

科目ナンバリング											
授業科目名 ＜英訳＞	ILAS Seminar-E2 :Introduction to Engineering in Biology and Medicine(医工学の基礎) ILAS Seminar-E2 :Introduction to Engineering in Biology and Medicine					担当者所属 職名・氏名	医生物学研究所 講師 OKEYO, Kennedy Omondi				
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・前期	受講定員 (1回生定員)	15 (15) 人		配当学年	主として1回生		対象学生	全学向		
曜時限	月5	教室	共西04					使用言語	英語		
キーワード	Biomedical engineering / Microengineering / Micro/Nano systems / Biomanipulation										
[授業の概要・目的]											
With increasing integration of science and engineering, more and more focus is being placed on multidisciplinary research. Against this background, this seminar will aim at introducing students, in particular first year students, to on-going engineering approaches aimed at understanding and/or solving biological and clinical problems. Discussions will be centered on (biological/clinical) problem identification, hypothesis setting around the problem, discussions on potential engineering solutions and, as may be necessary, experimental verification of the discussed solution.											
[到達目標]											
The present course is intended to help students develop the ability to expand engineering concepts and methods toward solving multiscale and multidisciplinary problems in biology and medicine. In addition, it is intended to nourish students' ability to discuss logically multidisciplinary research topics, an important skill for their future research undertaking.											
[授業計画と内容]											
This seminar will tackle different selected topics related to application of engineering principles and knowledge to solving clinical problems or elucidating known and unknown biological phenomena. Although the topics listed below are wide and varied, discussions will be consistent with the main focus of problem setting and identifying the most appropriate solution to the set problem.											
1) Introduction to nano/microfabrication (3 weeks) Microfabrication involves creating micro/nano scale tools or objects using light, heat, etc. This seminar will discuss recent trends in microfabrication, the methods being used and the useful tools being made for biomedical applications.											
2) Introduction to microfluidics (3 weeks) Microfluidics, as the name suggests, deals with handling and behaviour of small liquid volumes, typically in a micro-scale channel where flow is laminar and mixing becomes a problem. In this seminar, we will look at different types of micro/nanofluidics and how the technology is being applied drug discovery, cancer research and even games.											
3) Biochips and their applications (3 weeks) Biochips are products of micro/nano fabrication which have increasingly found application in cell, DNA and protein analyses for disease diagnosis and drug screening. In this seminar, we will look at specific examples of biochips based on specific application areas such as cell manipulation and DNA analysis.											
4) Introduction to bio micro electrical and mechanical systems (BIO-MEMS) and their clinical application (3 weeks)											
5) <u>Engineering approaches to manipulation and analysis of biological samples (2 weeks)</u> _ _ _ _ _											
ILAS Seminar-E2 :Introduction to Engineering in Biology and Medicine(医工学の基礎)(2)へ続く											

To conclude the seminar, we will take a look at the convergence of different engineering principles to manipulate and analyze single cells and DNA molecules and other biological materials using electric forces, fluid flow and light (lasers) etc.

6) Final report and presentations (1 week)

7) Review and feedback (1 week)

【履修要件】

None in particular. The seminar will be discussion-based, so prior preparation by way of reading about the above topics will be helpful in making the discussions lively.

【成績評価の方法・観点】

Class Presence / Participation 10%, Homework 15%, Midterm Report 25%, Final Report 35%, Final Presentation: 15%

【教科書】

授業中に指示する

【参考書等】

(参考書)

Yoshihiro Ito 『Biochip Technologies-Principles and Applications』 (CMC Books) ISBN:9784781310794

【授業外学修（予習・復習）等】

Prior reading of scientific papers on topics to be discussed is recommended to enhance understanding.

【その他（オフィスアワー等）】

To be announced during class. However, questions, suggestions and comments can be posted by email anytime.