Course n	umber	U-LAS70 10	0002	SE50										
Course title (and course title in English)	ILAS Seminar-E2 :How to make nano- machines (ナノマシンの作り方) ILAS Seminar-E2 :How to make nano-machines					nstru ame nd o f aff	uctor's e, job title, department iliation	Part-time Lecturer, BANERJEE, Amit						
Group	Seminars in Liberal Arts and			Sciences Numb			er of credits 2			Number of weekly time blocks		1		
Class style	sem (Fa	seminar (Face-to-face course)		Year/semest		<b>·s</b> 2025 • First		semester		Quota (Freshman)		15 (15	5)	
Target year	• Mair	Mainly 1st year students El		igible students		Fo	For all majors		Days and periods		Fri.5			
Classroom	12, Yoshida-South Campus Bldg. No. 4								Lan inst	guage of ruction	juage of ruction English			
Keyword	Keyword         Nano / Nano-machine / Nano-technology         / Internet of Things (IoT) / Artificial Intelligence (AI)													
[Overview	and p	ourpose of the	cou	rse]										
One of the greatest technological achievements of past few decades is our ability to make micro-meter scale ' machines'. These machines have become ubiquitous in our daily life, giving functional capabilities to our smart-phones, cars, digital projectors, medical devices, etc. In this technological revolution of extreme ' shrinking' of machines, we have entered an era where machines of only a few hundreds atoms wide can be built. Have you ever wondered how do we build such small machines and make them function desirably in such small scale? In this seminar course, I will reveal the tricks of the trade of fabricating micro / nanoscale machines. I will also elaborate the underlying physics (working principles) of micro / nano machines. This seminar course is based on my own research area, so I can show you pictures and videos of actual micro / nano machine fabrication and operation that I collect during my own research in Kyoto University.														
Students wi	ll learn	about nano-scale	mac	hines: how	the	y w	ork, how the	y are ma	ade,	and their	ama	zing		
applications						-	•	,	,					
[Course s	chedu	le and content	t <b>s)]</b>											
<ol> <li>Why do we want to make nano-machines?</li> <li>Introduction to nano-machines and their advantages, examples of micro/ Nano-machines and their applications. (2 weeks)</li> <li>How can we controllably create and sense motion at nanoscale?</li> </ol>														
Building blo	Building blocks of nano-machines: actuators, motion sensors, etc. (3 week)													
э. ноw do f	iano-m	acmines work?						Continue to ILAS	Seminar-E	E2 :How to make nand	-machines	( <u>ナノマシン</u> の	作り方)(2)	

ILAS Seminar-E2: How to make nano-machines (ナノマシンの作り方)(2)

Working principles of nano-machines: accelerometers, gyroscopes, pressure-sensors, ultra-sensitive mass and gas sensors, AI computing devices. (2 weeks)

4. How do we create nano-machines?

Material and methods for creating nano-machines: silicon, diamond, graphene, etc.; lithography, reactive-ionetching, chemical-vapor-deposition, electron and ion-beam methods, etc. (5 weeks)

5. Discussion on current trends and future potentials of this research area. (2 weeks)

6. Feedback (1 week)

[Course requirements]

None

[Evaluation methods and policy]

Active participation (10%), submission of a final report (topics will be discussed during the lecture) (90%)

## [Textbooks]

Not used

[References, etc.]

(References, etc.)

Distribution of relevant materials (distributed by PandA, when necessary).

[Study outside of class (preparation and review)]

Following lecture materials and reading recommended articles

[Other information (office hours, etc.)]

To be decided during lecture

[Essential courses]