

Course Syllabus
MBMB 502 Cell Biology
Academic year 2026

Course ID and Title MBMB 502 Cell Biology

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Instructors:

Assoc. Prof. Kanokporn Triwitayakorn, Ph.D. (KT)

Assoc. Prof. Dr. Phatchariya Phannasil, Ph.D. (PP)

Asst. Prof. Alita Kongchanagul, Ph.D. (AK)

Asst. Prof. Alisa Tubsuwan, Ph.D. (AT)

Asst. Prof. Narisorn Kitiyanant, Ph.D. (Nok)

Asst. Prof. Natee Jearawiriyapaisarn, Ph.D. (NJ)

Asst. Prof. Ittipat Meewan, Ph.D. (IM)

Chutima Thepparit, Ph.D. (CT)

Duangnapa Kovanich, Ph.D. (DK)

Promsin Masrinoul, Ph.D. (PM)

Siraprapa Boobphahom, Ph.D. (SB)

Supporting Staff:

1. Potchaman Sittipaisankul
2. Naraporn Sirinonthanawech
3. Theptharin Charuraksa
4. Kunjimas Ketsuwan

Credits: 3 (2-2-5)

Curriculum: Master of Science Program in Molecular and Integrative Biosciences
Doctor of Philosophy Program in Molecular and Integrative Biosciences

Semester offering: First semester

Pre-requisites: None

Course learning outcomes (CLOs):

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

- 1) Demonstrate core principles and comprehensive knowledge of cell structures, functions, and cellular processes, and apply them to molecular and integrative biosciences research
- 2) Apply both classical and applied techniques in cell biology, basic mammalian cell culture, and cellular and molecular approaches to solve scientific research questions
- 3) Adhere to scientific integrity, responsibility, and biosafety practices in cell culture work
- 4) Demonstrate leadership, teamwork, interpersonal skills, and responsibilities for the assignments

Course description

Cell Structure and organelles; Cellular Compartments and intracellular Sorting; Membrane Transport; Cell Signaling and Transduction; Cell Cycle and division; Cellular Response to Stress; Cell Aging and senescence; Cell Death; Cell Adhesion, Cell Junction and Extracellular Matrix; Cell Specialization; Stem Cells and Tissue Renewal; Cell Immunity; Cell Metabolism; Plant Cell Biology; Cellular Network Analysis & Data Visualization; Basic Mammalian Cell Culture Techniques; Compound treatments & DNA Transfection; MTT Assay; Flow Cytometry; Immunofluorescence; Confocal Microscopy

Alignment of Teaching and Assessment Methods to Course Learning Outcomes:

Course Learning Outcomes	Teaching Method	Assessment Method
1. Demonstrate core principles and comprehensive knowledge of cell structures, functions, and cellular processes, and apply them to molecular and integrative biosciences research	1. Lecture 2. Class Discussion 3. PBL	1. Q&A during lecture 2. Discussion/presentation performance 3. Assignment/Quiz/Written Examination
2. Apply both classical and applied techniques in cell biology, basic	1. Hands-on practice 2. Lab discussion 3. PBL	1. Lab performance/ Direct observation 2. Lab report

mammalian cell culture, and cellular and molecular approaches to solve scientific research questions		3. Discussion performance
3. Adhere to scientific integrity, responsibility, and biosafety practices in cell culture work	1. Lecture 2. Hands-on practice 3. Lab safety guidelines	1. Assignment/Quiz/Written Examination 2. Lab report 3. Class attendance 4. Direct observation/Lab performance
4. Demonstrate leadership, teamwork, interpersonal skills, and responsibilities for the assignments	1. Class Discussion 2. Presentation 3. Hands-on practice 4. PBL	1. Q&A during lecture 2. Discussion/presentation performance 3. Lab performance 4. Group Assignment

Course Schedule

Date	Time	Topics/Details	Class Activity	Lecturer
Week 1				
Wed 30 Sep 2026	9.00–9.30	Orientation and overview of the class	Introduction	Phatchariya
	09.30-11.30	Cell Structure & Organelles (L1)	Interactive Lecture, Class discussion	Siraprapa
	13.00-15.00	Cell Adhesion, Cell Junction & Extracellular Matrix (L2)	Interactive Lecture, Class discussion	Narisorn
Thu 1 Oct 2026	Self-study			
Fri 2 Oct 2026	09.00-11.00	Membrane Transport (L3)	Interactive Lecture, Class discussion	Natee

Date	Time	Topics/Details	Class Activity	Lecturer
	13.00-15.00	Cell Signaling & Transduction (L4)	Interactive Lecture, Class discussion	Duangnapa
Mon 5 Oct 2026	Self-study (Mahidol University Commencement Day)			
Tue 6 Oct 2026	Self-study (Mahidol University Commencement Day)			
Wed 7 Oct 2026	09.00-11.00	Cellular Response to Stress (L5)	Interactive Lecture, Class discussion	Promsin
	13.00-15.00	Cell Cycle & Division (L6)	Interactive Lecture, Class discussion	Ittipat
Thu 8 Oct 2026	09.00-11.00	Cell Aging & Senescence (L7)	Interactive Lecture, Class discussion	Alita
	13.00-15.00	Cell Death (L8)	Interactive Lecture, Class discussion	Promsin
Fri 9 Oct 2026	09.00-11.00	Intracellular Protein Sorting (L9)	Interactive Lecture, Class discussion	Chutima
Week 2				
Mon 12 Oct 2026	09.00-11.00	Cell Specialization (L10)	Interactive Lecture, Class discussion	Narisorn
	13.00-15.00	Cell Immunity (L11)	Interactive Lecture, Class discussion	Alita
Tue 13 Oct 2026	Self-study (Public holiday: King Bhumibol Memorial Day)			
Wed 14 Oct 2026	09.00-11.00	Cell metabolism (L12)	Interactive Lecture, Class discussion	Phatchariya
	13.00-15.00	Cellular Network Analysis & Data Visualization (L13)	Interactive Lecture, Class discussion	Duangnapa

