COURSE SPECIFICATION

Name of institution Mahidol University International College
Mahidol University

Campus/faculty/department Science Division

Section 1 General Information

1. Course code and course title

Thai	ICBI 401	พันธุศาสตร์และชีววิทยาระดับโมเลกุล ๒
English	ICBI 401	Genetics and Molecular Biology II

2. Number of credit 4 (4-0-8)

(Lecture hours – Laboratory hours - Self study hours/ week)

3. 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. (PW)

4.2 Course Lecturer Dr. Kwanchanit Tantivejkul, Ph.D. (KT)
Asst. Prof. Patsarin Wongkamhaeng, Ph.D. (PW)

5. Trimester/ Year of Study

5.1 Trimester 1 / Year 3 & Year 4

5.2 Course Capacity Approximately 30 students

6. Pre-requisite ICBI 211 Genetics and Molecular Biology I

7. Co-requisites -

8. Venue of Study Mahidol University International College

9. Date of Latest Revision

Date 20 Month August Year 2020

Section 2 Goals and Objectives

1. Course Goal

Upon successful completion of this course, students should be able to comprehend techniques used to study genomes, genes and proteins, and understand the genetic basis of complex traits and diseases.

2. Objectives of course development/revision

2.1 Course Objective

2.1.1 Explain the genetic basis of cancer development

2.1.2 Explain the genetics of complex traits

2.1.3 Describe the basic molecular techniques used to study genomes, genes and proteins

2.1.4 Exercise' intellectual curiosity, critical thinking and independent learning

2.2 Course-level Learning Outcome: CLOs

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

1. CLO1 Possess knowledge in Genetics and Molecular Biology (1.1)
2. CLO2 Apply knowledge in Genetics and Molecular Biology (1.2)
3. CLO3 Comprehend qualitative and quantitative data/ideas (2.1)
4. CLO4 Draw meaningful conclusion from the scientific data/materials (2.2)
5. CLO5 Retrieve relevant scientific information independently (2.3)
6. CLO6 Demonstrate proficiency oral communication (3.1)
7. CLO7 Demonstrate proficiency written communication (3.2)
8. CLO8 Demonstrate accountability ad responsibility (4.2)
9. CLO9 Independently complete in-class assignment (4.3)
10. CLO10 Able to formulate lines of enquiry that drive problem solving (6.1)

Section 3 Course Management

1. Course description

A higher course in genetics and Molecular Biology that talks about Genome analysis, Organelle genetics, Genetic analysis of development, Cancer genetics, Variation and Complex traits, Molecular cloning and tools, Genomics-Proteomics-Bioinformatics. Students are also expected to carry out an independent mini project in Bioinformatics.

คอร์สชั้นสูงของพันธุศาสตร์และชีววิทยาระดับโมเลกุลที่พูดถึงการวิเคราะห์จีโนม พันธุศาสตร์ของอวัยวะเซลล์ การเจริญเติบโต มะเร็ง ความหลากหลายทางพันธุกรรม ลักษณะที่ซับซ้อน การโคลนดีเอ็นเอ เครื่องมือและเทคนิคทางชีววิทยาระดับโมเลกุล จีโนม-โปรตีน-ชีวสารสนเทศศาสตร์ นักศึกษาต้องทำโปรเจ็คเล็กๆเกียวกับชีวสารสนเทศศาสตร์

2. Credit hours / trimester

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

3.

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

1. CLO1 Possess knowledge in Genetics and Molecular Biology (1.1)
2. CLO2 Apply knowledge in Genetics and Molecular Biology (1.2)
3. CLO3 Comprehend qualitative and quantitative data/ideas (2.1)
4. CLO4 Draw meaningful conclusion from the scientific data/materials (2.2)
5. CLO5 Retrieve relevant scientific information independently (2.3)
6. CLO6 Demonstrate proficiency oral communication (3.1)
7. CLO7 Demonstrate proficiency written communication (3.2)
8. CLO8 Demonstrate accountability and responsibility (4.2)
9. CLO9 Independently complete in-class assignment (4.3)
10. CLO10 Able to formulate lines of enquiry that drive problem solving (6.1)

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, workshop	Quizzes, Assignments, examinations
CLO3	Lecture, discussions	Quizzes, Assignments, examinations
CLO4	Lecture, discussions	Quizzes, Assignments, examinations
CLO5	Lecture, discussions	Project
CLO6	Lecture, discussions	Presentation
CLO7	Lecture, discussions	written examinations
CLO8	Lecture, discussions	Quizzes, Assignments, examinations
CLO9	Lecture, discussions	Assignments

