

**Course syllabus**  
**MBMG 513: Gene Expression and Applications**  
**3 Credits (2-2-5)**  
**Academic Year 2024**

**Course schedule:**

Date: Monday-Friday

Time: 09:30-16:30

**Room: C405**

**Course coordinator:** Kanokporn Triwitayakorn

Tel: 02-441-9003-7 ext. 1368, e-mail: kanokporn.tri@mahidol.ac.th

**Instructors:**

Apinunt Udomkit, Ph.D., Prof.

Chalermporn Ongvarrasopone, Ph.D., Prof.

Chalongrat Noree, Ph.D., Assoc. Prof.

Chonticha Saisawang, Ph.D.

Duncan R. Smith, Ph.D., Prof.

Kanokporn Triwitayakorn, Ph.D., Assoc. Prof.

Kusol Pootanakit, Ph.D., Asst. Prof.

Nattaya Srisawad, Ph.D.

Panadda Boonserm, Ph.D., Prof.

Panitch Boonsongcheep, Ph.D.

Piengtawan Tappiban, Ph.D.

Poochit Nonejuie, Ph.D., Asst. Prof.

Saovaros Svasti, Ph.D., Assoc. Prof.

Sarin Chimnaronk, Ph.D., Assoc. Prof.

Supajit Sraphet, Ph.D.

Ittiapt Meewan, Ph.D.

**Lab supporting Staff:**

Pannaphan Makarathut

**Course Schedule:**

<b>Date/ time</b>		<b>Topics/Details</b>	<b>No. of Hours</b>	<b>Class Activity/ Teaching Media</b>	<b>Lecturer</b>
<b>Sep 23</b>	9:30-10:00 10:00-12:00	Course overview/ Applications in PCR	2.5	Lecture	Kanokporn Triwitayakorn, Kusol Pootanakit
	13:30-16:30	<i>In-silico</i> primer design	1-2	Lecture-Lab	Kusol Pootanakit
<b>Sep 24</b>	9:30-11:30	cDNA and genomic libraries	2	Lecture	Panadda Boonserm
	13:30-16:30	PCR Lab (PCR and gel preparation)	3	Lab	Kusol Pootanakit Apinunt Udomkit Ittipat Meewan
<b>Sep 25</b>	9:30-12:30	PCR Lab (PCR and agarose gel electrophoresis)	3	Lab	Kusol Pootanakit Apinunt Udomkit Ittipat Meewan
	13:30-16:30	Self-study	3	Assignment due	
<b>Sep 26</b>	9:30-11:30	Sequence alignments	1-2	Lecture-Lab	Kusol Pootanakit
	13.30-15.30	Expression in <i>E. coli</i> of cloned DNA molecules	2	Lecture	Panadda Boonserm
<b>Sep 27</b>	9:30-11:30	Cloning in bacteria other than <i>E. coli</i>	2	Lecture	Poochhit Nonejuie
	13.30-16:30	Self-study	3	Assignment due	
<b>Sep 30</b>	9:30-12:00	Examination (I): - Applications in PCR - <i>In-silico</i> primer design - cDNA and genomic libraries - Expression in <i>E. coli</i> of cloned DNA molecules - Sequence alignments - Cloning in bacteria other than <i>E. coli</i>	2	Written examination	Kanokporn Triwitayakorn
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 1</b>	9:30-11:30	Gene expression in yeast	2	Lecture	Chalongrat Noree
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 2</b>	9:30-11:30	Gene expression in plant cell for production of pharmaceuticals	2	Lecture	Panitch Boonsongcheep
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 3</b>	9:30-11:30	The Role of Gene Expression in Human Disease: From Pathomechanism to Therapeutic Design	2	Lecture	Saovaros Svasti
	13:30-16:30	Self-study	3	Assignment due	

