Course Information

Course: Phil 110

Submitting Campus: Kapiʻolani Community College

Title & Catalog Description:
PHIL 110 Introduction to Deductive Logic is an introductory course in logic focusing on methods and principles of deductive reasoning. Integral to this study will be the presentation of methods for representing logical form and the development of a system of inference rules and strategies that allow for the determination of validity and invalidity of deductive arguments.

UHM Equivalent Course (check one): [Only equivalent courses may be submitted for Fast Track review.]

G PHIL 110 Introduction to Logic, Symbolic Reasoning

Symbolic Reasoning (FS) Hallmarks & Application Questions

Answer the following questions and submit the answers along with this form and at least one course syllabus.

1. Students will be exposed to the beauty, power, clarity and precision of formal systems. How will the course meet this hallmark?
2. Instructors will help students understand the concept of proof as a chain of inferences. How will instructors help students understand this concept?
3. Instructors will teach students how to apply formal rules or algorithms. How will instructors meet this hallmark?
4. Students will be required to use appropriate symbolic techniques in the context of problem solving, and in the presentation and critical evaluation of evidence. What symbolic techniques will be required and in what contexts? How will presentations and evaluations of evidence be incorporated into the course?
5. The course will not focus solely on computational skills. What reasoning skills will be taught in the course?
6. Instructors will build a bridge from theory to practice and show students how to traverse this bridge. How will instructors help students make connections between theory and practice?

Required Signatures

Requested by
Sheldon Hershinow

Humanities

Chair/Director

Department/Unit

Signature

Date

Approved by
Leon Richards

Chief Academic Officer

Campus

Signature

Date
1. **Students will be exposed to the beauty, power, clarity and precision of formal systems. How will the course meet this hallmark?**

Philosophy 110, as taught at Kapi‘olani Community College, begins with the problematic of distinguishing “good” from “bad” argumentation. The inability to make this distinction consistently or accurately leads naturally to the need for systematic tools that can lead to and support accurate judgements. A system of tools is then introduced, beginning with the development of a logical language (Predicate). This language is used to demonstrate the capacity of a formalized language to bring patterns of logical form into the foreground, and clearly represent precise distinctions that are often left vague and ambiguous in ordinary language.

The ability to represent English language arguments in a symbolic language that accurately represents logical form and shows the logical relationships among statements, leads the course to introduce a series of Rules of Inference and a method of proof. Students will use this system of Natural Deduction to demonstrate, explicitly and precisely, how a given conclusion follows from a set of premises (validity). Methods will also be presented that will allow students to determine a given argument’s invalidity and (in)consistency.

Students will learn the need for explicit demonstration to meet the high criterion of necessity characteristic of deductive reasoning. They will also be exposed to the power of logical languages to draw into the foreground the logical elements in statements and among statements that give integrity to deductive reasoning.

2. **Instructors will help students understand the concept of proof as a chain of inferences. How will instructors help students understand this concept?**

A majority of Philosophy 110, as taught at Kapi‘olani Community College, is devoted to the concept of proof as a sequence of inferences each of which is explicitly justified by reference to prior truth claims and a relevant Rule of Inference. Students will be required to master a basic skill in proof construction as a problem-solving device, using all rules introduced. The conventions of proof construction and the distinction between formal and informal proof will be stressed. In this context the value of symbolic languages is clearly shown. Students will be encouraged to understand that proofs are not a mechanical device but require sensitive attention to the relationships that exist among a set of statements, and the demands of the unique patterns presented through each Rule of Inference. The need for both a precise understanding of rules as well as creativity in applying them to reach solutions is stressed.

Within the context of proof construction, strategies for introducing assumptions will be stressed. Conditional proof and the indirect proof (*reductio ad absurdum*) will be of central importance. The need to follow proper protocols regarding the introduction and discharge of all assumptions will communicate their power and their limitations within the context of deductive reasoning.

