Course number	U-LAS14 10019 OE69　U-LAS14 10019 OE17		
Course title (and course title in English)	ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony Integrated Liberal Arts and Science with Small Group Seminars (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony	Instructor's name, job title, and department of affiliation	Institute for Liberal Arts and Sciences Professor,DALSKY，David Jerome Graduate School of Agriculture Associate Professor,HSIANG Tzu-Fan Graduate School of Medicine Senior Lecturer,SAHKER, ETHAN KYLE Graduate School of Medicine Assistant Professor,VEALE，Richard Edmund Graduate School of Letters Senior Lecturer,Duncan Wilson Graduate School of Science Associate Professor,BARNETT, Craig Antony Graduate School of Medicine Associate Professor,KIM MINSOO

Group	Natural Sciences	Field(Classification)	Biology(Introduction)

Language of instruction	English	Old group	Group B	Number of credits	4

Number of weekly time blocks	2	Class style	Lecture + Seminar (Face-to-face course)	Year/semesters	2026・Second semester

Days and periods	Fri.3・5	Target year	All students	Eligible students	For all majors

[Overview and purpose of the course]

Organisms communicate. How? Why? So what? In this interdisciplinary course, we aim to understand how life communicates, explore the various reasons behind this phenomenon, and discuss its potential implications. We begin by considering non-verbal communication in nature, such as birdsong, dolphin song, bioluminescence, and pheromones, to understand how animals and other organisms send and sense signals. The course then expands its scope to explore inter-species relationships such as symbiosis, and human-animal interactions and their implications for welfare. Finally, we examine the implications of communication extending to interactions among humans, machines, and AI.

By bridging the humanities and the sciences, students will develop cross-disciplinary thinking and curiosity about life and communication in all (imaginable) forms.

This course is designed for anyone interested in communication, regardless of their major. Through lectures, discussions, and a final poster presentation, students will interpret and integrate diverse scientific and cultural forms of knowledge and communicate those understandings clearly and critically.

In addition to 14 lectures, four seminar courses are offered:
Weeks 1-7, students choose“ Psychology of Communication ” or“ Honesty and Deceit in Biological Communication ”
Weeks 8-14, students choose:“ Human-Animal Interaction ” or“ Teaching a Robot to Communicate. ”
Students are divided into two groups and will take two different seminars, one in each half of the course.

演習については、4つのセミナー（前半：Psychology of Communication，Honesty and Deceit in Biological Communication、**後半：**Human-Animal Interaction, Teaching a Robot to Communicate）**が行われる。受講者は2グループに分かれ、前半７週と後半７週に異なるテーマで２つの演習を受講できる。**

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(2)↓↓↓

○ ISS Course Classification: [Science / Humanities]
This classification applies to ISS courses in which the primary theme places a strong emphasis on the natural sciences, while the secondary theme places a strong emphasis on the humanities.
○統合型複合科目分類　【理・文】
主たる課題について理系分野の要素が強く、副たる課題については文系分野の要素が強いと考えられるもの

[Course objectives]

1. Exploring how organisms use chemical signals to communicate and shape ecological interactions.
2. Examining how communication drives symbiosis and cooperation, shaping ecosystems and applications.
3. Understanding the key concepts, history, and interdisciplinary scope of huma - animal interaction studies.
4. Identifying major contexts of human - animal interaction (such as companionship, research, and conservation), and their welfare implications.
5. Understanding the biological and psychological bases of human - animal communication, including signaling and interpretation.
6. Analyzing how enhanced communication fosters trust, cooperation, and welfare in human - animal - robot relationships.
7. Exploring the behaviors and brain processes that subtly shape conscious experience beneath awareness.
8. Exploring the interconnections among mind, meaning, and machine in the context of human communication.
9. Gaining insight into human psychology and interpersonal communication as foundations for understanding AI.
10. Reflecting on how AI - human communication may drive the evolution of a“ Cultural Machine.”

[Course schedule and contents)]

（この授業では、講義と少人数演習を併せて学びます。講義のみ、少人数演習のみの出席では授業の到達目標に達しません。なお、講義の初回授業において少人数演習のグループ分けを行いますので、必ず出席してください/In this course, students will learn through a combination of lectures and small-group seminars. Attending only the lectures or only the seminars will not be sufficient to achieve the learning objectives. Please be sure to attend the first class, as students will be divided into seminar groups at that time.）

[Lecture］ Fri 3rd (Classroom : **共北**11）
Class 1: How Life Communicates: Networks in Harmony (Course Introduction):
The coordinator and all lecturers introduce themselves and their contributions to the course. The purpose of the course, learning objectives, and evaluation will be explained. The summary of the content covered by each instructor will be introduced. Students will be divided into four small-group seminars through a selection process primarily based on students’ preferences.