<b>Date/ time</b>		<b>Topics/Details</b>	<b>No. of Hours</b>	<b>Class Activity/ Teaching Media</b>	<b>Lecturer</b>
<b>Oct 4</b>	9:30-11:30	Gene expression in animal: transgenic and knockout animals	2	Lecture	Saovaros Svasti
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 7</b>	9:30-12:00	Examination (II): - Gene expression in yeast - Gene expression in plant cell for production of pharmaceuticals - The Role of Gene Expression in Human Disease: From Pathomechanism to Therapeutic Design - Gene expression in animal: transgenic and knockout animals	2.5	Written examination	Kanokporn Triwitayakorn
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 8</b>	Mahidol University Graduation Ceremony Academic Year 2023 *NO CLASS*				
<b>Oct 9</b>					
<b>Oct 10</b>	9:30-11:30	Gene editing by CRISPR/Cas technology	2	Lecture	Chonticha Saisawang
	13:00-16:00	DNA markers and genomic DNA analysis	1-2	Lecture-Lab	Ittipat Meewan Kanokporn Triwitayakorn
<b>Oct 11</b>	9:30-12:00	DNA markers and genomic DNA analysis	2	Lab	Supajit Sraphet
	13:00-16:00	DNA markers and genomic DNA analysis	3	Lab	Nattaya Srisawad Piengtawan Tappiban
<b>Oct 14</b>	Anniversary of the Death of King Bhumibol *NO CLASS*				
<b>Oct 15</b>	9:30-12:30	Post-transcriptional regulation	2	Lecture	Ittipat Meewan
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 16</b>	9:30-11:30	Synthetic biology	2	Lecture	Ittipat Meewan
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 17</b>		Self-study			
<b>Oct 18</b>	9:30-12:00	Exam III - Gene editing by CRISPR/Cas technology - DNA markers and genomic DNA analysis - Post-transcriptional regulation	2.5	Written examination	Kanokporn Triwitayakorn

<b>Date/ time</b>		<b>Topics/Details</b>	<b>No. of Hours</b>	<b>Class Activity/ Teaching Media</b>	<b>Lecturer</b>
		- Vaccine development (nucleic acid vaccine)			
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 21</b>	9:30-11:30	Metagenomics	2	Lecture	Kusol Pootanakit
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 22</b>	9:30-11:30	Next-generation sequencing technologies and their applications	2	Lecture	Chalernporn Ongvarrasopone
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 23</b>	Chulalongkorn Day *NO CLASS*				
<b>Oct 24</b>	9:30-11.30	Vaccine development (nucleic acid vaccine)	2	Lecture	Sarin Chimnaronk
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 25</b>	9:30-11:30	Virus gene structure and regulation	2	Lecture	Duncan R. Smith
	13:30-16:30	Self-study	3	Assignment due	
<b>Oct 28</b>	9:30-12:00	Examination (IV): - Next-generation sequencing technologies and their applications - Metagenomics - Synthetic biology - Virus gene structure and regulation	2.5		Kanokporn Triwitayakorn
	13:30-16:30	Group study / discussion	3	Assignment due	
<b>Oct 29</b>	9:30-11:30	Problem-based final assignment	2	Discussion	Kanokporn Triwitayakorn
<b>Oct 30</b>	9:30-11:30	Poster presentation	2	Presentation	All teaching staff

**Evaluation Plan for Learning Outcome**

<b>Learning Outcome</b>	<b>Activity</b>	<b>Evaluated in Week</b>	<b>Evaluation Ratio</b>
1. Acquire new knowledge and innovation in gene expression and applications (2.1, 2.2, 2.3)	Assignment, quiz, written examination	1-4	60%
2. Integrate comprehensive knowledge in gene expression to solve scientific research questions (3.1, 3.2, 3.3)	Problem-based learning, presentation (oral and poster)	1-4	10%
3. Analyze and present lab data by using appropriate information and communication technologies (5.1, 5.2)	Presentation (report, lab notebook)	1-4	10%
4. Demonstrate scientific integrity, responsibility, and safety practice (1.1, 1.2, 1.3)	Class attendance, Lab performance	1-4	15%
5. Demonstrate teamwork, interpersonal skills and responsibilities for the work assigned (4.1, 4.2)	Class participation, Group presentation, Group assignment	1-4	5%

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

<b>Percentage</b>	<b>Grade</b>	<b>Description</b>
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