

Course Syllabus
MBMB 630 Cellular and Molecular Imaging
Academic Year 2025

Course ID and Title: MBMB 630 Cellular and Molecular Imaging

Course Coordinator: Asst. Prof. Narisorn Kitiyanant, D.V.M., Ph.D.

Tel. 02-441-9003 to 7 Ext. 1366

Email: narisorn.kit@mahidol.ac.th

Office and Lab: C208 (2nd floor, wing C)

Institute of Molecular Biosciences, Mahidol University

Instructor:

1. Asst. Prof. Narisorn Kitiyanant (NK)
Email: narisorn.kit@mahidol.ac.th
2. Assoc. Prof. Dr. Chalongrat Noree (CN)
Email: chalongrat.nor@mahidol.ac.th

Support Staff:

1. Ms. Sasithorn Mongaim (SM)
Email: sasithorn.mon@mahidol.ac.th

Credits: 1(1-2-3)

Curriculum: Master of Science Program in Advanced Biomedical Technology and Venture Creation in Healthcare (Elective course)
Master of Science Program in Molecular and Integrative Biosciences (Elective course)
Doctor of Philosophy Program in Molecular and Integrative Biosciences (Elective course)

Semester: X^{XX} Semester

Pre-Requisites:

None.

Course Learning Outcomes (CLOs):

By the end of the course, should be able to:

1. Basic microscopy including fluorescence
2. Laser capture and confocal microscopy
3. Histology of tissues and cells
4. Immunocytochemistry
5. Advanced Imaging Techniques

Equipment & Software

Zeiss LSM 880 with Airyscan Super-resolution detector

Zeiss Axioimager with Apotome

DeltaVision

Two-photon microscope (@SC)

Typhoon imager

Zeiss Zen software

ImageJ

Course Learning Outcomes	Teaching Method	Assessment Method
1.	<ol style="list-style-type: none"> Lecture Discussion 	<ol style="list-style-type: none"> Q&A during lecture Discussion performance Quiz / short exercise Assignment
2.	<ol style="list-style-type: none"> Discussion Hands-on lab practice Individual or group assignment/presentation (lecture and lab session) 	<ol style="list-style-type: none"> Discussion performance Lab performance Problem-based learning (scientific content and inventive idea)
3. Demonstrate scientific integrity, responsibility, and safety practices.	<ol style="list-style-type: none"> Writing lab report Hands-on lab safety practice 	<ol style="list-style-type: none"> Lab report writing Safety practice performance
4. Demonstrate professional and interpersonal skills.	<ol style="list-style-type: none"> Discussion Individual or group assignment/presentation Problem-based learning 	<ol style="list-style-type: none"> Discussion performance Teamwork performance Project presentation performance

Course Description:

Optical Microscopy & Imaging in the Biomedical Sciences, SIM/STED Super-resolution Microscopy, SEM/TEM electron microscopy, Live cell imaging, Quantitative imaging, Quantitative Light Microscopy, Quantitative Fluorescence Microscopy, Application of modern microscopy methods for current research topics

Course Schedule:

(Classroom XXX and Lab Classroom)

Lecture

-

Lab

-

	Activities	Description	Time	Instructors and Assistants
Day 1				
1	Lecture:	- To know the concept and biology of the lentiviral vector - To understand different LV generations	9:00 – 12:00	
2	Lecture: LV Vectors	- To understand the applications and limitations of lentiviral vector - To know how to work safely with LV vectors	13:00 – 16:00	
Day 2				
3	Lab: Plasmid preparation	To prepare the plasmids for LV production	9:00 – 10:30	Staff
4	Lab: HEK293T preparation	To prepare HEK293T cultures for AAV production	10:30 - 12:00	
5	Lab: Viral Packaging	To transfect LV plasmids into HEK293T cells for recombinant LV production	13:00 – 16:00	
Day 3				
6	Lab: LV particle collection and purification	To collect recombinant LV particles from HEK293T culture and purify LV particles	9:00 – 12:00	Staff
7	Lab: LV particle collection and purification (continue)	To collect recombinant LV particles from HEK293T culture and purify LV particles (continue)	13:00 – 16:00	
Day 4				
8	Lab: LV transduction in vitro	To use LV particles to infect target cell line	9:00 – 12:00	Staff
9	Lab: LV titration I	To determine the titer of purified LV particles	13:00 – 16:00	
Day 5				
10	Lab: LV titration II	To determine the titer of purified LV particles (continue)	9:00- 10:30	Staff

	Activities	Description	Time	Instructors and Assistants
11	Discussion & Student's Reflection	To provide students opportunities to describe their learning experiences received from this course and to collect comments, suggestions from students for further improvements of the course.	10:30 – 12:00	

Assessment Criteria:

	Assessment Criteria	Description (in Details)	Scoring Rubric
1	Class Attendance (5%)	Showing up in the class (5%)	<ul style="list-style-type: none"> • Full attendance (4) • ~ 80% attendance (3) • ~ 60% attendance (2) • < 50% attendance (1)
2	Lab Report (30%)	The presence of introduction, methods, results, discussion, and conclusion with no plagiarism (10 %)	<ul style="list-style-type: none"> • Complete (4) • ~ 80% complete (3) • ~ 60% complete (2) • < 50% complete (1)
		Data presentation (5%)	<ul style="list-style-type: none"> • Complete (4) • ~ 80% complete (3) • ~ 60% complete (2) • < 50% complete (1)
		Data analysis and interpretation (10%)	<ul style="list-style-type: none"> • Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		On-time submission (5%)	<ul style="list-style-type: none"> • On-time (4) • Late (2-3) • Very late (1)
3	Discussion Performance (25%)	Participation and performance (10%)	<ul style="list-style-type: none"> • Active (4) • Fairly active (2-3) • Inactive (1)
		Communication and presentation skills (10%)	<ul style="list-style-type: none"> • Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)

Assessment Criteria		Description (in Details)	Scoring Rubric
		Creative and high-order thinking skills (5%)	<ul style="list-style-type: none"> • Highly expressed (4) • Fairly expressed (2-3) • Not shown (1)
6	Lab Performance (40%)	Safety practice (10%)	<ul style="list-style-type: none"> • Excellent (4) • Good (3) • Fair (2) • Not solid (1)
		Responsibility (5%)	<ul style="list-style-type: none"> • Highly expressed (4) • Fairly expressed (2-3) • Not shown (1)
		Lab skills (15%)	<ul style="list-style-type: none"> • Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Decision-making and trouble-shooting skills (10%)	<ul style="list-style-type: none"> • Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)

Student's achievement will be graded using symbols: A, B+, B, C+, C, D+, D and F, based on the criteria as follows:

Percentage	Grade	Description
80–100	A	Excellent
75–79	B+	Very Good
70–74	B	Good
65–69	C+	Fairly Good
60–64	C	Fair
55–59	D+	Poor
50–54	D	Very Poor
0–49	F	Fail

Date of Revision: September 30, 2023