

科目ナンバリング		U-LAS70 10002 SE50					
授業科目名 <英訳>	ILAS Seminar-E2 : Introduction to Logic, Proofs and Programs (論理, 証明およびプログラムへの入門) ILAS Seminar-E2 :Introduction to Logic, Proofs and Programs			担当者所属 職名・氏名	人間・環境学研究科 特定講師 THIES, Holger		
群	少人数群	単位数	2単位	週コマ数	1コマ	授業形態	ゼミナール (対面授業科目)
開講年度・開講期	2024・前期	受講定員 (1回生定員)	15 (15) 人	配当学年	主として1回生	対象学生	全学向
曜時限	月5	教室	吉田南総合館南棟230			使用言語	英語
キーワード	Computation / Logic / Formal proof						
(総合人間学部の学生は、全学共通科目として履修登録できません。所属部局で履修登録してください。)							
【授業の概要・目的】							
<p>This course is an introduction to basic logical principles and formal methods in computer science. Students will learn fundamental concepts and techniques of mathematical logic and their applications to computer science and other areas.</p> <p>The emphasis is on the computational aspects of logic and the topics will be introduced through hands-on use of the Coq proof assistant, a tool for machine-checked mathematical proofs.</p> <p>The software assists students in constructing formal proofs and automatically checks their correctness.</p>							
【到達目標】							
<p>Students will become familiar with logical reasoning and formal proofs.</p> <p>They will also get some practical experience in the use of a proof assistant.</p> <p>The course will help students develop skills that are important in any field of research, such as critical thinking and the ability to construct rigorous arguments.</p>							
【授業計画と内容】							
<p>Below are some possible topics that we will cover during the course. We will spend one or two weeks on each topic. The topics we cover may change depending on the interests and abilities of the students.</p> <ol style="list-style-type: none"> <li>1) Propositional logic</li> <li>2) First-order Predicate logic</li> <li>3) Computer assisted theorem proving</li> <li>4) Basics of functional programming</li> <li>5) Natural deduction</li> <li>6) Type Theory</li> <li>7) Constructive Logic</li> <li>8) The relationship between proofs and programs</li> </ol> <p>Total: 15 sessions (14 class sessions and 1 feedback session)</p>							
【履修要件】							
<p>No prior knowledge is required, however some familiarity with rigorous mathematical proofs and interest in computer programming will be helpful.</p> <p>The course will include some practical exercises. It is recommended that students have access to a computer where they can install software.</p>							
ILAS Seminar-E2 : Introduction to Logic, Proofs and Programs (論理, 証明およびプログラムへの入門) (4)へ続く							

### 【成績評価の方法・観点】

Students are expected to actively participate in discussion, read material, and solve exercises in class. Evaluation will be based on the following: written and oral assignments (50%), final report (50%)

### 【教科書】

No textbook. Relevant materials will be distributed in class.

### 【参考書等】

#### ( 参考書 )

The following books might be useful as references and background reading, but are not required.

1) "Logic in Computer Science" by Michael Huth and Mark Ryan

Publisher: Cambridge University Press (2004), ISBN: 978-0521543101

2) "A Beginner's Guide to Mathematical Logic" by Raymond Smullyan.

Publisher: Dover Publications (2014), ISBN: 978-0486492377

3) "Software Foundations" by Benjamin C. Pierce et al., Volume 1: Logical Foundations, available online:

<https://softwarefoundations.cis.upenn.edu/>

4) “ Interactive Theorem Proving and Program Development ” , by Yves Bertot and Pierre Casteran,

Publisher: Springer (2004), ISBN: 978-3662079645.

### 【授業外学修（予習・復習）等】

Students should review the course material after each class and solve the homework assignments.

### 【その他（オフィスアワー等）】