Lecture Section 1: Understanding Diverse Communication Methods in Organisms (Lecturers: Craig Barnett and Tzu-Fan Hsiang)

(Overview)
This section explores how organisms transmit and interpret information to survive and interact with their environments. It examines the physical, behavioral, and chemical mechanisms that underpin communication

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(3)↓↓↓

across species. Special attention is given to chemical signaling, such as volatiles, phytohormones, and metabolites that mediate interactions among plants, microbes, insects, and other organisms.

(Schedule and Contents)
Class 2: Signal transmission methods (Craig Barnett)
Class 3: Chemical communication (Pheromones for bugs, Quorum sensing for bacteria, plant hormones, flowering regulation, bioluminescence) (Tzu-Fan Hsiang)

Lecture Section 2: Understanding Symbiosis and Cooperative Relationships (Lecturers: Tzu-Fan Hsiang and Minsoo Kim)

(Overview)
This section examines how communication shapes cooperation, competition, and adaptation across biological systems, from plants to humans. It highlights molecular signaling in symbiosis, showing how organisms form mutualistic or parasitic relationships that influence evolution and health. Applications such as microbiota research, probiotics, and bioinspired agriculture demonstrate how understanding these networks can drive innovation in medicine, ecology, and sustainability.

(Schedule and Contents)
Class 4: Mutualism, commensalism, parasitism (Tzu-Fan Hsiang)
Class 5: Plant-host, Insect-host interaction (Tzu-Fan Hsiang)
Class 6: Microbiota-human host interactions (Minsoo Kim)
Class 7: Emerging technology inspired by biological communication (Tzu-Fan Hsiang)

Midterm evaluation: Biological communication in daily life

Lecture Section 3: Communication in Humans, Animals, and Robots (Lecturers: Duncan Wilson and Richard Veale)

(Overview)
These lectures explore how humans perceive, communicate with, and understand other beings— both biological and artificial. Students examine how communication shapes relationships, welfare, and awareness across species and systems. The sessions encourage interdisciplinary reflection on how conscious and unconscious processes influence interaction, empathy, and connection in both living and artificial worlds.

(Schedule and Contents)
Class 8: Introduction to Human-Animal Interaction (Duncan Wilson)
Class 9: Human-Animal Communication (Duncan Wilson)
Class 10: Mechanisms of Human Communication - Natural Language Processing (Richard Veale)
Class 11: Robotics, Artificial Intelligence (Richard Veale)

Lecture Section 4: Mind, Meaning, and Machine (Lecturers: Ethan Sahker and David Dalsky)
(Overview)
These lectures focus on the roles of mind and behavior (psychology) in interpersonal communication and how AI-human interactions negotiate meaning.
(Schedule and Contents)

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(4)↓↓↓

Class 12: Human Psychology and Communication (Ethan Sahker)
Class 13: AI-Human Communication (David Dalsky)

Class 14: Student poster presentation and discussion
Students will give poster presentations and engage in discussions based on the assignments from previous lectures.
Class 15: Feedback

[Seminars]
Students choose one seminar from the first half of the course and one from the second half.

Students choose:
Weeks 1-7: “Psychology of Communication” or “Honesty and Deceit in Biological Communication”

Seminar A: Friday 5th（Classroom: **国際高等教育院棟**2F **演習室**23）
Title: Psychology of Communication
By Ethan Sahker

(Overview and purpose of the course)
This class focuses on the cognitive and behavioral components of human communication, both internal thought processing (intrapersonal), and external applications (interpersonal). Students will gain an understanding of the factors that shape modern communication, the scientific applications of communication, and how this communication relates to health and well-being.

(Course schedule and contents)
Class 1: Cognitive and Behavioral Communication
Class 2: Psychodynamics: Inter- and Intrapersonal Communication
Class 3: Non-Verbal Communication
Class 4: Culture & Group Dynamics
Class 5: Internet Communication & Disinhibition
Class 6: Clinical Communication
Class 7: Health and Communication
Exercises: Thought Records, Personal Patterns, Cultural Non-Verbal Show & Tell, Stereotypes & Expectations, Roleplaying, Basic Counseling Skills
Details on feedback will be announced separately during class.

Seminar B: Friday 5th（Classroom: **国際高等教育院棟**2F **演習室**24）
Title: Honesty and Deceit in Biological Communication
By Craig Barnett

(Overview and purpose of the course)
Organisms have evolved many ways to transmit information to others. We will examine the evolution of communication signals, signal honesty, and how signals can be used to deceive others.

