

## Term Information

Effective Term Spring 2022  
*Previous Value* Summer 2012

## Course Change Information

### What change is being proposed? (If more than one, what changes are being proposed?)

Add the option to teach the course online.

### What is the rationale for the proposed change(s)?

Over the past year, the Department has learned of student demand for online learning opportunities, and our faculty are now experienced enough to be able to deliver courses online. After a review of our curriculum, we have identified a few courses that are particularly well-suited for online delivery. PHILOS 5500 is such a course.

### What are the programmatic implications of the proposed change(s)?

(e.g. program requirements to be added or removed, changes to be made in available resources, effect on other programs that use the course)?

We anticipate no programmatic implications of this change.

Is approval of the request contingent upon the approval of other course or curricular program request? No

Is this a request to withdraw the course? No

## General Information

Course Bulletin Listing/Subject Area	Philosophy
Fiscal Unit/Academic Org	Philosophy - D0575
College/Academic Group	Arts and Sciences
Level/Career	Graduate, Undergraduate
Course Number/Catalog	5500
Course Title	Advanced Symbolic Logic
Transcript Abbreviation	Adv Symbolic Logic
Course Description	Introduction to the metatheory of first-order logics and languages; axiomatic development of propositional and predicate logic; model theory; soundness, completeness, and Lowenheim-Skolem theorems.
Semester Credit Hours/Units	Fixed: 3

## Offering Information

Length Of Course	14 Week, 12 Week, 8 Week, 7 Week, 6 Week, 4 Week
Flexibly Scheduled Course	Never
Does any section of this course have a distance education component?	Yes
Is any section of the course offered	100% at a distance
<i>Previous Value</i>	<i>No</i>
Grading Basis	Letter Grade
Repeatable	No
Course Components	Lecture
Grade Roster Component	Lecture
Credit Available by Exam	No
Admission Condition Course	No
Off Campus	Never

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Campus of Offering Columbus

## Prerequisites and Exclusions

Prerequisites/Corequisites 2500.  
Exclusions  
[Previous Value](#) Not open to students with credit for 650.  
Electronically Enforced No

## Cross-Listings

Cross-Listings

## Subject/CIP Code

Subject/CIP Code 38.0102  
Subsidy Level Doctoral Course  
Intended Rank Junior, Senior, Masters, Doctoral  
[Previous Value](#) *Senior, Doctoral*

## Requirement/Elective Designation

The course is an elective (for this or other units) or is a service course for other units

## Course Details

Course goals or learning objectives/outcomes

- Introduce first-order logics and languages; natural deduction for propositional and predicate logic; model theory; soundness, completeness, and Löwenheim-Skolem theorems.

[Previous Value](#)

Content Topic List

- The meta-theory of 1st-order logic
- Axiomatic development of propositional and predicate logic
- Model theory
- Proofs of soundness and completeness for 1st-order logic
- The Lowenheim-Skolem theorems

Sought Concurrence No

## Attachments

- PHILOS 5500 in ASC DL syllabus\_template as of 10.8.2021.docx: DL Syllabus  
*(Syllabus. Owner: Shuster, Amy Lynne)*
- PHILOS\_5500\_syllabus\_in\_person\_Spring2020.pdf: In Person syllabus  
*(Syllabus. Owner: Shuster, Amy Lynne)*
- PHILOS 5500 asc\_distance\_approval\_cover\_sheet as of 10.8.2021.docx: ASC Tech review  
*(Other Supporting Documentation. Owner: Shuster, Amy Lynne)*

## Comments

**COURSE CHANGE REQUEST**  
5500 - Status: PENDING

Last Updated: Vankeerbergen, Bernadette  
Chantal  
10/14/2021

**Workflow Information**

Status	User(s)	Date/Time	Step
Submitted	Shuster, Amy Lynne	10/09/2021 05:26 PM	Submitted for Approval
Approved	Downing, Lisa J	10/10/2021 08:57 PM	Unit Approval
Approved	Vankeerbergen, Bernadette Chantal	10/14/2021 01:18 PM	College Approval
Pending Approval	Cody, Emily Kathryn Jenkins, Mary Ellen Bigler Hanlin, Deborah Kay Hilty, Michael Vankeerbergen, Bernadette Chantal Steele, Rachel Lea	10/14/2021 01:18 PM	ASCCAO Approval



# SYLLABUS

# PHILOS/5500

Symbolic Logic

Spring 2022 (full term)

3 credit hours

Distance learning with synchronous class meetings

Tuesdays and Thursdays 11:10-12:30pm on Zoom

## COURSE OVERVIEW

### Instructor

Instructor: **Neil Tennant**

Email address: [tennant.9@osu.edu](mailto:tennant.9@osu.edu) (preferred contact method)

Website: [u.osu.edu/tennant9/](http://u.osu.edu/tennant9/)

Student hours: Tuesdays and Thursdays, 2:00 p.m. to 4:00 p.m.

