Course Syllabus

MBMB 627 Bio-Based Products for Sustainability

Academic Year 2025

Course ID and Title: MBMB 627
Bio-based Products for Sustainability

ชมชม ๖๒๗
ผลิตภัณฑ์ชีวภาพเพื่อความยั่งยืน

Course Coordinator: Assoc. Prof. Chartchai Krittanai, Ph.D.
Tel. 02-441-9003 to 7 Ext. 1443, Mobile: 084-001-9151
Email: ckrittanai@gmail.com, chartchai.kri@mahidol.ac.th
Office and Lab: B406 (4th floor, C-wing)
Institute of Molecular Biosciences, Mahidol University

Instructors:

1. Assoc. Prof. Chartchai Krittanai, Ph.D.
Email: ckrittanai@gmail.com, chartchai.kri@mahidol.ac.th
Website: https://mb.mahidol.ac.th/web/en/chartchai-profile/
2. Prof. Panadda Boonserm, Ph.D.
Email: panadda.boo@mahidol.ac.th
Website: https://mb.mahidol.ac.th/web/en/panadda-profile/
3. Dr. Boonhiang Promdonkoy, Ph.D.
Email: Boonhiang@biotec.or.th

Support Staff:

1. Ms. Monrudee Srisaisap
Email: monruedee.srs@mahidol.ac.th

Credits: 1 (0 – 2 – 1)

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

Semester: 2nd Semester

Pre-Requisites: None.

Course Learning Outcomes (CLOs):

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

1. Discuss molecular biology techniques that can be used for research and development of selected bio-based products
2. Perform an experiment to investigate and validate selected commercial bio-based products
3. Comply with research ethics and scientific integrity.
4. Demonstrate professional and interpersonal skills to complete the assigned works and laboratory experiments.

Alignment of Teaching and Assessment Methods to Course Learning Outcomes:

Course Learning Outcomes	Teaching Method	Assessment Method
1. Discuss molecular biology techniques that can be used for research and development of selected bio-based products. **(Knowledge – Aligned with PLO1).**	1. Interactive lecture 2. Critical discussion 3. Site visit	1. Quiz / short exercise 2. Discussion performance 3. Assignment
2. Perform an experiment to investigate and validate selected commercial bio-based products **(Skills – Aligned with PLO2).**	1. Instructions 2. Hands-on laboratory 3. Discussion 4. Problem-based learning	1. Lab performance 2. Discussion performance 3. Problem-based learning
3. Comply with research ethics and scientific integrity. **(Ethics – Aligned with PLO3).**	1. Lab safety practice 2. Discussion on scientific integrity, responsibility 3. Assignment	1. Following safety practice? 2. Attendance (presence, absence, on-time?) 3. Work submitted on-time, and no plagiarism

4. Demonstrate professional and interpersonal skills to complete the assigned works and laboratory experiments. **(Characters – Aligned with PLO4).**	1. Discussion 2. Individual or group assignment/presentation 3. Problem-based learning	1. Performance (active participation?) 2. Teamwork and leadership

Course Description:

Overview of Bio-Based Products and Sustainability; Validation of Commercial Products; Biopesticides; Basic Molecular Techniques for Research and Development; Pathway from Research to Product Development and Commercialization; Potential and Challenges for Bio-Based Products; Visiting of Laboratory and Bio-Business Sites.

(In Thai) ภาพรวมของผลิตภัณฑ์ชีวภาพเพื่อความยั่งยืน การตรวจสอบผลิตภัณฑ์ชีวภาพในท้องตลาด สารชีวภาพเพื่อควบคุมแมลงและโรคพืช เทคนิคพื้นฐานเพื่อการวิจัยและพัฒนาผลิตภัณฑ์ เส้นทางการวิจัยสู่การพัฒนาผลิตภัณฑ์และธุรกิจ ศักยภาพและความท้าทายของผลิตภัณฑ์ชีวภาพ เยี่ยมชมห้องปฏิบัติการและหน่วยธุรกิจ