3. **Instructors will teach students how to apply formal rules or algorithms. How will the instructors meet this hallmark?**

Formal rules of inference will be presented through a formal system of Natural Deduction complemented by Quantification Rules. Students will be taught how to apply these rules in the context of proof construction. Students will be shown how to develop a larger system of rules a simple set of logical intuitions, justified against a specified definition of validity. Truth tables will be introduced as an algorithmic device that stipulates the meaning of specific logical functions, as well as provides a means for demonstrating (in)validity and (in)consistency.

4. **Students will be required to use appropriate symbolic techniques in the context of problem solving, and in the presentation and critical evaluation of evidence. What symbolic techniques will be required and in what contexts? How will presentations and evaluations of evidence be incorporated into the course?**

This course will present two symbolic languages, Predicate and Sentential, used in the field of Logic. In addition, Venn Diagrams will be used to help students understand relationships between quantified statements and statements
that designate individuals. Predicate and Venn diagrams will be introduced through the presentation of Categorical Syllogisms, enthymemes and sorities. Sentential will be introduced in the context of arguments that pivot around truth-functional relationships. As symbolic techniques these means of representation will be used largely in the context of formal proof but will also be used to help solve problems of ambiguity and logical equivalence.

Presentations of evidence will be consider in the context of the dynamic of argument as a particular type of discourse in which premises provide evidence for specific conclusions. The logical relationships that stand or do not stand between or among premises will be the focus of our consideration of evidence.

The course stresses that logicians are not no better suited than others to evaluate the truth content of the specific claims provided in any set of premises. The extent to which we can all consider the viability of evidence presented in premises will focus on logical relationships and the nature of logical implication.

Concepts of common knowledge, authority, analogy and fallacy will be introduced to expose students to a range of logical mistakes that can result when one fails to adequately scrutinize the relationship of the evidence presented to the conclusion being drawn.

5. The course will not focus solely on computational skills. What reasoning skills will be taught in the course?

Students will be encouraged to understand proof construction as a creative effort that, while following precise conventions, demands tenacity, creativity and the ability to recognize common patterns in the context of increasingly larger, and more complex sets of statements.

Students will be asked to understand the range of criteria for evaluating arguments and the particular importance of structural integrity (validity) within this range. Consideration of truth content and the criterion of persuasiveness will also be considered. In this latter context some discussion of informal fallacies will help students to understand the distinction between logic and rhetoric, and when the evidence presented is too weak to support a given conclusion.

Students will be encouraged to think of the various analytic and evaluative techniques and methods presented in the course as tools that serve different situations. Students will be required to make judgements about which tools best serve given situations. They will be encouraged to use strategies of analysis to break down complex situations into simpler ones and apply the appropriate level of tool as the context demands.

While the course focuses on deductive reasoning, students will also be introduced to inductive reasoning. They will be asked to understand the key differences between the two and how the criteria for evaluating reasoning and argumentation vary when applied to each.

6. Instructors will build a bridge from theory to practice and show students how to traverse this bridge. How will instructors help make students make connections between theory and practice?

Consideration of specific arguments in ordinary language, and their ability to be presented accurately in one of two logical languages, will provide the bridge between theory and practice. Problems of ambiguity, vagueness and logical equivalence will be considered as students are asked to consider how underlying meaning can be refined and represented with logical accuracy.

Students will provide their own examples of argument and will be asked to translate and evaluate them as a means of encouraging them to reflect on the logical coherency of their own responses to argument and their own patterns of reasoning.
PHILOSOPHY 110: Introduction to Deductive Logic (3cr)  
KAPI'OLANI COMMUNITY COLLEGE

INSTRUCTOR: Sharon Rowe, Ph.D.

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PHONE/VOICE MAIL: 734-9744  
HOURS: MWF 9am -10am & by apt

EMAIL: srowe@hawaii.edu

REQUIRED TEXT: Rowe, Sharon.  *An Introductory Course in Formal Logic*.  
Recommended Text: Samuel Guttenplan.  *The Languages of Logic*  
RECOMMENDED MATERIALS: Pencils, lots of scratch paper, 3x5 cards, colored pens, pencils or highlighters, a good pair of ears, your brain, time to practice.

