

Course Syllabus
MBNS757 Drug Development for Neurological Diseases
Academic Year 2022-2

Course ID and Name: MBNS757 Drug Development for Neurological Diseases

Course Coordinator: Jiraporn Panmanee, Ph.D.

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Instructors:

1. Prof. Banthit Chetsawang
2. Assoc. Prof. Nuanchan Chutabhakdikul
3. Assoc. Prof. Vorasith Siripornpanich
4. Assoc. Prof. Sujira Mukda
5. Asst. Prof. Sukonthar Ngampramuan
6. Asst. Prof. Sitthivut Charoensutthivarakul
7. Asst. Prof. Matthew Phanchana
8. Dr. Ittipat Meewan
9. Dr. Jiraporn Panmanee
10. Dr. Nopphon Petchyam
11. Dr. Phorutai Pearngam
12. Guest lecturer from Vanderbilt University School of Medicine

Supporting Staff:

1. Ms. Somsong Phengsukdaeng
2. Ms. Sasithorn Prommet
3. Ms. Kanda Putthaphongphuek
4. Ms. Kornkanok Promthep

Credits: 2 (1-2-3)

Curriculum: Doctor of Philosophy Program in Neuroscience (elective course)

Semester offering: Second semester

Pre-requisites: None

Course learning outcomes (CLOs):

Upon completion of this course, students are able to:

1. Understand the basic principle in the field of drug discovery and neurological diseases. (PLO2) P
2. Demonstrate many stages of the drug research and development process and the ethical and legal requirements. (PLO1) R (PLO2) P
3. Integrate the fundamentals of target identification, target validation and drug discovery methodologies. (PLO3) P

4. Describe the different drug target classes and the specific methods utilized for target validation and identification. (PLO2) P
5. Demonstrate teamwork, interpersonal skills, and responsibilities for the assigned and group work (PLO4) R
6. Apply the preclinical and current drug development processes work by different bioinformatic tools. (PLO5) P

Alignment of teaching and assessment methods to course learning outcome:

Course learning outcome	Teaching method	Assessment method
1. Understand the knowledge in the field of drug discovery and neurological diseases	(1) Lecture (2) Class discussion	(1) Written examination (2) Reports (3) In-class discussion
2. Demonstrate many stages of the drug research and development process and the ethical and legal requirements	(1) Lecture (2) Class discussion	(1) Written examination (2) Oral presentation (3) In-class discussion
3. Integrate the fundamentals of target identification, target validation and drug discovery methodologies	(1) Lecture (2) Practice-based learning	(1) Reports (2) Oral presentation (3) In-class discussion
4. Describe the different drug target classes and the specific methods utilized for target validation and identification	(1) Assignment (2) Practice-based learning (3) Class discussion	(1) Assessment of assigned work (2) Written examination (3) In-class discussion
5. Demonstrate teamwork, interpersonal skills, and responsibilities for the assigned and group work	(1) Assignment (2) Class discussion	(1) Assessment of assigned work (2) In-class discussion
6. Apply the preclinical and current drug development processes work by different bioinformatic tools	(1) Assignment (2) Practice-based learning	(1) Assessment of assigned work (2) Oral presentation

Course description:

The fundamentals of drug development and discovery; neurological and neuropsychiatric disease-relevant drug targets; biomarker identification in neurological diseases; the concepts and strategies of target identification and validation in drug development; the principles of target-based screening in computer-aided

drug design; bioinformatics tools for drug developments; lead identification and optimization; various classes of therapeutic agents; ethical and legal issues of drug development

Course schedule:

Date: Monday, Wednesday, and Friday

Time: 09.00-16.00

Venue: Institute of Molecular Biosciences, Mahidol University, Salaya (**Room: A401**)

Schedule

MBNS757 Drug Development for Neurological Diseases

Lecture: 10 April 2023 – 5 May 2023 | **Lab:** 30 Oct 2023 – 22 Nov 2023 |

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	Date	Time	Topic	Lecturer
0	30 Oct 2023	08.45-09.00	L0: Course orientation	Jiraporn
1	30 Oct 2023	09.00-10.30	L2: Neurological disease-relevant drug targets	Vorasith
2	30 Oct 2023	10.30-12.00	L1: The fundamentals of drug discovery and development	Jiraporn
3	30 Oct 2023	13.00-16.00	<i>Lab 1:</i> Basic databases for drug development: Primary and secondary databases	Jiraporn/Sujira
4	1 Nov 2023	8.30-10.00	L3: Neuropsychological disease-relevant drug targets	Nuanchan
5	1 Nov 2023	10.15-12.15	<i>Lab 2:</i> Basic tools for drug development: Sequence homology and conservation analysis	Jiraporn/Sujira
6	1 Nov 2023	13.15-14.15	L4: Biomarker identification in neurological and neuropsychological diseases	Sujira
7	1 Nov 2023	14.30-16.30	<i>Lab 3:</i> Biomarker identification from biological databases	Phorutai/Sujira/Jiraporn
8	3 Nov 2023	08.30-10.00	L5: The concepts and strategies of target identification and validation in drug development	Jiraporn

