Syllabus Reference

Course title	Bioimaging		
Term	後期 2nd Half		
Credit(s)	1		
The main day		The main period	
Program/Department	47 Basic Biology		
Lecturers	MURATA, NEMOTO, KAMEI, KATO, KANADOME, NONAKA		
成績評価区分 Grading Scale	A,B,C,Dの4段階評価 Four-grade evaluation		
レベル Level	Level 2		
力量 Competence	専門力 Academic expertise		

Instructor

Full name
* NONAKA SHIGENORI
KAMEI YASUHIRO
KATO KAGAYAKI
KANADOME TAKASHI
MURATA KAZUYOSHI
NEMOTO TOMOMI

Outline	Bioimaging is the visualization of information inside a living organisms to understand biological phenomena. Visualization targets multidimensional information that spans space and time, such as the form, size, number, and distribution of substances that make up living organisms, as well as local temperature and pH within living organisms. This lecture will include lectures and practices from experts in each field on various techniques for visualization, image analysis to extract information from them, and technology for controlling living organisms with light. Lectures ・Basic principles and concepts in light microscopy (Shigenori Nonaka) ・Fluorescent proteins and probes for bioimaging (Takashi Kanadome) ・Two-photon fluorescence microscopy and super-resolution microscopy (Tomomi Nemoto) ・Structural analysis of biomolecules using cryo-electron microscopy (Kazuyoshi Murata) ・Optical microscopy for 3D and 4D observation: Light sheet microscope (Shigenori Nonaka) ・Technology to control living organisms using light (Yasuhiro Kamei) Practice ・Quantitative image analysis to extract biological information (Kagayaki Kato)
Learning objectives	Understand cutting-edge visualization techniques for life sciences and learn the basics of quantitative image analysis.
Grading policy	The lectures will be graded based on attendance and submission of one or more reports on topic(s) of your choice. The practices will be graded based on attendance and participation status. Both are summarized as a four-point scale evaluation.
Lecture Plan	Feb 4 (Thu) 10:30-12:00 Basic principles and concepts in light microscopy (Shigenori Nonaka) 13:00-14:30 Fluorescent proteins and probes for bioimaging (Takashi Kanadome) 14:40-16:10 Two-photon fluorescence microscopy and super-resolution microscopy (Tomomi Nemoto) 16:20-17:50 Structural analysis of biomolecules using cryo-electron microscopy

	(Kazuyoshi Murata) Feb 5 (Fri) 09:00–10:30 Optical microscopy for 3D and 4D observation: Light sheet microscope (Shigenori Nonaka) 10:40–12:10 Technology to control living organisms using light (Yasuhiro Kamei) 13:10–16:20 Quantitative image analysis to extract biological information (Kagayaki Kato) The practice (Kato) will be performed using your own laptop.
Location	Seminar room B at 9F, Building 3, ExCELLS (Yamate campus)
Language	English
Textbooks and references	"Watch all living things! How to choose and use imaging 100+" Experimental Medicine Special Edition Vol.36 No.20 (2018) (Japanese)
Notes for students of other programs	Students from other courses are welcome to enroll. However, since the course will be held face-to-face, students whose home base is not Okazaki will need to come to Okazaki. Accommodation of the institute is available (https://www.orion.ac.jp/lodge/okazaki_lodge_en/index.html). For details, please contact Shigenori Nonaka (snonaka@nibb.ac.jp).
Others	Lectures: MURATA Kazuyoshi, NEMOTO Tomomi, KAMEI Yasuhiro, KATO Kagayaki, KANADOME Takashi, NONAKA Shigenori
Keyword	quantitative image analysis, image measurement, optical sheet microscopy, cryo-electron microscopy, two-photon fluorescence microscopy, super-resolution microscopy, IR-LEGO (Infrared laser-evoked gene operator)
Contact for Course Inquiries	Shigenori Nonaka snonaka@nibb.ac.jp