

Course Syllabus
MBMB 632 DNA barcoding
Academic Year 2025

Course ID and Title: MBMB 632
DNA barcoding
ชมชม ๖๓๒
เทคนิคชีววิทยาระดับโมเลกุลในการระบุชนิดสิ่งมีชีวิต

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Instructor:

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Support Staff:

1. Genomics Lab supporting staff

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: X^{XX} Semester

Pre-Requisites:

None.

Course Learning Outcomes (CLOs):

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

1. Demonstrate scientific integrity, responsibility, and safety practices.
2. Exhibit laboratory skills in molecular biology and genetics techniques.
3. Apply the skills and knowledge of molecular biology and genetics techniques to conduct the associated experiments.
4. Demonstrate critical thinking, teamwork, and interpersonal skills.
5. Effectively communicate scientific concepts and findings through discussions and presentations.

Alignment of Teaching and Assessment Methods to Course Learning Outcomes:

Course Learning Outcomes	Teaching Method	Assessment Method
1. Demonstrate scientific integrity, responsibility, and safety practices (Knowledge – Aligned with PLO1).	1. Lab safety orientation 2. Discussion 3. Lab report 4. Assignment	1. Laboratory performance 2. Discussion performance 3. Report and assignment submission 4. Assignment 5. Plagiarism detection
2. Exhibit laboratory skills in molecular techniques (Skills – Aligned with PLO2).	1. Hands-on lab practice	1. Laboratory performance 2. Lab report

Course Learning Outcomes	Teaching Method	Assessment Method
3. Apply the skills and knowledge of molecular techniques to conduct the associated experiments. (Skills – Aligned with PLO2).	1. Problem-based project 2. Discussion 3. Assignment	1. Laboratory performance 2. Discussion performance 3. Assignment
4. Demonstrate critical thinking, teamwork, and interpersonal skills (Characters – Aligned with PLO4).	1. Problem-based project 2. Discussion 3. Group activities	1. Laboratory performance 2. Discussion performance 3. Performance in group activities
5. Effectively communicate scientific concepts and findings through discussions and presentations (Characters – Aligned with PLO4).	1. Discussion 2. Presentation	1. Discussion performance 2. Presentation performance

Course Description:

DNA barcoding; DNA extraction; PCR for DNA barcoding; gel electrophoresis and gel staining; DNA sequencing; Blast search with database; and data alignment; phylogenetic tree construction; species identification

(In Thai) ดีเอ็นเอบาร์โค้ด การสกัดดีเอ็นเอ เทคนิคพีซีอาร์สำหรับดีเอ็นเอบาร์โค้ด เทคนิคการแยกดีเอ็นเอและการย้อมสีเจล การค้นหาความเหมือนหรือแตกต่างของลำดับดีเอ็นเอบาร์โค้ดกับฐานข้อมูล การจัดเรียงลำดับข้อมูล การสร้างแผนภูมิต้นไม้ การจำแนกชนิดและการระบุปีชีส์ของสิ่งมีชีวิต

Course Schedule:

(Classroom XXX and Lab Classroom XXX)

	Activities	Description	Time	Instructors and Assistants
Monday, XXX XX, 20XX				
1	Lecture: Basic genetic and DNA barcoding	Course introduction Lecture: Basic genetic and DNA barcoding	9.00 – 10.30	SS/KT/NS/PT
2	Lecture: DNA extraction	Lecture: Principle of DNA extraction	10.30-12.00	
3	Lab: DNA extraction	To extract the DNA		
4	Lecture: DNA quality and quantity	Lecture: Principle of DNA quality and quantity	13.00-16.00	
5	Lab: Measuring of DNA quality and quantity	To determine the DNA quality and quantity		
Tuesday, XXX XX, 20XX				
1	Lecture: Principle of Polymerase chain reaction (PCR)	Lecture: Polymerase chain reaction (PCR)	9.00-11.00	SS/KT/NS/PT
2	Lab: Setting up PCR	To set PCR reaction using primers for DNA barcoding		
3	Lecture: Principle of gel electrophoresis	Lecture: Gel electrophoresis	11.00-12.00	
4	Lab: Gel electrophoresis	To check PCR products	13.00-14.00	
5	Lecture: Principle of DNA staining	Lecture: DNA staining	14.00-16.00	
6	Lab: DNA staining	To stain DNA pattern		
Wednesday, XXX XX, 20XX				

1	Lecture: DNA sequencing and DNA barcoding data analysis	Lecture: DNA sequencing and DNA barcoding data analysis	9.00 – 12.00	SS/KT/NS/PT
2	Lab: DNA barcoding data analysis	To do blast search and data alignment		
3	Lab: Phylogenetic tree analysis	To construct phylogenetic tree	13.00 – 15.00	
4	Lab: Practice on identification of unknown species	To practice on identification of unknown species with DNA database		
5	Discussion and Summary	Discussion and Summary	15.00 – 16.00	
Thursday, XXX XX, 20XX				
1	Student's Reflection	To provide students opportunities to describe their learning experiences received from this course and how it can be applied to their future learning.	9:00 – 12:00	SS/KT/NS/PT
2	After Action Review	To collect comments, suggestions from students for further improvements of the course.		

Assessment Criteria:

Assessment method		Performance criteria	Scoring rubric
1	Class attendance & participation (10%)	Attendance and punctuality (5%)	Punctually (4) Seldom late (2-3) Moderately late (1) Frequently late or absent without notification (0)

			*Attending the class after 5 minutes is determined late
		Participation (5%)	Frequently participates (4) Moderately participates (2-3) Seldom participates (1) Never participates (0)
2	Assignment (15%)	Punctual assignment submission (1%)	On-time (4) 1 day late (3) 2 days late (2) 3 days late (1) 4 days late or later (0)
		Organization (2%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Content accuracy (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Supporting evidence (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Grammar and originality (2%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
3	Discussion (15%)	Participation and performance (2%)	Active (4) Fairly active (2-3) Inactive (1)
		Professional and interpersonal skills (responsibility,	Excellent (4) Above average (3) Average (2)

		teamwork, and leadership) (5%)	Needs improvement (1)
		Creative and high-order thinking skills (8%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
4	Lab performance (20%)	Safety practice (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Lab plan (preparation and readiness) (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Lab skills (10%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Time management (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Troubleshooting skills (5%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
5	Lab report (10%)	Punctual submission (2%)	On-time (4) 1 day late (3) 2 days late (2) 3 days late (1) 4 days late or later (0)
		Report organization: intro, methods,	Excellent (4) Above average (3)

		results, discussion and conclusion (10%)	Average (2) Needs improvement (1)
		Data presentation, analysis and interpretation (15%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
		Grammar and originality (3%)	Excellent (4) Above average (3) Average (2) Needs improvement (1)
6	Assignment (30%)		Excellent (4) Above average (3) Average (2) Needs improvement (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: XXX 20XX