

Course Syllabus
SIPS 530
Academic Year 2026
Department of Physiology
Faculty of Medicine Siriraj Hospital, Mahidol University

Course ID and name: SIPS 530: Fundamentals of Medical Physiology
Course coordinator: Assoc. Prof. Narawut Pakaprot, MD, PhD
Instructors: Assoc. Prof. Narawut Pakaprot, MD, PhD
Assoc. Prof. Wattana Watanapa, MD, PhD
Assoc. Prof. Suwattanee Kooptiwut, MD, PhD
Assist. Prof. Sompol Tapechum, MD, PhD
Assoc. Prof. Panapat Uawithya, MD, PhD
Assist. Prof. Yodying Dangprapai, MD, PhD
Assist. Prof. Rujapope Sutiwisesak, MD, PhD
Instructor Katesirin Ruamyod, PhD
Credits: 1 (1-0-2) (lecture – laboratory – self-study)
Curriculum: Masters of Science Program in Medical Physiology
Course type: ☐ Core ☒ Required ☐ Electives
Semester offering: 01/2026
Prerequisite: None
Date of Latest Revision: 23/07/2026

Course Description:

Homeostasis; body systems; biophysical principles, resistance-capacitance circuit, time constant, exponential decay; membrane transport; intercellular communication, electrical signaling in excitable cells, resting membrane potential, action potential, neural signal propagation; hormonal receptors, intracellular signal transduction; instrumentation for physiological signal recordings

Course-level Learning Outcomes (CLOs)

Upon completion of this course, students are able to:

1. Integrate fundamental physiological principles to explain the mechanisms of biological systems.
2. Perform physiological signal recordings with proper equipment setup.
3. Discuss physiological insights collaboratively to solve complex biological problems.

Constructive Alignment of CLOs and Program's ELOs

CLOs	ELO1	ELO2	ELO3	ELO4
1. Integrate fundamental physiological principles to explain the mechanisms of biological systems	I			R

2. Perform physiological signal recordings with proper equipment setup	I	I	I	R
3. Discuss physiological insights collaboratively to solve complex biological problems		I		R

Remarks: Show the level of the course management with the symbols I, R, P, and M.

Program's Expected Learning Outcomes

1. Demonstrate the current medical physiological knowledge for common clinical applications.
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	Date/Time
		Lecture	Laboratory	Self Study					
1	Orientation	0.5	-	1		Live synchronous	-	Dr. Narawut Dr. Katesirin	Tuesday, August 4 6:00 – 6:30pm
2	Homeostasis and body systems	1	-	2	1	Asynchronous lecture	Post-learning exercise	Dr. Panapat	Tuesday, August 4 6:30 – 7:30pm
3	Time constant and exponential decay	1	-	2	1	Asynchronous lecture	Post-learning exercise	Dr. Katesirin	Thursday, August 6 6:00 – 7:00pm
4	Resistance-capacitance circuit	1	-	2	1	Asynchronous lecture	Post-learning exercise	Dr. Sompol	Saturday, August 8 1:00 – 2:00pm
5	Biophysical measurement	2	-	4	1	Asynchronous lecture	Post-learning exercise	Dr. Wattana Dr. Katesirin	Saturday, August 8 2:00 – 4:00pm
6	Biophysical measurement exercise	2	-	4	1,3	Online synchronous discussion	Rubric (Discussion)	Dr. Wattana Dr. Katesirin	Wednesday, August 19 6:00 – 8:00pm
7	Q & A	2	-	4	1,3	Online synchronous discussion	-	Dr. Wattana Dr. Sompol Dr. Panapat Dr. Katesirin	Friday, August 14 6:00 – 8:00pm
8	Membrane transport	2	-	4	1,3	Online synchronous lecture and discussion	Rubric (Discussion)	Dr. Yodying	Tuesday, August 18 6:00 – 8:00pm
9	Hormone receptors	1	-	2	1	Online synchronous lecture	Q&A	Dr. Suwattanee	Thursday, August 20 6:00 – 7:00pm

