| Hokkaido University Syllabus | | | | | |
|---|---|---|---|---|---|

**Course Title**

Advanced Continuum and Discontinuum Mechanics

**Subtitle**

**Instructor (Institution)**

Shusaku HARADA ( Faculty of Engineering )

**Other Instructors (Institution)**

Shusaku HARADA ( Faculty of Engineering )

| Course Type | | | | Open To Other Faculties / Schools | OK |
|---|---|---|---|---|---|
| Year | 2020 | Semester | 1st Semester (Spring Term) | Course Number | 092851 |
| Type of Class | Lecture | Number of Credits | 2 | Year of Eligible Students | ～ |
| Eligible Department / Class | | | | Other Information | |

**Numbering Code**  ENG_SRE 6500

| Major Category Code | Major Category Title |
|---|---|
| ENG_SRE | Engineering_Sustainable Resources Engineering |

| Level Code | Level |
|---|---|
| 6 | Specialized Subjects (advanced) in graduate level (Master's Course and Professional Course) |

| Middle Category Code | Middle Category Title |
|---|---|
| 5 | |

| Small Category Code | Small Category Title |
|---|---|
| 0 | |

**Language Type**

Classes are in Japanese.

■■ Course list by the instructor with practical experiences

■■ Key Words

Dynamics of continuum, discontinuity, continuum, dynamics of discrete system, transport phenomena, multiphase flow

■■ Course Objectives

Learn about the concept and theory behind fluid motion, motion of granular body, and multiphase flow including granular body as disperse phase. Aim to understand equations describing transport phenomena and foundation of numerical solution and to learn how to handle mechanical interaction between continuum and discontinuity. Also learn how to calculate discrete system dynamics typified by the discrete element method (DEM).

■■ Course Goals

Aim to fully understand the concepts of continuum and discontinuity and to learn formulation and solution of those motions.

■■ Course Schedule

1. Foundation of transport phenomena in continuum (1): intuitive understanding of simple basic equations)
2. Fundamentals of transport phenomena in continuum (2): Physical meaning and solution of simple basic equation - Part 1 -)
3. Fundamentals of transport phenomena in continuum (3): Physical meaning and solution of simple basic equation - Part 2-)
4. Numerical Method of Transport Phenomena - Part 1
5. Numerical Method of Transport Phenomena - Part 2
6. Numerical Method of Discrete System Mechanics (1): Basis and Classification of Single Discrete System Mechanics)
7. Numerical Method of Discrete System Mechanics (2): Foundations and Applications of Single Discrete Element Method)
8. Classification and characteristics of particle-based multiphase flow
9. Mechanical interaction between particle and fluid - Part 1 -
10. Mechanical interaction between particle and fluid - Part 2-
11. Mechanical interaction between particle and fluid - its 3-
12. Mechanical interaction between particles
13. Behavior of Particulate Granular Bodies - Part 1 -
14. Behavior of Granular Matter as a Group - Part 2-
15. Behavior of Particulate Granular Bodies - Part 3 -

■■ Homework

Before each lecture, prepare and learn a sufficient amount by using the materials distributed.

■■ Grading System

Evaluate done through assignment (50%) and periodic test (50%).

■■ Practical experience and utilization for classes

## ■ Condition of tasking the subject


## ■ Textbooks

担当教員が作成した資料を適時配布する．


## ■ Reading List


## ■ Websites


## ■ Website of Laboratory


## ■ Additional Information

It is based on mathematical knowledge such as fluid dynamics, solid dynamics, partial differential equation
・ linear algebra.


## ■ Update

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