Philosophy 233 TR 9:30-10:50 Syllabus

This syllabus is a resource for information regarding class policies. I expect you to consult this syllabus if you have a question about the class policies. If you have a question about class policies that isn't addressed in the syllabus, then please feel free to ask me.

I will be communicating with you via your UM email account, especially for any unexpected changes that may come up with schedule, reading materials, etc. If you find the UM email interface unappealing, I suggest you forward that email to an account that you prefer. I will expect that you check your email daily.

Office hours and contact information

Professor Duwell
Office: LA 154
email: armond.duwell@mso.umt.edu
office hours: MW9:10-10, F10-11, and by appointment if office hours cannot be attended out of necessity.

Summary

This course is an introduction to a formal language called First Order Logic (FOL). For people new to logic, this course is more akin to a mathematics course or computer science course than most philosophy courses. We will be doing a good deal of symbolic manipulation and proofs. That said, we will also be studying how FOL, as an abstract formal language is related to the natural language English. Juxtaposing the two highlights the interesting differences between the two, especially the context sensitivity and ambiguity of English in comparison to FOL. What you take away from this course will partly be a matter of your own interests. For mathematicians and computer scientists one will get a solid introduction to FOL that one can use as a basis for leaning the metatheory of FOL. For those with a more traditional philosophical bent, you will learn to tell good argumentation from bad, and sharpen your ability to analyze argumentation, and be able to better formulate arguments yourself.

Course Goals

Upon completion of this course:

1. Students will know the truth conditions associated with the Boolean connectives as well as universally and existentially quantified statements.

2. Students will be able to complete proofs in propositional logic and first order logic. In particular, they will be able to use the introduction and elimination rules, for conjunction, disjunction, negation, identity, conditionals, biconditionals, as well as universal and existential quantifiers. Additionally, they will be able to complete proofs that require nested subproofs.

3. Students will be able to translate between statements in propositional and first order logic and English. They will be able to translate English sentences that involve multiple mixed quantifiers.

Required Texts

Language, Proof, and Logic, 2nd Edition by Barwise and Etchemendy

This course is taught from a book that is closely tied to a software package. One of the best features of this package is the ability for you to get feedback on homework using a system called Grade Grinder. For many of the homeworks assigned, one may get their assignments graded online before they submit them to me. The homeworks are assessed electronically, and you can get feedback on where you went wrong, if anywhere. This allows you to learn a lot by yourself, and gives you a lot of control over your homework grades.

Here's the big reason why you need a new book: Each book has a registration ID which allows you to access Grade Grinder over the web, using software provided by the book. Without the ID, you will not be able to submit homework over the web, and that is how the majority of homework is graded.

The book is available online at https://ggweb.gradegrinder.net/store ($55) which is as cheap as you can get it. You can also require a physical copy of the book if you want, but it is an additional $15 to do so.

Homework

You will have weekly homework that must be submitted before class on Tuesday if it is to be submitted electronically. If you are to turn in something on paper, you must do so on Tuesday at the beginning of class. You are encouraged to collaborate with other people on homework, but ***YOU MAY NOT WRITE THE ASSIGNMENT UP TOGETHER***. That means that you may not copy off of a single source for your assignments, nor may you copy and paste from one computer to another. The Grade Grinder can detect such attempts to cheat, and will report that to me. Any such collaboration will result in receiving no credit for the homework in question for the person copying and the person copied. No exceptions will be made.

When you just want to check to see if you have everything correct or not, then choose **"Just Me"**. When you submit an assignment make sure to choose **"Instructor Too"**. Please only submit to me ***once!*** Also, make sure to **use the instructor email address**: armond.duwell@mso.umt.edu . If I don't receive a copy of the homework before class on Tuesdays, I will consider it late, and it will not be accepted.

I will be posting the assignments on Moodle as well as any changes in schedule.

Grading

Your final grade will consist of 20% HW, 20% (almost weekly) Quizes, 30% Midterms, 30% Final Exam. Homework will be due on Tuesday before class. No late assignments will be accepted. The midterms are **tentatively** scheduled 10/3 and 11/2 and the Final is firmly scheduled for 10:10-12:10 Thursday 12/14. The midterm dates are tentative, and will be subject to change. The final will be cumulative, with a weight on material from the second half of the course. Make up exams will be given only in the case of extreme circumstances, i.e. severe illness, family death, etc. ***Proof of extreme circumstances is required in order for me to schedule a make up exam.*** For those of you that work, please make arrangements now so there will be no conflict of interest on exam dates.

If you want to do well in this class, you will do your homework every week, turn it in one time, figure out why you didn't manage to get full credit, ***and redo the problems that you missed after we discuss them in class***. If you don't constantly go back and correct deficiencies in understanding, you will get behind and have severe difficulties catching up. I will allow you to redo your homework and turn it in one week after it was due. I will give you half the points back, ***but only if you turn in a perfect assignment.*** I will *not* give you any points back for a less than *perfect* redo assignment.

Attendance and Etiquette:

Attendance is crucial in this course. Practicing problems is and watching them be solved are key to doing well in class. You are expected to arrive on time, stay for the duration of class and participate in discussion. If you have to leave early, please tell me at the beginning of class and sit close to the exit to minimize the disturbance to the class. Cell phones should be turned off for the duration of class. You will be asked to leave if you are doing anything not relevant for class, e.g. reading the newspaper, sleeping, doing work for other classes, etc.