### Teaching Assistant

Instructor: **TBA**

Email address: TBA

Student hours: TBA

### Prerequisites

PHILOS 2500 or equivalent. Not open to students with credit for 650.

### Course description

We introduce the student to the metatheory of first-order logics and languages; natural deduction for propositional and predicate logic; model theory; soundness, completeness, and Löwenheim-Skolem theorems.

### Advice for prospective students

A prerequisite for this course is PHIL2500: Introduction to Symbolic Logic. We shall be making important use of techniques of logical analysis and regimentation, at both the object- and the meta-level. We shall revise relevant introductory material as necessary. Graduate students in Philosophy, however, need to take this course in order to fulfill their program requirements. For this reason, it is especially important to take advantage of the instructor's student hours when the need arises.

## HOW THIS ONLINE COURSE WORKS

**Mode of delivery:** This course is 100% online. You will find a sequence of materials and activities each week in Carmen, and we will meet for two weekly Zoom sessions during our scheduled class meeting times. To connect to our Zoom, see the meeting link in the menu of our course's Carmen page.

**Pace of online activities:** This course is divided into **weekly modules** that are released one week ahead of time. You may schedule your efforts freely throughout the week as you keep pace with due dates.

**Credit hours and work expectations:** This is a **3-credit-hour course**. According to Ohio State policy ([go.osu.edu/credithours](http://go.osu.edu/credithours)), students should expect around 3 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 6 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

**Attendance and participation requirements:** Research shows regular participation is one of the highest predictors of success. With that in mind, I have the following expectations for everyone's participation:

- **Participating in online activities: AT LEAST ONCE PER WEEK**  
You are expected to log in to the course in Carmen every week. (During most weeks you will probably log in many times.)
- **Twice Weekly Zoom sessions: REQUIRED.** Students should plan to attend all synchronous class sessions for the course. Recordings of synchronous class sessions will be made available on Carmen for students who have a good reason to have to miss class. The recordings are not meant to be a substitute for the class sessions themselves.
- **Zoom instructor office hours: OPTIONAL.**  
You are encouraged to note my office hours in your weekly schedule and attend as you have questions, but these sessions are optional.

## COURSE MATERIALS AND TECHNOLOGIES

### Textbooks

#### Required

- Neil Tennant, *Natural Logic*, Edinburgh University Press, 2nd revised edition, 1991. A PDF will be made available for free on Carmen

# Course technology

## Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at [ocio.osu.edu/help/hours](https://ocio.osu.edu/help/hours), and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** [ocio.osu.edu/help](https://ocio.osu.edu/help)
- **Phone:** 614-688-4357(HELP)
- **Email:** [servicedesk@osu.edu](mailto:servicedesk@osu.edu)
- **TDD:** 614-688-8743

## Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen ([go.osu.edu/canvasstudent](https://go.osu.edu/canvasstudent))
- CarmenZoom virtual meetings ([go.osu.edu/zoom-meetings](https://go.osu.edu/zoom-meetings))
- You are welcome [to use the free, Ohio State-themed virtual backgrounds](https://go.osu.edu/zoom-backgrounds) ([go.osu.edu/zoom-backgrounds](https://go.osu.edu/zoom-backgrounds)) during CarmenZoom meetings.

## Required equipment

- **Computer:** current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- **Webcam:** built-in or external webcam, fully installed and tested
- **Microphone:** built-in laptop or tablet mic or external microphone
- **Other:** a mobile device (smartphone or tablet) to use for BuckeyePass authentication

If you do not have access to the technology you need to succeed in this class, review options for technology and internet access at [go.osu.edu/student-tech-access](https://go.osu.edu/student-tech-access).

## Required software

- **Microsoft Office 365:** All Ohio State students are now eligible for free Microsoft Office 365. Visit [the installing Office 365](https://go.osu.edu/office365help) ([go.osu.edu/office365help](https://go.osu.edu/office365help)) help article for full instructions.

## Carmen access

You will need to use BuckeyePass ([buckeyepass.osu.edu](https://buckeyepass.osu.edu)) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you do each of the following:

- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions ([go.osu.edu/add-device](https://go.osu.edu/add-device)).

- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Install the Duo Mobile application ([go.osu.edu/install-duo](https://go.osu.edu/install-duo)) on all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service.

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

## GRADING AND FACULTY RESPONSE

### How your grade is calculated

ASSIGNMENT CATEGORY	POINTS
Mid-Semester Exam	40
Final Exam	60
Zoom attendance and participation	Extra credit opportunity for above-average attendance; asking good questions; and making useful contributions to class discussions.
<b>Total</b>	<b>100</b>

*See course schedule below for due dates.*

### Descriptions of major course assignments

#### Mid-Semester and Final Exams

**Description:** These exams will require that you demonstrate understanding of core concepts and the skills covered in each section of the course. Exams will involve giving written answers to questions (or answering multiple-choice questions) that will probe more deeply your understanding of central concepts and the skills that involve them. Some exam questions may be of multiple-choice type; but others will be more probing than the easier questions in the low-stakes quizzes. The point values of exam questions will be clearly indicated; they will not necessarily all be equal. Exams are not available asynchronously. The Midsemester Exam will be taken during a scheduled class period. The Final Exam will be taken during the official exam period in Finals Week. They will be accessible online under "Quizzes" on Carmen/Canvas.

