

Course Syllabus
MBSB 502 Applied Systems Biosciences
Academic Year 2021

Course ID and name: MBSB 502 Applied Systems Biosciences
Course coordinator: Dr. Duangnapa Kovanich
Email: duangnapa.kov@mahidol.ac.th

Instructors:

- | | |
|---|----------------------------------|
| 1. Assoc. Prof. Panat Anuracpreeda | 10. Dr.Kittiphong Paiboonsukwong |
| 2. Asst. Prof. Alisa Tubsuwan | 11. Dr.Natee Jearawiriyapaisarn |
| 3. Asst. Prof. Boonsit Yimwadsana | 12. Dr.Phatchariya Phannasil |
| 4. Asst. Prof. Duangrudee Tanramluk | 13. Dr.Poochit Nonejuie |
| 5. Asst. Prof. Narisorn Kitiyanant | 14. Dr.Promsin Masrinoul |
| 6. Asst. Prof. Patompon Wongtrakoongate | 15. Dr.Sirirat Kumarn |
| 7. Dr.Alita Kongchanagul | |
| 8. Dr.Chutima Thepparit | |
| 9. Dr.Duangnapa Kovanich | |

Credits: 3 (3-0-6)

Curriculum: Doctor of Philosophy Program in Systems Biosciences (Required course)

Semester offering: First semester

Prerequisite: None

Course level: Advanced

Course Description:

Stem cells and organogenesis, gene regulatory networks in stem cells, Omics studies in Thalassemia, cancer, microbiome, host-pathogen interactions, immune system and responses to infection, current topics on immune response to infection, vaccine strategies, innovation in vaccine research, overview of drug discovery and development and case studies, systems biosciences approach in drug discovery and development, structural bioinformatics for drug discovery, computer applications for systems bioscience.

Course Learning Outcomes (CLOs)

Upon completion of this course, students are able to:

1. Explain content knowledge and core principles in systems biosciences
2. Obtain critical information from systems-biosciences experimental examples since the level of molecules to cells, tissues, and organs
3. Apply the obtained knowledge with integration of genomics, transcriptomics, proteomics, and metabolomics to construct analytical framework for systems-biosciences research

Constructive Alignment of Course Content to CLOs and Program ELOs

Lecture No.	Topic	CLOs	Program ELOs
1	Stem cells I	1,2	1-2
2	Epigenetics in stem cell biology	1,2	1-2
3	Stem cells II	1,2	1-2
4	Research highlight in the topic of stem cells	2,3	1-4, 6-8
5	Microbiome	1,2	1-2
6	Cancer	1,2	1-2
7	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy I	1,2	1-3
8	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy II	1,2	1-3
9	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy III	1,2	1-3
10	Immune system I	1,2	1-2
11	Immune system II	1,2	1-2
12	Host-pathogen interactions	1,2	1-2
13	General vaccinology	1,2	1-2
14	Innovations in vaccine research	1,2	1-3
15	Research highlight in the topic of vaccine developments	2,3	1-4, 6-8
16	Drug discovery I	1	1-2
17	Drug discovery II	1	1-2
18	Protein database and protein visualization	1	1-2
19	Computer Applications for Systems Biosciences	1	1-2
20	Structural Bioinformatics and Drug Discovery	1	1-2

Course Schedule 2021

Tuesday and Thursday, Time 9:00-12:00, Room A407

Date	Lecture No.	Topic	Teaching & Learning Strategy	Assessment	Instructor
	1	Stem cells I	Interactive lecture	Assignment	Narisorn
	2	Epigenetics in stem cell biology	Interactive lecture	Assignment	Patompon
	3	Stem cells II	Interactive lecture	Assignment	Alisa
	4	Research highlight in the topic of stem cells	Presentation, group discussion	Performance assessment using rubrics, Q&A	All
	5	Microbiome	Interactive lecture	Assignment	Poochit
	6	Cancer	Interactive lecture	Assignment	Phatchariya
	7	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy I	Interactive lecture	Assignment	Kittipong
	8	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy II	Interactive lecture	Assignment	Natee
	9	Omics studies in Thalassemia: from phenotypes and genotypes towards therapy III	Interactive lecture	Assignment	Kittipong
	10	Immune system I	Interactive lecture	Assignment	Alita
	11	Immune system II	Interactive lecture	Assignment	Alita
	12	Host-pathogen interactions	Interactive lecture	Assignment	Panat
	13	General vaccinology	Interactive lecture	Assignment	Promsin
	14	Innovations in vaccine research	Interactive lecture	Assignment	Promsin
	15	Research highlight in the topic of vaccine developments	Presentation, group discussion	Performance assessment using rubrics, Q&A	All

	16	Drug discovery I	Interactive lecture	Assignment	Sirirat
	17	Drug discovery II	Interactive lecture	Assignment	Sirirat
	18	Protein database and protein visualization	Interactive lecture and practicals	Assignment	Duangrudee
	19	Computer Applications for Systems Biosciences	Interactive lecture and practicals	Assignment	Boonsit
	20	Structural Bioinformatics and Drug Discovery	Interactive lecture and practicals	Assignment	Duangrudee

Assignments

1. Reading, practical or problem-solving assignments from instructors
2. Paper discussions

Assessment Criteria

Assessment Criteria	Assessment Method	Scoring Rubric
Assignment/Exam (60%)	1) Take-home assignments	1) Punctual assignment submission 2) Creativity 3) Sequencing of information 4) Content accuracy 5) Supporting evidences 6) Grammar and originality
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
Presentation (30%)	1) Presentations 2) Group discussion	1) Organization 2) Content 3) Subject knowledge/ answering questions 4) Presentation style

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 ⁺	Good
70-74.99%	B	Fairly good
65-69.99%	C ⁺	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; Tel. 02-441-9003-7 ext. 1314

Date revised: October 10, 2021