Program.....BSc..... Program Level ✓ Bachelor ☐ Graduate Diploma ☐ Master ☐ Higher Graduate Diploma ☐ Doctor

Course Title...Physics for Health Science.. Faculty/College/Institute .....Science.....

Course Code.....SCPY181..... Department .....Physics.....

Course Specification

Section 1 General Information

1. Course Code and Title

In Thai .....วทฟส ๑๘๑ ฟิสิกส์สำหรับวิทยาศาสตร์สุขภาพ

In English ...SCPY 181 Physics for Health Science .....

2. Number of Credits ..... 3 (3-0-6).....

(Theory ...3..... hrs. Practice .....0.. hrs. Self-Study ...6..... hrs./week)

3. Curriculum and Course Type

3.1 Program ... Undergraduate level (International Program): Biomedical Science.....

3.2 Course Type ✓ Specific Course ☐ Compulsory Course ☐ Elective Course

4. Course Coordinator and Instructor

4.1 Course Responsible Instructor..... Dr. Narin Nuttavut / Dr. Withoon Chunwachirasiri .....

4.2 Instructors ..... Dr. Narin Nuttavut / Dr. Withoon Chunwachirasiri.....

5. Semester/Class Level

5.1 Semester First Semester/ First Year

5.2 Number of Students Allowed Approximately ..80. Students

6. Prerequisites **..... None .....**

7. Co-requisites **..... None .....**

8. Date of Preparation/Latest Revision of the Course Specifications ...1..July....2025.....

Section 2 Course Goals and Course Description

1. Course Goals

..... The course aims to give students the basic knowledge of physics in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics.

.....

2. Course Description

(In English) ... Fundamentals of physics in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics, for application to medical science.

.....

Section 3 Course Objectives, Course-level Learning Outcomes and Course Implementation

1. Course Objectives

... Understanding of elementary physics in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics, for application to medical science and related fields.....

2. Course-level Learning Outcomes: CLOs

By the end of the course, students are able to

CLO1 give qualitative explanations for a variety of natural phenomena from everyday life using basic physics principles in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics.

CLO2 apply appropriate physics concepts to analyze introductory level physics problems in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics.

CLO3 use appropriate mathematical techniques and concepts to obtain quantitative solutions to introductory level physics problems in the areas of (i) mechanics, (ii) fluid mechanics, (iii) thermodynamics, (iv) waves and optics, (v) electromagnetism, and (vi) modern physics.

CLO4 demonstrate basic communication skills through discussions and writing of report within groups of 3-4 students.

3. How to organize learning experiences to develop the knowledge or skills stated in number 2 and how to measure the learning outcomes

	Teaching and Learning Experience Management				Learning outcomes measurements			
	Lecture	Demonstration	Practice on problem solving	Team based Learning	Homework Assignment	Group Report	Written Exam: Short Answer	Written Exam : CRQ
CLO1	✓	✓	✓				✓	✓
CLO2	✓	✓	✓	✓	✓	✓	✓	✓
CLO3	✓		✓	✓	✓			✓
CLO4				✓		✓		

Section 4 Lesson Plan and Evaluation

1. Lesson Plan

Week	Topic/Description	No. of hours	Lecture	Demonstration	Practice on problem solving	Team based learning
1	physical quantities, dimensional analysis, coordinate systems, vectors, derivatives, integrals, translational motions in 1D and 2D, forces, Newton's laws of motion, free-body diagrams	3	✓	✓	✓	
2	work, energy, conservation of energy, linear momentum, collisions in 1D and 2D, center of mass, motions of a system of particles	3	✓			
3	rigid body, rotational motions, moment of inertia, torque, relationships between angular and linear quantities, work and energy in rotational motions	3	✓			✓
4	rolling, static equilibrium of solid objects, conservation of angular momentum, elastic properties of solids, Newton's law of universal gravitation	3	✓		✓	
5	fluids, pressure and Pascal's principle, buoyant force and Archimedes' principle, flow rate, continuity equation	3	✓	✓		✓
6	Bernoulli's equation, viscosity, Poiseuille's equation, surface tension, capillarity	3	✓	✓		
7	temperature, thermal expansion, ideal gas, heat, heat capacity, heat transfer, thermodynamic processes, first law of thermodynamics	3	✓		✓	
8	heat engines, second law of thermodynamics, entropy	3	✓			
9	**Midterm examination**					
10	oscillations, wave pulse and harmonic waves, waves on strings, sound waves, Doppler effect, superposition, standing waves and resonance	3	✓			

11	light, reflection, refraction and Snell's law, dispersion, total internal reflection, image formation, optical devices, interference, diffraction, polarization	3	✓	✓	✓	✓
12	electric force, Coulomb's law, electric field, Gauss' law, electric potential, capacitance, electric current, electric resistance, Ohm's law, direct-current circuits, Kirchhoff's rules	3	✓	✓		✓
13	magnetic field, magnetic force on a moving charge, Lorentz force, particle motion in a magnetic field, magnetic fields produced by currents, Biot- Savart law, Ampere's law, magnetic materials	3	✓	✓	✓	✓
14	Faraday' s law, Lenz' law, inductance, Maxwell's equations, electromagnetic waves, alternating-current circuits, electrical resonance	3	✓			
15	photon, photoelectric effect, Compton effect, photon momentum and de Broglie wavelength, atomic structure, hydrogen energy levels, light emission from hydrogen and absorption spectrum of hydrogen, Pauli exclusion principle and quantum numbers, X-rays, lasers	3	✓		✓	✓
16	nucleus, atomic and mass numbers, isotopes, nuclear binding energy, mass defect, radioactivity, nuclear reactions, detection of radiation, radiation damage, medical uses of radioactivity, radioactive dating	3	✓			
17	**Final examination**					

2. Plan for Assessment of Expected Course-Level Learning Outcomes (CLOs)

2.1 Measurement and Evaluation of learning achievement

A. Formative Assessment

.....