**Academic integrity and collaboration:** You are not permitted to collaborate with others on these exams, but you may refer to your course materials. The work that you turn in must be entirely your own.

## Missing an Exam

If (and only if) you are able to provide a genuine excuse for missing a scheduled exam, please let the Instructor know as soon as possible if this is the case, so that an accommodation can be made within Carmen/Canvas for you to take the exam that you have missed at a later time.

## Grading scale

93–100:	A
90–92.9:	A-
87–89.9:	B+
83–86.9:	B
80–82.9:	B-
77–79.9:	C+
73–76.9:	C
70–72.9:	C-
67–69.9:	D+
60–66.9:	D
Below 60:	E

## Instructor feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-4357(HELP)** at any time if you have a technical problem.)

- Preferred contact method: If you have a question, please contact me first through my Ohio State email address. I will reply to emails within 24 hours on days when class is in session at the university.
- Class announcements: I will send all important class-wide messages through the Announcements tool in CarmenCanvas. Please check your notification preferences ([go.osu.edu/canvas-notifications](http://go.osu.edu/canvas-notifications)) to ensure you receive these messages.
- Grading and feedback: Students will receive their scores on exams within ten days of submission, and students will receive feedback on any informal assignments that they have arranged with the Instructor, in order to help them practice their skills.

## OTHER COURSE POLICIES

### Discussion and communication guidelines



The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.
- **Synchronous sessions:** During our Zoom sessions I ask you to use your real name and a clear photo of your face in your Carmen profile. During our full-group lecture time, you may turn your camera off if you choose. When in breakout rooms or other small-group discussions, having cameras and mics on as often as possible will help you get the most out of activities. You are always welcome [to use the free, Ohio State-themed virtual backgrounds](https://go.osu.edu/zoom-backgrounds) (go.osu.edu/zoom-backgrounds). Remember that Zoom and the Zoom chat are our classroom space where respectful interactions are expected.

## Policy on attendance at Zoom meetings

Carmen/Canvas records your log-in times, thereby enabling the instructor to keep an accurate check on the extent to which you meet these attendance and participation requirements. That record will contribute significantly to the final calculation of your overall letter grade. You should ensure that the instructor is made aware of any circumstances that would excuse your missing any of the expected occasions of attendance and participation.

## Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

Academic integrity is essential to maintaining an environment that fosters excellence in teaching, research, and other educational and scholarly activities. Thus, The Ohio State University and the Committee on Academic Misconduct (COAM) expect that all students have read and understand the university's [Code of Student Conduct](https://studentconduct.osu.edu) (studentconduct.osu.edu), and that all students will complete all academic and scholarly assignments with fairness and honesty. Students must recognize that failure to follow the rules and guidelines established in the university's Code of Student Conduct and this syllabus may constitute "Academic Misconduct."

The Ohio State University's Code of Student Conduct (Section 3335-23-04) defines academic misconduct as: "Any activity that tends to compromise the academic integrity of the university or subvert the educational process." Examples of academic misconduct include (but are not limited to) plagiarism, collusion (unauthorized collaboration), copying the work of another student, and possession of unauthorized materials during an examination. Ignorance of the university's Code of Student Conduct is never considered an excuse for academic misconduct, so I recommend that you review the Code of Student Conduct and, specifically, the sections dealing with academic misconduct.

**If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct.** If COAM determines that you have violated the university's *Code of Student Conduct* (i.e., committed academic

misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page ([go.osu.edu/coam](http://go.osu.edu/coam))
- Ten Suggestions for Preserving Academic Integrity ([go.osu.edu/ten-suggestions](http://go.osu.edu/ten-suggestions))
- Eight Cardinal Rules of Academic Integrity ([go.osu.edu/cardinal-rules](http://go.osu.edu/cardinal-rules))

## Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: <https://contactbuckeyelink.osu.edu/>

For undergraduates, advising resources are available here: <http://advising.osu.edu>

For graduate students in Philosophy, Declan Smithies *qua* Director of Graduate Studies is available for advising questions and concerns: [smithies.2@osu.edu](mailto:smithies.2@osu.edu).

For graduate students in departments other than Philosophy, please consult the Chair of your program.

## Copyright for instructional materials

The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

## Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct

The Ohio State University is committed to building and maintaining a community to reflect diversity and to improve opportunities for all. All Buckeyes have the right to be free from harassment, discrimination, and sexual misconduct. Ohio State does not discriminate on the basis of age, ancestry, color, disability, ethnicity, gender, gender identity or expression, genetic information, HIV/AIDS status, military status, national origin, pregnancy (childbirth, false pregnancy, termination of pregnancy, or recovery therefrom), race, religion, sex, sexual orientation, or protected veteran status, or any other bases under the law, in its activities, academic programs, admission, and employment. Members of the university community also have the right to be free from all forms of sexual misconduct: sexual harassment, sexual assault, relationship violence, stalking, and sexual exploitation.

