COURSE SPECIFICATION

Name of institution Mahidol University International College
Mahidol University
Campus/faculty/department Science Division

Section 1 General Information

Course code and course title

Thai ICBI 211
พันธุศาสตร์และชีววิทยาระดับโมเลกุล ๑

English ICBI 211 Genetics and Molecular Biology I

Number of credit 4 (4-0-8)
(Lecture hours – Laboratory hours - Self study hours/ week)

Curriculum and type of subject

3.1 Curriculum Bachelor of Science in Biological Science
3.2 Type of Subject Required course

4. Course Coordinator and Course Lecturer

4.1 Course Coordinator Asst. Prof. Patsarin Wongkamhaeng, Ph.D.
4.2 Course Lecturer Dr. Kwanchanit Tantivejkul, Ph.D.
Asst. Prof. Patsarin Wongkamhaeng, Ph.D.

5. Trimester/ Year of Study

5.1 Trimester 1 / Year 3 & Year 4
5.2 Course Capacity Approximately 30 students

6. Pre-requisite ICBI 101 Biology

7. Co-requisites N/A

8. Venue of Study Mahidol University International College

9. Date of Latest Revision

Date 5 Month April Year 2018

Section 2 Goals and Objectives

Course Goal

Upon successful completion of this course, students should be able to comprehend the basic principles and concepts of Genetics and Molecular biology.

Objectives of course development/revision

2.1 Course Objective

2.1.1 Describe the principle of Mendelian Genetics and Chromosome theory of inheritance

2.1.2 Describe the processes of Mitosis, Meiosis and DNA mutations

2.1.3 Explain different biological processes at the molecular level, focusing on the Central Dogma.

2.1.4 Comprehend qualitative and quantitative data

2.1.5 Conclude and interpret scientific data

2.2 Course-level Learning Outcome: CLOs

By the end of the course, students will be able to

CLO1 Possess knowledge in Genetics and Molecular biology (1.1)

CLO2 Comprehend qualitative and quantitative data (2.1)

CLO3 Draw meaningful conclusion from the scientific data/ materials (2.2)

CLO4 Demonstrate proficient in oral communication (3.1)

CLO5 Demonstrate proficient in written communication (3.2)

CLO6 Demonstrate accountability and responsibility (4.2)

Section 3 Course Management

Course description

An introductory course to Genetics and Molecular biology, that focuses on genes/chromosome as inheritable elements, processes of Mitosis and Meiosis, DNA mutations, Mendelian Genetics and Central Dogma.

คอร์สเริ่มต้นที่อธิบายถึง
หลักการถ่ายทอดกรรมพันธุ์ทางโครโมโซมและสารพันธุกรรมดีเอ็นเอ
กระบวนการของการแบ่งตัวของเซลล์แบบไมโทซิสและไมโอซิส
ความผิดปกติของดีเอ็นเอ พันธุศาสตร์ของเมนเดล และเซนทรัลด็อกม่า

Credit hours / trimester

Lecture (Hour)	Additional class (Hour)	Laboratory/field trip/internship (Hour)	Self study (Hour)
48 (4x12 weeks)	-	-	96 (8x12 weeks)

1.
3.
3.

Number of hours that the lecturer provides individual counseling and guidance

4 hours per week at 1 hour per day available at fixed schedule; and if required, students may schedule an appointment with the lecturer or walk in during office hours.

Section 4 Development of Students' Learning Outcome

1. Short summary on the knowledge or skills that the course intends to develop in students (CLOs)

By the end of the course, students will be able to

CLO1 Possess knowledge in Genetics and Molecular biology (1.1)

CLO2 Comprehend qualitative and quantitative data (2.1)

CLO3 Draw meaningful conclusion from the scientific data/ materials (2.2)

CLO4 Demonstrate proficient in oral communication (3.1)

CLO5 Demonstrate proficient in written communication (3.2)

CLO6 Demonstrate accountability and responsibility (4.2)

2. Teaching methods for developing the knowledge or skills specified in item 1 and evaluation methods of the course learning outcomes

ICBI211	Teaching methods	Evaluation Methods
CLO1	Lecture, discussions,	Quizzes, Assignments, examinations
CLO2	Lecture, discussions,	Quizzes, Assignments, examinations
CLO3	Lecture, discussions,	Quizzes, Assignments, examinations
CLO4	Discussions	Presentation
CLO5	Lecture, discussions,	Quizzes, Assignments, examinations
CLO6	Lecture, discussions,	Quizzes, Assignments, examinations

Section 5 Teaching and Evaluation Plans

1. Teaching plan

Class	Topic/Activity	Number of Hours		Teaching Methods	Course Lecturer
		Lecture	Laboratory		
1	Introduction to genetics and Medelian genetics	4	-	lecture	Kwanchanit Tantivejkul
2	Mitosis and Meiosis	4	-	lecture	
3	Chromosome theory of inheritance, Gene linkage and recombination	4	-	lecture	
4	DNA structure replication and recombination,	4	-	lecture	
5	DNA mutations	4	-	lecture	
6	Eukaryotic chromosome and Chromosomal rearrangements	4	-	lecture	
	Midterm examination				
7	The flow of genetics: Central dogma, Bacterial transcription: process	4	-	lecture, Discussion	Patsarin Wongkamhang
8	Bacterial transcription: regulation and shift in transcription	4	-	lecture, Discussion	
9	Eukaryotic transcription	4	-	lecture, Discussion	
10	Eukaryotic mRNA processing	4	-	lecture, Discussion	
11	Translation	4	-	lecture, Discussion	
12	Transposons and plant evolution, Genetics manipulation	4	-	class discussion	
	Final Examination				
Total					Lecture 48 hours Laboratory …. hours Self-study 96 hours

