September 6, 2013

TO: Members of the Core Curriculum Committee

FROM: Dr. Frank Fair, Philosophy Program Coordinator

CONCERNING: Background for the request to allow the Introduction to Contemporary Logic course to count as an option in Core Curriculum Mathematics Area

Over the past several years, the practice had arisen of accommodating students with severe learning disabilities, those which had been certified as such by the Services for Students with Disabilities (SSD) Director, by allowing them to substitute the Introduction to Contemporary Logic course for a mathematics course in order to meet their Core Curriculum mathematics requirement.

In early July, Dr. Eglsaeer told me that, in consultation with the SSD Director, it had been decided to continue that accommodation, and he asked me to submit an application to have the Introduction to Contemporary Logic course be available as an option in the Mathematics component of the new Core Curriculum. Hence, the request you have before you.

In order to avoid confusion, please note that, independently and some months earlier, after discussion with faculty members teaching the course, we sent forward a request through the CHSS Curriculum Committee to the University Curriculum Committee to have the number of the Introduction to Contemporary Logic course changed from PHIL 3362 to PHIL 2352. The change was to make room for a "Logic II" course at the upper division level, if there was sufficient student interest, and to be in step with our sister institutions such as the University of Houston and TAMU that have their Introduction to Logic courses listed at the 2000 level.

Also, we have since hired two new faculty members starting this fall who will be teaching this course in the Fall 2014 semester, and I should note that on Tuesday, September 3, I met with them and got their feedback about the application and their consent to the specifics of the description of the course, including how topics will be addressed and assessed.

So, assuming that this application is approved, we will be ready to accommodate those students who are certified by the SSD Director at the start of the Fall 2014 semester by allowing them to enroll in PHIL 2352 Introduction to Contemporary Logic.
PART I – Course Information

Course Type
☒ Existing/Restructured
☐ New Course Proposed Fall 2013

If new, have you submitted a Form B to the SHSU Curriculum Committee? ☐ Yes ☐ No

Course Prefix & Number: PHIL 2352

Texas Common Course Number (TCCN Matrix): None

Course Title: Introduction to Contemporary Logic

Course Catalog Description (Copy and paste from online catalog for existing courses):

[PHIL 3362] PHIL 2352 introduces the student to the principles of ordered thought and to the terminology and rules of symbolic logic. Discusses the logic of statements and the logic of predicates, quantifiers, and identity. Credit 3. [NOTE: A request to change PHIL 3362 to PHIL 2352 was made independently in the Spring 2013 semester. The rationale for the number change is that the renumbering of the introductory mathematical logic course corresponds better to the level of the course content, and it opens space for a “Logic II” course at the upper level should there be sufficient interest. Numbering the course at the lower-division level also corresponds to the approach U. of Houston (PHIL 1321) and TAMU (PHIL 240). It should be noted that at TAMU PHIL 240 Introduction to Logic is listed as an option to fill 3 hours of the 6 hour core curriculum Mathematics requirement.]

Course Prerequisites: None

Available Online?
☒ Yes, currently developed in online delivery mode
☐ Anticipated development in online delivery mode (Semester, Year:    )
☐ No

Number of Sections to be Offered per Academic Year: 4

Estimated Enrollment per Section: 35

Course Level (freshman, sophomore): Sophomore

Designated Contact Person (for follow-up communication purposes): Frank Fair

E-Mail Address: psy_ffk@shsu.edu

Phone: 936-294-1509

Approvals

Department Chair: ____________________________

Signature: ____________________________

Date: 9-7-13

Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271
CORE CURRICULUM COMPONENT APPLICATION
Sam Houston State University

Academic Dean: [Signature] 9/7/13

Page 2 of 10
Submit completed, signed form to Core Curriculum Committee - Box 2478 or Fax 4-1271
PART II – THECB Foundational Component Areas

See Appendix for full description of each component area.

