

# University of Florida

## Department of Health Outcomes & Biomedical Informatics College of Medicine

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Course Director: Mathias Brochhausen, PhD  
Course Number and Title: GMS 6805 *Information Modeling in Biomedicine*

Credit Hours: 3 hours  
Semester/Year: Fall 2020

Phone Number: 352-294-5984  
Email Address: [mbrochhausen@ufl.edu](mailto:mbrochhausen@ufl.edu)  
Office Hours: by appointment  
Canvas URL: <http://elearning.ufl.edu/>  
Department Website: <https://hobi.med.ufl.edu/>

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**PREREQUISITES:** None

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### DESCRIPTION OF COURSE CONTENT

#### *Course Description*

This course introduces students to information science and knowledge representation methodologies (e.g. set theory, formal logic) for the purpose of information integration. Students will gain familiarity with traditional information modeling methodologies (e.g. UML) and with Semantic Web Technologies, which that allows rich in semantics AI applications.

#### *Course Objectives & Goals*

Upon successful completion of this course, the student is able to:

1. Articulate and understand the definition of data, information, and knowledge based on current information theory approaches.
  2. Understand and apply the basics of UML
  3. Articulate, understand, and apply definitions of formal language, model theory, and proof theory.
  4. Understand and apply sentential logic
  5. Understand and apply predicate logic
  6. Understand and apply the basics of Description Logics
  7. Understand and apply the basics of RDF
  8. Understand and apply the basics of OWL
  9. Understand and apply the basics of SPARQL
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### TEXTBOOKS/READING MATERIALS

#### *Main Textbooks* (required)

- *The Logic Book*. Bergmann M, Moore J, Nelson J, 2014, 6<sup>th</sup> edition, ISBN: 0078038413
- *A Semantic Web Primer*. Antoniou G, Groth P, van Harmelen F, Hoekstra R, 2012, 3<sup>rd</sup> edition, ISBN: 0262018284

## Additional Readings

- *Knowledge Representation and Reasoning*. Brachmann R, Levesque H, 2004, 1<sup>st</sup> edition, ISBN: 9781558609327
- *Information – A Very Brief Introduction*. Floridi L, 2010, 1<sup>st</sup> edition, ISBN: 0199551375
- *Benchmarking — Theory and Practice*. Rolstadås A, 1995, 1<sup>st</sup> edition, ISBN: 0412626802
- *A Description Logic primer*. Krötzsch M, Simancík F, Horrocks , 2013, arXiv:1201.4089v3
- *Set Theory, Logic, and Math for Computing*. Makinson D. 2012, 2<sup>nd</sup> edition, ISBN: 1447124995
- *UML@Classroom*. Seidl M, Scholz M, Huemer C, Kappel G, 2015, 1<sup>st</sup> edition, ISBN: 3319127411
- *A Practical Guide to Entity-Relationship Modeling*. Song I, Froehlich K, <https://pdfs.semanticscholar.org/6ae2/465cafdb0cbdcc2d247fbbb64438c5bc89c1.pdf>
- *Metalogic. An Introduction to the Metatheory of Standard First Order Logic*. Hunter, G, 1996, 6<sup>th</sup> printing with corrections, ISBN: 0520023560

All books listed above will only be used in part. The students will not need to buy all books in this list. There are elements in the list above that are not books and hence do not have an ISBN

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## CLASS SCHEDULE

Week 1:	Introduction to Information Theory / Brochhausen / Floridi: Chapter 2&3 / Quizzes
Week 2:	Modeling information with UML and ER models / Brochhausen / Seidl Chapter 4, Song&Froehlich / Quizzes
Week 3:	Set Theory and knowledge representation / Brochhausen / Makinson Chapter 1 / Quizzes
Week 4:	Knowledge representation, formal logic & ontologies / Brochhausen / Brachmann & Levesque Chapter 1, Hunter 1-7, Bergmann et al. Chapter 1 / Quizzes
Week 5:	Sentential Logic: Syntax & Symbolization / Brochhausen / Bergmann et al. Chapter 2 / Quizzes
Week 6:	Sentential Logic: Semantics / Brochhausen / Bergmann et al. Chapter 3 / Quizzes
Week 7:	Sentential Logic: Truth trees / Brochhausen / Bergmann et al. Chapter 4 / Quizzes
Week 8:	Sentential Logic: Derivations / Brochhausen / Bergmann et al. Chapter 5.1,5.2,5.3 / Quizzes
Week 9:	Predicate Logic: Syntax and Symbolization / Brochhausen / Bergmann et al. Chapter 7 / Quizzes
Week 10:	Predicate Logic: Semantics / Brochhausen / Bergmann et al Chapter 8 / Quizzes
Week 11:	Predicate Logic: Truth trees & Derivations / Brochhausen / Bergmann et al Chapter 9.1,9.2,9.3,10.1
Week 12:	Description Logic / Brochhausen/ Krötzsch et al. / Quizzes
Week 13:	Semantic Web Technologies & Ontologies: Introduction & RDF / Brochhausen / Antoniou, G. et al Chapter 1&2
Week 14:	Semantic Web Technologies & Ontologies: SPARQL / Brochhausen/ Chapter 3 / Quizzes
Week 15:	Semantic Web Technologies & Ontologies: Introduction to Ontologies / Brochhausen / Antoniou, G. et al Chapter 4, Grüninger & Fox / Quizzes
Week 16:	Semantic Web Technologies& Ontologies: Ontologies in OWL / Brochhausen / Antoniou, G. et al Chapter 4 / Quizzes

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## COURSE POLICIES

### Attendance Policy

Class attendance is mandatory. Excused absences follow the criteria of the UF Graduate Catalogue (e.g, illness, serious family emergency, military obligations, religious holidays), and should be communicated to the instructor prior to or on the day of absence, not later. Given the online format of the course, students are responsible for all assigned reading material and meeting the scheduled due dates for class assignments. For information regarding the UF Attendance Policy see the Registrar website for additional details:

### **Quiz/Exam Policy**

Unless otherwise stipulated, all assignments are individual assignments. Students are forbidden to collaborate or consult with one another on such assignments. Students must follow University Policy on Academic Misconduct.

### **Assignment Policy**

A penalty of 10% per day (maximum of two days) shall be assessed on assignments turned in late. Non-participation on discussion forums will earn a grade of zero.

### **Make-up Policy**

Students are allowed to make up work only as the result of illness or other unanticipated circumstances. In the event of such emergency, documentation will be required in conformance with University policy. Work missed for any other reason will earn a grade of zero.

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## **EVALUATION AND GRADING POLICIES**

### **Evaluation of Grades**

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Quizzes (12)	10 each	15%
Discussion Contributions (4)	10 each	5%
Midterm Exam	100	40%
Final Exam	100	40%
		100%

### **Grading Policy**

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67
66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<http://gradcatalog.ufl.edu/content.php?catoid=10&navoid=2020#grades>

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

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## UF POLICIES

### ***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://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.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

### ***Campus Resources:***

#### ***Health and Wellness***

##### **U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

### Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.