

**Course Syllabus**  
**MBSB 505 Molecular Diagnosis and Therapy**  
**Academic Year 2023**

**Course ID and name:** MBSB 505 Molecular Diagnosis and Therapy  
**Course coordinator:** Assistant Professor Dr. Alisa Tubsuwan  
(Email: alisa.tub@mahidol.ac.th) and Assistant Professor Dr. Sirirat Kumarn (Email: sirirat.kum@mahidol.ac.th)

**Instructors:**

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|---|---|
| 1. Assoc. Prof. Dr. Panat Anuracpreeda  | 8. Dr. Kittiphong Paiboonsukwong            |
| 2. Assoc. Prof. Dr. Natini Jinawat      | 9. Asst. Prof. Dr. Natee Jearawiriyapaisarn |
| 3. Asst. Prof. Dr. Alisa Tubsuwan       | 10. Asst. Prof. Dr. Phatchariya Phannasil   |
| 4. Asst. Prof. Dr. Duangrudee Tanramluk | 11. Dr. Promsin Masrinoul                   |
| 5. Asst. Prof. Dr. Narisorn Kitiyanant  | 12. Asst. Prof. Dr. Sirirat Kumarn          |
| 6. Dr. Chutima Thepparit                | 13. Asst. Prof. Dr Alita Kongchanagul       |
| 7. Dr. Duangnapa Kovanich               |   |

**Credits:** 3 (3-0-6)  
**Curriculum:** Doctor of Philosophy Program in Systems Biosciences (Required course)  
**Semester offering:** Second semester  
**Prerequisite:** None  
**Course level:** Advanced

**Course Description:**

Molecular diagnosis, molecular diagnostic techniques; DNA-based diagnosis; RNA-based diagnosis; protein-based diagnosis; applications of molecular techniques for prenatal diagnosis; paternity testing; forensic medicine; molecular therapy; drug delivery; nucleic acid-based therapy, gene therapy, and genome editing technology; protein-based therapy; cell-based therapy

**Course Learning Outcomes (CLOs)**

Upon completion of this course, students are able to:

1. Identify the role and importance of molecular diagnostics in genetic and acquired diseases
2. Demonstrate knowledge and principle in molecular techniques for diagnosis and monitoring of genetic and acquired diseases
3. Identify limitation in molecular diagnostics strategy and ethical issue in molecular diagnostics strategy
4. Apply knowledge in molecular techniques for development of diagnostic kit based on patients and disease specific information and parameters
5. Demonstrate knowledge in molecular therapeutic strategies such as nucleic acid-based therapy, protein-based therapy, gene and cell therapy
6. Apply their knowledge in molecular therapeutic strategies to develop molecular therapeutics based on patient- and disease-specific information and parameters

### Constructive Alignment of Course Content to CLOs and Program ELOs

Lecture No.	Topic	CLOs	Program ELOs
1	Introduction to molecular diagnosis	1	1, 2
2	DNA-based diagnosis	1-3	1, 2
3	Nucleic acid detection with CRISPR-Cas 13a/12a	1-3	1, 2
4	RNA-based diagnosis	1-3	1, 2
5	Protein-based diagnosis	1-3	1, 2
6	Application of molecular techniques for prenatal diagnosis, paternity testing, forensic medicine	1-3	1,2
7	Group activities: Development of new diagnostic kits	1-4	1-8
8	Introduction to molecular therapy	5	1, 2
9	Drug development	5	1, 2
10	Drug delivery systems and targeted delivery	5	1, 2
11	Nucleic acid-based therapy	5	1, 2
12	Gene therapy	5	1, 2
13	Genome editing technology	5	1, 2
14	Protein-based therapy	5	1, 2
15	Cell-based therapy	5	1, 2
16	Group activities: Development of new molecular therapy	5-6	1-8

