

GMS 6805: Introduction to Applied Ontology

Location: HPNP Rm. G-110

Class Hours: 2:00-4:55

Instructor: Amanda Hicks, PhD

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Office Hours: By Appointment

Course Description: Applied ontology is a sub-discipline of knowledge representation that develops resources that make the meaning of terms accessible to computers to improve interoperability of data and to support reasoning with digital knowledge bases. This course introduces students to the fundamentals of applied ontology and its role in biomedical informatics. Students will learn what ontologies are, how they differ from similar resources, and how to build, evaluate and query ontologies. Students will also gain familiarity with a variety of different ontologies and their application in biomedical informatics.

Course Prerequisites: None, but PHI 6105: Seminar in Logic, or experience with symbolic logic, is an asset.

Course Objectives:

- Describe ontology as a discipline and articulate how ontological artifacts differ terminologies and other semantic networks
- Summarize and classify various uses of ontology artifacts in biomedical informatics and other disciplines
- Understand the logical principles behind ontology development and implementation
- Articulate standards and criteria for good ontologies and evaluate ontologies in light of these criteria
- Illustrate common pitfalls of ontology development
- Identify the components of the Semantic Web technology and the goals of the Semantic Web
- Create a domain ontology in an ontology editor such as Protégé
- Construct queries that demonstrate an understanding of the logical principles of ontologies and the Semantic Web

Course Texts:

Required Tests:

Arp, R. et al. (2015) *Building Ontologies with Basic Formal Ontology*, Cambridge, MA: MIT Press.

Selected Articles made available on the course website

Recommended Texts:

Antoniou, G. (2012). *A Semantic Web Primer*. Cambridge, MA: The MIT Press.

Course Work and Evaluation:

Applied ontology requires the ability to think critically and provide clear oral and written proposals and evaluations. It also requires the ability to create machine readable ontological representation. Accordingly, assignments will be geared toward helping students develop and assess their writing skills and their coding skills, (producing owl files, writing queries).

Short assignments – 25%

Project Proposal – 15%
Preliminary ontology owl file - %10
Final Project – 50%

Course Project: The course project consists of two parts 1) a written component and 2) an ontology owl file.

Students may work independently or in groups. If you are working in a group, the group may have no more than 3 members, each member's contribution to the project should be clearly stated in the course proposal, and the group should be interdisciplinary with respect to its members (i.e., a group consisting of two computer science students and a philosophy student is ok; a group consisting of two philosophy students only is not ok.). Exceptions may be made but must be justified in writing and approved by the course instructor.

Students will present their work the last week of class.

The research paper may be either a scientific paper or an argumentative/theoretical paper. Requirements for each are listed below.

Scientific Paper

Project proposals – Project proposals must be approved by the course instructor. They should include, a title, an abstract, group members and their role if applicable, a section explaining the background and motivation for the project, objectives, and a methods section, and references. The references should be in Vancouver style.

Final project - Final papers should include, a title, an abstract, group members and their contributions if applicable (this belongs in a "credits" section), an introduction explaining the background and motivation for the project, a methods section, a results section, a discussion section, and references. The references should be in Vancouver style. The project should also result in an ontology owl file. The paper, the owl file, and the presentation will be evaluated to determine the final project score.

Argumentative/Theoretical Paper

Project proposals - Project proposals must be approved by the course instructor. They should include, a title, an abstract, group members and their role if applicable, a section explaining the background and motivation for the project, a methods section, objectives, an outline/summary of the argument, and references. The references should be in Vancouver style.

Final project - Final papers should include, a title, an abstract, group members and their contributions if applicable (this belongs in a "credits" section), an introduction explaining the background and motivation for the project, an detailed argument involving ontological analysis, a clear ontological conclusion or proposal, and references. The references should be in Vancouver style. The project should also result in an ontology owl file that exemplifies the main points of the paper. The paper, the owl file, and the presentation will be evaluated to determine the final project score.

COURSE SCHEDULE (TENTATIVE):

The course schedule is subjected to change.

Week	Topic	Notes
1	Introduction and course overview: ontology as a discipline, history, state of the art, overview of examples of ontologies	
2	Semantic Networks: Ontologies and non-ontological semantic networks. SNOWMED, UMLS Thesaurus, WordNet, data models Realism vs. nominalism in ontological representation– BFO vs. DOLCE	Discussion of course project
3	Ontologies at work: OBO Foundry; applications of applied ontologies; the Gene Ontology (GO); Ontology for cohort identification, data integration, data annotation, information extraction, DRON, obc.ide	
4	Semantic Web Technology; URIs, OWL/RDF	
5	Logical Principles: Description Logic	
6	Getting Started with Protégé Ontology Editor Getting started creating an ontology 1. Identifying a domain 2. Competency Questions	
7	Ontological design principles: Good definitions Ontology creation: Annotations	
8	Ontological design principles: Good hierarchies Ontology creation: Creating hierarchies in Protégé, RDF vs. SKOS hierarchy relations	Project proposals due
9	Ontological design principles: Good relations, class restrictions Ontology creation: adding DL restrictions in Protégé, OWL object properties	
10	Ontological design principles: Reuse of good ontologies and other best practices	Preliminary owl files due
11	Evaluating existing semantic resources – SUMO, DOLCE, SNOMED, WordNet	
12	OBO Foundry	
13	BFO	
14	BFO and other biomedical ontologies (IAO, OGMS, OMRSE)	
15	Validating an ontology with DL	
16	Final Project Presentations	

Grading scale:

Letter Grade	Grade Points	Grade Percentage
A	4.0	95-100
A-	3.67	90-94
B+	3.33	87-89
B	3.0	83-86
B-	2.67	80-82
C+	2.33	77-79
C	2.0	73-76

C-	1.67	70-72
D+	1.33	67-69
D	1.0	63-66
D-	.67	60-62
E	0	< 59

For more detail on letter grades and related University of Florida policies, please see the Grades and Grading Policies at <http://gradcatalog.ufl.edu/content.php?catoid=6&navoid=1219#grades>.
UF POLICIES:

University policy on accommodating students with disabilities: Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

University policy on academic misconduct: Academic honesty and integrity are fundamental values of the University community. Students should be sure that they understand the UF Student Honor Code at <http://www.dso.ufl.edu/students.php>. You are expected and required to comply with the University's academic honesty policy (University of Florida Rules 6C1-4.017 Student Affairs: Academic Honesty Guidelines, available at <http://regulations.ufl.edu/chapter4/4017.pdf>). Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated. Note that misrepresentation of the truth for academic gain (e.g., misrepresenting your personal circumstances to get special consideration) constitutes cheating under the University of Florida Academic Honesty Guidelines

Netiquette – communication courtesy: All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. The first instance of clearly rude and/or inappropriate behavior will result in a warning. The second instance will result in a deduction of five percentage points from your overall grade. The third instance will result in a drop of a letter grade (A to B, A- to B-, and so on).

Online Course Evaluations:

Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu>.

GETTING HELP:

For issues with technical difficulties for E-learning in Canvas, please contact the UF Help Desk at: learning-support@ufl.edu
 (352) 392-HELP - select option 2
<https://lss.at.ufl.edu/help.shtml>

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at:
<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.