Course Objectives: This course addresses the General Education Foundations Requirement in Symbolic Reasoning. For this reason our study will focus on concepts, techniques and skill building in the area of formal, deductive reasoning. To illustrate the nature of deductive inference we will develop symbolic languages (Predicate and Sentential) and a system of Rules of Inference that will allow us to demonstrate and understand the nature of deductive validity. Venn diagrams will be used to assist our understanding of the value and purpose of symbolic representation and their relationship to reasoning patterns found in ordinary language. Truth Tables will provide further tools for discussing and assessing validity and invalidity, as well as the concepts of soundness and consistency. Our study of basic logical concepts and principles will assist us in learning to distinguish effective from ineffective reasoning patterns and help us recognize these patterns in our own reasoning and use of language. As time allows we will consider the full range of criteria used in evaluating the quality of argument.

Assignments & Evaluation: Final grades will reflect demonstrated mastery of the material as reflected in grades received on the following assignments:

I. Homework-(15%) to be handed in weekly and graded informally*.
II. Midterm on Predicate and Categorical Syllogisms (25%)
III. Midterm on Sentential and Natural Deduction (25%)
IV. Cumulative Final (35%)

*Informal Grading System: Full credit is given for ★ and above.  
★+++ = Perfect. No mistakes. Clear understanding. A rare but possible joy. (A+)
★++ = Good understanding of all points. Should do well putting material together (B, A-)
★ ++ = Basic understanding but some points need for clarification. Read text, review notes, ask for help (C).
★ + = Missing important points. Read texts, review notes, ask for help (D-/F).
★ - = Major misunderstanding of key points. Read texts/review notes, ask for help (F).
I = Incomplete (full credit is not given)

NOTES ON HOMEWORK: Homework is due once a week. Late work receives no credit. You may, however, turn it in late for correction and feedback.

GRADING OPTIONS  
Option A: As stated above. Homework is handed in weekly + exam grades.  
Option B: If a significant portion of homework is not handed in, I will average your 3 exam grades.

COURSE COMPETENCIES: Upon successful completion of this course you should be able to:

• Translate English language statements into appropriate logical languages, supplying language keys as necessary.
• Employ a basic system of Inference Rules to present well-constructed proofs of validity for symbolized arguments.
• Correctly introduce and follow protocols governing the use of assumptions in deductive
- Construct truth tables for arguments, statements and sets of statements.
- Use truth tables to determine (in)validity and (in)consistency.
- Use Venn Diagrams to represent categorical and individual statements, and basic syllogistic arguments.
- Explain the different criteria for assessing the quality of arguments and the particular importance of argument structure among these criteria.
- Apply different criteria appropriately to specific cases of argument.

**General Course Outline:** Some adjustments will likely be made to this assignment schedule. However, we will follow the Manual sequentially. It is your responsibility to come to class daily to know exactly where we are. Please hand in homework that is neat and legible. I recommend you use pencil or sketching out solutions on scratch paper. Erasing mistakes, missteps and strategies that don't pan out are all features of this work. Readings from Guttenplan will be assigned to complement exercises.