Select Component Area: II. Mathematics

In one paragraph, describe how the proposed course will fulfill the core and skill objectives of the component area:
Modern symbolic logic developed in the 19th and 20th centuries as a result of mathematicians' efforts to clarify mathematical inferences and the foundations of mathematics. Thus in the 19th century mathematicians such as Boole and Frege advanced our capacity to clarify inferences by symbolizing them, and in the 20th century Whitehead and Russell's monumental treatise in logic, Principia Mathematica, explored the foundations of mathematics in detail. PHIL 2352 Introduction to Contemporary Logic is an introduction to that body of work. One of the central concepts in mathematical reasoning is the concept of proofs. Students in PHIL 2352 will be routinely doing homework assignments which require them to symbolize statements to clarify their meaning and then to construct proofs, using not only rules such as Modus Tollens (From two statements IF p, THEN q and NOT q, infer NOT p), but also conditional and indirect proofs. These techniques were first employed by Greek mathematicians to prove, for example, that the square root of 2 is an irrational number. It might also be noted that in the hands of Alan Turing and others modern symbolic logic was the inspiration for what became, toward the middle of the 20th century, the discipline of Computer Science. While a typical PHIL 2352 course will emphasize a grasp of deductive logic and the related skills of constructing proofs, the course will also include some consideration of the logic of hypothesis testing and other aspects of inductive logic. Thus critical thinking skills such as clarifying meaning and distinguishing between valid and invalid deductive and inductive arguments will be emphasized. Communication skills, both written and oral, will be reinforced by requiring the students to provide written solutions to homework problems and discussing those solutions in class. Empirical and quantitative skills will be emphasized by a focus on the logic of hypothesis testing and using samples to support generalizations.

PART III – Course Objectives & Student Learning Outcomes (SLO)

Insert the applicable course objectives stated as student learning outcomes (e.g., Students completing the course will be able to...) that support the core component area objectives. Please reference the component rubric for additional information on core component area objectives.

Objective/SLO 1: Students successfully completing this course will gain an understanding of the concepts and methods of symbolic logic. They will be able to use that logic to express patterns and relationships and to clarify ordinary language statements. While some of the material in this course will overlap with the material covered in MATH 1332 (see the MATH 1332 application for a list of topics such as deductive vs. inductive reasoning, logical connectives and truth-tables, conditional statements and quantifiers, valid and invalid arguments), PHIL 2352 will cover these items and others in greater depth since logic is the entire focus of this course.
How will the objective be addressed (including strategies and techniques)?
Through weekly homework and in-class examples, the student will learn how to translate natural language sentences into symbolic form, understand the truth-functional connectives through the truth-table method, and learn how to use symbolic logic to remove ambiguity in ordinary language.

Describe how the objective will be assessed: Quizzes and exams will be designed across all sections of the course which demonstrate proficiency in solving problems of: (1) translating sentences from natural language to symbolic form, ex: “All socialist economies have government-controlled markets” to “\(\forall x [(Ex \land Sx) \rightarrow (Mx \land Gx)]\); (2) understanding the semantics of the logical connectives and their truth-functions, ex: “\(p\) and \(q\)” is true when “\(p\)” and “\(q\)” are both true, otherwise it is false; and (3) removing ambiguity from ordinary language sentences, ex: a doctor’s verbal order, like “surgery or radiation with chemotherapy” to differentiate between “\((p \lor q) \land r\)” and “\(p \lor (q \land r)\).” Instructors will incorporate a common subset of problem types in the final exam of each section.

Objective/SLO 2: Students successfully completing this course will have gained skills at constructing multi-step logical proofs for arguments—a skill vital not only to mathematics, but also the legal profession, science, medicine, etc.

How will the objective be addressed (including strategies and techniques)?
Through weekly homework and in-class examples, the student will learn how use deductively valid rules to construct proofs to derive conclusions from a given set of premises.

Describe how the objective will be assessed: Quizzes and exams will be designed across all sections of the course which demonstrate proficiency in solving problems of: (1) identifying and applying standard rules of deduction, such as modus ponens (from “\(if p \land q\)” and “\(p\)” infer “\(q\)” and modus tollens (from “\(if p \land q\)” and “\(not-q\)” infer “\(not-p\)” and (2) understanding and using proof methods, such as conditional proof (if from an assumption “\(p\)” another statement “\(q\)” can be derived from the premise set, then “\(if p \text{ then } q\)” is true) and reductio ad absurdum (if a given hypothesis deductively arrives at a contradiction from the premise set, that assumption is false). Instructors will incorporate a common subset of problem types in the final exam of each section.

Objective/SLO 3: Students successfully completing this course will come to a familiarity with the basics of inductive arguments, including being able to articulate the distinction between inductive and deductive reasoning and being able to recognize different types of inductive arguments and critical factors regarding each.

How will the objective be addressed (including strategies and techniques)?
Through weekly homework and in-class examples, the student will come to recognize, distinguish, and evaluate the strength of various inductive arguments.

