo-application

In addition, there are a number of textbooks and online resources that we will refer to frequently:

- Design Patterns: Elements of Reusable Object-Oriented Software (Erich Gamma, Richard Helm, Ralph Johnson, John Vlissides)
- Object Oriented Design and Patterns (Cay Horstmann)
- Dive Into Design Patterns (Alexander Shvets)
- Designing with Objects (Avinash Kak)

These will be supplemented with the following online resources:

- Source Making (a website dedicated to Object-Oriented Design Patterns)
- Refactoring Guru (alternative site of Object-Oriented Software Methods)
- Microservice Architecture

2.2 Graded work

The assessed work for this course consists of homework assignments, lab assignments, a semester project , two exams (one in-person midterm, one online final), course participation and in-class quizzes. There will be weekly homework and lab assignments. All assignments are weighted equally within their category; the lowest assignment score will be dropped.

2.3 Grade breakdown

The components of the course are weighted as follows:

Category	**Weight**
Homework assignments	40%
Lab assignments	15%
Semester project	10%
Participation/quizzes	15%
Midterm and final	20%

Participation is scored based on attendance at meetings, in-class quizzes, Slack discussions, and contributions to class discussions.

2.4 Late work and extensions

As a rule, work will not be accepted late except in case of documented emergency or illness. You may petition the professor in writing for an exception if you feel you have a compelling reason for turning work in late.

2.5 Schedule of Topics

The following table lists an approximate schedule of topics and assignments for the course. Everything in this table is subject to change.

Day	Date	Topic	Notes
M	1/9	Introduction, Java Review	
W	1/11	Classes and Objects	
M	1/16	Martin Luther King Jr. Day. No classes	
W	1/18	Inheritance and Polymorphism	
M	1/23	Interfaces and Abstract classes	
W	1/25	Introduction to Design Patterns	
M	1/30	The Observer Pattern	
W	2/1	the Decorator Pattern	
M	2/6	the Factory Pattern	
W	2/8	Singleton and Command	
M	2/13	Adapter and Facade	
W	2/15	the Template Method Pattern	
M	2/20	Iterator and Composite	
W	2/22	State and Proxy	
M	2/27	Compound Patterns	
W	2/29	Leftover Patterns	
M	3/6	Monolithic vs Microservice	
W	3/8	Midterm Exam in class	
M	3/13	Spring break	
W	3/15	Spring break	
M	3/20	Decomposition	
W	3/22	Interprocess communication	
M	3/27	Managing transactions	
W	3/29	Designing business logic	
M	4/3	Implementing queries	
W	4/5	External API	
M	4/10	Testing microservices	
W	4/12	Security	
M	4/17	Deploying microservices	
W	4/19	Refactoring to microservices	
M	4/24	Project presentations	
W	4/26	Project presentations	
F	5/5	FINAL EXAM: an online quiz on canvas	

2.6 Special Needs and Accommodations

Our goal in this classroom is that learning experiences be as accessible as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know immediately so that we can discuss options. You are also welcome to contact the Office of Disability Services at (812) 855-7578 to establish reasonable accommodations. For additional information on the Office of Disability Services and reasonable accommodations, please visit https://studentaffairs.indiana.edu/student-support/disability-services/index.html.

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

2.7 Subject to change statement

The information in this syllabus, except for the final exam time and grade breakdown, is subject to change by the instructor with notice.