Course number	U-LAS70 10002 SE50				
Course title (and course title in English)	ILAS Seminar-E2 :Introduction to the biology of nematodes（線虫の生物学入門） ILAS Seminar-E2 :Introduction to the biology of nematodes	Instructor's name, job title, and department of affiliation	Graduate School of Biostudies Associate Professor,CARLTON, Peter		
Group	Seminars in Liberal Arts and Sciences	Number of credits	2	Number of weekly time blocks	1
Class style	seminar (Face-to-face course)	Year/semesters	2025・First semester	Quota (Freshman)	10 (10)
Target year	Mainly 1st year students	Eligible students	For all majors	Days and periods	Thu.5
Classroom	3D, Yoshida-South Campus Academic Center Bldg. North Wing			Language of instruction	English
Keyword	biology / genetics / nematodes / 遺伝学 / 線虫				

[Overview and purpose of the course]

This class will introduce to students one of the most abundant forms of life on earth: the Nematodes or roundworms. The most famous of these is the useful model organism called Caenorhabditis elegans. The goal of the class is to provide both a survey of how scientists use these organisms to conduct research, demonstrate the worm's great importance to biology, and provide hands-on experience with simple worm manipulation.

Students will also learn directly about some of the current biological questions that are being addressed with this versatile model organism. We will also find wild nematodes around Kyoto, make scientific observations on them and use DNA sequencing to identify their species. Whether we find a new species, or identify new isolates of known ones, this class will introduce you to a new realm of life.

線虫学入門 - 生物学を学びながら新種の線虫を見つけよう!

線虫は動物の中で最も個体数の多い生物種です。線虫は土壌や植物から簡単に見つけることができ、分子生物学における重要なモデル生物の一つでもあります。2002年には、線虫を用いた細胞死の研究に対して、2006年には、線虫におけるRNA干渉の発見に対して、それぞれノーベル賞が贈られています。線虫が持つ遺伝子のうち、６０－７０%は私たち人間にも共通しているため、ヒトにも共通する様々な生体のメカニズムを理解することを目指して、飼育や遺伝子組み換えが容易な線虫が、実験材料として分子生物学では用いられます。

この授業では、各自、サンプルを持参して、そこから線虫を取り、それぞれの線虫のゲノムDNAの一部を増幅し、そのシーケンスを読むことによって、線虫種を同定します。

新種の線虫を発見する可能性もあり！新種の線虫の探索に加えて、分子生物学の研究において一般的に使われている野生株と変異株を用いた遺伝学実験、高解像度顕微鏡を用いた染色体構造の観察も行います。

[Course objectives]

-To understand the biology and diversity of nematodes
-To understand the uses of the nematode Caenorhabditis elegans in modern biological research

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-To understand the anatomy and life cycle of C. elegans
-To learn how to create new strains containing desired mutations by designing crosses between animals
-To acquire the knowledge and experience needed to begin genetic research with C. elegans

[Course schedule and contents)]

About half the classes will occur in the classroom, and half in my laboratory, as indicated below; some changes to the following might occur depending on circumstances.

Class# Topic
1 Classroom: Intro to class, wild worm collection kits distributed
2 Classroom: Life cycle/development; assessment of wild worm collection
3 Lab: Wild worm observation I : brightfield microscopy
4 Lab: Wild worm observation II : PCR on cleaned species
5 Classroom: Wild worm observation III : BLAST, Species IDs, some informatics (MSA); then RNAi theory for next lab class
6 Lab: RNAi on C. elegans
7 Lab: RNAi on C. elegans
8 Lab: Wild worm observation IV : Chromosome counting/fluorescence microscopy; crossing mutant strains
9 Classroomv : Meiosis
10 Lab: microinjection of gonads (CRISPR-Cas editing)
11 Classroom: Sex Determination/Sex Chromosomes
12 Lab: Live imaging of C. elegans
13 Classroom: Nematode Parasitism
14 Classroom: Aging, End of the class, Survey for this class

15 Classroom: short presentations
16 Lab: feedback on class

[Course requirements]

This is an introductory course. There are no requirements, but a basic familiarity with biology and genetics will be beneficial.

[Evaluation methods and policy]

Evaluations will be based on participation, short quizzes, and a final presentation, with contributions of 40%, 40%, and 20%, respectively, to the final grade.

[Textbooks]

Instructed during class

[References, etc.]

（References, etc.）

Fay, Starr, Spencer, Johnson 『Worm Breeding for Dummies: A guide to genetic mapping in C. elegans』 （PDF textbook）

[Study outside of class (preparation and review)]

Students will have to understand technical vocabulary in English. This may require studying outside of class hours.

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[Other information (office hours, etc.)]

Office hours will be 1 hour once per week, schedule to be announced on the first day of class.

This class involves some genetic experiments on nematodes.
遺伝子実験：対象(ヒト以外の動物、植物、生物等)

[Essential courses]