Date	Time	Topics/Details	Class Activity	Lecturer
Thu 15 Oct 2026	Self-study			
Fri 16 Oct 2026	13.00-15.00	Stem Cells and Tissue Renewal (L14)	Interactive Lecture, Class discussion	Alisa
Week 3				
Mon 19 Oct 2026	13.00-15.00	Plant cell biology (L15)	Interactive Lecture, Class discussion	Kanokporn
Tue 20 Oct 2026	Self-study			
Wed 21 Oct 2026	Biosafety training			
Thu 22 Oct 2026	Biosafety training			
Fri 23 Oct 2025	Self-study (Public Holiday: Chulalongkorn Day)			
Week 4				
Mon 26 Oct 2026	09.00-11.00	Basic Mammalian Cell Culture Techniques: Cell Plating	Hands-on practice	Phatchariya, Chutima, Natee, Narisorn
Tue 27 Oct 2026	09.00-11.00	Transfection	Hands-on practice	Phatchariya, Natee, ittipat, Narisorn
Wed 28 Oct 2026	Self-study			
Thu 29 Oct 2026	09.00-11.00	Investigation of the fluorescent proteins and their localization: Confocal Microscope	Hands-on practice	Phatchariya, Natee, Narisorn
	13.00-15.00	Flow cytometry, Harvest cells for RNA and protein extraction	Hands-on practice	Natee, Narisorn, Phatchariya
Fri 30 Oct 2026	09.00-11.00	RNA extraction	Hands-on practice	Phatchariya,

Date	Time	Topics/Details	Class Activity	Lecturer
				Natee, Narisorn, Promsin,
	13.00-15.00	cDNA synthesis	Hands-on practice	Phatchariya, Natee, Narisorn, Promsin,
Week 5				
Mon 2 Nov 2026	9.00-10.00	Real-time PCR	Hands-on practice	Phatchariya, Natee, Narisorn, Promsin
	13.00-15.00	Protein extraction for Western blot analysis	Hands-on practice	Narisorn, Promsin, Duangnapa, Alita
Tue 3 Nov 2026	9.00-10.00	Western blot I: SDS-PAGE	Hands-on practice	Narisorn, Promsin, Duangnapa, Alita
	13.00-16.00	Western blot II: Membrane transfer and blocking	Hands-on practice	Alita, Narisorn, Promsin, Duangnapa
Wed 4 Nov 2026	09.00-11.00	Antibody incubation	Hands-on practice	Alita, Narisorn, Promsin, Duangnapa
	13.00-16.00	Western blot analysis	Hands-on practice	Alita, Narisorn, Promsin, Duangnapa
Thu 5 Nov 2026	9.00-10.00	PBL discussion	Interactive Lecture, Class discussion	All staff
Mon 9 Nov 2026	9.00-10.00	Lab Presentation and Discussion	Presentation and Discussion	All staff
Thu 10 Nov 2026	9.00-10.00	PBL presentation	Presentation and Discussion	All staff

Note: The laboratory session will be organized as a project-based learning.

Assessment Criteria:

Assessment Criteria		Description (In Details)	Scoring Rubric
1	Class Attendance (5%)	Showing up in the class (5%)	• Full attendance (4) • ~ 80% attendance (3) • ~ 60% attendance (2) • < 50% attendance (1)
2	Assignment/Quiz/written examination (40%)	Content accuracy (15%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Creativity (10%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Sequencing of information (2.5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Supporting evidence (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Grammar and originality (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		On-time submission (2.5%)	• On-time (4)

Assessment Criteria		Description (In Details)	Scoring Rubric
			• Late (2-3) • Very late (1)
3	Presentation/discussion (25%)	Organization (2.5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Content (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Subject knowledge/answering questions (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Presentation technique and use of visual aids (2.5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Creative and high-order thinking skills (5%)	• Highly expressed (4) • Fairly expressed (2-3) • Not shown (1)
		Professional and interpersonal skills (responsibility, teamwork, and leadership) (2.5%)	• Active (4) • Fairly active (2-3) • Inactive (1)
		Time management (2.5%)	• Excellent (4)

Assessment Criteria		Description (In Details)	Scoring Rubric
			• Good (3) • Fair (2) • Need to be improved (1)
4	Lab performance (20%)	Ability to follow procedure or to design a procedure for the experiment (10%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Use of equipment (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Working area and safety (5%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
5	Lab report (10%)	Writing style: Organization and Sequencing of information (2%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Lab report submission (1%)	• On-time (4) • Late (2-3) • Very late (1)
		Lab report content (5%)	• Excellent (4) • Good (3) • Fair (2)

Assessment Criteria		Description (In Details)	Scoring Rubric
			• Need to be improved (1)
		Data analysis, interpretation of data, and conclusion (2%)	• 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 range	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: 13 July 2026