**TQF 3**

**Course Description.**

**College/Faculty** Science **Department** Physics

**Program** Bachelor of Biomedical Science.

**Section 1 General Information.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| PHY 135 |  | Life Science Physics |  | 3 (2-3-6) |
| Co-requisite course(s) |  | - |  |  |
| Pre-requisite course(s) |  | - |  |  |
| Semester |  | 2/2024 |  |  |
| Section |  | 111 (Lecture), 112 and 113 (Laboratory) |  |  |
|  |  |  |  |  |
| Categorization of course |  | Preparation Courses |  |  |
|  |  | General Education Courses |  |  |
|  |  | Specific Requirement Courses |  |  |
|  |  | Free Elective Courses |  |  |
| Responsible faculty member | Dr.Kitakorn Jatiyanon |  | Head of course |  |  |
| Instructor | Dr.Kitakorn Jatiyanon |  | Instructor |  | Guest Instructor |
| Place of study | 6-305A (Lecture),4/2-302 (Laboratory) (Sec112)4/2-301 (Laboratory) (Sec113) |  | On campus |  | Off-campus |
| Date of preparation | 2 January 2025 |  |  |  |  |

**Section 2 Course Objectives and Course Contents.**

**1. Course Objectives.**

 Lecture:

1. To understand the basic concept of physics necessary for life
2. To be able to apply the knowledge in physics to solve advance problems in biomedical field.

Laboratory:

1. To provide experimental experiences related to the theoretical concepts in the lectures.
2. To familiarize students with experimental apparatus, the scientific method, and the method of data analysis.
3. To introduce concept and techniques which have been widely applied in experimental science.
4. To learn how to write a technical report with scientific information.

2. **Course content**s.

This course aims to develop analytical and problem-solving skills by using linear algebra and

related calculus in the following topics: Units and Measurements, Kinematics and Kinetics of linear motion and rotational motion, Equilibrium (Physics of Muscles), Fluid, Wave and Sound, Light and Optics, Introductory Electronics, Nuclear Physics and radioactivity.

**3. Number of hours per week for advising and academic counselling for individual students**

.......3........hours/week e-mail: Kitakorn.j@gmail.com

 Facebook: ………………………

 Line: taorensai

 Other…………………………............

**Section 3 Learning Outcomes.**

Development of student learning outcomes in the following standards:

**1. Ethics and Morality**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Expected outcome** | **Teaching methodology** | **Assessment** |
| 1.1 | The students need to haveself-discipline, punctuality in attending theclass and submitting theassignments, and respect torules and regulations ofthe class and society. | * Teaching indirectly about discipline, punctuality in class.
* Applying classroom rules.
 | * Observing students’

behavior and manner in class.* Checking punctuality via submission of completed assignments.
 |

2**. Knowledge**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Expected outcome** | **Teaching methodology** | **Assessment** |
| 2.1 | The student will be able tounderstand basic mathematics, basic physics, basic engineeringand economics, also able tosolve related engineering problems and able to develop an innovation. | * Lecturing by using problem-based learning.
* Demonstrating the physics phenomena.
* Assignment of additional reading.
* Assignment of interesting problems.
 | * Evaluating quizzes, assignments and in-class activities.
* Mid-term and final examinations.
 |

3**. Intellectual skills**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Expected outcome** | **Teaching methodology** | **Assessment** |
| 3.2 | The students will be able toflexibly apply theknowledge to creativityin developing an innovation or technology | * Lecturing with applications.
* Experimental Based Learning.
 | * Mid-term and final examinations.
* Evaluating homework and assignments
 |

4. **Interpersonal skills and responsibility**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Expected outcome** | **Teaching methodology** | **Assessment** |
| 4.1 | Students will be able to academically communicate with others.  | * Encouraging class participation.
* Do a report and present it in class.
 | * Observing attendance and participation in class.
* Evaluating student’s assignments.
 |

5**. Qualitative skills, communication skills, and ICT skills**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Expected outcome** | **Teaching methodology** | **Assessment** |
| 5.1 | The students will be able to effectively use informationtechnology related to mathematics or apply statistic visualization in anappropriate manner. | * Lecturing and demonstrating how to apply those methods to the problems.
* Assigning of Group study.
 | * Evaluating student’s assignments.
 |

**Section 4 Course Planning and Assessment**

* 1. **Course plan**

| **Week** | **Contents** | **Hours** | **Activities and****Materials** | **Instructor** |
| --- | --- | --- | --- | --- |
| 1-2 | Lecture:Chapter1: Units and Biomedical measurement.* SI unit.
* Dimension analysis.
* Biomedical measurement.

Chapter2: Kinematics of 1D motion and 2D motion.* Linear motion.
* Free falling motion.
* Projectile motion.
* Circular motion.

Laboratory:* Vernier Caliper Usage
* Micrometers Usage
 | Lec: 4HrLab: 6Hr | * Lecture.
* Homework.
* Demonstration.
 | Kitakorn Jatiyanon |
| 3 | Lecture:Chapter3: Kinetic * Newton’s laws of motion of linear motion
* Application of Newton’s laws of motion to circular motion

Laboratory:* Free falling motion
 | Lec: 2HrLab:3Hr | * Lecture.
* Homework.
* Demonstration.
 | Kitakorn Jatiyanon |
| 4-7 | Lecture:Chapter4: Equilibrium (Physics of muscles).* Statics equilibrium of physics system and of muscles.
* Center of mass and center of gravity.