Course Schedule: (Classroom C405 and Laboratory C406)

No.	Activities	Description	Time	Instructors
Day 1 – Monday (April-27-2026)				
1	**Interactive Lecture:** Research & Development for Bio-based Products	Overview of R&D on bio-based products and sustainability	9.00-11.00	BP / CK
2	**Interactive Lecture:** Product Validation	Validation of the active component of the products	11.00-12.00	BP
3	**Hands-on Laboratory:** Analysis of Commercial Products	Performing hands-on validation for active compounds of selected products	13.00-15.00	BP / PB / CK
4	**Discussion:** Selected products in the market	Discussion on validation and case study of other samples	15.00-16.00	

Day 2 – Tuesday (April-28-2026)				
1	**Hands-on Laboratory:** Analysis of Commercial Products (Cont.)	PCR-based validation (Cont.)	9.00-10.30	BP / PB / CK
2	**Discussion:** Validation of Product Activity	Discussion of the laboratory data	10.30-12.00	
3	**Site Visit:** TAB Innovation Co., Ltd.	Visit R&D or business sites	13.30-16.00	BP / PB / CK
Day 3 – Wednesday (April-29-2026)				
1	**Interactive Lecture:** Basic Sciences for Product Development	Demonstration of a link between basic research and product development	9.00-11.00	PB
2	**Lab demonstration and discussion:**	Discussion on research data that paves the way for product development	11.00-12.00	PB / CK
3	**Assignment:** World of Patents	Introduction of major sources of information for global R&D	13.00-15.00	PB / CK
Day 4 – Thursday (April-30-2026)				
1	**Interactive Lecture:** Bio-Products from plants and industrial waste	Introduction of diversified sources of bioactive agents in plants	9.30-12.00	CK
2	**Laboratory:** Bioactive Molecules for Plant Disease Control	Inhibition Analysis of plant extracts against major pathogens	13.00-15.00	CK / PH / BP
Day 5 – Friday (May-1-2026)				
1	**Problem-Based Learning:**	Discussion and presentation of an assigned case study	10.00-11.00	BP / PB / CK
2	**Discussion:**	Discussion on the potential and challenges of current bio-based products	11.00-12.00	
2	**Student's Reflection**	Providing an opportunity for students to describe their learning experiences from the course and how to apply for their future learning.	13.00-14.00	PB / CK
3	**After Action Review**	Collecting comments and feedback for further improvements to the course.	14.00-15.00	CK

BP: Boonhiang Promdonkoy CK: Chartchai Krittanai

PB: Panadda Boonserm

Assessment Criteria:

Assessment Criteria		Description	Scoring Rubric
1	Class Attendance (10%)	Showing up in class	• Full attendance (4) • ~ 80% attendance (3) • ~ 60% attendance (2) • < 50% attendance (1)
2	Quiz / Exercise (10%)	The correctness and completion	Scores will be adjusted in a range of 0-10%
3	Assignment (25%)	Completion of assigned work, with discussion, no plagiarism, and submitted on time	• Complete (4) • ~ 80% complete (3) • ~ 60% complete (2) • < 50% complete (1)
4	Discussion (25%)	Active participation (10%)	• Active (4) • Fairly active (2-3) • Inactive (1)
		Performance with creative and high-order thinking skills (10%)	• Highly expressed (4) • Fairly expressed (2-3) • Not shown (1)
		Professional and interpersonal skills (5%)	• Active (4) • Fairly active (2-3) • Inactive (1)
5	Lab Performance (15%)	Responsibility and Safety practice (5%)	• Excellent (4) • Good (3) • Fair (2) • Not solid (1)
		Lab skills (10%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
6	PBL Presentation (15%)	Presentation and Communication skills (10%)	• Excellent (4) • Good (3) • Fair (2) • Need to be improved (1)
		Knowledge sharing (5%)	• 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 or 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: 12 November 2025