If you do have to miss a class, it is YOUR responsibility to find out what was covered, learn that material, and prepare for the next class appropriately. Moodle will be the primary means by which I convey what material is covered and what you are responsible for preparing.

Academic Misconduct:

You are strictly held to the University of Montana Student Conduct Code (http://www.umt.edu.SA). The exams are closed-note: you may not consult anything but your own mind in order to answer questions on the exam. You may not use cell-phones, or any electronic devices to aid you, nor fellow students, nor fellow students' answers on exams, etc. You will receive no credit for any exam that you cheat on. Your conduct will also be reported to the Dean.

Drop policy

I adhere to the UM policy on dropping courses. Between the first and 45th instructional day, it is entirely your decision whether to drop the course or not. If you want to drop course between the 46th instructional day and the last instructional day prior to finals week, and you want me to recommend the drop, you will have to provide reasons that you should be allowed to drop the course. Acceptable reasons demonstrate that some (post 45th instructional day) circumstance *out of your control* interferes with your ability to complete the course. Simply not having done the work required of you, or belief that you do not think that you can get the grade you want, or that you need such and such grade to maintain your financial aid, are not sufficient reasons for me to recommend dropping the course after the 45th instructional day, though they might be prior to the 45th day.

Special Needs:

Students with disabilities will receive reasonable modifications in this course related to those disabilities. Your responsibilities are to request them from me with sufficient advance notice, and to be prepared to provide verification of disability and its impact from Disability Services. Please speak with me after class or during my office hours to discuss the details. For more information, visit the Disability Services for Students website at www.umt.edu/dss/ . Please inform me if you have any accessibility issues.

Tentative Schedule:

There are several dates to focus on in class. The **tentative** midterm dates are:

Midterm 1: Tuesday 10/3
Midterm 2: Thursday 11/2

The midterms dates are subject to change if I feel it is appropriate.

The final exam is on Thursday 12/14 10:10-12:10 and is cumulative. NOTE: I will not allow people to take the final exam early. I will NOT reschedule the final exam because you made travel plans that interfere with that time. Do not make travel plans that interfere with the final exam schedule.

Below is is a chronological list of what we will cover. For specific and up to date class information, look on Moodle. You are held responsible for staying up to date in class even if you were absent. If you are absent, please contact me as soon as possible to know what your current responsibilities are.

Topic 1

Introduction, Chapter 1, perhaps start Chapter 2

Learning goals*: Understanding formal first-order languages. Syntax of FOL: Predicate symbols, individual constants, function symbols. Examples of first-order languages: the blocks language.

Topic 2

Chapter 2

Learning goals: Understanding logical validity of arguments. How to show arguments are valid: Basic properties of the identity predicate: reflexivity, principle of the substitutability of identicals. Basic properties of other predicate symbols (transitivity, reflexivity, symmetry, inverse relations). Informal proofs. Fitch and formal proofs. How to show that arguments are not valid: the method of counterexamples.

Topic 3

Chapter 3

Learning goals: Translating sentences from English into FOL using the Boolean connectives. Expressive power of the Boolean connectives: "neither . . . nor —" and "not both . . . and —"; how to express complicated things using the blocks language and the Boolean connectives.

Topic 4

Chapter 4

Learning goals: Understanding logical truth, tautologies, and TW-necessities. Tautological equivalence, consequence, and validity. The method of truth tables, tautological equivalences: De Morgan's Laws and other equivalent trans-formations.

Proving tautological equivalence by a chain of equivalences. Negation, conjunctive and disjunctive normal forms.

Topic 5

Chapter 5, start Chapter 6

Learning goals: Proving arguments valid by informal and formal proofs. Basic properties of ∧ and ∨. Formal rules for ∧ and ∨.

Topic 6

Learning goals: Basic properties of ¬ . Indirect proof and formal proofs with ¬ . Arguments with inconsistent premises. Informal proofs about FOL. Formal proofs of tautologies. Strategies for formal proofs.

Topic 7

Chapter 7, start Chapter 8

Learning goals: Truth tables for → and ↔ . Translations from English to FOL using the conditionals. Conversational implicature. Rules for formal proofs involving → and ↔ .

Topic 8

Chapter 8, perhaps start 9

Topic 9

Chapter 9

Learning goals: Understanding syntax and semantics of quantifiers: well-formed formulas, free and bound variables, satisfaction. The Aristotelian forms. Simple translations.

Topic 10

Chapter 10

Learning goals: The truth-functional form algorithm: when are sentences of FOL tautologies? The replacement method. First-order interpretations. First-order validity and consequence. Constructing first-order interpretations. Using Venn diagrams to specify interpretations. Relations between logical notions.

Topic 11

Chapter 11

Learning goals: Meaning and use of multiple occurrences of the same quantifier. Translation mistakes: different variables does not mean different objects. Meaning and use of mixed quantifiers. The step-by-step method of translation. Understanding why the order of quantifiers matter, ambiguity. Expressing complicated properties using quantifiers.

Topic 12

Chapter 13

Learning goals: Understanding and applying the introduction and elimination rules for ∃, ∀ . Strategies for proofs with quantifiers. Proofs with multiple and mixed quantifiers. Proofs with identity.

Topic 13

Chapter 14
Learning goals: Understanding numerical quantification: how to express 'there are exactly/at most/at least n things of a certain kind.' Russell's and Strawson's analyses of definite descriptions. How to express 'both' and 'neither' in FOL.

* Statements of Learning Goals are taken from Richard Zach's website (U Calgary).