

## Course Syllabus

### MBMB 653 Vaccine Technology and Development

Academic Year 2025

**Course ID and Title:** MBMB 653 Vaccine Technology and Development

**Course Coordinator:** Dr. Promsin Masrinoul

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#### Instructor:

1. Promsin Masrinoul, Ph.D (PM)

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**Credits:** 1 (X-X-X)

**Curriculum:** Master of Science Program in Molecular and Integrative Biosciences (Elective course)  
Doctor of Philosophy Program in Molecular and Integrative Biosciences (Elective course)

**Semester:** 2<sup>nd</sup> Semester

#### Pre-Requisites:

None.

#### Course Learning Outcomes (CLOs):

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

1. Describe the vaccine development process and understand the overview of regulation and quality control of vaccine, and manufacturing process.
2. Apply knowledge of the manufacturing processes for vaccines, including the production of antigens, adjuvants, and delivery techniques.

3. Demonstrate scientific integrity, responsibility, and safety practices.
4. Demonstrate professional and interpersonal skills.

**Alignment of Teaching and Assessment Methods to Course Learning Outcomes:**

Course Learning Outcomes	Teaching Method	Assessment Method
1. Describe the vaccine development process and understand the overview of regulation and quality control of vaccine, and manufacturing process	<ol style="list-style-type: none"> <li>1. Lecture</li> <li>2. Discussion</li> <li>3. Problem-based learning</li> </ol>	<ol style="list-style-type: none"> <li>1. Q&amp;A during lecture</li> <li>2. Discussion performance</li> <li>3. Assignment</li> <li>4. Problem-based learning (scientific content and inventive idea)</li> </ol>
2. Apply knowledge of the manufacturing processes for vaccines, including the production of antigens, adjuvants, and delivery techniques	<ol style="list-style-type: none"> <li>1. Discussion</li> <li>2. Problem-based learning</li> </ol>	<ol style="list-style-type: none"> <li>1. Discussion performance</li> <li>2. Problem-based learning (scientific content and inventive idea)</li> </ol>
3. Demonstrate scientific integrity, responsibility and safety practice	<ol style="list-style-type: none"> <li>1. Discussion (about scientific integrity, responsibility)</li> <li>2. Assignment</li> <li>3. Writing lab report</li> <li>1. Hands-on lab safety practice</li> </ol>	<ol style="list-style-type: none"> <li>1. Attendance (presence, absence, on-time?)</li> <li>2. Task submission (on-time?)</li> <li>3. Lab report writing (plagiarism?)</li> <li>1. Lab performance (follow safety practice?)</li> </ol>
4. Demonstrate professional and interpersonal skills.	<ol style="list-style-type: none"> <li>1. Discussion</li> <li>2. Writing lab report</li> <li>3. Individual or group assignment/presentation</li> <li>4. Problem-based learning</li> </ol>	<ol style="list-style-type: none"> <li>1. Discussion performance (active participation?)</li> <li>2. Lab report writing performance</li> </ol>

Course Learning Outcomes	Teaching Method	Assessment Method
		4. Performance in the team (teamwork or leadership skills)

**Course Description:** Prelude to vaccinology: vaccine development pathway, non-clinical evaluation of vaccine, clinical vaccine development process, introduction to vaccine manufacturing, overview of regulation and quality control of vaccine manufacturing, adjuvants for vaccines, vaccine delivery, case study of vaccine innovation, manufacturing facility.

(Classroom **XXX** and Lab Classroom **XXX**)

Date	Time	Activities	Description	No. of hr	Lecturer	Class activity/teaching media
Mon, XX XXX 20XX	10:00 – 12:00	Prelude to vaccinology: vaccine development pathway	To understand an overview of vaccine development pathway, manufacturing and regulation.	2	PM	Lecture/Class discussion
Wed, XX XXX 20XX	10:00 – 12:00	Non-clinical evaluation of vaccine	To understand for non-clinical evaluation of vaccine (consideration and challenges for safety testing of various type of vaccines)	2	PM	Lecture/Class discussion
Fri, XX XXX 20XX	10:00 – 12:00	Clinical vaccine development process	To understand the process of clinical vaccine development	2	PM	Lecture/Class discussion
Mon, XX XXX 20XX	10:00 – 12:00	Introduction to vaccine manufacturing	Various type of manufacturing for vaccine development	2	PM	Lecture/Class discussion