Describe how the objective will be assessed: Quizzes and exams will be designed across all sections of the course which demonstrate proficiency in solving problems of: (1) recognizing the difference between inductive and deductive arguments; (2) differentiating types of inductive arguments, ex: statistical, causal, analogical, etc.; and (3) understanding critical factors regarding each, ex: how to properly generalize from a sample, how to test a scientific
hypothesis, the difference between strong and weak analogies, etc. Instructors will incorporate a common subset of problem types in the final exam of each section.

Objective/SLO 4:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:
Objective/SLO 5:

How will the objective be addressed (including strategies and techniques)?

Describe how the objective will be assessed:

PART IV – THECB Skill Objectives

Address each of the THECB skill objectives required within the component area. Explain how the skill is addressed, including specific strategies to address the skill(s). Address all skill objectives associated with the selected Component Area. (See Appendix)

1. Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information

How will the skill be addressed (including specific strategies, activities, and techniques)? The PHIL 2352 course emphasizes basic aspects of critical thinking by giving students consistent practice in systematic, structured thinking wherein each step of inference is assessed for its validity. Also, the practice of translating ordinary language statements into symbolic language of necessity compels giving careful attention to determining what exactly the statements express, another basic critical thinking skill. In addition, the critical thinking skill of being able to distinguish valid patterns of inference such as Modus Tollens (Denying the Consequent) and nonvalid patterns such as Affirming the Consequent is an integral feature of the course.

2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication

How will the skill be addressed (including specific strategies, activities, and techniques)? Communication skills will be reinforced with practice since students will regularly be doing homework problems that require written responses. Also students will routinely be called upon to present their responses to the class, orally on some occasions and, on other occasions, visually with diagrams on the board.

3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions

How will the skill be addressed (including specific strategies, activities, and techniques)? In the inductive logic portion of the course empirical and quantitative skills will be emphasized as students become familiar with the logic of hypothesis testing, in particular the need to present falsifiable hypotheses, and as they practice applying basic concepts of sampling, experimental design, and probability to situations that model real world circumstances.
4. **Teamwork**: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

How will the skill be addressed (including specific strategies, activities, and techniques)?

N/A
5. **Personal Responsibility**: to include the ability to connect choices, actions and consequences to ethical decision-making

How will the skill be addressed (including specific strategies, activities, and techniques)?
N/A

6. **Social Responsibility**: to include intercultural competence, knowledge of civic responsibility, and the ability to engage effectively in regional, national, and global communities

How will the skill be addressed (including specific strategies, activities, and techniques)?
N/A

**PART V – SHSU Core Curriculum Committee Requirements**

1. Using a 15-week class schedule, identify the topics to be covered during each week of the semester. Provide sufficient detail to allow readers to understand the scope and sequence of topics covered.

<table>
<thead>
<tr>
<th>Week</th>
<th>Unit I: An Introduction to Basic Concepts of Deductive Logic, and to Identifying Arguments, Symbolizing Statements, and Constructing Truth Tables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Week 2</td>
<td>Homework problems involving inferences using IF, OR, and AND</td>
</tr>
<tr>
<td>Week 3</td>
<td>Truth tables, tautologies, contradictions</td>
</tr>
<tr>
<td>Week 4</td>
<td>First Exam. Begin Unit II Mapping the structure of arguments with appropriate diagrams and validating the arguments through proofs</td>
</tr>
<tr>
<td>Week 5</td>
<td>Using Implicational rules such as Modus Ponens and Modens Tollens in constructing proofs</td>
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<tr>
<td>Week 6</td>
<td>More on using implicational rules in constructing proofs.</td>
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<tr>
<td>Week 7</td>
<td>Using Equivalence rules such as DeMorgan’s Laws in constructing proofs</td>
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<tr>
<td>Week 8</td>
<td>Second Exam. Begin Unit III Proofs using techniques of conditional proofs and indirect proofs (reductio ad absurdum)</td>
</tr>
<tr>
<td>Week 9</td>
<td>An introduction to predicate logic.</td>
</tr>
<tr>
<td>Week 10</td>
<td>Standard forms of categorical statements—All F’s are G’s, Some F’s are G’s, No F’s are G’s, and Some F’s are not G’s in quantification notation. The Square of Opposition traditionally understood and its modern interpretation</td>
</tr>
<tr>
<td>Week 11</td>
<td>Demonstrating invalidity. The Third Exam. Unit IV Further developments in predicate logic: Relations,</td>
</tr>
<tr>
<td>Week 12</td>
<td>The logic of quantifier negation, symbolizing relations and their properties of transitivity, symmetry, and reflexivity.</td>
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<tr>
<td>Week 13</td>
<td>Proofs involving relations and symbolizing statements involving the identity relation. Fourth exam</td>
</tr>
<tr>
<td>Week 14</td>
<td>Begin Unit V Logic and inductive reasoning. The logic of hypothesis testing. Sampling and generalizing.</td>
</tr>
<tr>
<td>Week 15</td>
<td>The rules of probability and Bayes’ theorem with applications to breast cancer screening and DNA “fingerprinting.”</td>
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</tbody>
</table>

