

**Course Syllabus**  
**MBNS757 Drug Development for Neurological Diseases**  
**Academic Year 2022**

**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. Asst. Prof. Sujira Mukda
5. Asst. Prof. Sukonthar Ngampramuan
6. Asst. Prof. Sitthivut Charoensutthivarakul
7. Asst. Prof. Matthew Phanchana
8. Dr. Jiraporn Panmanee
9. Dr. Phorutai Pearngam
10. Dr. Nopphon Petchyam
11. 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:** Master of Science Program in Neuroscience (elective course)

Doctor of Philosophy Program in Neuroscience (elective course)

**Semester offering:** First/ 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. Apply the preclinical and current drug development processes work by different bioinformatic tools. (PLO5) P
6. Demonstrate teamwork, interpersonal skills, and responsibilities for the assigned and group work (PLO4) R

**Alignment of teaching and assessment methods to course learning outcome:**

Course learning outcome	Teaching method	Assessment method
1. Integrate 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 (4) Class attendance
3. Demonstrate 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. 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
6. 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

**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

## Schedule

### MBNS757 Drug Development for Neurological Diseases

Lecture: 10 April 2023 – 5 May 2023 | Lab: 10 April 2023 – 5 May 2023 |

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	Date	Time	Topic	Lecturer
0	10 Apr 2023	09.00-09.30	L0: Course orientation	Jiraporn <sup>(1)</sup>
1	10 Apr 2023	09.30-10.30	L1: The fundamentals of drug development and discovery	Jiraporn <sup>(1)</sup>
2	10 Apr 2023	11.00-12.00	L2: Neurological disease-relevant drug targets	Vorasith <sup>(1)</sup>
3	10 Apr 2023	13.00-15.00	Lab 1: Basic databases for drug development: Primary and secondary databases	Jiraporn/Sujira <sup>(1,2)</sup>
4	12 Apr 2023	09.00-10.00	L3: Neuropsychological disease-relevant drug targets	Nuanchan <sup>(1)</sup>
5	12 Apr 2023	10.15-12.15	Lab 2: Basic tools for drug development: Sequence homology and conservation analysis	Jiraporn/Sujira <sup>(1,2)</sup>
6	12 Apr 2023	13.15-14.15	L4: Biomarker identification in neurological and neuropsychological diseases	Sujira <sup>(1)</sup>
7	12 Apr 2023	14.15-16.15	Lab 3: Biomarker identification from biological databases	Phorutai/Sujira <sup>(1,2)</sup>
8	19 Apr 2023	09.00-10.00	L5: The concepts and strategies of target identification and validation in drug development	Jiraporn <sup>(1)</sup>
9	19 Apr 2023	10.15-12.15	Lab 4: Protein-Protein interaction analysis for omics data	Jiraporn <sup>(1,2)</sup>
10	19 Apr 2023	13.15-14.15	L6: The principles of target-based screening in computer-aided drug design	Nopphon/Jiraporn <sup>(1)</sup>
11	19 Apr 2023	14.30-16.30	Lab 5: Computer-aided drug design: Protein modeling	Nopphon/Jiraporn <sup>(1)</sup>
Exam I	21 Apr 2023	09.00-12.00	Exam I (L1-L5)	Somsong

