

AO 400: Ontology Design Patterns

Meeting Pattern

1 meetings per week, 120 minutes per meeting.

Instructor

John Beverley, PhD

Email

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Office Location & Hours

Remote, by request

Course Description

This course provides a comprehensive, hands-on introduction to the rapid creation and application of ontology design patterns. Students will learn to construct modular, reusable patterns and adapt them to various modeling scenarios. Topics include modularity, the distinction between simplified and complex patterns, and displaying patterns in various formats (e.g., PowerPoint, Mermaid.js). The course emphasizes heuristic-driven, practical approaches to pattern design, fostering skills that enable rapid prototyping and iteration.

Learning Outcomes

Outcome	Method of Assessment
Identify key principles of modularity and reusability in ontology design patterns.	Pattern 1-3, Midterm
Distinguish between simplified and complex patterns and decide which is appropriate for specific use cases.	Pattern 1-3, Midterm
Develop skills to present patterns effectively using tools like PowerPoint, Mermaid.js, and other visualization frameworks.	All
Use heuristic methods and best practices to design and implement ontology patterns efficiently.	Pattern 3,4
Work collaboratively on real-world design pattern creation, receiving and providing constructive feedback.	All
Assess the quality and suitability of ontology design patterns in terms of modularity, expressivity, and reusability.	Final Project

Required Text(s)

- See Tentative Schedule

Course Requirements

- Students will be expected to attend and participate in class discussions.
- Students will be expected to submit biweekly design patterns.
- Students will be expected to review biweekly design patterns.
- Students will be expected to revise and resubmit all submitted design patterns at midway.
- Students will be expected to submit one final pattern.

Grading Policy

Weighting	Assessment/Assignment
40%	Submitted Patterns
30%	Reviews of Patterns
15%	Midterm Review
15%	Final Pattern

Design Pattern Assignments

Five design patterns will be assigned during the course. You are encouraged to work with your classmates on these assignments. You will be allowed to select a domain to model. You will be evaluated based on your ability to identify a competency question that is neither too narrow nor too broad, then provide a design pattern that can be used to answer it. Patterns will be due **at the beginning of class on the Monday of the week that they are assigned** unless otherwise specified. Patterns will be submitted to the instructor via email. **Late patterns will not be accepted.** We will likely discuss submitted patterns in class following the deadline, hence the strict late policy. When calculating your final score for the course, **I will drop your lowest scored pattern.**

Attendance and Participation

In my experience, attendance is vital to mastering the material covered during this course. With that in mind, I require students attend each class session, and incorporate this requirement into each student's grade. There are two components to the grade: attendance and participation.

With respect to attendance, you are allowed to **miss two sessions** without penalty and without an excuse.

With respect to participation, I intend to follow the rubric below:

- 90-100% - Regularly contribute to class discussions with insightful and relevant comments. Engage constructively with peers.
- 80-89% - Frequently participates in class discussions. Shows a good understanding of course material.
- 70-79% - Participates in class but contributions are less frequent. Understands basic concepts but does not demonstrate good understanding of the course material.
- 60-69% - Rarely participates in class discussions. Contributions show minimal understanding of the course content.
- 0-59% - Does not participate in class discussions or contributions are off-topic or disruptive. Shows little to no understanding or engagement with the course material.

Accordingly, it will serve you well to be prepared to discuss the course content when you arrive each day, that is, complete the assignments, and be ready to engage in discussions.

Students may have valid reasons for missing classes, including military duties, religious commitments, health issues verified by a physician or qualified healthcare provider, among other things. You must inform me at least 48 hours in advance via email, when feasible. I will determine what constitutes a fair amount of work to compensate for your absence.

Midterm Pattern

The cumulative midterm evaluation will consist of the revision and resubmission of design patterns you have created up to that point in the course. Each student is required to complete the midterm review. The midterm review submission will be due **at the beginning of class on the Monday of the week that it is assigned** unless otherwise specified. The midterm review will be submitted to the instructor via email. The midterm review **will not be accepted after the deadline**.

Final Pattern

The cumulative final pattern will consist of a portfolio of design patterns, of no fewer than three design patterns, submitted by each student. Each student is required to complete the final pattern assignment. Students are required to work with each other to complete the assignment, as they will be evaluated in part based on the extent to which the content of their design pattern portfolio complements the portfolios of other students. Redundancy across students will count against the grades for each. Students are encouraged to revise and include design patterns submitted earlier in the course for their portfolio. The final will be due **at the beginning of class on the Monday of the week that it is assigned** unless otherwise specified. The final will be submitted to the instructor via email. The final **will not be accepted after the deadline**.

Incompletes

A grade of incomplete (“I”) indicates that additional course work is required to fulfill the requirements of a given course. Students may only be given an “I” grade if they have a passing average in coursework that has been completed and have well-defined parameters to complete the course requirements that could result in a grade better than the default grade. An “I” grade may not be assigned to a student who did not attend the course. Prior to the end of the semester, students must initiate the request for an “I” grade and receive the instructor’s approval. Assignment of an “I” grade is at the discretion of the instructor.

Grading Chart

Letter Grade	Points	Letter Grade	Points	Letter Grade	Points
A	93%-100%	B-	80%-82.9%	D+	65%-69.9%
A-	90%-92.9%	C+	77%-79.9%	D	60%-64.9%
B+	87%-89.9%	C	73%-76.9%	F	< 60%
B	83%-86.9%	C-	70%-72.9%		

Sample Schedule

Week	Topic	Lecture Topic	Assignment
Week 1	• Introduction	<ul style="list-style-type: none"> • What are design patterns? • What aren't design patterns? 	
Week 2	• Survey of the Field	<ul style="list-style-type: none"> • BFO/CCO Design Patterns • ODP/W3C/Manchester 	Pattern #1
Week 3	• Competency Questions	<ul style="list-style-type: none"> • Competency Question Taxonomy • Design Pattern Taxonomy 	Review Pattern #1
Week 4	• Disambiguation	<ul style="list-style-type: none"> • Structure vs Content • Theory vs Implementation Languages 	Pattern #2
Week 5	• Formal Disambiguation	<ul style="list-style-type: none"> • Modularity • Complex vs Simple 	Review Pattern #2
Week 6	• Basic Formal Ontology I	<ul style="list-style-type: none"> • Application Building Blocks • Annotation Techniques 	Pattern #3
Week 7	• Basic Formal Ontology II	<ul style="list-style-type: none"> • Formal Properties of Relations • Arities 	Review Pattern #3
Week 8	• Systematic Disambiguation I	• BFO Design Patterns in Depth	
Week 9	• <i>Spring Break</i>		
Week 10	• Systematic Disambiguation II	• Common BFO Design Pattern Errors	Draft Final Project
Week 11	• Cutting from the Whole Cloth	• CCO Design Patterns in Depth	Final Project

