View Syllabus Information

Course Information

Year	2024	School	School of Fundamental Science and Engineering	
Course Title	Dynamics B English-based Undergraduate Program			
Instructor	SAITO, Kiyoshi／TEZUKA, Asei／PENG, Linyu／YANAO, Tomohiro／YAMAGUCHI, Seiichi／YOSHIMURA, Hiroaki			
Term/Day/Period	summer quarter Fri.3			
Category	Elective Courses in the Major	Eligible Year	3rd year and above	Credits 1
Classroom	53-104	Campus	Nishi-Waseda(Former: Okubo)	
Course Key	26MA022005	Course Class Code	01	
Main Language	English			
Class Modality Categories	[On-campus]			
Course Code	MECX22ZL			
First Academic disciplines	Mechanical Engineering			
Second Academic disciplines	Mechanical Engineering			
Third Academic disciplines	Dynamics			
Level	Intermediate, developmental and applicative	Types of lesson	Lecture	

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Subtitle	Dynamical Systems and Their Stability
Course Outline	Note: The eligible year for EBSE September enrollees is different from the above. Please make sure to check “Students HANDBOOK”. In the course Dynamics divided into Dynamics A and Dynamics B, an elementary introduction to the mathematical theory of mechanical systems will be discussed, including work, momenta, energy, variational principles, Lagrangian and Hamiltonian formalisms, symmetries, first integrals, etc. In particular in Dynamics B, we will be focused on an introduction to dynamical systems and their stability. *Starting from 2024, please note that the contents of Dynamics A and Dynamics B have been swapped.
Objectives	Objectives of Dynamics B are as follows: 1) to gain a knowledge of foundations of dynamical systems and 2) to understand the stability of linear and nonlinear systems. *Note that the syllabus is tentative and may be subject to change.
before/after course of study	Check the contents of the previous lecture before the next lecture and do homework when it is given until the next lecture.
Course Schedule	1: 第1回：Course introduction An introduction of the course will be given. 2: 第2回：Motion in Euclidean spaces and Newton’s law We will mainly be focused on motions of particles in Euclidean spaces. 3: 第3回：The conservation of momentum and energy We will introduce conserved quantities of some well-known conservative systems. 4: 第4回：Examples of simple mechanical systems Examples will be given. 5: 第5回：Exercises In-class exercises. 6: 第6回：Linear systems: Equilibria and stability We will study equilibria of linear systems and their stability. 7: 第7回：Nonlinear systems and linearization We will give a simple introduction to linearization of nonlinear systems and study stability of their equilibria.
Textbooks	There is no required textbook for this course. References will be recommended during lectures.
Reference	V.I. Arnold, Mathematical Methods of Classical Mechanics, 2nd ed., Springer, New York, 1989. J.E. Marsden and T.S. Ratiu, Introduction to Mechanics and Symmetry, 2nd ed., Springer, New York, 1999. S.H. Strogatz, Nonlinear Dynamics and Chaos, Perseus Books, 1994.
Evaluation	30%: Assignments & Attendance 70%: Examination or Report

Note / URL	