2. **Attachments (Syllabus Required)**
Syllabus Attached?  ☒ Yes  ☐ No

Other Attached?  ☒ Yes  ☐ No  If yes, specify: A cover letter explaining the genesis of this request, an example Unit IV exam, an example of the final, comprehensive exam which covers material from Unit V in addition to earlier units, and a copy of the Table of Contents of the most widely-used Introduction to Logic text by Irving Copi et al.
Appendix: THECB Component Area Descriptions and Skill Requirements

I. Communication (Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience.)

II. Mathematics (Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience.)

III. Life and Physical Sciences (Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on human experiences.)

IV. Language, Philosophy, and Culture (Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures.)

V. Creative Arts (Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art.)

VI. American History (Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role.)

VII. Government/Political Science (Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations.)

VIII. Social and Behavioral Sciences (Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human. Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture.)

Required Skill Objectives

<table>
<thead>
<tr>
<th>Foundational Component Areas</th>
<th>Critical Thinking</th>
<th>Communication</th>
<th>Empirical &amp; Quantitative</th>
<th>Team Work</th>
<th>Social Responsibility</th>
<th>Personal Responsibility</th>
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</thead>
<tbody>
<tr>
<td>Communication</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>Mathematics</td>
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<td>✓</td>
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<tr>
<td>Life and Physical Sciences</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
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<tr>
<td>Language, Philosophy &amp; Culture</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Creative Arts</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>American History</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Government/Political Science</td>
<td>✓</td>
<td>✓</td>
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<td></td>
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<tr>
<td>Social and Behavioral Sciences</td>
<td>✓</td>
<td>✓</td>
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</tbody>
</table>
Generic Syllabus for PHIL 2352: Contemporary Logic Semester
Instructor contact information:

CATALOGUE COURSE DESCRIPTION: PHIL 2352 Introduction to Contemporary Logic. Introduces the student to the principles of ordered thought and to the terminology and rules of symbolic logic. Discusses the logic of statements and the logic of predicates, quantifiers, and identity. Credit 3. [NOTE: Formerly this course was taught as PHIL 3362.]

COURSE OBJECTIVES: (a) to acquaint students with modern first-order propositional logic and predicate logic, the background of all of today’s computer programming languages, (b) to give students a thorough grasp of fundamental concepts of logic such as deductive validity, truth functions, and quantifiers, (c) to give students opportunities to practice the skills that are required to construct rigorous proofs, (d) to explore philosophical topics connected with logic such as the nature of truth.

TEXTS AND OTHER REQUIRED MATERIALS:
1. The Power of Logic 3rd edition by C. Stephen Layman
2. Logic Made Easy by Deborah Bennett
3. Calculated Risks by Gerd Gigerenzer

4. VERY IMPORTANT: The textbook comes with an online resource for students at http://highered.mcgraw-hill.com/sites/0072875827/student_view0/logic_tutor_home.html as part of the website for the book. The LogicTutor gives feedback on attempted solutions for a number of the problems that will be assigned as homework. This is very important because getting feedback promptly while attempting the homework problems promotes learning. NOTE: We will not be using PageOut.

5. IMPORTANT: The Reason1able Argument mapping software on the SHSU computer system and tutorials on using the software at the Reason1able website. Access to these materials is described on a separate handout.

6. There may at times be material on electronic reserve at the library. To access this material, go to the SHSU homepage and click on the Library button. Next click on the Resources button. You will see then a button for Electronic Reserves. Follow the directions to locate the material on reserve for this class PHL 362 under my name. Then you will need a password, which I will get from the ERES librarian. The materials are in pdf files which require Adobe Acrobat reader to download.

7. There will be a number of items posted on Blackboard, including the syllabus, some standard policies, directions for how to access the Reason1able argument mapping software, review sheets for exams, announcements, homework assignment schedules, etc. IMPORTANT: You need to check your student email account regularly.

GRADING: The grading scale is: 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D, below 60 = F.

Exams: There will be four major exams plus a final exam. Each of the five exams will count 100 points for a total of 500. Each test is announced in advance and there will ordinarily be a class period set aside for review before each exam. The final average is a result of adding the point total for the exams to the point totals for the items described below and then dividing by 5 for the final average.