B. Summative Assessment

(1) Tool and weight for measurement and evaluation

Learning Outcomes	Evaluation Method*				Weight (Percentage)
	MCQ	Group work	Individual work presentation	In-class activities	
CLO1 ...(see above for details)	15	-	10	5	**30**
CLO2	10	10	-	-	**20**

CLO3	10	-	-	15	**15**
CLO4	-	15	10	-	**25**
รวม	**35**	**25**	**20**	**20**	**100**

(2) Grading Rules

Grading Criteria

Grade	A	B+	B	C+	C	D+	D	F
Final Score	80-100	75-79	70-74	65-69	60-64	55-59	50-54	Less than 50

Grades D and above are passing grade.

(3) Measurement and Evaluation

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2.2 Re-examination (if the course allows any.)

There will be no re-examination. Students who do not pass this course have to enroll again.

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3. Students' Appeal

... Students may contact the instructor for informal grade appeal. The formal submission of grade appeal can be submitted to the office of the Educational Affair Division, Faculty of Science.

Section 5 Teaching Resources

1. Required Texts

1) ...H. Young and R. Freedman. University Physics. Pearson Education, Inc.....
2) .....

2. Suggested Materials

R. D. Knight, Physics for Scientists and Engineers: A Strategic Approach with Modern Physics, 4th ed., Pearson, 2017.

D. C. Giancoli, Physics for Scientists and Engineers with Modern Physics, 4th ed., Pearson, 2014.

W. Bauer and D. G. Westfall, University Physics with Modern Physics, 2nd ed., McGraw Hill, 2014.

B. H. Brown, R. H. Smallwood, D. C. Barber, P. V. Lawford, and D. R. Hose, Medical Physics and Biomedical Engineering, Institute of Physics Publishing, 1999.

P. Herman, Physics of the Human Body, 2nd ed., Springer, 2016.

S. A. Kane, Introduction to Physics in Modern Medicine, 2nd ed., CRC Press, 2009.

J. Newman, Physics of the Life Sciences, Springer, 2008.

F. Cardarelli, 2008, Materials Handbook: A Concise Desktop Reference, 2nd ed., Springer, 2008.

W. D. Callister, Jr., and D. G. Rethwisch, Fundamentals of Materials Science and Engineering, 5th ed., Wiley, 2015.

3. Other Resources (if any)

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Section 6 Evaluation and Improvement of Course Implementation

1. Analysis and Evaluation of Course Implementation

A. Data for Analysis

....Digital implementation and committee panels.....

B. Course Effectiveness Evaluation

..... Digital implementation and committee panels.....

2. Revision Process and Improvement Plan for Course Effectiveness

..... Digital implementation and committee panels.....

3. The self-assessment report of the course

.... Digital implementation and committee panels.....

Appendix

1. Relations between the course and the program

Table 1 Relations between the course and the PLOs

	Program-Level Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO..	PLO..
(Course Code) ..SCPY181..	✓		✓	✓				

แสดงระดับการจัดการเรียนรู้ของรายวิชา ด้วยอักษร I, R, P หรือ M โดยนำข้อมูลของรายวิชาที่แสดงไว้ในหลักสูตร Curriculum Mapping มาแสดงให้สอดคล้องกัน

Table 2 Relation between CLOs and PLOs

(Course Code)	Program-Level Learning Outcomes (PLOs)							
	PLO1	PLO2	PLO3	PLO4	PLO5	PLO6	PLO..	PLO..
CLO1	1.1			4.2				
CLO2			3.2					
CLO3	1.2							
CLO4	1.2							

ระบุว่าแต่ละ CLO สอดคล้องกับ PLO ในระดับ SubPLO ใดบ้าง โดยใส่หมายเลขของ SubPLO ใน column PLO ที่ตรงกัน เพื่อ แสดงความเชื่อมโยงให้ชัดเจน (Program-level Constructive Alignment)

Table 3 PLOs and SubPLOs that the course is responsible for

PLOs	SubPLOs
PLO1	1.1 .....
	1.3 .....
	1.4 .....
PLO3	3.4 .....
PLO4	4.2 .....

2. Rubric scoring*

***หมายเหตุ** ถ้ามีการใช้ Rubric scoring เป็นเครื่องมือในการวัดผล ให้แสดงเพิ่มเติมในภาคผนวกข้อที่ ๒.

3. Relations between the course and Sustainable Development Goals (SDGs)

☐ SDG1 No poverty

☐ SDG2 Zero Hunger
☐ SDG3 Good Health and Well – being
☐ SDG4 Quality Education
☐ SDG5 Gender Equality
☐ SDG6 Clean Water and Sanitation
☐ SDG7 Affordable and Clean Energy
☐ SDG8 Decent Work and Economic Growth
✓ SDG9 Industry, Innovation and Infrastructure
☐ SDG10 Reduced Inequalities
☐ SGD11 Sustainable Cities and Communities
☐ SDG12 Responsible Consumption and Production
☐ SDG13 Climate Action
☐ SDG14 Life Below Water
☐ SDG15 Life on Land
☐ SDG16 Peace, Justice and Strong Institutions
☐ SDG17 Partnerships for the goals