<table>
<thead>
<tr>
<th>WEEK</th>
<th>TOPICS</th>
<th>READING should be completed prior to coming to class</th>
<th>Homework: Due each Monday (Wed if Monday is a holiday). As a rule, hand in ONLY the odd # examples.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>General Course Business Reason, Inference &amp; Argument</td>
<td>pp 1.1-1.15 Go over terms in the glossary at the back.</td>
<td>Exercise 1 (1.5) Due the second day of class. Exercise 2 (1-7) may be assigned the first week as well.</td>
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<tr>
<td>2</td>
<td>Analyzing Arguments &amp; Analyzing Statements</td>
<td>pp 1. 18–1.32</td>
<td>Exercise 2 and 3 and 4</td>
</tr>
<tr>
<td>3</td>
<td>Symbolizing Statements: Propositional Functions, Propositions, Truth Functional Operators &amp; Quantifiers, Logical Equivalence and Venn Diagrams</td>
<td>pp 1.33-1.43</td>
<td>Ex 5, 6 and 8 possibly 7</td>
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<tr>
<td>4</td>
<td>Proving Validity: 2-Column Proofs, Using Assumptions, Conditional Proof</td>
<td>pp 1.45-57</td>
<td>Ex 9, 10 and 11</td>
</tr>
<tr>
<td>5</td>
<td>Indirect Proof</td>
<td>pp. 1.58-1.65</td>
<td>Ex 12, (13 &amp; 14 as time allows)</td>
</tr>
<tr>
<td>Day</td>
<td>Topic</td>
<td>Pages</td>
<td>Additional Notes</td>
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| 6   | Review & Midterm I | Midterm 1 will cover a minimum of pp. 1.1-1.65 | Midterm Exam I  
Begin reading Part 2 pp 2.1 - 2.9  
Exercise 1 due Monday. |
| 7   | Sentential | pp 2.10-2.26 | Ex 2, 3, 4, and 5 |
| 8   | Introducing New Operators, Rules and Reviewing Proofs | pp. 2.27-37 | Ex 6, 7, and 8  
Translate and prove all the translations |
| 9   | Working with conditionals | pp 2.38-2.44, pp. 2.57-2.58 | Ex 9, 10, and 11  
Do all the translations |
| 10  | Negation Elimination and Combining Strategies | pp 2.44-2.48 | Ex 12, 13,  
Do all the translations |
| 11  | Disjunction Elimination | 2.49-2.56 | Ex. 14  
odd translations only |
| 12  | Review for Midterm II: at a minimum will cover Section 2 of the manual up to Exercise 14 | Practice at your own pace | Practice as needed  
Midterm II Exam |
| 13  | Truth Tables | pp 3.1 - 3.3.9 | Exercise 1 and 2 (answer both questions)  
Proofs as assigned |
| 14  | Short Cut Method Soundness and Consistency | pp. 3.15-3.17 | Exercise 3, 4, 5 and 6  
Proofs as assigned |
| 15  | Review | read as needed | practice as needed |
| 16  | Final Review | Cumulative Review | Practice what you need  
EXAM DATE: Dec |
PHIL 110: Introduction to Deductive Logic (3) AA/ML
3 hours lecture per week
Prerequisite: Qualification for English 100
Corequisite: none
Recommended Preparation: Qualification for Math 103

PHIL 110 is an introductory course in logic focusing on methods and principles of deductive reasoning. Integral to this study will be the presentation of methods for representing logical form and the development of a system of inference rules and strategies that allow for the determination of validity and invalidity of deductive arguments.

2. COURSE OBJECTIVES/COMPETENCIES:

Upon successful completion of Phil 110, the student should be able to:

6. • Translate English language statements into appropriate logical languages, supplying language keys as necessary.
• Employ a basic system of Inference Rules to present well constructed proofs of validity for symbolized arguments.
• Correctly introduce and follow protocols governing the use of assumptions in deductive reasoning.
• Construct truth tables for arguments, statements and sets of statements.
• Use truth tables to determine (in)validity and (in)consistency.
• Use Venn Diagrams to represent categorical and individual statements, and basic syllogistic arguments.
• Explain the different criteria for assessing the quality of arguments and the particular importance of argument structure among these criteria.
• Apply different evaluative criteria to specific cases of argument.

3. GENERAL EDUCATION AND RELATIONSHIP TO OTHER COURSES:

Phil 110 is an elective course in the Arts and Sciences curriculum. The general purpose of Phil 110 is to provide students with a foundation in critical reasoning that can be applied to a wide range of course work in other disciplines. It is comparable in its challenge to Math 103 and provides students with an alternative course in mathematical and symbolic reasoning.
Qualification for English 100 is required for the following reasons: The techniques of translation used in Symbolic Logic demand a basic familiarity with the subject-predicate structure of English. Success in Phil 110 requires the abilities to distinguish simple and compound statements, and identify words and phrases that convey logical meaning so as to render them into appropriate logical symbols. Qualification for Math 103 is a recommended preparation because Symbolic Logic presents a comparable level of demand with respect to analytic reasoning skills and techniques and strategies of abstract problem solving.