To report harassment, discrimination, sexual misconduct, or retaliation and/or seek confidential and non-confidential resources and supportive measures, contact the Office of Institutional Equity:

1. Online reporting form at [equity.osu.edu](https://equity.osu.edu),
2. Call 614-247-5838 or TTY 614-688-8605,
3. Or email [equity@osu.edu](mailto:equity@osu.edu)

The university is committed to stopping sexual misconduct, preventing its recurrence, eliminating any hostile environment, and remedying its discriminatory effects. All university employees have reporting responsibilities to the Office of Institutional Equity to ensure the university can take appropriate action:

- All university employees, except those exempted by legal privilege of confidentiality or expressly identified as a confidential reporter, have an obligation to report incidents of sexual assault immediately.
- The following employees have an obligation to report all other forms of sexual misconduct as soon as practicable but at most within five workdays of becoming aware of such information: 1. Any human resource professional (HRP); 2. Anyone who supervises faculty, staff, students, or volunteers; 3. Chair/director; and 4. Faculty member.

## **Commitment to a diverse and inclusive learning environment**

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

## **Land Acknowledgement**

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greenville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

<https://mcc.osu.edu/about-us/land-acknowledgement>

## **Your mental health**

As a student you may experience a range of issues that can cause barriers to learn, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at [go.osu.edu/ccsondemand](https://go.osu.edu/ccsondemand). You can reach an on-call counselor when CCS is closed at 614- 292-5766, and 24-hour emergency help is also available through the 24/7 National Prevention Hotline at 1-800-273-TALK or at [suicidepreventionlifeline.org](https://suicidepreventionlifeline.org). The Ohio State Wellness app is also a great resource available at [go.osu.edu/wellnessapp](https://go.osu.edu/wellnessapp).

## **ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES**

### **Requesting accommodations**

The university strives to make all learning experiences as accessible as possible. If you anticipate or experience academic barriers based on your disability including mental health, chronic or temporary medical conditions, please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with [Student Life Disability Services](#). After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services.

### **Disability Services Contact Information**

- Phone: 614-292-3307
- Website: [slds.osu.edu](https://slds.osu.edu)
- Email: [slds@osu.edu](mailto:slds@osu.edu)
- In person: [Baker Hall 098, 113 W. 12th Avenue](#)

### **Accessibility of course technology**

This online course requires use of CarmenCanvas (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- Canvas accessibility ([go.osu.edu/canvas-accessibility](http://go.osu.edu/canvas-accessibility))
- Streaming audio and video
- CarmenZoom accessibility ([go.osu.edu/zoom-accessibility](http://go.osu.edu/zoom-accessibility))
- Collaborative course tools
- You are welcome [to use the free, Ohio State-themed virtual backgrounds](http://go.osu.edu/zoom-backgrounds) (go.osu.edu/zoom-backgrounds) during CarmenZoom meetings.

## COURSE SCHEDULE

Refer to the Carmen course for up-to-date assignment due dates. The student will be presumed to have read Chapters 1-4 of the textbook, since these chapters cover the material of PHIL 2500. The material to be covered in this course includes, at the outset, some revision of the '2500 basics'. It then proceeds to deal with certain topics covered by the later chapters of the textbook, and by other material available only in the Instructor's Beamer presentations that will be posted on Carmen. All of the Instructor's postings will be downloadable. It is imperative the students keep track of what postings by the Instructor are relevant to the material being covered each week. The order of presentation may have to be altered as the course progresses, in order to accommodate students' questions in class, and whatever problems of understanding that the Instructor may discern from students' performance in Quizzes and the Midsemester Exam.

Week	Dates	Topics, Readings, Assignments, Deadlines
1	Jan 11 and 13	Formal languages v. natural languages. Deductive logic as the study of validity of arguments. Applications of deductive logic, in both mathematics and empirical science. The philosophical importance of logic for the study of language and rationality.  Read: Chapter 1
2	Jan 18 and 20	Eliminating syntactic ambiguity. Categorizing linguistic expressions: names, function signs, predicates, connectives, quantifiers, variable-binding term-forming operators. Formal grammars as involving precise inductive definitions of <i>term</i> and of <i>well-formed formula</i> .  Read: Chapter 2
3	Jan 25 and 27	Interpretation of the connectives by means of truth-tables. Calculating the truth-value of a sentence of propositional logic under an assignment of truth-values to its constituent atoms. Showing that any sentence with no repetitions of atoms is contingent.  Read: Section 3.2