CLO10	Lecture, discussions	Project

Section 5 Teaching and Evaluation Plans

1. Teaching plan

Class	Topic/Details	Number of hours		On-line Sessions	On-Campus	Instructors	Note
		In-Class sessions	Lab sessions				
1	Introduction to Molecular biology	2	-		x	Patsarin Wongkamhang	8-9-2020
2	DNA Cloning I	2	-		x	Patsarin Wongkamhang	10-9-2020
3	DNA Cloning II	2	-		x	Patsarin Wongkamhang	15-9-2020
4	Cloning exercise	2	-		x	Patsarin Wongkamhang	17-9-2020
5	Cloning presentation (5%)	2	-		x	Patsarin Wongkamhang	22-9-2020
6	Molecular tools I	2	-		x	Patsarin Wongkamhang	24-9-2020
7	Molecular tools II	2	-		x	Patsarin Wongkamhang	29-9-2020
8	Molecular tools exercise and presentation (5%)	2	-		x	Patsarin Wongkamhang	1-10-2020
9	Omics	2	-		x	Patsarin Wongkamhang	6-10-2020

Class	Topic/Details	Number of hours		On-line Sessions	On-Campus	Instructors	Note
10	Recent molecular biology techniques	2	-		x	Patsarin Wongkamhang	8-10-2020
	HOLIDAY						13-10-2020
11	**Midterm**				x		15-10-2020
12	The Human Genome Project	2	-	x		Kwanchanit Tantivejkul	20-10-2020
13	Chapter 12: Eukaryotic Chromosome	2	-	x		Kwanchanit Tantivejkul	22-10-2020
14	Chapter 13: Chromosome Rearrangements	2	-	x		Kwanchanit Tantivejkul	27-10-2020
15	Chapters 15: Organellar Inheritance	2	-	x	x	Kwanchanit Tantivejkul	29-10-2020
16	Quiz #1; Chapter 14: Bacterial Genetics	2	-	x		Kwanchanit Tantivejkul	3-11-2020
17	Chapter 16: Gene Regulation in Prokaryotes	2	-	x		Kwanchanit Tantivejkul	5-11-2020
18	Chapter 17: Gene Regulation in Eukaryotes	2	-	x		Kwanchanit Tantivejkul	10-11-2020
19	Chapter 20: Understanding Cancer	2	-	x	x	Kwanchanit Tantivejkul	12-11-2020
20	Quiz #2	2	-	x		Kwanchanit Tantivejkul	17-11-2020
21	Chapter 18: Manipulating the Genomes	2	-	x		Kwanchanit Tantivejkul	19-11-2020
22	Chapter 19: Developmental Genetics	2	-	x		Patsarin Wongkamhang	24-11-2020
23	Current events discussion and review session	2	-	x	x	Patsarin Wongkamhang	26-11-2020
24	**Final examination**				x		

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	10%
CLO2 Apply knowledge in Genetics and Molecular Biology	assignment/presentation/ Team-based learning	20
CLO3 Comprehend qualitative, quantitative data	assignment/presentation	
CLO4 Draw meaningful conclusions from the scientific data	assignment/presentation	
CLO5 Retrieve relevant scientific information independently	assignment/presentation	
CLO6 Demonstrate proficient in oral communication	Presentation	
CLO8 Demonstrate accountability and responsibility	assignment/class attendance	
CLO9 Independently complete in-class assignment	in-class Assignment	10
CLO10 Able to formulate lines of enquiry that drive problem solving	Team-based learning	10
Total		50

b. Summative Assessment (Midterm 30% and Final examinations 20%)

(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	10

CLO2 Apply knowledge in Genetics and Molecular Biology	Written Examination – MCQ, short responses & essays	10
CLO3 Comprehend qualitative, quantitative data	Written Examination – MCQ, short responses & essays	10
CLO4 Draw meaningful conclusions from the scientific data	Written Examination – MCQ, short responses & essays	10
CLO7 Demonstrate proficient in written communication	Written Examination – MCQ, short responses & essays	10
Total		50

(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

1. 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)

Joseph Sambrook, David William Russell. Molecular Cloning: A laboratory manual (2001)

2. Documents and important information

Ariel et al. 2003. Genome-based bioinformatic selection of chromosomal *Bacillus anthracis* putative vaccine candidate coupled with proteomic identification of surface-associated antigens. Infection and Immunity 71:4563.

Rodpothong P and Auewarakul P. 2012. Positive selection sites in the surface genes of dengue virus. Virus Genes44: 408-414

3. Documents and recommended information

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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 401	R	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 401	Program Learning Outcomes (PLOs)					
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6
CLO1 Possess knowledge in Genetics and Molecular biology	1.1					
CLO2 Apply knowledge in Genetics and Molecular Biology	1.2					
CLO3 Comprehend qualitative, quantitative data		2.1				
CLO4 Draw meaningful conclusions from the scientific data		2.2				
CLO5 Retrieve relevant scientific information independently		2.3				
CLO6 Demonstrate proficient in oral communication			3.1			
CLO7 Demonstrate proficient in written communication			3.2			
CLO8 Demonstrate accountability and responsibility				4.2		

CLO9 Independently complete in-class assignment				4.3		
CLO10 Able to formulate lines of enquiry that drive problem solving						6.1

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
	1.2 Apply knowledge in Genetics and 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
	2.3 Retrieve relevant scientific information independently
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
	4.3 Independently complete in-class assignment
PLO6 Able to integrate different discipline to formulate solutions for novel situation	6.1 Able to formulate lines of enquiry that drive problem solving