Homework: there will be a number of homework assignments that will each add one point to the overall point total for an assignment acceptably done. That means every problem attempted and turned in on time. LATE OR INCOMPLETE WORK IS NOT ACCEPTED. Assignments not done acceptably will subtract one point from the overall point total.

Class participation: there will be occasional extra credit for class participation, by asking informed questions and making informed comments, and by participating in problem solving on the blackboard. With regard to the latter, credit is one point for writing a proof on the blackboard and one point for discovering a flaw in a proof written on the blackboard.

MAKE-UPS: I hate to give make-up exams. If I give one, it is likely to be longer and harder than the regular test since you would have more time to prepare for it. You must have valid reason for missing an
Another test the same day, for example, does not count. If you must miss a test, please let me know your reason for missing it. YOUR EXCUSE MUST BE WRITTEN AND APPROPRIATELY DOCUMENTED. AN EXCUSE THAT DOES NOT WITHSTAND VERIFICATION WILL RESULT IN A GRADE OF ZERO FOR THAT EXAM. If your excuse is valid, then we will make necessary arrangements for you to take a make up exam as soon as possible.

ABSENCES: In accordance with University regulations, I take roll every period. I make no use of the absence record in determining grades. However, if you do not attend class, YOU MUST DROP THE COURSE; otherwise you will receive an F. The last day to drop a course is Wednesday, October 11.

STANDARD POLICIES: Each of these standard policies is stated in full on the Blackboard website for this course under Course Documents. I have extracted the full statement as a reminder of the policy in its entirety, but the student must download the posting on Blackboard to have the full policy statement. Here are the six standard policy matters:
1. NOTICE TO PERSONS WITH A DISABILITY: No accommodation can be made until you register with the Counseling Center. There will be no retroactive accommodations.
2. ACADEMIC DISHONESTY: Any student found guilty of dishonesty in any phase of academic work will be subject to disciplinary action.
3. CLASSROOM RULES OF CONDUCT: Students are expected to assist in maintaining a classroom environment that is conducive to learning.
4. VISITORS IN THE CLASSROOM: It is at the instructor’s discretion whether or not he/she will be allowed to remain.
5. ABSENCE ON RELIGIOUS HOLY DAYS: A student desiring to be excused from class in order to observe a religious holy day(s) shall present in advance to each instructor involved a written statement concerning the religious holy day(s).
6. COURSE EVALUATIONS: In accordance with University policy, students will have an opportunity near the end of the semester on a set day and time to complete a course evaluation.

TENTATIVE SCHEDULE
August
Unit I: An Introduction to Basic Concepts of Deductive Logic, and to Identifying Arguments, Symbolizing Statements, and Constructing Truth Tables
Mon 21 Introduction to the course. The classical concept of deductive validity.
Wed 23 Read Power of Logic (POL) Chap. 1 pp. 1-20. Assignment #1: (Ex. 1.1 Part A, Ex. 1.1 Part C, and Ex. 1.2. In all three of these sections DO THE EVEN NUMBERED PROBLEMS only and do not do the ones done in the back of the book. NOTE: this is due to be turned in TODAY.)
Fri 25 Read POL Chap. 1 pp. 21-36 Assignment #2: (Ex. 1.3 Part A EVENS ONLY and Part C EVENS ONLY.) Read Logic Made Easy (LME) Introduction: Logic is Rare.

Mon 28 Read POL Chap. 1 pp. 37-45 and Chap. 2 pp. 47-53. Assignment #3: (Ex. 1.4 Part C evens and 2.1 evens). Read LME Chap. 1 Proof and LME Chap. 6 When Things Are IFFY
Wed 30 Read POL Chap. 2 pp. 53-75 Well-crafted arguments. Assignment #4: (2.2 Part A evens) Read LME Chap. 7 Sylogisms Involving IF, AND, and OR, just to p. 134.

