

December 11, 2006, Naohiro Kato

Syllabus: Spring 2007 BIOLOGICAL SCIENCES 7800 Section 5
Bioimaging - Live Cell Imaging and Digital Image Handling

Call Number: 7483

Course Number: BIOL7800

Section Number: 5

Course Type: Lecture and Laboratory, 3 credit hours

Course Title: Bioimaging - Live Cell Imaging and Digital Image Handling

Enrollment Limit: 7

Meeting Days and Time: Tuesday and Thursday 12 : 10 pm – 1 : 30 pm

Meeting Rooms: Life Sciences Building 28

Instructor: Naohiro Kato, Ph.D.

Assistant Professor, the Department of Biological Sciences, LSU

Office: Room 226, Life Sciences Building, LSU, Baton Rouge, LA

Office Hours: Friday 9 am – 12 pm (a small message board is available on the office door in case of absence) or By Appointments

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Website: <http://www.biology.lsu.edu/webfac/nkato>

Contact Policy: Email is recommended.

Teaching Assistant: Rasheed A. Armad

Graduate Student, the Department of Biological Sciences, LSU

Lab: 229 Life Science Building

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Digital images can tell not only the shape and colors of the objects but also biochemical reactions in them. Recent developments in digital imaging technology have changed the way to analyze and present biological images. The images are pixilated with binary coded data so that researchers can accurately compare light intensity differences in the various areas of the images. The images are easily shared in different forms, such as prints, PowerPoint presentations, and websites. Many scientific publishers now require so called “electronic submission”. It is necessary in the modern science society of today to understand the digital imaging technologies from data acquisition to publication.

Course Objective:

The objective is to understand live cell imaging technology from the acquisition to the presentation. At the end of the course, students will be able to 1) select molecular tools, 2) analyze the images, and 3) format the data for publication and sharing.

Course Description:

Class will be held as a lecture as well as a hands-on experimental session. After the students learn digital image handling and methods to measure molecular activity in live

cells (known as *molecular imaging*), they will conduct a project built upon knowledge gained in the class. The individual students will present the result of the project in the class using PowerPoint and printed materials. The results will be also posted on a website.

Prerequisites:

Basic knowledge of cell and molecular biology such as functions of cellular components and DNA cloning techniques. BIOL 3090, Cell Biology or equivalent. Contact the instructor kato@LSU.edu before registration if your qualification is not certain.

Required Purchases:

None

Course Resources:

Recommended Internet Sites:

<http://www.microscopy.fsu.edu>

Recommended Textbook:

Live Cell Imaging A Laboratory Manual, Edited By Robert D. Goldman and David L. Spector, Copyright 2005, Cold Spring Harbor Laboratory Press, Cold Spring Harbor, NY, ICBN 0879696834. (**No need** to purchase the textbook for this particular course.)

Course Materials:

Live Cells, DNA, fluorescence microscopes, digital cameras, personal computers, imaging software, internet accesses, book chapters, and scientific journals. All physical materials will be provided in the class. All digital materials will be provided through Blackboard.

Course Management System:

Announcements will be made in class as well as on Blackboard.

Resister your name in the BlackBoard system at <http://blackboard.lsu.edu> before the first class begins. Visit Blackboard between each class session.

Research and Session Assignment:

All students must present scientific papers of interest. Active readings and internet searches outside class will be required. Preparative and supportive assignments for each class session, such as reading scientific papers, memorizing terminology, and analyzing images on computers also may be given.

Research Project:

The students will conduct a research project that use living cells and fluorescent probes during the course. The students will present the results in three formats (prints, PowerPoint, and website).

Grading Polices:

Grading is absolute but not on a curve. Extra credit assignments are not given.

Midterm and Final examination will be given in the classroom. Exams will have short answer and essay type questions. Make-up exams will only be given when official paper documentation is provided that clearly indicates circumstances beyond a student's control. A note from a friend or family member is not acceptable documentation.

The final grade will be based on 400 points.

Midterm Exam: 100 points

Final Exam: 100 points

Research Project: 100 points

Assignment: 50 points

Attendance: 50 points

Your final grade will be based on your cumulative percentage using the scale below:

%	100-90	89-80	79-65	64-50	< 50
Grade	A	B	C	D	F

Course Legal Statements:

Equal Opportunity:

All qualified students have equal opportunity in class without regard to race, creed, color, marital status, sexual orientation, religion, sex, national origin, age, or veteran's status.

Disabilities:

A student having learning disabilities should consult the instructor and Office of Disability Services (<http://appl003.ocs.lsu.edu/slas/ods.nsf/TextOnly>) before registration.

Academic Integrity and Civility:

Code of Student Conduct issued by the Office of the Chancellor

([http://appl003.lsu.edu/slas/judicialaffairs.nsf/\\$Content/Code+of+Student+Conduct?OpenDocument#5.1](http://appl003.lsu.edu/slas/judicialaffairs.nsf/$Content/Code+of+Student+Conduct?OpenDocument#5.1)) will be applied.

Memo:

Spring 2006 BIOL 7800 sec 5 Bioimaging Class Tentative Schedule

Session	Date	Week	Topics	Hands-on	Lecture
1	1/16/07	Tuesday	Introduction I		Course Description
2	1/18/07	Thursday	Introduction II	Live cell observation	Principal
3	1/23/07	Tuesday	Fluorescent Probe I		Detection Systems
4	1/25/07	Thursday	Fluorescent Probe II		Optics and Data Processing
5	1/30/07	Tuesday	Fluorescence Microscope		Detection of molecular activities in Live Cells
6	2/1/07	Thursday	Cellular Functions I		Protein-protein interactions
7	2/6/07	Tuesday	Cellular Functions II		Experimental design
8	2/8/07	Thursday	Cellular Functions III		Internet database
9	2/13/07	Tuesday	Cellular Functions IV		Principal
10	2/15/07	Thursday	Digital Imaging I		
	2/20/07	Tuesday	Mardi Gras Holiday		
11	2/22/07	Thursday	Digital Imaging II	Imagel and Photoshop	Students present research papers
12	2/27/07	Tuesday	Digital Imaging III	Image handling I, analysis	Students present research papers
13	3/1/07	Thursday	Digital Imaging IV	Image handling II, sharing	Students present research papers
14	3/6/07	Tuesday	Mid-semester Exam		
15	3/8/07	Thursday	Journal Club I		Students present research papers
16	3/13/07	Tuesday	Journal Club II		Students present research papers
17	3/15/07	Thursday	Journal Club III		Students present research papers
18	3/20/07	Tuesday	Live Cell Imaging I	Preparation I	
19	3/22/07	Thursday	Live Cell Imaging II	Data collection I	
20	3/27/07	Tuesday	Live Cell Imaging III	Data analysis I	
	3/29/07	Thursday	Spring Break		
	4/3/07	Tuesday	Spring Break		
21	4/5/07	Thursday	Live Cell Imaging I	Preparation I (Group Projects)	Students present the project results
22	4/10/07	Tuesday	Live Cells Imaging IV	Data collection I (Group Projects)	Students present the project results
23	4/12/07	Thursday	Live Cells Imaging V	Data analysis I (Group Projects)	Students present the project results
24	4/17/07	Tuesday	Live Cells Imaging VI	Data analysis II (Group Projects)	Students present the project results
25	4/19/07	Thursday	Presentation I		
26	4/24/07	Tuesday	Presentation II		
27	4/26/07	Thursday	Presentation III		
28	5/1/07	Tuesday	Presentation IV		Students present the project results
29	5/3/07	Thursday	Final Exam		