4. 建築・都市環境工学系　Architecture and Civil Engineering		ACE-F2
授業科目名 Course Title	Data Science for Architecture and Civil Engineering	単位数 Credit	**2**
担当教員 Instructor	Keigo Suzuki	開講学期 Semester	Autumn
キーワード Keywords	Python, Signal Processing, Data science, Machine learning	曜日/時限 Day & Time	Fri/1

授業概要　Course summary
Mathematical science is an indispensable tool for understanding and analyzing the laws of nature. Mathematical science has also contributed significantly to the development of architecture and civil engineering and is widely used as an analysis and evaluation tool for people to lead safe, secure, and comfortable lives. In this lecture, we will deepen our understanding of the mathematical science used in architecture and civil engineering while experiencing numerical processing utilizing Python's programming language. In addition, topics include machine learning for image judgment. The class materials are distributed on Google classroom. Students must join the classroom, the code of which is "q3vz45j".

到達目標　Course goal
Upon completion of the course, students will:

1. Gain script writing ability in Python
2. Be capable of signal processing using Fourier transform and displacement calculation by stiffness matrix method.
3. Understand the basics of machine learning methods, and build learning models.

授業内容　Course description
＃1 Python basics (Script basics, input / output, if statements, conversational format) ＃2 Python basics (List) ＃3 Python basics (Numerical analysis using NumPy) ＃4 Python basics (Repetitive processing) ＃5 Python basics (Reading from external text file) ＃6 Python application (Signal processing by Fast Fourier Transform) ＃7 Python application (Signal processing with booleans and low-pass filters) ＃8 Python application (Stiffness matrix and node displacement) ＃9 Machine learning (Basics of image processing) ＃10 Machine learning (Classification with the logistic regression model) ＃11 Python basics (Function definition and recursive processing in folders) ＃12 Machine learning (Verification of learning model by hold-out validation) ＃13 Machine learning (Confirmation of generalization performance of learning model by cross validation) ＃14 Python basics (Definition of class) ＃15 Python basics (Application of class)

準備学習（予習・復習）等　Preparation / Review
Work for at least 2 hours of preparation based on watching the lesson videos. After the lecture, review for at least one hour while checking the results of the examples and assignments.

授業形式　Class style

All the lectures are held in person not on-line, but explanatory videos will be provided on Google Classroom. A flipped classroom is held. Reading the lecture materials and watching explanatory videos in advance are essential and preparing for them. At the beginning of the lesson time, the contents of the lesson video will be briefly explained, and questions and answers will be provided. After that, students will work on script writing.

成績評価の方法・基準　Method of evaluation
Homework: 50%, Final exam:50% Credits will not be granted unless a score of at least 50% is obtained on the final exam.

教科書・参考書等　Textbook and material
いちばんやさしい Python 機械学習の教本　(Written in Japanese) 鈴木たかのり、降籏洋行、平井孝幸 株式会社ビープラウド インプレス社 978-4295006411

受講要件・予備知識　Prerequisite
All the lectures are held in person (face to face), not online. If another class you want to take is scheduled at the same time, you should contact the instructor. (Keigo Suzuki, suzuki-k@u-fukui.ac.jp)

その他の注意事項　Note
If a student is absent 5 times or more, the student will not have credits. The student will be regarded as absent if the student is late or leaves early for 30 minutes or more.