Date	Time	Activities	Description	No. of hr	Lecturer	Class activity/teaching media
XXX 20XX						
Wed, XX XXX 20XX	10:00 – 12:00	Overview of regulation and quality control of vaccine manufacturing	To understand an overview of regulation and quality control of vaccine manufacturing	2	PM	Lecture/Class discussion
Fri, XX XXX 20XX	10:00 – 12:00	Adjuvants and formulation for vaccines	To understand the adjuvants or excipients used in vaccine.	1	PM	Lecture/Class discussion
	11:00- 12:00	Vaccine delivery	To understand the vaccine delivery and integrating new technology and updates	1	PM	
Mon, XX XXX 20XX	10:00 – 12:00	Case study of successful vaccine innovation	To demonstrate the case study of vaccine development from lab to commercialization.	2	PM	Demonstration/ Class discussion
Wed, XX XXX 20XX	10:00 – 12:00	Visit to manufacturing facility	Visit the vaccine manufacturing facility	2	PM	Field trip
Fri, XX XXX 20XX	9:00- 12:00	Research highlight Student's reflection	To assess student performance and provide feedback on the selected research article. To provide students opportunities to describe their learning experiences	3	All staffs	Presentation discussion and assignment

Date	Time	Activities	Description	No. of hr	Lecturer	Class activity/teaching media
			received from this course and how it can be applied to their future learning.			

**Assessment Criteria:**

Assessment Criteria		Description (in Details)	Scoring Rubric
1	<b>Class Attendance (5%)</b>	Showing up in the class (5%)	<ul style="list-style-type: none"> <li>• Full attendance (4)</li> <li>• ~ 80% attendance (3)</li> <li>• ~ 60% attendance (2)</li> <li>• &lt; 50% attendance (1)</li> </ul>
2	<b>Report and assignment (25%)</b>	The presence of intro, methods, results, discussion, and conclusion <b>with no plagiarism</b> (5%)	<ul style="list-style-type: none"> <li>• Complete (4)</li> <li>• ~ 80% complete (3)</li> <li>• ~ 60% complete (2)</li> <li>• &lt; 50% complete (1)</li> </ul>
		Data presentation (5%)	<ul style="list-style-type: none"> <li>• Complete (4)</li> <li>• ~ 80% complete (3)</li> <li>• ~ 60% complete (2)</li> <li>• &lt; 50% complete (1)</li> </ul>
		Data analysis and interpretation (5%)	<ul style="list-style-type: none"> <li>• Excellent (4)</li> <li>• Good (3)</li> <li>• Fair (2)</li> <li>• Need to be improved (1)</li> </ul>
		English and writing skills (5%)	<ul style="list-style-type: none"> <li>• Excellent (4)</li> <li>• Good (3)</li> <li>• Fair (2)</li> </ul>

Assessment Criteria	Description (in Details)	Scoring Rubric
		<ul style="list-style-type: none"> <li>• Need to be improved (1)</li> </ul>
	Report format and typing errors (2%)	<ul style="list-style-type: none"> <li>• Excellent (4)</li> <li>• Good (3)</li> <li>• Fair (2)</li> <li>• Need to be improved (1)</li> </ul>
	On-time submission (3%)	<ul style="list-style-type: none"> <li>• On-time (4)</li> <li>• Late (2-3)</li> <li>• Very late (1)</li> </ul>
3	Quiz / Exercise (10%)	<p>Depending on the correctness and completion (10%)</p> <p><b>Raw scores will be adjusted to be in a range of 0-10%</b></p>
4	Discussion Performance (50%)	<p>Participation and performance (5%)</p> <ul style="list-style-type: none"> <li>• Active (4)</li> <li>• Fairly active (2-3)</li> <li>• Inactive (1)</li> </ul> <p>Professional and interpersonal skills (responsibility, teamwork, and leadership) (10%)</p> <ul style="list-style-type: none"> <li>• Active (4)</li> <li>• Fairly active (2-3)</li> <li>• Inactive (1)</li> </ul> <p>Creative and high-order thinking skills (35%)</p> <ul style="list-style-type: none"> <li>• Highly expressed (4)</li> <li>• Fairly expressed (2-3)</li> <li>• Not shown (1)</li> </ul>
5	Reflection (10%)	<p>Knowledge sharing (2.5%)</p> <ul style="list-style-type: none"> <li>• Excellent (4)</li> <li>• Good (3)</li> <li>• Fair (2)</li> <li>• Need to be improved (1)</li> </ul> <p>Inventive and creative thinking skills (2.5%)</p> <ul style="list-style-type: none"> <li>• Highly expressed (4)</li> <li>• Fairly expressed (2-3)</li> <li>• Not shown (1)</li> </ul>

Assessment Criteria	Description (in Details)	Scoring Rubric
	Communication skills (2.5%)	<ul style="list-style-type: none"> <li>• Excellent (4)</li> <li>• Good (3)</li> <li>• Fair (2)</li> <li>• Need to be improved (1)</li> </ul>
	Professional and interpersonal skills (responsibility, teamwork, and leadership) (2.5%)	<ul style="list-style-type: none"> <li>• Active (4)</li> <li>• Fairly active (2-3)</li> <li>• Inactive (1)</li> </ul>

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: 31 Jan 2024