Course Syllabus

SIPS 522 Principles of Physiological Experimentation

Academic Year 2025

Department of Physiology, Faculty of Medicine Siriraj Hospital, Mahidol University

Course ID and name:	SIPS 522: Principles of Physiological Experimentation
Course coordinator:	Lecturer Rujapope Sutiwisesak MD, PhD
Instructors:	Assist. Prof. Sompol Tapechum MD, PhD
	Assoc. Prof. Wattana Wattanapa MD, PhD
	Assoc. Prof. Suwattanee Kooptiwut MD, PhD
	Assoc. Prof. Panapat Uawithya MD, PhD
	Assoc. Prof. Reawika Chaikomin MD, PhD
	Assoc. Prof. Narawut Pakaprot MD, PhD
	Assoc. Prof. Chantacha Sitticharoon MD, PhD
	Lecturer Thaksaon Kittipassorn MD, PhD
	Lecturer Rujapope Sutiwisesak MD, PhD
	Lecturer Patamat Nitiwaranggoon MD, PhD
	Lecturer Kanat Chanthongdee MD, PhD
Credits:	2 (2-0-4) (lecture – laboratory – self-study)
Curriculum:	Master of Science Program in Medical Physiology
Course type:	☐ Core ☐ Required ☑ Electives
Semester offering:	2/2025
Prerequisite:	None
Date of Latest Revision:	4 November 2025

Course Description:

Basic methods in molecular biology, electrophoresis of protein and nucleic acids, DNA technology, polymerase chain reaction; receptor-drug interaction; immunoassay, flow cytometry, immunohistochemistry, in situ hybridization; microscopy, imaging techniques; cell culture; electrophysiological methods; neurophysiological studies; behavioral studies; methods in GI research; methods in autonomic research; ethics of research in human subjects and experimental animals in science ; safety in research practice

Course-level Learning Outcomes (CLOs)

Upon completion of this course, students are able to:

1. Explain the following aspects of experimental methods used in physiological research: Principles, Methods, Interpretation, Advantages and Disadvantages

2. Apply the knowledge to choose appropriate methods in experimental designs and appraise the choice of methods employed in literatures

Constructive Alignment of CLOs and Program's ELOs

CLOs	ELO1	ELO2	ELO3	ELO4
1. Explain the following aspects of experimental methods used in physiological research: Principles, Methods, Interpretation, Advantages and Disadvantages	I			
2. Apply the knowledge to choose appropriate methods in experimental designs and appraise the choice of methods employed in literatures		R		R

Remarks: Show the level of the course management with the symbols I (Introduced & assessed), R (Reinforced & assessed), P (Practiced & assessed), and M. (Level of Mastery is assessed).

Program's Expected Learning Outcomes

1. Demonstrate the current medical physiological knowledge for common clinical application.
2. Evaluate the scientific research and major research developments.
3. Perform medical physiology research with a technique in an ethical way to test an idea or hypothesis in an area of interest.
4. Communicate knowledge and ideas of medical physiological research clearly to peers and the scientific community at national level.

Course Schedule and teaching/assessment plan

No.	Topic	Hours			CLOs	Teaching & learning strategy	Assessment (in-class)	Lecturers
		Lecture	Laboratory	Self-Study				
1	Course introduction			1		VDO asynchronous		RS
2	Principles of cell culture	2		4	1,2			TK
3	Principles of fluorescence	1		2	1,2	Onsite lecture	Post-learning exercise	RS
4	Principles of flow cytometry	1		2	1,2	Onsite lecture	Post-learning exercise	RS
5	Principles of molecular biology techniques 1: DNA	2		4	1,2			SK
6	Principles of molecular biology techniques 2: Protein	2		4	1,2			SK
7	Principles of immunoassays	2		4	1,2			CS
8	From principles to application 1	2		4	2	Onsite discussion	Discussion rubric	PN
	Summative evaluation 1 (Topic 2-7, 50 minutes)					Onsite examination		
9	Principles of pharmacodynamics	2		4	1,2			WW
10	Principles of autonomic research	2		4	1,2			PU
11	Principles of gastrointestinal research	2		4	1,2			RC
12	Principles of behavioral studies	2		4	1,2			KC
13	From principles to application 2	2		4	2	Onsite discussion	Discussion rubric	KC
	Summative evaluation 2 (Topic 9-12, 40 minutes)					Onsite examination		
14	Principles of histological and imaging studies	2		4	1,2			CS
15	Electrophysiology: Extracellular recordings	2		4	1,2			NP
16	Electrophysiology: Intracellular and whole-cell recordings	2		4	1,2			WW
17	From principles to application 3	2		4	2	Onsite discussion	Discussion rubric	ST
	Summative evaluation 3 (Topic 14-16, 30 minutes)					Onsite examination		
	Total hours of the study	**30**		**61**				

Course Assignments

Students are required to review assigned readings and preparatory materials before class, actively participate in interactive sessions, and complete in- class exercises or discussion assignments as scheduled.

Assessment Criteria

- In-class assessment 15% (3 discussions; 5% each)
    - Discussion rubric
- Examination 85% (from topic 2-17)

Appeal Procedure

Students may appeal academic assessment results by submitting a written request to the course coordinator within 7 days of grade release. The appeal will be reviewed by the course committee according to Faculty of Medicine Siriraj Hospital academic regulations.