September
Fri 1 Read POL chap. 7 pp. 247-263 Symbolizing English Arguments. Assignment #5: (Do the evens in Ex. 7.1 Part C and Part D) Read LME Chap. 9 Symbols That Express Our Thoughts
Mon 4 Labor Day Holiday
Wed 6 Read POL 263-280 Truth Tables. Assignment #6: (Do Ex. 7.2 #12-#24 evens and do Ex. 7.3 Part A #2-#12 evens and Part C evens.) Read LME Chap. 10 Logic Machines and Truth Tables
Fri 8 Read POL 287-294 Tautology, Contradiction, Contingency, and Logical Equivalence. Assignment #7: (Do Ex. 7.5 Part A evens and Part C evens)

Mon 11 Review for First Exam.
Wed 13 FIRST EXAM—100 points—one fifth of final grade

Unit II: Mapping The Structure of Arguments and Validating Them Through Proofs
Fri 15 POL Chap. 2 pp. 78-80 Argument Diagramming. Access the ReasonIAbLe website at austrink.com and access the ReasonIAbLe software on the SHSU system. Assignment #8: (Use the
Reason!Able software to diagram arguments 1.1, 1.2, 1.3, 1.4, 1.5, 1.6 in Tutorial 1 from the Reason!Able website. You will of course need to read the discussion in Tutorial 1 before you attempt the diagramming. Write notes to compare your diagrams with the models.

Mon 18 Assignment #9: (Use Reason!Able to diagram arguments 2.1, 2.2, 2.3, 2.4 in Tutorial 2. Compare your diagrams with the models.)

Wed 20 Assignment #10: (Use Reason!Able to map arguments 3.1, 3.2, 3.3, and 3.4 in Tutorial 3. Compare your diagrams with the models.)

Fri 22 Read POL Chap. 8 pp. 297-307 on Implicational Rules of Inference. Assignment 11: (Ex. 8.1 Part A evens and Part C #2, #6, and #8)

Mon 25 Read POL Chap. 8 pp. 313-320 Five Equivalence Rules. Assignment #12: (8.1 Part D #2-#20 evens and Part E evens)

Wed 27 Assignment #13: (Ex. 8.2 Part A evens and Part C #2-#12 evens)

Fri 29 Go to http://austhink.com/argumentmapping/index.htm#whyneed and then scroll down and click on "Enhancing Our Grasp of Complex Arguments"—a paper by Paul Monk and Tim van Gelder. Make a copy of this paper on argument mapping, read it, and bring it to class. Assignment #14: (Write up a "well-crafted" summary of their argument and an evaluation of their argument. How cogent is it? What are its strengths? Weaknesses? Be specific!)

October

Mon 2 Assignment #15: (Ex. 8.2 Part C #14-#24 evens and Part D #2 and #6). Review for Second Exam.

Wed 4 SECOND EXAM—100 points—one fifth of final grade.

Unit III: More Proof Techniques, an Intro to Predicate Logic, and a look at Aristotle’s Logic

Fri 6 Read POL Chap. 8 pp. 326-335 Five More Equivalence Rules. Assignment #16: (Ex. 8.3 Part A evens and Part C evens)

Mon 9 Read POL Chap. 8 pp. 338-344 Conditional Proof (CP). Assignment #17: (Ex. 8.3 Part E evens and Ex. 8.4 #2, #6, and #8)

Wed 11 Last Day to Drop. Read POL Chap. 8 pp. 345-355 Reductio ad Absurdum (RAA) and a handout on RAA arguments. Assignment #18: (Ex. 8.4 Part B #2 and #4 and Ex. 8.5 Part A #2-#20 evens)

Fri 13 Read POL Chap. 9 361-376 Predicates and Quantifiers. Assignment #19: (I STRONGLY RECOMMEND THAT YOU USE LOGIC TUTOR to check a number of your responses to Ex. 9.1 Parts A and B. THESE ARE NOT TO BE TURNED IN BUT ARE TO CHECK YOUR UNDERSTANDING. THE HOMEWORK TO BE TURNED IN IS Ex. 9.1 Part C evens.)

Mon 16 Read POL Chap. 5 pp. 167-175 Standard Forms of Categorical Statements. Assignment #20: (Ex. 9.1 Part D evens). Read LME Chap. 2 ALL and Chap. 3 A NOT Tangles Everything Up

Wed 18 Read POL Chap. 5 pp. 175-181 and read a handout on The Traditional Square of Opposition vs. the Modern. Assignment #21: (Ex. 9.1 Part F evens). Read LME Chap. 4 SOME is Part or All of ALL

Fri 20 Read POL Chap. 9 377-386 Demonstrating Invalidity. And also read LME Chap. 5 Syllogisms, but just pp. 73-80 and pp. 89-95.

