

科目ナンバリング		U-LAS14 20050 LE68									
授業科目名 <英訳>		Practical Computing for Biologists-E2 Practical Computing for Biologists-E2				担当者所属 職名・氏名		生命科学研究科 准教授 CARLTON , Peter			
群	自然科学科目群			分野(分類)	生物学(各論)			使用言語	英語		
旧群	B群	単位数	2単位	週コマ数	1コマ	授業形態	講義 (対面授業科目)				
開講年度・ 開講期	2024・後期		曜時限	火5		配当学年	主として1・2回生	対象学生	理系向		
【授業の概要・目的】											
<p>This class will introduce students to basic but powerful computational tools that are increasingly becoming an essential part of biological research. We will learn how to navigate a command line environment in a UNIX computer system, explore some useful open source software for DNA and protein analysis, and learn the basics of Python programming for analyzing biological sequence and images.</p> <p>Each class will start with a background lecture and proceed to hands-on guidance. The ultimate aim of the class is to provide an introduction that will facilitate your further exploration of computational biology.</p>											
【到達目標】											
<ul style="list-style-type: none"> -To discover current bioinformatics and biological image analysis software -To be able to design analyze DNA sequences using open online software -To learn general principles of programming using the Python language -To develop a foundation for further exploration of the exciting world of bioinformatics 											
【授業計画と内容】											
<ol style="list-style-type: none"> 1. Overview of the course. How are computers used in biology? 2. Getting the computer to do stuff: introduction to the "Shell" (terminal) 3. Introduction to manipulating text files and how DNA sequences are stored as text files 4. The EMBOSS molecular biology suite: Searching protein and DNA sequences for features 5. Searching for sequences within the human genome and proteome 6. Detailed work with DNA sequences: introduction to Benchling and DNA cloning (making a new DNA sequence from existing ones) 7. Beginning programming with Python, a general computer language that can be adapted for biology 8. Expanding Python with modules 9. Searching DNA sequences with Python 11. Plotting data with Python 12. Imaging for biologists: Image fundamentals (pixels, intensity, scaling) using Fiji 13. Measuring 2D and 3D objects in images 14. Review of the entire class 15. Feedback (test review and Q&A session) 											
【履修要件】											
<p>A laptop computer with a wireless internet connection is highly recommended for this class.</p> <p>Windows users should install the program "Cygwin" (from http://www.cygwin.com) to provide a shell environment; Mac and UNIX users can use the built-in terminal program.</p> <p>All students should also install "Anaconda" from http://www.anaconda.com to provide a Python environment.</p>											
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Provisions can be made for students who do not have their own laptop.

【成績評価の方法・観点】

Grading will be based on three areas: active participation, quizzes, and a final exam.

"Active participation" will be measured by: class attendance, asking questions/giving comments on Panda (as a rule, each student should ask at least 1 question/give one comment on Panda for each class), and answering questions during in-person classes.

Quizzes: short homework assignments. 3 will be given in total, at week 4, 8, and 12 of the class.

The final exam will be a 3-page exam with short answers, multiple choice questions, and a short English writing assignment.

Each area will contribute 1/3rd of the total grade.

【教科書】

Haddock and Dunn 『Practical Computing for Biologists』 (Sinauer Associates) ISBN:978-0-87893-391-4 (Textbook purchase is suggested but optional. See also the companion website at <http://practicalcomputing.org>)

【授業外学修（予習・復習）等】

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

【その他（オフィスアワー等）】

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