2. Plan for Assessing Course Learning Outcomes

2.1 Assessing and Evaluating Learning Achievement

a. Formative Assessment

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1 Possess knowledge in Genetics and Molecular biology	Quiz	20
CLO2 Comprehend qualitative, quantitative data	Quiz,	
CLO3 Draw meaningful conclusions from the scientific data	Quiz, Class assignments (presentations and discussions)	10
CLO4 Demonstrate proficient in oral communication	Class assignments (presentations and discussions)	
CLO6 Demonstrate accountability and responsibility	Quiz, Class assignments (presentations and discussions)	
Total		30

b. Summative Assessment (Midterm 30% and Final examinations 30%)

(1) Tools and Percentage Weight in Assessment and Evaluation

Learning Outcomes	Assessment Methods	Assessment Ratio (Percentage)
CLO1 Possess knowledge in Genetics and Molecular biology	Written Examination – MCQ, short responses & essays	40
CLO2 Comprehend qualitative, quantitative data and/or ideas	Written Examination – MCQ, short responses & essays	15
CLO3 Draw meaningful conclusions from the scientific data	Written Examination – MCQ, short responses & essays	15%
CLO5 Demonstrate proficient in written communication	Written Examination – MCQ, short responses	

	& essays	
Total		70

(2) Grading System

Grade	Achievement	Final Score (% range)	GPA
A	Excellent	90-100	4.0
B+	Very good	85-89	3.5
B	Good	80-84	3.0
C+	Fairly good	75-79	2.5
C	Fair	70-74	2.0
D+	Poor	65-69	1.5
D	Very poor	60-64	1.0
F	Fail	Less than 60	0.0

(3) Re-examination (If course lecturer allows to have re-examination)
N/A - (Not applicable with MUIC

3. Student Appeals According to MU rule and regulation

Section 6 Teaching Materials and Resources

Texts and main documents

Leland H. Hartwell, Leroy Hood, Michael L. Goldberg, Ann E. Reynolds, Lee M. Silver: Genetics: From Genes to Genomes 4th Edition. International Student Edition. (McGraw-Hill, New York, 2011)

Weaver, Robert F. 2008. *Molecular Biology*. 4th edition. McGraw-Hill.

Documents and important information

Damon Lisch 2013. How important are transposons for plant evolution? Nature Rev. 14:49

Sharma et al. 2010. Transcriptional switching in *Escherichia coli* during stress and starvation by modulation of sigma 70 activity. FEMS Microbiol. Rev. 34:646.

Documents and recommended information

Damon Lisch 2009. Epigenetic regulation of transposable elements in plants. Annu. Rev. Plant Biol. 60:43

Section 7 Evaluation and Improvement of Course Management

1. Strategies for evaluating course effectiveness by students

    1.1 Student feedback of instructors, teaching methods and materials, and course content through MUIC student evaluation forms

2. Strategies for evaluating teaching methods

    2.1 Evaluation of effectiveness based on student evaluation scores and comments

    2.2 Evaluation through peer observations by co-instructor or other Division faculty

3. Improvement of teaching methods

    3.1 Adjustments based on student feedback, personal observations, comments from peer observations and discussions with supervisor and/or other Division faculty in one-on-one and/or group meetings as specified by MUIC guidelines

4. Verification process for evaluating students' standard achievement outcomes in the course

    4.1 Verification through student performance on assessments based on MUIC/Division standards

5. Review and plan for improving the effectiveness of the course

    5.1 Course instructors (and coordinator/supervisor) will meet to discuss results of student evaluations and student performance based on learning outcomes in order to identify point for improvement

    5.2 Strategy for improvement set according to MUIC/Division guidelines

Appendix

Alignment between Courses and Program

Table 1 The relationship between course and Program Learning Outcomes (PLOs)

Course Name Molecular biology	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
ICBI 211	R	R	R	R		

Note: Indicate the level of CLOs by letter I, R, P or M. Using the information as shown in the Curriculum Mapping of TQF2

Table 2 The relationship between CLOs and PLOs

(Course code) ICBI 211	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Possess knowledge in Genetics and Molecular biology	1.1					
CLO2 Comprehend qualitative, quantitative data and/or ideas		2.1				
CLO3 Draw meaningful conclusions from the scientific data		2.2				
CLO4 Demonstrate proficiency in oral communication			3.1			
CLO5 Demonstrate proficient in written communication			3.2			
CLO6 Demonstrate accountability and responsibility				4.2		

Table 3 The description of PLOs and Sub Los of the course

PLOs	SubPLOs (CLOs)
PLO1 Apply discipline-specific knowledge and technical skills in biological sciences	1.1 Possess knowledge in Molecular biology
PLO2 Appraise scientific information critically	2.1 Comprehend qualitative, quantitative data and/or ideas
	2.2 Draw meaningful conclusion from the scientific data/materials
PLO3 Demonstrate proficiency in oral and written communication of scientific concepts	3.1 Demonstrate proficiency in oral communication
	3.2 Demonstrate proficiency in written communication
PLO4 Apply scientific integrity and professionalism	4.2 Demonstrate accountability and responsibility