

科目ナンバリング		U-LAS70 10002 SE50					
授業科目名 <英訳>	ILAS Seminar-E2 :Discussions in Biomechanics and Biophysics (バイオメカニクス・生物物理セミナー) ILAS Seminar-E2 :Discussions in Biomechanics and Biophysics			担当者所属 職名・氏名	医生物学研究所 助教 金 英寛		
群	少人数群	単位数	2単位	週コマ数	1コマ	授業形態	ゼミナール (対面授業科目)
開講年度・ 開講期	2024・後期	受講定員 (1回生定員)	10 (10) 人	配当学年	主として1回生	対象学生	全学向
曜時限	水5	教室	1共04			使用言語	英語
キーワード	Biology / Physics / Biomedical / Engineering						
【授業の概要・目的】							
<p>May force be with you. This famous goodbye phrase from Star Wars summarises the important roles physical forces like gravity, friction etc play in our daily life. It turns out that living systems including our bones, muscles, cells and even proteins in our body depend a lot on physical forces to function properly. For example, why do astronauts become weak such that they are unable to walk after prolonged stay in space? Or, how do plants utilize photons of light to make glucose? Again, why are migratory birds able to sense their migration direction over long distances? These are just but a few examples highlighting how living systems on earth have adapted to physical forces such as gravity and electromagnetic forces, etc. In this seminar, we will discuss some of the ground breaking discoveries and technological advances integrating biology, physics, and chemistry. Specifically, we will explore how living systems, including the human body, have adapted to and utilize physical forces to survive and function normally, and sometimes, abnormally.</p>							
【到達目標】							
<p>The ultimate goal of this seminar is to help students nurture a multidisciplinary approach to scientific discussions and problem solving in biology, medicine and engineering.</p>							
【授業計画と内容】							
<p>Discussions in this seminar will center on the impact of physical forces on living systems, and adaptive responses of such systems to acting forces. Some selected discussion topics are listed below.</p> <p>1) Recent exciting discoveries in science with revolutionary societal impacts (3 weeks) We will begin the discussion series by exploring ground-breaking discoveries in biology, chemistry, physics and/or engineering, and discuss their impacts on the society. Topics may be drawn from Nobel Prize winning researches which are expected to contribute significantly to advances in biology, medicine and/or engineering.</p> <p>2) Connecting the dots: Exploring interconnectivity between physics and biology (3 weeks) Discussions here will explore interesting but rather puzzling phenomena involving the interaction between physical forces and living systems. We will discuss how living systems (including our body) sense and react to physical forces in the environment. Specific examples of adaptations to forces in biology will be drawn from plants, animals, and even from the human body. Importantly, the importance of force-mediated adaptation in health and disease will be explored.</p> <p>3) May force be with you: Life in a force-ruled world (3 weeks) <u>Some forces like friction may sometimes be annoying, but equally important in our daily life. Our body itself</u></p>							

is a force producing machine; our muscles contract, our hearts beat, our lungs expand and shrink, blood flow through our veins and arteries etc. This topic will explore how our bodies adapt and respond to forces at the cellular level, and how this is important to biology and medicine.

4) Role of forces in bone and muscle health (3 weeks)

Why do astronauts lose their ability to walk after staying in space for an extended period of time? Continuing the theme of the previous topic, this topic will look specifically into the role of physical forces in bones and muscles, including why lack of physical exercise or prolonged exposure to microgravity conditions may contribute to the weakening of muscles and bones.

5) Role of forces in wound healing and disease development (2 weeks)

This topic will introduce latest pioneering researches on the role of physical forces in wound healing and disease development, and how physical forces can be exploited to realize better treatment methods and improve quality of life.

6) Lecture review and student presentations (2 weeks)

【履修要件】

特になし

【成績評価の方法・観点】

Class attendance and active participation: 60%

Discussions and presentations: 40%

【教科書】

使用しない

【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】

You may consider listening to TED talks to learn about some exciting science topics and how to give a nice presentation.

【その他（オフィスアワー等）】

Office hours will be announced during class hours.