Mon 23 Assignment #22: (POL Ex. 9.2 Part B evens)

Wed 25 Review for Third Exam

Fri 27 THIRD EXAM—100 points—one fifth of final grade

UNIT IV: Further Developments in Predicate Logic: Relations, Identity, and Fuzzy Logic

Mon 30 Read POL Chap. 9 pp. 386-406 Constructing Proofs. Assignment #23: (Ex. 9.3 Part A evens and Part C evens)
November

Wed 1 Read POL Chap. 9 pp. 407-415 Quantifier Negation, RAA, and CP. Assignment #24: (Ex. 9.3 Part D evens and Part E evens)
Fri 3 Read POL Chap. 9 pp. 416-424 The Logic of Relations: Symbolizations. Assignment #25: (Ex. 9.4 Part A evens #2-#18 and Part C all of #8-#12)

Mon 6 Read POL Chap. 9 pp. 425-434 The Logic of Relations: Proofs. Assignment #26: (Ex. 9.5 Part A All of them and Part B evens)
Wed 8 Read POL Chap. 9 pp. 435-441 Identity: Symbolizations. Read LME Chap. 8 Series Syllogisms and Assignment #27: (Ex. 9.6 Part B evens and Part C #2 and #12)
Fri 10 Read POL Chap. 9 441-447 Identity: Proofs. Assignment #28: (Ex. 9.8 Part A evens and Part B #8 and #10)

Mon 13 Continue proofs with identity
Wed 15 Review for Fourth Exam.
Fri 17 FOURTH EXAM—100 points—one fifth of final grade

Unit V: Logic and Inductive Reasoning


Wednesday 22—Sunday 26 Thanksgiving Holidays

Mon 27 Read POL Chap. 10 pp. 449-464 Induction, Arguments from Authority, Induction by Enumeration. Read a handout on the General Logic of Comparative Experimentation and also read a handout on Sampling and Generalizing. Assignment #29: (Ex. 10.2 evens)

Wed 29 Read POL Chap. 11 pp. 489-505 Three Theories of Probability and The Rules of Probability and read GG Chap. 3 Innumeracy and Chap. 4 Insight. Assignment #30: (Ex. 11.2 Part A evens, Part B evens, and Part D evens)

December
Fri 1 Read POL Chap. 11 pp. 505-511 on Bayes' Theorem and a Handout on Bayes' theorem.
Assignment #31: (Ex. 11.3 Part A #2, #4, #6 and Part B #2 to #6)

Mon 4 Read GG Chaps. 5 Breast Cancer Screening, Chap. 6 (Un)informed Consent, Chap. 7 AIDS Counseling, and Chap. 10 DNA Fingerprinting
Wed 6 LAST CLASS DAY. Review for Final Exam.

Fri 8 No classes. Final Exam Study Day.

Wed 13 FINAL EXAM—100 points—one fifth of final grade 2:00 PM-4:00 PM
PHIL 2352: Introduction to Contemporary Logic

Unit IV Exam

[Point values are in the margins.]

16--1. Symbolize the premises and the conclusion of this argument and then use the logic of quantifiers and statements prove that it is valid:

(a) No nuclear power plants have solved the problem of nuclear waste disposal. (b) Some of the power plants in Texas are nuclear power plants, and, therefore, (c) some of the power plants in Texas have not solved the problem of nuclear waste disposal.

16--2. Symbolize the premises and the conclusion of this argument and then use the logic of quantifiers and statements prove that it is valid:

(a) All letters that will be mailed must have proper postage on them, but (b) none of the letters in the box have the proper postage on them, so (c) none of the letters in the box will be mailed.

16--3. Symbolize each of the following statements using the predicate logic symbols of constants, quantifiers, and predicates, and explain your symbols. Try to be somewhat detailed:

(a) Paris Hilton always wears designer jeans.

(b) Only good students take demanding courses.

(c) Someone does not love everybody.

(d) Mandy will go to the movies with Brett unless she has too much work to do.
8–4. For a three-valued logic using T, F, and ?, show how to construct the truth table for P v Q

16–5. (a) Explain the process used in Indirect Proof (Reductio ad Absurdum) and (b) use it to work this problem:

1. (∃x)(∀y)(Cx → ~Byx)    Premise
2. ~ (∃y)(∃x)~Byx         Premise    To Prove: ~ (y)Cy

12–6. Assume that you are using Zadeh's fuzzy logic and you have two statements Ra for "Allen is rich" and Ya for "Allen is young." Assume that in your view, Ra is 70% true and Ya is 30% true. Then tell what the fuzzy truth values are for the following statements and show how you got those values:

(a) Ra & Ya                  (b) Ra v Ya                        (c) Ra → Ya [Assume that this = ~Ra v Ya]

16–7. As an example of progress in logic (a) explain—with examples—the Traditional Interpretation of contraries, subcontraries, contradictories, and subalternates in the Square of Opposition and then (b) explain the Modern Interpretation.
PHIL 2352: Contemporary Logic Final Exam Semester

(NOTE: this exam is cumulative in that it calls on knowledge developed in all of the units of the course.