This course supports the following college competency areas:

- Computation and communication abilities
- Values for living
- Quality of life as affected by technology and science
- Problem-solving and decision-making abilities
- Responsiveness to the arts and humanities
- Career choices and life-long learning

This course also satisfies the following Associate in Arts degree competencies:

AA -
Critical Thinking:
Critical thinking, an analytical and creative process, is essential to every content area and discipline. It is an integral part of information retrieval and technology, oral communication, quantitative reasoning, and written communication. Upon completion of an A.A. degree, the student should be able to:

- Identify and state problems, issues, arguments, and questions contained in a body of information.
- Identify and analyze assumptions and underlying points of view relating to an issue or problem.
- Recognize and understand multiple modes of inquiry, including investigative methods based on observation and analysis.
- Evaluate a problem, distinguishing between relevant and irrelevant facts, opinions, assumptions, issues, values, and biases through the use of appropriate evidence.
- Apply problem-solving techniques and skills, including the rules of logic and logical sequence.
- Synthesize information from various sources, drawing appropriate conclusions.
- Communicate clearly and concisely the methods and results of logical reasoning.
- Reflect upon and evaluate their thought processes, value systems, and worldviews in comparison to those of others.

AA -
Information Retrieval and Technology:
Information retrieval and technology are integral parts of every content area and discipline. Upon completion of an A.A. degree, the student should be able to:

- Demonstrate knowledge of basic vocabulary, concepts, and operations of information retrieval and technology.

**AA - Quantitative Reasoning:**
Quantitative reasoning can have applications in all content areas and disciplines. Upon completion of an A.A. degree, the student should be able to:

- Apply numeric, graphic, and symbolic skills and other forms of quantitative reasoning accurately and appropriately.
- Demonstrate mastery of mathematical concepts, skills, and applications, using technology when appropriate.
- Communicate clearly and concisely the methods and results of quantitative problem solving.

**AA - Written Communication:**
Written communication is an integral part of every content area and discipline. Upon completion of an A.A. degree, the student should be able to:

- Use writing to discover and articulate ideas.
- Identify and analyze the audience and purpose for any intended communication.
- Choose language, style, and organization appropriate to particular purposes and audiences.
- Gather information and document sources appropriately.
- Express a main idea as a thesis, hypothesis, or other appropriate statement.
- Develop a main idea clearly and concisely with appropriate content.
- Demonstrate mastery of the conventions of writing, including grammar, spelling, and mechanics.

This course also satisfies the following Associate in Science degree competencies:

**AS-**

- Employ skills and understanding in language and mathematics essential to fulfill program requirements.
- Understand attitudes and values of various cultures and examine their potential for improving the quality of life and meaningfulness in work.
- Recognize effects of technology and science on the natural and human environments.
• Understand contemporary issues and problems and respond to the impact of current conditions.
• Demonstrate proficiency in conceptual, analytical, and critical modes of thinking.
4. COURSE CONTENT:

I. The nature of argument and inference (15% of course)
   A. Types of arguments: Inductive and Deductive
   B. The structure of argument:
      1. Parts of arguments: Premise(s) and Conclusion
      2. Argument form vs. argument content
   C. Criteria for assessing the quality of arguments:
      1. Structural Integrity
      2. Truth Content
      3. Persuasiveness

II. Symbolizing arguments into Logical Languages (25% of course)
   A. Predicate
      1. Subject - Predicate relationships
      2. Quantification
      3. Categorical statement formula
   B. Sentential
      1. Basic Logical Operators
      2. Relationships among sentences

III. Proving Validity (45% of course)
   A. A basic method of proof
   B. Rules of Inference including Quantification rules
   C. Strategies and techniques in the construction of proofs of validity
      1. Introducing and discharging assumptions
      2. Proof strategies using assumptions

IV. Invalidity, Soundness and Consistency (15% of course)
   A. Truth tables as an algorithmic tool
   B. Truth vs. Validity
   C. Soundness and Consistency

5. POSSIBLE TEXTS:

A wide array of texts is available on the textbook market for use in this course. The following are offered as suggestions most supportive of a focus on symbolic reasoning.


