General Course Information

Course number: 80-211
Time: MWF, 11:30 – 12:20
Room: Porter Hall 226B

<table>
<thead>
<tr>
<th>Name</th>
<th>Edward Dean</th>
<th>Sebastian Stranahan</th>
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<tbody>
<tr>
<td>Office</td>
<td>Baker Hall 143</td>
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<tr>
<td>OH</td>
<td>Monday 1:00 – 3:00</td>
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<tr>
<td>Email</td>
<td>edean@andrew</td>
<td>sstranah@andrew</td>
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Course Website

The course website is accessible from the “Teaching” section of the instructor’s homepage:

http://www.andrew.cmu.edu/user/edean/

Important information will be posted there as the semester progresses. Please check for updates routinely.

Required Texts

The following should be available at the CMU bookstore (and elsewhere):

- E. J. Lemmon. *Beginning Logic*.
About this Course

This course is, first and foremost, an introduction to symbolic logic. We will investigate, in turn, the propositional calculus and the predicate calculus. The latter encompasses the former, and in its formal language we can express much of what we can express in ordinary language. Our formal, symbolic methods allow us to examine rules of reasoning in a very precise manner. Moreover, we will find that exploring mathematical reasoning in the light of our formal logic is a fruitful endeavor. During the course, you will be exposed to elements of set theory, arithmetic and the concept of computability.

Course Requirements

Homework: Typically, there will be problem sets assigned each week, due one week later. Assignments will be posted on the course website. No late homeworks will be accepted. However, your lowest two (2) problem set grades will be dropped.

Exams: There will be two midterm exams and a final exam. Each exam is cumulative up to that point in the course.

Participation: You will be expected to show up to class on a regular basis, to be prepared, and ready to (at least attempt to) answer questions I might pose to you. Do keep up with the material as we progress. This course is of a mathematical nature, and the concepts that we will be covering will build rather directly on preceding ones.

These components are weighted as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
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<tbody>
<tr>
<td>Homework</td>
<td>45%</td>
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<tr>
<td>Midterm 1</td>
<td>10%</td>
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<tr>
<td>Midterm 2</td>
<td>15%</td>
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<tr>
<td>Final Exam</td>
<td>25%</td>
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<tr>
<td>Participation</td>
<td>5%</td>
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Each individual assignment will be graded on a 100 point scale. Unless otherwise specified, the following correspondence holds:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
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<tbody>
<tr>
<td>A</td>
<td>90–100</td>
</tr>
<tr>
<td>B</td>
<td>80–89.9</td>
</tr>
<tr>
<td>C</td>
<td>70–79.9</td>
</tr>
<tr>
<td>D</td>
<td>60–69.9</td>
</tr>
<tr>
<td>R</td>
<td>0–59.9</td>
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</tbody>
</table>

(Depending on overall student performance, the grades for a particular exam may be distributed differently.) Your total course grade is then on this same 100 point scale, with individual assignments weighted as above.
Tentative Schedule

The following schedule is subject to change, but gives more than a rough idea of where we will be when.

January 11: Introduction

PART I: Propositional Calculus, Taste of Set Theory

January 13: The nature of logic: arguments, logical form, validity (Lemmon 1–5)
January 15: Conditionals and negation: rules A and MPP (Lemmon 5–12)
January 18: Rules MTT, DN and CP; Certain fallacies (Lemmon 12–18)
January 20: Conjunction, disjunction: rules &I, &E, ∨I (Lemmon 19–22)
January 22: Rules ∨E, RAA (Lemmon 22–27)
January 25: Biconditional, necessary/sufficient conditions (Lemmon 28–33)
January 27: Formation rules, theorems (Lemmon 42–53)
January 29: Substitution instances, theorem/sequent intro. (Lemmon 53–58)
February 1: Derived rules; Summary of syntax (Lemmon 58–62)
February 3: Truth-tables, truth-functional validity (Lemmon 64–73)
February 5: Consistency and completeness I (Lemmon 75–91)
February 8: Consistency and completeness II (same)
February 10: Variables and sets (Velleman 26–33)
February 12: Operations on sets (Velleman 34–41)
February 15: MIDTERM 1

PART II: Predicate Calculus, A Bit More Set Theory

February 17: Logical form 'all' and 'some' (Lemmon 92–102)
February 19: Universal quantifier (Lemmon 104–109)
February 22: Existential quantifier (Lemmon 111–116)
February 24: Proofs with quantifiers (Lemmon 117–127)
February 26: General quantifier arguments (Lemmon 128–137)
March 1: Formation/derivation rules (Lemmon 138–146)
March 3: Theorems, substitution instances (Lemmon 148–155)
March 5: More operations on sets (Velleman 73–81)
March 17: Ordered pairs and Cartesian products (Velleman 163–170)
March 19: Relations (Velleman 171–178)
March 22: Interpretations (Lemmon 155–158)
March 24: Consistency and completeness I
March 26: Consistency and completeness II
March 29: MIDTERM 2

PART III: Further Topics (Flexible)

March 31: Modelling computation I
April 2: Modelling computation II
April 5: Undecidability of the predicate calculus
April 7: Mathematical induction (Velleman 260–265, 270)
April 9: Identity (Lemmon 159–167)
April 12: Axioms for the natural numbers
April 14: Incompleteness, undecidability
April 19: Functions (Velleman 226–233)
April 21: One-to-one and onto (Velleman 236–243)
April 23: Properties of relations (Lemmon 179–187)
April 26: Equinumerous sets (Velleman 306–312)
April 28: Countable and uncountable sets (Velleman 315–321)
April 30: REVIEW (Bring questions)
Cell Phones and Laptops . . .

are wonderful devices. But your fingers should not touch these during class. (If you can demonstrate that using a laptop is necessary for your learning, that is fine, but please do so in advance. Otherwise use of these instruments will lead me to assume that you are paying no attention at all.)