Week	Dates	Topics, Readings, Assignments, Deadlines
4	Feb 1 and 3	<p>Determining the truth-value of a complex first-order sentence under an interpretation/model. Evaluating a first-order sentence as true (or as false) in a finite model, using the 'model-relative' rules for introducing the universal quantifier and eliminating the existential quantifier.</p> <p>Categorically describing finite models.</p> <p>Expressing finitude and infinity in a first-order language.</p> <p>Read: Sections 3.3 to 3.5, and selections posted to Carmen.</p>
5	Feb 8 and 10	<p>The primitive Introduction and Elimination Rules of <i>Natural Deduction</i> for the connectives <math>\neg</math> (not), <math>\wedge</math> (and), <math>\vee</math> (or), <math>\rightarrow</math> (if. . . then __); the quantifiers <math>\exists</math> (some) and <math>\forall</math> (all); and the identity predicate <math>=</math> (with particular attention paid to restrictions on parameters, and to possibilities of discharge of assumptions in subordinate proofs).</p> <p>The Absurdity Rule for the absurdity symbol <math>\perp</math>.</p> <p>Explaining why it is necessary to obey the <i>restrictions on parameters</i> in applications of the rules of existential elimination and universal introduction.</p> <p>Validity of argument. Logical consequence and logical truth ('tautologousness'). Compactness of logical consequence. Counterexamples to invalid arguments.</p> <p>Read: Sections 3.6, 3.8</p>
6	Feb 15 and 17	<p>The primitive Left and Right rules of the <i>Sequent Calculus</i> for the connectives <math>\neg</math> (not), <math>\wedge</math> (and), <math>\vee</math> (or), <math>\rightarrow</math> (if. . . then __); the quantifiers <math>\exists</math> (some) and <math>\forall</math> (all); and the identity predicate <math>=</math>. The Structural Rules of the Sequent Calculus.</p> <p>The relationship between natural deductions and sequent proofs.</p> <p>Read: Chapter 4 and selections posted to Carmen.</p>
7	Feb 22 and 24	<p><i>The Non-Compossibility Theorem: expressive power and deductive power cannot be maximized simultaneously in any language for mathematics.</i></p> <p>Read: selections posted to Carmen.</p>
8	Mar 1 and 3	<p>Classical negation rules.</p>

Week	Dates	Topics, Readings, Assignments, Deadlines
		<p><i>Discharging assumptions</i> in the course of an argument. The notion of a <i>formal proof</i> of a conclusion from a set of undischarged assumptions. <i>Deducibility</i> and <i>theoremhood</i> in a particular logical system. Interdefinability of logical operators in the classical case. Interderivability of rules of inference.</p> <p>What rules make up the systems of Minimal, Intuitionistic and Classical logic.</p> <p>Using the rules of inference of Intuitionistic Logic to mimic the left-right readings of the rows of the truth-tables for the connectives. Deriving any of the four classical negation rules from any other such rule, within Intuitionistic Logic.</p> <p>Prenex normal forms.</p> <p>Normalizability of natural deductions.</p> <p>Read: Chapter 4, again.</p>
9	Mar 8 and 10	<p><i>The decidability problem in logic</i>: Can we algorithmically find proofs of, or counterexamples to, formal arguments with finitely many premises?</p> <p>There is an effective method to do this in monadic predicate logic, but not in first-order logic with but one binary predicate.</p> <p>The difference between <i>automated</i> theorem-proving and <i>interactive</i> theorem-proving in computational logic. The algorithmic complexity of automated theorem-proving in various propositional logics.</p> <p>Read: selections posted to Carmen.</p>
	Mar 14-18	<i>Spring Break</i>
10	Mar 22 and 24	<p>Free logic: how to accommodate non-denoting singular terms.</p> <p>Abstractive terms in mathematical theories.</p> <p>Read: Chapter 6, and selections posted to Carmen.</p>
11	Mar 29 and 31	<p>Various well-known first-order axiomatic theories in mathematics, dealing with numbers, orderings, sets, and algebras.</p> <p>Monomathematics v. Polymathematics.</p> <p>Read: selections posted to Carmen.</p>

Week	Dates	Topics, Readings, Assignments, Deadlines
12	Apr 5 and 7	<p>The <i>consistency</i> or <i>inconsistency</i> of a set of sentences.</p> <p>Maximal consistent sets of first-order sentences.</p> <p>Matching logical consequence to logical deducibility; logical truth to logical theoremhood; and logical falsity to logical refutability.</p> <p>Read: Sections 4.6, 5.3, pp 98-9.</p>
13	Apr 12 and 14	<p>Soundness and completeness of classical first-order logic.</p> <p>The Countable Models Theorem.</p> <p>Skolem's Paradox: the ineffability of uncountability.</p> <p>Read: Sections 4.11, 5.3, and selections posted to Carmen.</p>
14	Apr 19 and 21	Review and SEIs
Finals Week	Registrar scheduled time	Final Exam



Syllabus  
for  
PHIL5500: Symbolic Logic  
Spring Semester, 2020

Instructor

Neil Tennant

tennant.9@osu.edu  
<http://u.osu.edu/tennant.9/>

University Hall, Room 322  
Department of Philosophy  
The Ohio State University  
Columbus, Ohio 43210

October 8, 2019

## **1 Lecture/seminar**

Tuesday and Thursday, 11:10 a.m.–12:30 p.m. in Seminar Room, University Hall 353

## **2 Aims**

We introduce the student to the metatheory of first-order logics and languages; natural deduction for propositional and predicate logic; model theory; soundness, completeness, and Löwenheim-Skolem theorems.