(Course schedule and contents)
Class 1: An introduction to communication: a biologist’s perspective
Class 2: Truth in advertising: the evolution of signal honesty

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(5)↓↓↓

Class 3: Nature abhors a vacuum: the evolution of deception
Class 4: Case study 1: It's not over until the fat bird sings: bird song as an honest communication system
Class 5: Case study 2: The evolution of crypsis, aposematism, and mimicry
Class 6: Case Study 3: Bolas spiders and other forms of biological deception
Class 7: Presentations, recap, conclusions, and discussion
Exercises: Group discussions, Short group presentation on an example of biological communication, Excursion to Mt. Yoshida
Details on feedback will be announced separately during class.
Students choose:
Weeks 8-14: "Human-Animal Interaction" or "Teaching a Robot to Communicate"

Seminar C: Friday 5th（Classroom: **国際高等教育院棟**2F **演習室**23）
Title: Human-Animal Interaction
By Duncan Wilson

(Overview and purpose of the course)
This course examines the dynamic interactions between humans and animals, focusing on how communication influences human-animal relationships and welfare. Students explore biological, psychological, and social aspects of human-animal communication and how understanding signals, empathy, and behaviour can improve well-being in contexts such as companionship, research and conservation. The course encourages critical reflection on how effective, compassionate communication benefits both humans and animals.

(Course schedule and contents)
Class 1: Human-Animal Welfare
Class 2: Cross-cultural Variation in Human-Animal Interaction
Class 3: Human-Pet Interaction and Animal Assisted Interventions
Class 4: Human-Farm Animal Interaction
Class 5: Human-Laboratory Animal Interaction
Class 6: Human-Zoo Animal Interaction
Class 7: Human-Wildlife Interaction

Exercises: Group discussion, video analysis, quizzes, debate, role play
Details on feedback will be announced separately during class.

Seminar D: Friday 5th（Classroom: **国際高等教育院棟**2F **演習室**24）
Title: Teaching a Robot to Communicate
By Richard Veale

(Overview and purpose of the course)
Understanding behaviors and neural mechanisms that unconsciously influence our conscious experience.

(Course schedule and contents)
Understanding behaviors and neural mechanisms that unconsciously influence our conscious experience.
Class 1: Computer vision: basic concepts (filtering/convolution)
Class 2: Modeling early human visual system
Class 3: Gaze/Eye Tracking

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(6)↓↓↓

Class 4: Models of gaze control
Class 5: Head-tracking (memory?)
Class 6: Adding sound? Basic Auditory Processing
Class 7: Learning simple words— association of sound/sight

Exercises: Wearable/static eye-tracking, Building models, Basic robot "Primal" communication via vision/ audition/vibration (synchronization)
Details on feedback will be announced separately during class.

[Course requirements]

None

[Evaluation methods and policy]

Lecture(50% of final grade): Evaluation will be based on class attendance and participation (40%), final poster presentation (40%), and homework (20%).

Seminar(50% of final grade):Students take two seminars. Evaluation criteria may vary slightly by group and will be explained by each seminar instructor during the first class.
・Seminar A (Psychology of Communication): Reflection Paper (50%),quizzes (30%), participation (20%)
・Seminar B (Honesty and Deceit in Biological Communication); Papers (50%), final presentation (50%)
・Seminar C (Human-Animal Interaction): Class attendance and participation (40%), final report (40%), homework (20%)
・Seminar D (Teaching a Robot to Communicate): In-class practical labs/homeworks (40%),final project (40%), final presentation (10%),theory quizzes (10%)

Final Grade = Lecture (50%) + Average of Two Seminars (50%)

[Textbooks]

No textbook will be used. However, lecture materials and additional readings in English will be provided as handouts or distributed electronically.

[References, etc.]

（References, etc.）
Introduced during class

[Study outside of class (preparation and review)]

Students should read the recommended lecture materials before class and review the course handouts.

[Other information (office hours, etc.)]

Instructors are available by appointment to meet with students. We expect active class participation in this class.
Note: the lecture/seminar contents and order of lectures/seminars are subject to change.

Due to character limits on official documents such as transcripts, the English course title "Integrated Liberal Arts and Science with Small Group Seminars" is abbreviated as "ISS."
Please note that the same restriction applies to E2 course titles on KULASIS, where the title is also

Continue to ISS (Natural Sciences b)-E2 :How Life Communicates:Networks in Harmony(7)↓↓↓

abbreviated as "ISS."
成績証明書等では、表示文字数の制約上、英文科目名「Integrated Liberal Arts and Science with Small Group Seminars」**が**「ISS」**と略記されます。**
なお、E2**科目名については**KULASIS**上も同様の制約がかかり、科目名が**「ISS」**と略記されていますので、ご注意ください。**

[Essential courses]