## Course Schedule 2023

Date	Time	Lecture No.	Topic	Teaching & Learning Strategy	Assessment	Instructor
14-Sep	13.00-13.20	1	Course orientation		-	Alisa and Sirirat
14-Sep	13.30-16.30	2	Introduction to molecular diagnosis	Lecture	Behavior in class, written examination	Kittiphong
18-Sep	13.00-15.00	3	DNA-based diagnosis	Lecture	Behavior in class, written examination	Nathini
18-Sep	15.00-16.00		Nucleic detection with CRISPR-Cas 13a/Cas12a	Lecture	Behavior in class, assignment	Alisa
21-Sep	13.00-16.00	4	RNA-based diagnosis	Lecture and group discussion	Behavior in class, written examination	Phatchariya
25-Sep	13.00-15.00	5	Protein-based diagnosis-antibody	Lecture	Behavior in class, written examination	Panat
28-Sep	13.00-15.00	5	Protein-based diagnosis - chromatography	Lecture	Behavior in class, written examination	Duangnapa
02-Oct	13.00-16.00		ExamI (Unit 1-5)			All staff
05-Oct	13.00-16.00	6	Application of molecular techniques for prenatal diagnosis, paternity testing, and forensic medicine	Lecture	Behavior in class, written examination	Kittiphong
09-Oct	13.00-16.00	7	Group activities: development of new diagnostic kits	Group activity, problem-based learning, presentation	Behavior in class, performance, and participation in class activities, assessment of presentation	All staff
12-Oct	13.00-16.00	8	Introduction to molecular therapy	Lecture	Behavior in class, assignment	Alisa
16-Oct	13.00-16.00	9	Drug delivery I	Lecture	Behavior in class, written examination	Sirirat

<b>Date</b>	<b>Time</b>	<b>Lecture No.</b>	<b>Topic</b>	<b>Teaching &amp; Learning Strategy</b>	<b>Assessment</b>	<b>Instructor</b>
19-Oct	13.00-16.00	10	Drug delivery II	Lecture	Behavior in class, written examination	Sirirat
26-Oct	13.00-16.00		ExamII (unit 6-10)			All staff
30-Oct	13.00-16.00	11	Nucleic acid-based therapy	Lecture and group discussion	Behavior in class, assignment	Natee
02-Nov	13.00-16.00	12	Genome editing technology	Lecture and group discussion	Behavior in class, assignment	Alisa
06-Nov	13.00-16.00	13	Protein-based therapy-antibody	Lecture	Behavior in class, written examination	Panat
09-Nov	13.00-15.00	14	Protein-based therapy-vaccine	Lecture	Behavior in class, assignment	Chutima
13-Nov	13.00-16.00	15	Cell-based therapy	Lecture and group discussion	Behavior in class, assignment	Narisorn
20-Nov	13.00-16.00		ExamIII (unit 11-15)			All staff
27-Nov	13.00-16.00	16	Group activities: Development of new molecular therapy	Group activity, problem-based learning, presentation	Behavior in class, performance, and participation in class activities, assessment of presentation	All staff

### **Assignments**

- 1) Assignment from instructors
- 2) Group activity

## Assessment Criteria

Assessment Criteria	Assessment Method	Scoring Rubric
Written examination/ Assignment (60%)	1) Take-home assignments 2) Written Exam	1) Punctual assignment submission 2) Content accuracy
Attendance/participation (10%)	1) Direct observation 2) Group activities and discussion	1) Attendance and punctuality 2) Participation 3) Distracting behaviors 4) General attitude towards learning
Group activity and presentation (30%)	1) Presentations 2) Group discussion	1) Content 2) Organization 3) Understanding of scientific content 4) Presentation style 5) Question handling 6) Shark's score 7) Product 8) Informative 9) Time management

Students must receive a score of 60% or more to pass the course. Student's achievement will be graded using symbols: A, B+, B, C+, C and F based on the following criteria;

Percentage	Grade	Description
≥ 80%	A	Excellent
75-79.99%	B <sup>+</sup>	Good
70-74.99%	B	Fairly good
65-69.99%	C <sup>+</sup>	Fair
60-64.99%	C	Poor
< 60%	F	Fail

However, a final grade will be adjusted based on frequency distribution of student's scores from the whole course.

## Appeal Procedure

Should the students have any appeal regarding the assessments or grade, inquiry can be made to the instructors and/or the course coordinator immediately either by direct contact, telephone or email.

**Course Reading Materials**

A series of textbooks, online resources and appropriate journal articles will be introduced throughout the course by the instructors. These materials may be found on the google classroom.

**General Inquiry**

Ms. Siriporn Monkasemsiri [siriporn.mon@mahidol.edu](mailto:siriporn.mon@mahidol.edu); Tel. 02-441-9003-7 ext. 1314

**Date revised:** August 18, 2023