Point values for each question are in front of the question number.

8—1. Symbolize these statements using the symbolism of sentence logic and give a key for the symbols:

(a) Neither Helen nor Sarah was at the banquet.

(b) Roger will be able to ski the black diamond slope only if he gets some skiing lessons.

(c) General Motors will lay off thousands of workers unless GM can find another way to cut costs.

(d) Reagan and Roosevelt cannot both be the greatest President since Lincoln.

10—2. Symbolize these statements using the symbolism of predicate logic and give a key for the symbols:

(a) All turkeys are dumb.

(b) No turkey has hair.

(c) Some turkeys lay eggs.

(d) Some turkeys do not lay eggs.

(e) Santa Claus is a right jolly old elf.

(f) If Rudolph is a red-nosed reindeer, then Blitzen is a black-nosed reindeer.

8—3. Prove that these two syllogisms are valid arguments using predicate logic.

(a) No insurgency can be won by purely military means.
   Some conflicts the US is engaged in are insurgencies.
   So, some conflicts the US is engaged in cannot be won by purely military means.

(b) All terriers are smart.
   Some terriers are white.
   So, some white things are smart.
6--4. Explain the difference between the Traditional Square of Opposition and the Modern Interpretation of the Square of Opposition. In your explanation, focus on the relation of two statements that are contraries, and give a pair of statements to serve as examples.

8--5. Use DeMorgan's laws to solve the following problem:

1. \( Z \lor \neg P \)
2. \( \neg (A \land D) \rightarrow \neg Z \)
3. \( \neg A \)
4. \( Q \rightarrow R \)
5. \( \neg R \)  
   To Prove: \( \neg (P \lor Q) \)

8--6. Use Conditional Proof to solve this problem:

1. \( (x) (Ax \rightarrow Tx) \)
2. \( (x) [Tx \rightarrow (Cx \lor Bx)] \)
3. \( (x) (\neg Bx) \)  
   To Prove: \( (\exists x)(Ax) \rightarrow (\exists x)(Cx) \)
8—7. Show explicitly how to use the rules of probability to answer these two questions:

Rob can afford to go on a date this weekend only if Sandy pays back the money he owes Rob in time or Jim pays back the money he owes Rob. Rob estimates the chances that Sandy will pay back him back in time are pretty good at 80%, but the chances that Jim will pay him back are only 40%. Given that the two events are independent of each other and that they are not mutually exclusive, (a) show how to figure the chances that both Sandy and Jim will pay Rob back and (b) how to figure that chances that one or the other of them will pay him back.

10—8. (a) State Bayes’ theorem and explain the meaning of each part of the theorem, then (b) apply it to solve this problem:

Chris has a set of symptoms that include fever, aching bones, ringing in the ears, etc. People with this set of symptoms have a 20% chance of having a new kind of avian flu called type Z. There is a new test for Type Z that has a true positive rate of 95%, hence a false negative rate of 5%. It also has a false positive rate of 10%, and hence a true negative rate of 90%. Chris tests positive for Type Z. Given Bayes’ Theorem and the information above show how to calculate the probability that Chris has Type Z given the positive test result.

8—9. (a) In relation to hypothesis testing Give the simple logical patterns for refutation on the one hand and confirmation on the other. Explain which one has more logical power than the other. (b) Explain how the logic involved in refutation is more complex than the simple pattern. (c) Explain how the logic involved in confirmation is more complex than the simple pattern.
6—10. Professor Frothingslosh wants to do a survey of students at Mega State University about tail gate parties at football games. He gets a random sample of 500 from the MSU student data base using a random sampling based on student ID numbers. When he looks at his sample, he is dismayed to find that he has a sample of 437 male students and 63 female students. Explain what went wrong and what Prof. F could have done to try to prevent the problem.

20–11. You are a researcher at the Cat's Meow Institute of Veterinary Medicine. A colleague has created a new vaccine that he believes will have a powerful preventive effect on the occurrence of feline leukemia. You are to test the vaccine, and you have a sample of 500 cats to work with. Describe how you would set up the experiment to test the vaccine, and as you do this use and define each of the following concepts: (a) blocking, (b) confounding, (c) control, (d) null hypothesis, (e) statistically significant difference, and (f) level of significance.