### **3 Some words of advice for students who are considering taking this course**

A prerequisite for this course is PHIL2500: Introduction to Symbolic Logic. We shall be making important use of techniques of logical analysis and regimentation, at both the object- and the meta-level. We shall revise relevant introductory material as necessary. Graduate students in Philosophy, however, need to take this course in order to fulfil their program requirements. For this reason, it is especially important to take advantage of the instructor's student hours when the need arises.

### **4 Textbook**

Neil Tennant, *Natural Logic*, 2nd revised edition, Edinburgh University Press, 1991. The full .pdf of this book is available for download from Canvas.

### **5 Assigned readings**

The readings assigned are all those in the textbook under any section whose heading corresponds to a sequence of lectures within the course. It will be clear as the course progresses what pieces you will need to read in advance of the lectures, in order to derive maximum benefit from them, and what readings you will need to have under your belt in order to take your exams. Any pieces of his own writing that the Instructor makes available are also to be taken as assigned. These might include lecture-summaries on occasion, or slide presentations. *All examinable material will be found in the latter*, which will be posted on Carmen/Canvas.

### **6 Important deadlines**

Date to be determined	Midsemester exam
Official date for final exam set by the Registrar	Final exam

## 7 Assessment

Midsemester exam	40%
Final exam	60%
Class attendance and participation	An adjustment factor

## 8 Student hours

TBD

Please *knock on the door* to let me know you are there!

## 9 Policy on attendance at classes

Attendance is expected, and will be recorded.

If the record involves the signing of attendance sheets, please be advised that the authenticity of signatures will be checked. Anyone forging another student's signature, or knowingly allowing their own signature to be forged, will be severely penalized, since it will count as academic misconduct.

Every unexcused absence will result in a drop of one percentage point in your final numerical grade. (One letter grade consists of ten percentage points.)

The commonest excuse for an absence is that one has been ill or that there has been a family emergency. In the case of a medical excuse, please be prepared to give me, if requested, a copy of the standard visitation form signed by the medical practitioner. Please email your medical excuse to me. Likewise, in the case of a family emergency, please just email me to let me know.

Please note the importance of emailing your excuses *from lectures* to me. Make sure you use a subject header of the form

PHIL 5500: Week [Number], [Day-of-week].

Example:

PHIL 5500: John Doe: Week 5, Tuesday.

Week 1 is the week that begins on Monday, January 6, 2020.

You will be trusted not to abuse this 'honor' system, which is designed to minimize stress on students genuinely experiencing it. These excuses will be retroactive, but each excuse must be recorded at the first class after the absence, and certainly before the beginning of exam week.

## 10 Plagiarism

(This is boiler-plate stuff. I do not expect it to be particularly relevant to PHIL 5500. But I have to include it, to be on the safe side.)

Plagiarism is intellectual theft: purloining another person's ideas or mode of expression without proper attribution, and passing off the written material in question as one's own work. Plagiarism is serious *academic misconduct*, and the University has strict rules that penalize it. You will be assumed to be acquainted with these rules. Please be mindful of the need for careful note-taking, so that you do not inadvertently make the mistake, when completing an assignment, of including material that you forget you had copied earlier from another source. The risk of inadvertent copying is especially marked if you download material from the web. But then so is the risk of being caught, since one can search the web for the very material that the student has failed to attribute to its original source.

The Ohio State University's policies on punishments for plagiarism do not pre-empt the instructor's right to specify a minimum penalty for any student who plagiarizes in the instructor's course. A central requirement in my grading policy is that every assignment needs to be completed by the due date (unless an exemption from this requirement is expressly granted by me). Failure to meet this requirement results in automatic failure in the course. Naturally, if you are unable to complete an assignment owing to illness, family emergency or like cause, I shall be lenient and understanding, and grant the necessary exemption. But if a student is found guilty of plagiarism after due process before the Committee on Academic Misconduct, and if the Committee imposes only the very lenient penalty of a zero for the piece of work concerned (or the even more lenient penalty of allowing the student to re-submit the piece of work in question), then the Committee's penalty will be overridden by my grading policy. As a result of any such decision by the Committee, the student will be deemed to have failed to complete the assignment in question by its due date, and will consequently fail in the course.

## 11 Accommodations for Disabilities

Any student who feels a need for an accommodation because of a disability should ask Disability Services to contact me confidentially about the accommodation needed:

Student Life Disability Services  
098 Baker Hall  
113 W. 12th Ave  
Columbus, OH 43210  
614-292-3307  
General business email: [slds@osu.edu](mailto:slds@osu.edu)  
Exam accommodations email: [slds-exam@osu.edu](mailto:slds-exam@osu.edu)

This Office coordinates reasonable accommodations for students with documented disabilities.

