科目名　Couse Title	
数理科学展望 I(Perspectives in Mathematical Science I)	
学科・専攻　Department/Program	受講年次　Grade
多元数理科学研究科	
授業形態　Class style	必修・選択の別　Compulsory or Elective
講義	
時間割コード　Registration code	開講期・曜日・時限　Semester,Day & Period
1610000	春学期 火曜　曜：4限時限
単位数　Credit	科目区分　Course type
2	

担当教員　Instructor	大平　徹 (Toru Ohira)
所属研究室　Laboratory	
連絡先　Contact	ohira@math.nagoya-u.ac.jp
居室　Room	A-341
担当教員　Instructor	ジャック　ガリグ (Jacques Garrigue)
所属研究室　Laboratory	
連絡先　Contact	garrigue@math.nagoya-u.ac.jp
居室　Room	多-405
担当教員　Instructor	ラース　ヘッセルホルト(Hesselholt Lars)
所属研究室　Laboratory	
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居室　Room	A-449

講義の目的とねらい　Course purpose

This course is designed to be one of the English courses which the Graduate School of Mathematics is providing for the graduate and undergraduate students not only from foreign countries but also domestic students who wish to study abroad or to communicate with foreign scientists in English. All course activities including lectures, homework assignments, questions and consultations are in English. The purpose of this course is to introduce and explainvarious concepts and methods in mathematical sciences. This year, the course is provided by three instructors:

Part 1: Kummer's ideal numbers (L. Hesselholt)
Part 2: Typed Lamba-Calculi and the Curry-Howard isomorphism (J. Garrigue)
Part 3: Bayes' theorem (T. Ohira)

履修要件　Prerequisite

Working knowledge of basic undergraduate mathematics including calculus and linear algebra is required.

履修取り下げについて　Course withdrawal

<可否>
<条件>

成績評価　Grading

In each part, the instructor will assign exercises, problems, etc. during the lectures and determines grades (A, B, C, F) independently. Therefore, each student has three letter grades after the course is done. Based on these three estimates, the final grade of the course will be determined.

不可（F）と欠席の基準　Criteria for "Absent" &"Fail" grades

関連する科目　Related courses

他学科学生の聴講について　About attend other

<可否>　可能
<条件>
While this course is open for any students at Nagoya University as one of the ``open subjects'' of general education, students not majoring in mathematics should contact any of the instructors before the first lecture to see if the course is appropriate to take.

教室　Class room

School of Science Building 1 (Mathematics), Room 109

授業内容　Content

Part 1: Kummer's ideal numbers

In 1847, Lamé and Cauchy announced proofs of Fermat ' s last theorem in a meeting of the French Academy of Sciences. However, shortly thereafter, Kummer pointed out a fatal error in the proofs. In a way, this was a most fortunate turn of events, for some very important parts of modern mathematics grew out of Kummer ' s work. This portion of the course will present some parts of this mathematics. In the end, I will present a conjecture of Kummer—or as he wrote, " a theorem still to be proved " —that to this day remains an important open problem.

Part 2: Typed Lamba-Calculi and the Curry-Howard isomorphism

Starting from mathematical logic, the lambda-calculus has become one of the main foundations of programming language theory. Through the introduction of types, it has demonstrated a close connection between proofs and programs, known as the Curry-Howard isomorphism. It has been applied both to functional programming languages and type theory based proof assistants. We will give a quick tour through some of the type systems developped for lambda-calculus, and show their implications both for programming and logic.

Part 3: Bayes' Theorem

In this part of the lecture, we aim to understand the Bayes' theorem, which gives a way to infer a cause from outcomes statistically. The basic concepts such as expectation, conditional probability of the probability theory are reviewed as a preparation. We will discuss concrete examples and applications of the theorem as well.

教科書　Textbook
参考書　Recommended reading
連絡方法　Contact method
その他　Remarks