

登録コード	TS217600	開講年度	2026			
授業科目	数理情報学応用特論				担当教員	KAWAMOTO PAULINE NAOMI
英文授業名	Applied Mathematics and Informatics				副担当	
単位数	2	講義期間	後期	曜日・時限	金曜・1時限 金曜・2時限	対象学生
講義室	工W1-215教室		授業形態	講義	備考	
信大コンピテンシー	非該当					
(1)授業の達成目標	【授業で得られる「学位授与の方針」要素】				【授業の達成目標】	
	2 4 TSカリ, 2 3 TSカリ					
	【研究科共通】深い専門知識に基づいて自らの思考や妥当性を論理的に説明できる批判的思考力				Students will learn to be able to write a number of basic mathematical theorems and construct their proofs using a formalized language which can be checked for logical correctness with a mechanized (computerized) proof checker.	
	2 6 TSカリ, 2 5 TSカリ, 2 4 TSカリ, 2 3 TSカリ					
	【専攻】専門知識に基づいて自らの思考や妥当性を論理的に説明できる批判的思考力				Students will learn the basic notions and techniques for formalizing concepts that can be used to describe software and hardware systems and study how to construct logical proofs to verify specific conditions and characteristics of the systems.	
(2)授業の概要	Lectures and tutorials will be given on: + descriptions of mathematical concepts in natural language + introduction to mathematical formalizations + formalizations of theorems + proof design + mechanized proof checking					
(3)授業計画	1. Introduction 2. Definitions, theorems 3. Descriptions of definitions in natural language 4. Descriptions of theorems in natural language 5. Theorems and proof descriptions 6. Comparing mathematical definitions in natural and formalized languages 7. Comparing mathematical theorems in natural and formalized languages 8. Formatting mathematical definitions for mechanical processing (predicates) 9. Formatting definitions (operators) 10. Formatting definitions (attributes) 11. Explaining proof strategies 12. Sketching proof skeletons (universal quantifiers, implications, equivalence) 13. Mechanized proof assistants 14. Checking proof skeletons 15. Constructing proofs for mechanical processing 16. Class review for final exercise					
(4)成績評価の方法	Grading will be based on the completion of assignments (60%) for checking the student's understanding of the basic concepts of writing definitions, theorems, and proofs using formal and natural languages and a final report (40%) demonstrating the student's understanding of the differences between proof checking done by humans and by machines using concrete examples. To qualify for a grade, all exercises must be completed.					
(5)成績評価の基準	Assignments (60%): to check the student's understanding of the basic concepts of writing definitions, theorems, and proofs using formal and natural languages Final report (40%): to check the student's understanding of the differences between proof checking done by humans and by machines and ability to explain the differences using concrete examples					
(6)事前事後学習の内容	Weekly exercises should be completed at least two days before the next class meeting or by the specified deadlines.					
(7)履修上の注意	The main language for the course will be English. Students will need a PC to do mechanical checking of their proof texts before submission to the instructor.					
(8)質問,相談への対応	Instructor contact e-mail: pauline@cs.shinshu-u.ac.jp					
(9)その他						
【教科書】	None.					
【参考書】	To be announced, as needed.					