	Date	Time	Topic	Lecturer
9	3 Nov 2023	10.15-12.15	Lab 4: Protein-Protein interaction analysis for omics data	Jiraporn/Nopphon
10	3 Nov 2023	13.15-14.15	L6: The principles of target-based screening in computer-aided drug design	Ittipat
11	3 Nov 2023	14.30-17.00	Lab 5: Computer-aided drug design: Protein modeling	Nopphon/Ittipat/Jiraporn
Exam I	8 Nov 2023	09.00-12.00	Exam I (L1-L6)	Somsong
12	10 Nov 2023	08.30-10.00	L7: Bioinformatic tools for drug developments	Phorutai/Sujira
13	10 Nov 2023	10.15-12.15	Lab 6: Computer-aided drug design: Protein-ligand interaction, Structural visualization and analysis	Nopphon/Ittipat/Jiraporn
14	10 Nov 2023	13.15-14.15	L8: Computer-aided drug design: Protein-ligand interaction	Matthew/Jiraporn
15	10 Nov 2023	14.30-17.00	Lab 7: Virtual screening	Matthew/Jiraporn
16	13 Nov 2023	09.00-12.00	Lab 8: Molecular dynamic simulation	Matthew/Jiraporn
17	13 Nov 2023	13.00-14.00	L9: Lead identification and optimization	Sitthivut
18	13 Nov 2023	14.15-16.45	Lab 9: Computer-aided drug design: Lead optimization	Ittipat/Jiraporn
	15 Nov 2023	8.30-10.00	Special lecture: Fragment-based and structure-based drug discovery in pharmaceutical industry	Kangsa
19	15 Nov 2023	10.30-11.30	L10: Various classes of therapeutic agents	Banthit
20	15 Nov 2023	12.30-13.30	L11: Ethical and legal issues of drug development	Sukonthar
21	15 Nov 2023	13.45-16.45	Lab10: Computer-aided drug design: Targeted design for neurological diseases	Jiraporn
22	20 Nov 2023	9.00-12.00 13.00-16.00	Student Presentation (Targeted design for neurological diseases)	Jiraporn/ Faculty staff
Exam II	22 Nov 2023	09.00-12.00	Exam II (L7-L11)	Somsong

Assessment Criteria:

Assessment Criteria	Assessment Method	Scoring Rubric
Assignments/ Examination (40%)	(1) Assigned Report (2) Written examination	(1) Comprehension
Laboratory performance (40%)	(1) Direct observation (2) Practical examination (3) In-class discussion	(1) Ability to follow procedure or to design a procedure for experiments (2) Use of tools (3) Group work
Practice-based learning presentation (10%)	(1) Presentation	(1) Ability to apply knowledge to solve research problems (2) Ability to answer questions
Class attendant (10%)	(1) Number of classes signed in (2) Direct observation	(1) Class participation

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
85-100	A	Excellent
80-84	B+	Very good
70-79	B	Good
60-69	C+	Fairly good
50-59	C	Fair
45-49	D+	Poor
40-44	D	Very poor
< 40	F	Fall

Lab Performance Evaluation Rubric				
Criteria	Excellent (score = 4)	Good (score = 3)	Fair (score = 2)	Need Improvement (score = 1)
Active participation	Students are enthusiastically involved in participation and discussion with friends and teachers and show evident leadership skills	Students are actively involved in participation in class with friends and teachers	Students are present in class and show moderate interest during study	Students show no interest in participation or fail to present in class
Data collection and analysis	Accurately collects and records data, analyzes data using appropriate statistical techniques, and interprets and communicates results effectively	Accurately collects and records data and analyzes data using appropriate statistical techniques, but may have difficulty interpreting and communicating results	Accurately collects and records data, but may have difficulty analyzing data and interpreting and communicating results	Struggles with accurate data collection and analysis
Problem-solving and critical thinking	Identifies and troubleshoots problems effectively, develops creative solutions to problems, and asks relevant questions and proposes hypotheses	Identifies and troubleshoots problems effectively and asks relevant questions, but may have difficulty developing creative solutions to problems	Identifies and troubleshoots problems, but may have difficulty asking relevant questions or developing creative solutions	Struggles with problem-solving and critical thinking

Practice-based learning Presentation Rubric					
Criteria	Outstanding (score = 5)	Above average (score = 4)	Average (score = 3)	Below average (score = 2)	Poor (score = 1)
Information quality and organization of topic presented (including answering the questions) (5%)	The information presented is accurate, comprehensive, and well-organized, with a clear and logical structure	The information presented is mostly accurate and well-organized, with a clear structure	The information presented is generally accurate and adequately organized, with a clear structure	The information presented is partially accurate and poorly organized, with a confusing structure	The information presented is inaccurate and poorly organized, with a very confusing structure
Verbal communication and English language proficiency (2%)	Speaker's voice is very steady, clear and confident. Spoken language is very fluent and grammatically corrected.	Speaker's voice is steady and confident. Spoken language is fluent and mostly grammatically corrected.	Speaker's voice is moderately confident but could be developed. Spoken language is mediocre and has some grammatical errors.	Speaker's voice is unsteady and lacks confident. Use of spoken language needs to be improved, and many errors can be recognized.	Speaker fails to deliver proper presentation orally. Unable to deliver presentation via spoken English language.
Non-verbal communication (1%)	Speaker appears to be comfortable and confident. Effective uses of eye contacts and gestures are presented to support the presentation.	Speaker appears to be fairly confident. Eye contacts and gestures are generally used.	Speaker appears to be generally at ease. Moderate use of eye contact and gesture but not very effective.	Speaker appears uneasy, insecure or panicked. Eye contact and gesture are rarely used.	Speaker is obviously uncomfortable for presentation. No eye contact or gesture is presented.

Practice-based learning Presentation Rubric					
Criteria	Outstanding (score = 5)	Above average (score = 4)	Average (score = 3)	Below average (score = 2)	Poor (score = 1)
Visual tools (2%)	The visual tools used (e.g. slides, charts, diagrams) are visually appealing, relevant, and effectively support the presentation	The visual tools used are visually appealing and relevant, but could be better integrated into the presentation	The visual tools used are adequate and relevant, but could be improved	The visual tools used are poorly designed and not well integrated into the presentation	Mostly no visual aids are used, and very poorly designed.

Date revised: 28 March 2023