科目ナンバリング	U-LAS70 10002 SE50						
授業科目名<英訳>	ILAS Seminar-E2 :What are Liquids? Answers from Physics, Chemistry and Engineering（液体は何？液体の基礎物理学と化学） ILAS Seminar-E2 :What are Liquids? Answers from Physics, Chemistry and Engineering			担当者所属職名・氏名	理学研究科　准教授　THUERMER, Stephan		
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	2025・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	火5	教室	共北11			使用言語	英語
キーワード	Fluid engineering / Water / Liquids / Flow phenomena / Interfaces						

[授業の概要・目的]

Every day you see and use liquids such as water and oil, but also toothpaste, creams or glue. In this seminar we want to study ‘liquids’ from the point of view of physics, chemistry and engineering (in particular fluid dynamics). Have you ever wondered what makes water stick to a window or how toothpaste flows out of the tube? I invite you to study the properties of liquids, how they flow, stick or spread, and gain a deeper understanding of their behavior, which is so important in nature and your daily life. This course will take a closer look on liquids from various perspectives, combining various fields but without getting lost too much into details. Students with any major are welcome.

液体は水のように生命現象に欠くことができない物質の相であり、多くの化学合成や物質開発が溶液中で行われています。また、構造変化の大きな液体は、固体とは性質の似て非なる興味深い凝集相です。このセミナーでは、物理・化学・工学におよぶ多角的な視点から、液体の科学について学びます。

[到達目標]

Students will gain the following form this seminar:
- Interest and fun to learn more about phenomena in nature and study topics on their own.
- Knowledge about liquid behavior as a starting point for other courses in natural science.
- The ability to look at problems and behavior from multiple scientific fields (physics, chemistry, engineering).
- The ability to express their ideas, discuss and present topics of natural sciences in English.

この講義の目的の一つは、英語で科学を議論するスキルを学ぶことですが、同時に、物理や化学、工学のように分野の境界を越えて、様々な視点から現象を考える機会を持つことです。

[授業計画と内容]

This seminar is held in a causal and interactive way! Students can influence the selection of topics based on their interest!

The course will work though several aspects of liquids, which include the following topics. The plan below is not strict and rather serves as a guideline.

1. Introduction to liquids - Honey, toothpaste or even sand? (3 weeks)
We look at liquids from different scientific viewpoints and identify their behavior.

2. Oil and water do not mix? (4 weeks)
We learn why liquids form and which different forces hold liquids together.

3. The shape of a raindrop and the lotus effect. (4 weeks)
We take a closer look at liquid surface and interface effects such as adhesion, cohesion, surface tension.

4. How to get ketchup out of the tube? (3 weeks)
We see what makes liquids flow and how different liquids react to forces.

5. Feedback and presentation (1 week)

Depending on the available time and interest of the students, we may also discuss topics such as the application of liquids in nature, science, and technology or exotic liquids such as ionic or magnetic liquids.

[履修要件]

特になし

[成績評価の方法・観点]

Preparing homework (30%)
Small exercises during the seminar (30%)
Giving a short presentation at the end of the seminar (40%)

[教科書]

使用しない
No textbook is used. Handouts will be provided during class.

[参考書等]

（参考書）
John Finney 『Water: A Very Short Introduction』（Oxford University Press）ISBN:9780198708728（This book is a short and interesting read specifically about water）
Bruce Hunt 『Fluid Mechanics for Civil Engineers』（Individually published, 2020）ISBN:9798685686510（Introduces the basic mathematics for the description of fluids）
Etienne Guyon, Jean-Pierre Hulin, Luc Petit, Catalin D. Mitescu 『Physical Hydrodynamics』（Oxford University Press）ISBN:9780198702450（An advanced book if you are really interested in the science behind liquids）

[授業外学修（予習・復習）等]

Students are expected to review the lecture handouts after each class and look up unknown English terms themselves. Homework assignments need to be prepared before the next lecture. It is also encouraged to refer to additional sources of information (books, websites) for the specific topics. If something is unclear or difficult, the instructor can be asked at any time.

[その他（オフィスアワー等）]

The lectures will be held in English, but some supporting material and explanations are given in Japanese. Students are welcome to ask questions in English or Japanese during and after the class. Office hours are flexible. Appointments can be made directly or via email.

ILAS Seminar-E2 :What are Liquids? Answers from Physics, Chemistry and Engineering (液体は何？液体の基礎物理学と化学) (3)へ続く↓↓↓

ILAS Seminar-E2 :What are Liquids? Answers from Physics, Chemistry and Engineering (液体とは？液体の基礎物理学と化学) (3)

[主要授業科目（学部・学科名）]