Chapter5: Work, Energy and Power* Work, energy and power of linear motion.
* Work, energy and power of circular motion.

Chapter6: Fluid.* Volumetric mass density and specific gravity.
* Pressure
* Pascal’s Principle
* Archimedes’ Principle
* Dynamics fluid

Laboratory:* Rotational motion
* Coefficient of static friction
* Energy conservation and projectile motion
* Moment of Inertia
 | Lec:8HrLab:12Hr | * Lecture.
* Homework.
* Demonstration.
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| 8 | Mid-term exam.Term break. |
| 9-11 | Lecture:Chapter7: Thermodynamics* Temperature and Heat
* Thermal expansion
* Heat capacity and Specific heat capacity
* Latent Heat
* Heat transfer
* Gas laws
* Laws of thermodynamics

Chapter8: Wave and Sound* Properties of waves
* Stationery wave
* Sound level
* Beat
* Dropper effect
* Sense of Hearing

Laboratory:* Spring
* Resistance
* Series circuit
 | Lec:6HrLab:9Hr | * Lecture.
* Homework.
* Demonstration.
 | Kitakorn Jatiyanon |
| 12-13 | Lecture:Chapter9: Light and Optics* Properties of light.
* Geometric optics.
* Application of Geometric optics.

 Laboratory:* Parallel circuit
* Ohm’s laws
 | Lec:4HrLab:6Hr | * Lecture.
* Homework.
* Demonstration.
 | Kitakorn Jatiyanon |
| 14-16 | Lecture: Chepter10: Introductory Electronics.* Electrostatics.
* Direct current.
* Alternating current.

Chapter11: Nuclear Physics and radioactivity* Isotope
* Radioactivity decay
* Nuclear reaction

Laboratory:* Practicing class before the exam
* Practical examination
 | Lec:6HrLab:9Hr | * Lecture.
* Homework.
* Demonstration.
 | Kitakorn Jatiyanon |
| 17 | Final exam |

**2. Assessment**

| **Learning Outcome** | **Assessment Method** | **Assessment Week** | **Mark Allocation** |
| --- | --- | --- | --- |
| 2.1-2.2,5.1-5.3 | QuizHomeworkMid-term examination.Final examination. | Whole semesterEvery chapter817 | 10%17%20%20% |
| 1.1-1.5, 1.7, 3.1-3.4, 4.1-4.3, 5.1-5.3 | Lab reportPractical examination. | Whole semester13 | 13%20% |

**Grading Criteria**

* This course requires criterion-referenced standard.

|  |  |
| --- | --- |
| Grade | Range of scores (100) |
| A | 80-100 |
| B+ | 75-79 |
| B | 70-74 |
| C+ | 65-69 |
| C | 60-64 |
| D+ | 55-59 |
| D | 50-54 |
| F | 0-49 |

* Students who are absent on either lecture or lab exam will get F-grade.
* Students must attend the lecture and lab classes as least 80%; otherwise, they will not pass the class.

##### Section 5 Course Resources.

**1. Required textbooks and reading.**

1. Halliday, D., Resnick, R., and Walker, J. (2005). Fundamentals of Physics (7th ed.). NJ: WILEY.

 2. Young, Hugh D., Freedman, Roger A. (2004). Sears and Zemansky’s university physics: with modern physics (11th ed.). CA: Pearson.

 3. Serway, Raymond A. (2004). Physics for Scientists and Engineers with Modern Physics (6th ed.).

 CA: Brook/Cole-Thomson Learning.

**2. Supplementary reading list/references.**

1. John D. Cutnell , Kenneth W.Johnson , **Physics** , John Wiley & Sons, Inc.,1998.

2. Hugh D. Young , **Physics** , Addison-Wesley Publishing Company ,Eighth Edition , 1992.

3. Thomus L.Floyd , **Electric Circuits Fundamentals** , Prentice-Hall International , Inc. Fourth Edition , 1998.

4. Douglas C. Giancoli , Physics For Scientists and Engineers with Modern Physics. second Edition Pretice - Hall , int , United Sate of America , 1988

**3. Recommended reading list/references.**

MIT Open Courseware

(https://www.youtube.com/watch?v=wWnfJ0-xXRE&list=PLyQSN7X0ro203puVhQsmCj9qhlFQ-As8e)

**Section 6 Assessment and Improvement of Course Operation.**

**1. Course assessment strategies by students.**

Course assessment will use the following activities:

1. Discussion with students.
2. Investigation from students’ behavior.
3. Class evaluation/peer evaluation.

**2. Teaching assessment strategies.**

Teaching assessment will be evaluated by

1. Comments from other lecturers.
2. Examination results.

**3. Teaching improvement.**

Teaching techniques will be improved by

1. Attending course workshops and meetings.
2. Knowledge sharing.

**4. Quality assurance of the course.**

 Discussion with students.

 Investigation from students’ behaviors.

 Grading and evaluation of the learning outcome.

 Comprehensive knowledge examination.

 Learning outcome reports.

 Class evaluation/peer evaluation.

 Other ....................................................................................

**5. Course revision and development plan.**

 This course will be improved by considering the results from online evaluation, students’ behavior and learning outcomes of students. The major and minor revision will be achieved by internal committee comments.