Students are expected to purchase no other supplies or equipment students.

6. METHODS OF INSTRUCTION:

Proposed instructional methodologies for teaching this course, include lectures and group study, student participation and hands-on practice. Students will be encouraged to form study groups and partnerships to support each another. As available, class time will be given to support skill building and offer students individual attention.

7. METHOD OF EVALUATION:

Student grades will be determined by their homework (no more than 20% of their final grade) and their mastery of the skills, techniques and conceptual knowledge presented in the course, as demonstrated through two midterm exams (25% each) and one final exam (30%) performance.

Suggested Grading Scale:

90 - 100% = A
80 - 89.9% = B
70 - 79.9% = C
60 - 69.9% = D
less than 60% = F

This course is not repeatable for credit.
8. **JUSTIFICATION:**

A. This curriculum change is required because of the introduction of the Banner system which intends to integrate registration across the campuses of the UH system. Competencies are being refined to reflect the strengthened emphasis on deductive logic.

Changes in prerequisites are proposed to support student success and maintain current levels of enrollment. Currently KCC is the only campus in the UH system that requires extensive pre-requisites in pre-college Math courses. Under the Banner system KCC will be at a distinct disadvantage in recruiting students into this course when they can take it at any of the other CC campuses without having to take prerequisite courses.

While the PC Math series presents a limited range of skills and strategies, that overlap with those taught in Phil 110. However, current prerequisites requiring successful completion of Math 24 and/or 25 to a specified level of competency, have no direct bearing on the course content of Phil 110, nor do they prepare students to successfully complete Phil 110.

The recommended preparation for Math 103 indicates that Phil 110 is a course of comparable difficulty and is sufficient indication of the level of work required.

Changes in competencies are a refinement of current competencies intended to place greater emphasis upon the process of formalized, deductive reasoning.

B. This course will neither increase nor decrease the number of required hours needed for a certificate or degree.

9. **RESOURCE REQUIREMENTS:**

A. This proposal will require no change in staff, equipment, facilities, or other resources. Current faculty will continue to teach this course.

B. The proposed changes to this course will likely increase the demand for this course at KCC and impact the number of students who currently enroll in the Math 24 and 25 series. This is mitigated by the prerequisite of qualification to matriculate into college level English and by the recommended preparation of qualification for Math 103, which is intended to encourage students and counselors to make wise decisions about student preparedness for this course. At this time the Humanities Department does not plan to increase the number of sections offered over past semesters. There is no foreseeable impact on other departments as regards program support or space requirements. Present classroom and office resources will be unaffected.

C. Maximum enrollment per class section will remain at 35. The estimated number of sections to be offered per semester will remain the same, at one or two sections per semester depending on student demand.

10. **ARTICULATION:**
A. As revised Phil 110 comports with similar courses at other UH campuses. The course is currently offered at:

<table>
<thead>
<tr>
<th>College</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honolulu Community College</td>
<td>Phil 110</td>
<td>Introduction to Logic</td>
<td>3 credits</td>
</tr>
<tr>
<td>Windward Community College</td>
<td>Phil 110</td>
<td>Introduction to Logic</td>
<td>3 credits</td>
</tr>
<tr>
<td>Leeward Community College</td>
<td>Phil 110</td>
<td>Introduction to Logic</td>
<td>3 credits</td>
</tr>
<tr>
<td>Kaua‘i Community College</td>
<td>Phil 110</td>
<td>Introduction to Logic</td>
<td>3 credits</td>
</tr>
<tr>
<td>Maui Community College</td>
<td>Phil 110</td>
<td>Introduction to Logic</td>
<td>3 credits</td>
</tr>
<tr>
<td>University of Hawai‘i-Manoa</td>
<td>Phil 110</td>
<td>Introduction to Deductive Logic</td>
<td>3 credits</td>
</tr>
</tbody>
</table>

B. Phil 110 is currently articulated with the UH-Manoa. Changes proposed do not involve substantive changes in course content or competencies, but amend prerequisites and refine wording of competencies to highlight a strengthened emphasis in deductive logic.