PHIL R112: SYMBOLIC LOGIC

Originator
chorrock

College
Oxnard College

Discipline (CB01A)
PHIL - Philosophy

Course Number (CB01B)
R112

Course Title (CB02)
Symbolic Logic

Banner/Short Title
Symbolic Logic

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
This course provides an introduction to the concepts and methods of modern symbolic logic. Emphasis is placed on problems of translating English expressions into logical symbols and on the development of skills in using the formal proof procedures of sentential and predicate logic.

Taxonomy of Programs (TOP) Code (CB03)
1509.00 - Philosophy

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
E - Non-Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
Will not be required

Grading method
Letter Graded

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
52.5
Maximum Contact/In-Class Lecture Hours
52.5

Activity

Laboratory

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
52.5
Total Maximum Contact/In-Class Hours
52.5

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
105
Maximum Outside-of-Class Hours
105

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
157.5
Total Maximum Student Learning Hours
157.5

Minimum Units (CB07)
3
Maximum Units (CB06)
3

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Students will identify the types of arguments proficient for analysis by quantificational logic; reconstruct those arguments in standard form; and solve by one or more the methods studied
2	Students will test an argument by means of the formal deduction method/proof for quantificational arguments.
3	Students will test an argument by means of the indirect or "short-cut" method/proof.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Apply truth-functional logic notation to ordinary language sentences.
2	Apply truth tables to test validity of arguments' forms.
3	Test propositional forms for equivalency, consistency, tautology, contradiction, and contingency.
4	Apply techniques for problem-solving of conditional proofs, indirect proofs, and proofs of invalidity.
5	Develop skill in using the truth tree method of formal problem-solving.
6	Use notation and techniques for symbolizing propositions in quantification(predicate) logic.
7	Apply rules of inference for quantificational instantiation and generalization.
8	Identify and use the change of quantifier rule.
9	Construct quantificational proofs to establish validity.
10	Perform conditional and indirect proofs using quantificational logic.
11	Map relational predicates and overlapping quantifiers.
12	Evaluate quantificational arguments which include simple identity statements.

Course Content

Lecture/Course Content
1. Propositional logic: Basic Concepts
   a. Translating ordinary sentences into symbolic language
   b. Logical connectives (logical "operators")

       i. Negation ("not")
      ii. Conjunction ("and")
     iii. Disjunction ("or")
     iv. Conditionals ("if...then...")
      v. Bi-conditionals ("...if and only if...")

2. Truth Tables
   a. Truth tables test for propositions
      i. Tautology
      ii. Contradiction
      iii. Equivalence
      iv. Contingency
   b. Truth table testing for the validity of arguments
   c. Indirect truth tables
3. Natural Deduction: Derivations
   a. Rules of implication
      i. Simplification
      ii. Modus Ponens
      iii. Modus Tollens
      iv. Disjunctive
      v. Additional forms
   b. Rules of Replacement
      i. Double negation
      ii. De Morgan's rule
      iii. Material implication
      iv. Additional forms
   c. Conditional Proof
   d. Indirect Proof
   e. Truth tree method of proof
4. Quantificational (Predicate) Logic: Basic Concepts
   a. Symbols and translations
   b. Universal generalization
   c. Existential quantifiers
   d. Individual variables
   e. Free and bound variables
5. Rules of Inference
   a. Universal instantiation
   b. Universal generalization
   c. Existential generalization
6. Methods of Derivation
   a. Changing quantifier rules
   b. Conditional and indirect proof (with quantifiers)
   c. Proving invalidity: counterexample method
7. Relational Predicates and Overlapping Quantifiers
   a. Translating relational statements
   b. Using rules of inference (with relational statements)
8. Identity
   a. Simple identity statements
   b. "Only" and "Except" statements
   c. Definite descriptions
   d. Identity relations in natural deductions

Laboratory or Activity Content
None

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):
Problem solving exercises

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Essay exams
Group projects
Objective exams
Problem-Solving Assignments
Quizzes
Skills demonstrations
Skill tests

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Audio-visual presentations
Computer-aided presentations
Class discussions
Distance Education
Field trips
Instructor-guided interpretation and analysis
Lecture

Describe specific examples of the methods the instructor will use:

1. Instructor will direct interactive instructional activities asking students to compare and contrast (the more basic) truth-functional approaches to logic with (the more advanced) quantificational based methods of logic studied in the course.
2. Guided and focused class discussions of various formal, methodological quantificational problem-solving techniques. These discussions would elicit student recognition of types of problems in logic; methods to re/solve; solution to problem
3. Instructor will provide/explore/discuss examples of "complexity"/(systematic thinking) which require multiple levels/dimensions of abstract analysis in order to understand and/or perhaps solve.

Representative Course Assignments

Writing Assignments

1. Rewriting ordinary language statements using symbolic language
2. Constructing "models" to solve for a variety of logical activities

Critical Thinking Assignments

1. Compare and contrast different approaches of solving a logic problem within multiple systems, for example, solving a truth-functional argument by using a formal deduction (method/ology) versus solving by a "short" (quantification/al) truth-table, (i.e, by the "indirect method").
2. Participate in class and small group discussions which engage the quantificational-level of logical connectedness involved in analyzing multivalent/multiple-value/s problems of complexity, (e.g. health care crisis; climate crisis issues, etc.).