10	Intracellular signal transduction	1	-	2	1	Online synchronous lecture	Q&A	Dr. Suwattanee	Thursday, August 20 7:00 – 8:00pm
11	Electrical signaling in excitable cells and resting membrane potential	2	-	4	1	Asynchronous lecture	Post-learning exercise	Dr. Narawut	Friday, August 21 5:00 – 7:00pm
12	Action potential and neural signal propagation	1	-	2	1	Asynchronous lecture	Post-learning exercise	Dr. Narawut	Friday, August 21 7:00 – 8:00pm
13	Group discussion (Intracellular signal transduction)	1	-	2	1,3	Online synchronous discussion	Rubric (Discussion)	Dr. Suwattanee	Tuesday, August 25 6:00 – 7:00pm
14	Q & A 2	2	-	4	1,3	Online synchronous discussion	-	Dr. Suwattanee, Dr. Yodying, Dr. Narawut	Thursday, August 27 6:00 – 8:00pm
15	Instrumentation for physiological recordings	-	3	1.5	2,3	Practice (Onsite lab)	Rubric (Lab performance)	Dr. Rujaopope, Dr. Kanat	Saturday, August 29 9:00am – 12:00pm
16	Summative examination					Written (Onsite at Computer room)			Saturday, August 29 1:00 – 3:30pm
17	Reflection & Feedback					Online synchronous discussion		Dr. Katesirin	Friday, September 18 4:30 – 5:00pm
	Total hours of the study	14	3	40.5					

Course Assignments

Assignment materials; reading, VDO

Assessment Criteria

- Assess the score of the test at the end of the class
- Attend the assigned activities not less than 80%

70%	Summative examination
20%	Performance in discussion classes
10%	Laboratory performance

Rubric for Laboratory performance

Assessment topics	Excellent (3)	Good (2)	Satisfactory (1)	Needs Improvement (0)
1) Explain experimental objectives and techniques (CLO2)				
2) Set up recording equipment and apply safety protocols (CLO2)				
3) Record signals and control data quality (CLO2)				
4) Maintain punctuality and laboratory readiness (CLO3)				
5) Execute assigned tasks and take responsibility (CLO3)				
6) Discuss physiological insights to solve problems collaboratively (CLO3)				

Class Participation and Discussion Rubric (Revised 2026)

Scoring Scale: 5 = Excellent | 4 = Good | 3 = Satisfactory | 2 = Developing | 1 = Unacceptable

	5	4	3	2	1
1. Ideation & Engagement <i>Measurable Action:</i> Volunteering & initiating	Initiates scientific ideas or perspectives voluntarily and frequently.	Offers relevant ideas or insights voluntarily when prompted.	Contributes answers or ideas only when directly called upon.	Rarely contributes; remains passive during group work.	Fails to contribute any ideas or refuses to answer.
2. Scientific Quality <i>Measurable Action:</i> Analyzing & backing with data	Analyzes cases deeply and justifies views with empirical data.	Explains relevant mechanisms accurately and correctly.	States basic facts from memory without mechanical depth.	Provides irrelevant info that deviates from the clinical topic.	Shows no scientific substance or pre-class preparation.
3. Professionalism & Collaborative spirit <i>Measurable Action:</i> Responding & building on ideas	Actively and respectfully pays attention and builds on peers/instructor's ideas to move discussion forward.	Pays attention and responds to peers/instructor appropriately and politely.	Listens but occasionally loses focus or interrupts others.	Disengages from the group (e.g., uses mobile devices).	Fails to pay attention; disrupts the class or displays disrespectful behavior.

GRADING CRITERIA

A	80%	to	100%, with all CLOs passed (minimum 50% each)
B+	65%	to	<80%, with all CLOs passed (minimum 50% each)
B	50	to	<65%, with all CLOs passed (minimum 50% each)
F	<50%		

Actions Based on CLO Status:

I-1	Retake the exam and/or complete the assigned work within one month after the exam result is announced, if at least one CLO (CLO1-3) is failed
I-2	Complete the assigned work and undergo a new evaluation within the next semester if all CLOs fail.
I-3	Repeat the course when it is next offered, if all CLOs are failed.

Appeal Procedure

Students are able to inquire about their scores or grade directly to the course coordinator either by direct contact, telephone or email within 1 week after the scores or grade is announced. The appealing through the program is also available.