	Date	Time	Topic	Lecturer
12	24 Apr 2023	09.00-10.00	<b>L7:</b> Bioinformatic tools for drug developments	Phorutai/Sujira <sup>(1)</sup>
13	24 Apr 2023	10.15-12.15	<i>Lab 6:</i> Computer-aided drug design: Protein-ligand interaction, Structural visualization and analysis	Nopphon/Jiraporn <sup>(1)</sup>
14	24 Apr 2023	13.15-14.15	<b>L8:</b> Computer-aided drug design: Protein-ligand interaction	Matthew <sup>(1)</sup>
15	24 Apr 2023	14.30-16.30	<i>Lab 7:</i> Virtual screening	Matthew/Jiraporn <sup>(1)</sup>
16	26 Apr 2023	10.00-12.00	<i>Lab 8:</i> Molecular dynamic simulation	Matthew/Jiraporn <sup>(1)</sup>
17	26 Apr 2023	13.00-14.00	<b>L9:</b> Lead identification and optimization	Sitthivut <sup>(1)</sup>
18	26 Apr 2023	14.15-16.15	<i>Lab 9:</i> Computer-aided drug design: Lead optimization	Sitthivut <sup>(1)</sup>
	28 Apr 2023	9.00-10.00	<b>Special lecture:</b> Fragment-based and structure-based drug discovery in pharmaceutical industry	Kangsa <sup>(1)</sup>
19	28 Apr 2023	11.00-12.00	<b>L10:</b> Various classes of therapeutic agents	Banthit <sup>(1)</sup>
20	28 Apr 2023	13.00-14.00	<b>L11:</b> Ethical and legal issues of drug development	Sukonthar <sup>(1)</sup>
	3 May 2023	9.00-12.00	<i>Lab10:</i> Targeted design for neurological diseases Student Presentation	RCN staff
Exam II	5 May 2023	09.00-12.00	<b>Exam II (L6-L10)</b>	Somsong

#### Assessment Criteria:

Assessment Criteria	Assessment Method	Scoring Rubric
Assignments/ Examination (40%)	(1) 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 experiment (2) Use of equipment (3) Working area and safety (4) Group work
Problem-based learning presentation (10%)	(1) Presentation	(1) Ability to apply knowledge to solve research problems

Assessment Criteria	Assessment Method	Scoring Rubric
		(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	Exemplary (score = 4)	Proficient (score = 3)	Basic (score = 2)	Inadequate (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.
Group communication		Students can communicate well with other students and teachers, both verbally and non-verbally.	Students can moderately communicate or discuss with other students, or when being asked.	Students fail to communicate with others and tend to leave discussion.
Theory knowledge		Students show profound background	Students have some degrees of knowledge of	Students have very little or no knowledge about

Lab Performance Evaluation Rubric				
Criteria	Exemplary (score = 4)	Proficient (score = 3)	Basic (score = 2)	Inadequate (score = 1)
		knowledge on topics being discussed and evaluated.	topics being studied but can be improved in certain points.	topics being studied and not prepared for the session.

Problem-based learning Presentation Rubric					
Criteria	Excellent (score = 5)	Very good (score = 4)	Adequate (score = 3)	Limited (score = 2)	Poor (score = 1)
<b>Information quality and organization of topic presented (including answering the questions)</b>	Main points are explicitly presented with impressive detail and organization. Information is directly linked to the topic of presentation.	Main points are presented with good amount of detail. Information is well-organized and linked to the topic given.	Main points are somewhat clear but could add some more detail. Information is organized and linked to the topic given.	Main points are not clear and lack detail. Information is loosely organized and some are off-topic.	Main points are missed and have no detail. Information is disorganized and off-topic.
<b>Verbal communication and English language proficiency</b>	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.
<b>Non-verbal communication</b>	Speaker appears to be comfortable and confident. Effective uses	Speaker appears to be fairly confident. Eye contacts and	Speaker appears to be generally at ease. Moderate use	Speaker appears uneasy, insecure or panicked. Eye	Speaker is obviously uncomfortable for presentation.

Problem-based learning Presentation Rubric					
Criteria	Excellent (score = 5)	Very good (score = 4)	Adequate (score = 3)	Limited (score = 2)	Poor (score = 1)
	of eye contacts and gestures are presented to support the presentation.	gestures are generally used.	of eye contact and gesture but not very effective.	contact and gesture are rarely used.	No eye contact or gesture is presented.
<b>Visual tools</b>	Visual aids are very creative, easy to read and greatly enhance presentation.	Visual aids are typically clear and easy to follow.	Visual aids are good in terms of quality, but some points can be improved.	Limited visual aids are used or difficult to help audiences follow the topic.	No visual aids are used, and presentation is not interested by audiences.

Date revised: 29 Nov 2022