科目ナンバリング	U-LAS12 10033 LE57						
授業科目名<英訳>	Advanced Dynamics-E2 Advanced Dynamics-E2			担当者所属職名・氏名	工学研究科　講師　AMAR, Julien Samuel		
群	自然科学科目群			分野(分類)	物理学(基礎)	使用言語	英語
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義（対面授業科目）
開講年度・開講期	2026・後期	曜時限	火4	配当学年	主として1回生	対象学生	理系向

[授業の概要・目的]

This course aims to introduce advanced concepts of classical mechanics. After learning the content of this course, students will be able to apply Newtonian mechanics to solve advanced problems of classical mechanics, including but not limited to: (a) rotation of rigid bodies, (b) motion under central forces, for example, planetary motion, (c) motion observed from non-inertial frames, etc. Students are also expected to be able to advance their mathematical skills, particularly regarding vector calculus and 2D/ 3D polar coordinate systems by studying the concepts of this course.

[到達目標]

(1) To build upon the ideas learnt in Fundamental physics A, (2) To be able to understand advanced concepts of dynamics of rigid bodies, (3) To develop the ability to tackle practical problem solving.

[授業計画と内容]

1. Brief review of Cartesian coordinate systems, vector analysis, coordinate transformations, Newton's laws, inertial and non-inertial frames, conservation of energy and momentum, collision problems, distributed systems, and center of mass (5 weeks)

2. Lagrangian mechanics and generalized coordinates (2 weeks)

3. Midterm exam and review of previous topics (1 week)

4. Central forces, simple rigid body dynamics (inertia and torques), and orientation in 3D space with Euler angles (3 weeks)

5. General motion of rigid bodies, inertia tensor and principal axes, Euler's equations of rigid body rotation, precession and nutation, free symmetric top, and heavy symmetric top (2 weeks)

6. Introduction to the limits of classical mechanics (chaos theory, special relativity) (1 week)

7. Feedback (1 week)

[履修要件]

Completion of Fundamental Physics A is required.

[成績評価の方法・観点]

Evaluation will be based on active participation (10%), one Mid-term in-class exam (40%), one Final in-class exam (50%)

Advanced Dynamics-E2(2)へ続く↓↓↓

Advanced Dynamics-E2(2)

[教科書]

授業中に指示する

[参考書等]

（参考書）
授業中に紹介する

[授業外学修（予習・復習）等]

Following study materials and working on assignments

[その他（オフィスアワー等）]

Will be discussed in the class.

[主要授業科目（学部・学科名）]