Reading Assignments

1. Standard logic textbook chapter readings
2. "Streamlined" formula guide/chart notes (which "synthesize" the concepts being studied)
3. Examples of "model" arguments/problems which can be solved using symbolic languages

Skills Demonstrations

1. Putting an ordinary-language arguments into "standard form" for quantificational logic/al analysis.
2. Applying truth trees, and/or conditional proof/s, and/or indirect proof/s methods to test for validity (of formal quantificational arguments).

Other assignments (if applicable)

1. (Live) Tutorial sessions
2. Research electronic databases for additional material on logic
   a. Logic and computers
   b. Logic and electronics
   c. Logic and engineering
   d. Logic and language

    e. Logic and brain function
    f. Logic and law

Outside Assignments

Representative Outside Assignments

1. Reading/s of primary source materials in quantificational logic, and completing homework-style problems related to the reading/s.
2. Reading/s of secondary source materials in quantificational logic, and completing homework-style problems related to the reading/s.
3. Reviewing video of, for example, open-source university lectures on topics in quantificational logic
4. Searching for video related to course topics, but not included in the syllabus, and/or course bibliography
5. Research electronic databases, e.g., Standard Encyclopedia of Philosophy, for additional material on a subject
6. Reviewing content found on university/4-yr. college philosophy department websites, including philosophy program features, instructor web pages (of recent work, professional background), student web pages, insofar as they are indicative of professional work within the field of quantificational logic.
7. Weekly short essay assignments related to class lecture and assignments.
8. Library/Learning resource search-inquiries and assignments.
9. (Self)-Reports/-ing of searches/inquiries, outcomes of searches, interpretation/analysis of searches.

Articulation

C-ID Descriptor Number
PHIL 210

Status
Approved

Comparable Courses within the VCCCD
PHIL M09 - Introduction to Symbolic Logic

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

D2. Communication/Analytical Thinking
Approved

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

Course is CSU transferable
Yes

CSU Baccalaureate List effective term:
Fall 1999

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

A3 Critical Thinking
Approved

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

Area F: Ethnic Studies

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

UC TCA

UC TCA
Approved

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals
Resource Type
Textbook

Description
Hurley, P.; Watson, L. (2018). *A Concise Introduction to Logic*. Wadsworth/Cengage. (Boston/MA)

Resource Type
Textbook

Description
Bonevac, Daniel (2003). *Deduction: Introductory Symbolic Logic.* Wiley/Blackwell. (Hoboken/NJ)

Resource Type
Textbook

Description
Bergmann, M.; Moor, J.; Nelson, J.; (2013). *The Logic Book;* McGraw Hill, (NY/NY)

Distance Education Addendum

Definitions

Distance Education Modalities

Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%–50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic such As by distinguishing the relative merits of solving a quantificational Argument problem by one method/-ology versus Another, e.g. formal deductions; conditional proofs; proofs involving identity; etc.
E-mail	Faculty will communicate with students via email regarding course information and concerns.
Other DE (e.g., recorded lectures)	Faculty may record audio recordings and/or video lectures on the course content including videos on metaphysics, epistemology, ethics, critical thinking/ philosophy of science., social and political philosophy, theology, and/or axiology…within the context of each one's (relative) impact on the field of quantificational logic
Video Conferencing	Faculty may utilize online live meetings with students to deliver lectures and have discussions on topics related to the course content.

Hybrid (51%–99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic such As by distinguishing the relative merits of solving a quantificational Argument problem by one method/-ology versus Another, e.g. formal deductions; conditional proofs; proofs involving identity; etc.
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Video Conferencing	Faculty may utilize online live meetings with students to deliver lectures and have discussions on topics related to the course content.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Asynchronous Dialog (e.g., discussion board)	Students will post a discussion board topic such As by distinguishing the relative merits of solving a quantificational Argument problem by one method/-ology versus Another, e.g. formal deductions; conditional proofs; proofs involving identity; etc.
E-mail	Faculty will communicate with students via email regarding course information and concerns.
Other DE (e.g., recorded lectures)	Faculty may record audio recordings and/or video lectures on the course content including videos on metaphysics, epistemology, ethics, critical thinking/ philosophy of science., social and political philosophy, theology, and/or axiology...within the context of each one's (relative) impact on the field of quantificational logic
Video Conferencing	Faculty may utilize online live meetings with students to deliver lectures and have discussions on topics related to the course content.

Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
PHILOSOPHY

Review and Approval Dates

Department Chair
09/20/2020

Dean
09/21/2020

Technical Review
10/28/2020

Curriculum Committee
10/28/2020

DTRW-I
MM/DD/YYYY

Curriculum Committee
11/25/2020

Board
MM/DD/YYYY

CCCCO
MM/DD/YYYY

Control Number
CCC000530048

DOE/accreditation approval date
MM/DD/YYYY