## 12 Mental Health: Counseling and Consultation Service (CCS)

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities.

The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you are suffering from any of the aforementioned conditions, or you know someone who is, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting [ccs.osu.edu](http://ccs.osu.edu) or calling 614-292-5766. CCS is located on the 4th Floor of the Younkin Success Center and on the 10th Floor of Lincoln Tower.

You can reach an on-call counselor when CCS is closed, at 614-292-5766. Also, 24-hour emergency help is available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK and at [suicidepreventionlifeline.org](http://suicidepreventionlifeline.org).

# Distance Approval Cover Sheet

## For Permanent DL/DH Approval | College of Arts and Sciences

Course Number and Title: **PHILOS 5500: Advanced Symbolic Logic**

### Carmen Use

Please consider using [ASC's distance learning course template](https://teaching.resources.osu.edu/teaching-topics/carmen-common-sense-best-practices). For more on use of Carmen: <https://teaching.resources.osu.edu/teaching-topics/carmen-common-sense-best-practices>

A Carmen site will be created for the course, including a syllabus and gradebook at minimum. **Yes**

### Syllabus

Proposed syllabus uses the ASC distance learning syllabus template, includes boilerplate language where required, as well as a clear description of the technical and academic support services offered, and how learners can obtain them. **Yes**

Syllabus is consistent and is easy to understand from the student perspective. **Yes**

Syllabus includes a schedule with dates and/or a description of what constitutes the beginning and end of a week or module. **Yes**

If there are required synchronous sessions, the syllabus clearly states when they will happen and how to access them. **Yes**

Additional comments (optional):

### Instructor Presence

For more on instructor presence: <https://teaching.resources.osu.edu/teaching-topics/online-instructor-presence>

Students should have opportunities for regular and substantive academic interactions with the course instructor. Some ways to achieve this objective:

- Regular instructor communications with the class via announcements or weekly check-ins
- Instructional content, such as video, audio, or interactive lessons, that is visibly created or mediated by the instructor
- Regular participation in class discussion, such as in Carmen discussions or synchronous sessions
- Regular opportunities for students to receive personal instructor feedback on assignments



Please comment on this dimension of the proposed course (or select/explain methods above):  
 Students will have the opportunity to meet with the instructor twice a week during a synchronous class session over CarmenZoom, and to set up one-on-one appointments over CarmenZoom with the course instructor.

## Delivery Well-Suited to DL/DH Environment

Technology questions adapted from the [Quality Matters](#) rubric. For information about Ohio State learning technologies: <https://teaching.resources.osu.edu/toolsets>

The tools used in the course support the learning outcomes and competencies. **Yes**

Course tools promote learner engagement and active learning. **Yes**

Technologies required in the course are current and readily obtainable. **Yes**

Links are provided to privacy policies for all external tools required in the course. **Not applicable**

Additional technology comments:

This course relies upon standard OSU technology, including computers, Carmen, CarmenZoom and Microsoft365 suite (especially Word). Instructor uses a Wacom tablet to write and draw within a Word document which is shared in real time when lecturing on CarmenZoom. This has proved to be an effective substitute for writing on a blackboard or whiteboard when teaching an in-person course.

Which components of this course are planned for synchronous delivery and which for asynchronous delivery? (For DH, address what is planned for in-person meetings as well.)

Class meetings and office hours will occur synchronously. Recordings of class meetings will be posted for asynchronous review and viewing. Feedback on exams supplied asynchronously.

If you believe further explanation would be helpful, please comment on how course activities have been adjusted for distance learning:

Exams have been set up in Carmen with many questions that autograde and return feedback to students after the due date for submission has passed. Instructor offers individualized feedback through comments section of Quizzes. Correct/Incorrect answers for exam questions are reviewable by students after due date has passed.

## Workload Estimation

For more information about calculating online instruction time: [ODEE Credit Hour Estimation](#)

Course credit hours align with estimated average weekly time to complete the course successfully. **Yes**

Course includes direct (equivalent of "in-class") and indirect (equivalent of "out-of-class") instruction at a ratio of about 1:2. **Yes**

Provide a brief outline of a typical course week, categorizing course activities and estimating the approximate time to complete them or participate:

Students meet with instructor for 3 hours of class meetings and students complete assigned readings and practice problems over 6 hours on their own.

In the case of course delivery change requests, the course demonstrates comparable rigor in meeting course learning outcomes. **Yes**

## Accessibility

For more information or a further conversation, contact the [accessibility coordinator](#) for the College of Arts and Sciences. For tools and training on accessibility: [Digital Accessibility Services](#)

Instructor(s) teaching the course will have taken Digital Accessibility training (starting in 2022) and will ensure all course materials and activities meet requirements for diverse learners, including alternate means of accessing course materials when appropriate. **Yes**

Information is provided about the accessibility of all technologies required in the course. All third-party tools (tools without campus-wide license agreements) have their accessibility statements included. **Yes**

Description of any anticipated accommodation requests and how they have been/will be addressed. Instructor will share the Zoom meeting details directly with students, including the link, meeting ID, password, and telephone access options. The instructor will enable Zoom's Live Transcription service and alert students to its availability at the beginning of each class period. The instructor will enable NameCoach in Carmen and direct students to record the pronunciation of their name in the first week of classes. Included in the syllabus is the availability of Zoom backgrounds and Digital Flagship resources. The main course reading is supplied as an OCR readable PDF, which students who need to use a screen reader for the readings can use.

