## 2025/03/31 14:11

Year	First semester 2025
Course	Mathematics B
Day/Period	Thu.1Period
Credit(s)	2Credits
Instructor	KOJI HASEGAWA,TAKASHI SHIOYA,CAVALLINA LORENZO
Eligible Participants	Not specified (For all grades)
Course code/number	SMA-MAT802E
Main Subjects	0
Course of Media Class	
Practical business	
Language Used in Course	English
Course Title	Mathematics B
Purpose/Abstract	Themes are chosen from algebra, geometry, and analysis and are explained in English by experts in each field, allowing students to learn mathematics and how to express it in English.
Goal	This course will cover some advanced and basic mathematics. Students will gain perspective and an understanding of the usefulness of mathematics.
Contents and progress schedule of the class	ALGEBRA "Matrix groups"/Koji Hasegawa   1. Linear algebra review 2. Basic example of matrix groups   3. More examples and Klein's view (Erlangen program)   4. Poincar ' e's model of non-Euclidean geometry   5. Introduction to Lie theory   GEOMETRY "Topology of surfaces"/Takashi Shioya   1. Basics of topology   2. Gluing of surfaces   3. Euler number and connected sum of surfaces   4. Representation of surfaces   5. Classification of closed surfaces   ANALYSIS   "Fixed point theorems and applications"/Lorenzo Cavallina   1. Fixed point s and contraction mappings: definitions and examples.   2. The Banach Contraction Principle   3. The Implicit Function Theorem and the Inverse Function Theorem in Banach spaces   4. Iterative methods in Banach spaces   5. The solution to ODEs in Banach spaces
Grading	Report and attendance
Books required/referenced	No textbook assigned and we will give suitable references at each lecture.
Contents of preparation and review	Study relevant textbooks or references.
Study time for preparation and review	Standard Hours for Preparation/Review per class: *Lectures 4 hour *Seminar 2-4 hour *Experiment, Laboratory Work, and Skill Test 2 hours
How to contact and Google Classroom Code	Materials will be provided via ISTU and/or google classroom (fap4af3). More information will be given at the class.
Remarks	Mail addresses of Hasegawa, Shioya and Cavallina are as follows. koji.hasegawa.d7©tohoku.ac.jp takashi.shioya.a2©tohoku.ac.jp cavallina.lorenzo.e6©tohoku.ac.jp
Last Update	2025-02-14

One-credit courses require 45 hours of study. In lecture and exercise-based classes, one credit consists of 15-30 hours of class time and 30-15 hours of preparation and review outside of class. In laboratory, practical skill classes, one credit consists of 30-45 hours of class time and 15-0 hours of preparation and review outside of class.