Additional comments:

If the instructor receives a letter of accommodation for a student, then the instructor will review accessibility options at <https://teaching.resources.osu.edu/toolsets/carmenzoom/guides/accessibility-carmenzoom>

## Academic Integrity

For more information: <https://go.osu.edu/teaching-resources-academic-integrity>

The course syllabus includes online-specific policies about academic integrity, including specific parameters for each major assignment: **Yes**

Assignments are designed to deter cheating and plagiarism and/or course technologies such as online proctoring or plagiarism check or other strategies are in place to deter cheating: **Yes**

Additional comments:

The synchronous nature of exams that are only accessible through Carmen, which requires students to login with their BuckID, deters cheating.

## Frequent, Varied Assignments/Assessments

For more information: <https://teaching.resources.osu.edu/teaching-topics/designing-assessments-student>

Student success in online courses is maximized when there are frequent, varied learning activities. Possible approaches:

- Opportunities for students to receive course information through a variety of different sources, including indirect sources, such as textbooks and lectures, and direct sources, such as scholarly resources and field observation
- Variety of assignment formats to provide students with multiple means of demonstrating learning



Opportunities for students to apply course knowledge and skills to authentic, real-world tasks in assignments

Comment briefly on the frequency and variety of assignment types and assessment approaches used in this course (or select methods above):

Students are offered the opportunity to receive information through assigned course readings and class sessions that include lecture and discussion. Practice problems are offered in class and as informal homework.

## Community Building

For more information: <https://teaching.resources.osu.edu/teaching-topics/student-interaction-online>

Students engage more fully in courses when they have an opportunity to interact with their peers and feel they are part of a community of learners. Possible approaches:

Opportunities for students to interact academically with classmates through regular class discussion or group assignments

Opportunities for students to interact socially with classmates, such as through video conference sessions or a course Q&A forum

Attention is paid to other ways to minimize transactional distance (psychological and communicative gaps between students and their peers, instructor, course content, and institution)

Please comment on this dimension of the proposed course (or select methods above):

Instructor will engage directly with students during synchronous class time and plentiful office hours. Students will be asked to work in groups on sample problems through Zoom breakouts. Instructor will log into Zoom five minutes in advance of synchronous class time and encourage students to do so as well to permit informal conversation among course participants. Instructor will check in with students outside of class meeting times to receive feedback on their experience of the course. In light of this feedback, instructor will consider options for meeting the expressed needs of students after consulting this page: <https://teaching.resources.osu.edu/teaching-topics/creating-inclusive-environment>

## Transparency and Metacognitive Explanations

For more information: <https://teaching.resources.osu.edu/teaching-topics/supporting-student-learning-your>

Students have successful, meaningful experiences when they understand how the components of a course connect together, when they have guidance on how to study, and when they are encouraged to take ownership of their learning. Possible approaches:

Instructor explanations about the learning goals and overall design or organization of the course

Context or rationale to explain the purpose and relevance of major tasks and assignments

Guidance or resources for ancillary skills necessary to complete assignments, such as conducting library research or using technology tools

Opportunities for students to take ownership or leadership in their learning, such as by choosing topics of interest for an assignment or leading a group discussion or meeting



Opportunities for students to reflect on their learning process, including their goals, study strategies, and progress

Opportunities for students to provide feedback on the course

Please comment on this dimension of the proposed course (or select methods above):

*Instructor explains the overall organization of the course content on the first day of class, and makes connections throughout the semester. During class, instructor will discuss with students their goals and how course content can help them pursue them. During office hours, instructor will invite students to reflect on their learning process, both what is working in it and what may be a barrier. Instructor will informally speak with students outside of regular class times to solicit their feedback on the course, and an SEI will be administered at the end of the semester.*

## Additional Considerations

### Syllabus and cover sheet reviewed by Jeremie Smith on 10/8/2021

*This syllabus includes all required syllabus elements and provides a complete and comprehensive overview of the course expectations. It is recommended that additional low-stakes, high frequency assignments or assessments be added to the course design to better facilitate remote student engagement. Ideally, some aspect of these additional low-stakes assignments would include opportunities for further student interaction such as an explicitly required use of discussion forums or a collaborative project of some sort. [The Teaching and Resources Center has a very informative resource on designing assessments of student learning an online environments](#), you may find it useful should you choose to reconsider assignments for this course.*

Additional resources and examples can be found on [ASC's Office of Distance Education](#) website.