



Course Syllabus (Academic Year 2018)

School of Interdisciplinary Studies, Kanchanaburi Campus, Mahidol University

- Course No. and Title** : KAID251 Physics for Agricultural Science
Credit (study hours) : 4(4-0-8)
- Program Name** : Bachelor of Science in Agricultural Science
- Course Module** : Major Required Courses
Pre/co-requisite : -
- Class Semester** : 1st Semester 2nd Semester Academic Year 2018
- Class Schedule & Venue** : Mon 13:30 – 15.30, Thu 8:30 – 10: 30, Room L-2xx, Laboratory Building
- Class Coordinator** : Dr. Kwanchanok Chansawang
Email : kc.muka@gmail.com

7. Course Description

Mechanics: Particle kinematics, particle dynamics, work and energy, linear momentum and collisions, rotation motions, elastic properties of matters, oscillatory motion

Fluid mechanics: Fluid statics, fluid dynamics

Thermodynamics: Temperature and heat, the first law of thermodynamics, entropy and the second law of thermodynamics

Waves: Wave motion, reflection, superposition of waves, sound and hearing, standing wave, resonance, types of waves

Optics: Geometrical optics, physical optics

Electricity and magnetism: Electric force, magnetic force, electric field, magnetic field, electric potential, capacitor, electromagnetic induction, basic electric circuits, application of electromagnetism in agriculture

Quantum mechanics: Blackbody radiation, photoelectric effects, Compton effect, atomic spectra, de Broglie's hypothesis (wave-particle duality), hydrogen atom, laser

Nuclear physics: Structure of nucleus, mass-energy equivalent, binding energy, nuclear force, radioactive decay, nuclear reaction, interactions of radiation with matter, radiation detection and measurement, application of nuclear technology in agriculture

8. Course Objectives / Course Learning Outcomes (CLOs)

| No. | Objectives / CLOs | Expected Skills / Knowledge | | | PLOs |
|-----|---|-----------------------------|---------|-----------|------|
| | | Specific | Generic | Knowledge | |
| 8.1 | To provide students with knowledge and understanding of general principles and fundamental theories in physics. | | | | |
| 8.2 | To instruct students of the fundamental laws of physics and the application of scientific data, concepts, and models for use in the natural sciences and real world situations. | | | | |
| 8.3 | To provide students with problem solving skills by an approach that describes physical phenomena with relevant mathematical models and formulae. | | | | |
| 8.4 | To provide students with basic skills of physics that can be applied in agriculture. | | | | |

9. Class Instructor List

9.1 Name : Dr. Kwuanchanok Chansawang (KC)

Email : kc.muka@gmail.com

10. Course Outline

| Week | Date | Contents | CLOs | Instructor's Names |
|------|----------|--|------|--------------------|
| 1 | 20/08/18 | Introduction : SI Units, Vector & Scalar, Basic Mathematics, Significant Figure | 1 | KC |
| | 23/08/18 | Mechanics : Particle Kinematics | 1-2 | KC |
| 2 | 27/08/18 | Mechanics : Particle Dynamics | 1-3 | KC |
| | 30/08/18 | Work & Energy | 1-3 | KC |
| 3 | 3/09/18 | Mechanics : Momentum & Collisions | 1-3 | KC |
| | 6/09/18 | Rotation Motion | 1-3 | KC |
| 4 | 10/09/18 | Mechanics : Equilibrium & Elasticity | 1-3 | KC |
| | 13/09/18 | Periodic Motion | 1-3 | KC |
| 5 | 17/09/18 | Fluid Mechanics : Fluid Statics, Density, Pressure | 1-3 | KC |
| | 20/09/18 | Buoyancy, Surface Tension | 1-3 | KC |

| | | | | |
|----|----------------------|---|-----|----|
| 6 | 24/09/18 | Fluid Mechanics : Fluid Dynamics, Fluid Flow, Bernoulli's Equation, Viscosity, Application in AG | 1-4 | KC |
| | 27/09/18 | Thermodynamics : Temperature & Heat, Thermal Properties of Matter | 1-3 | KC |
| 7 | 1/10/18 | Thermodynamics : The 1 st Law of Thermodynamics | 1-3 | KC |
| | 4/10/18 | The 2 nd Law of Thermodynamics | 1-3 | KC |
| 8 | 8/10/18 | Thermodynamics : Entropy, Application in AG | 1-4 | KC |
| | 11/10/18 | Waves : Wave Motion, Mechanical Wave | 1-3 | KC |
| 9 | Mid-term Examination | | | |
| 10 | 22/10/18 | Waves : Sound & Hearing, Application in AG | 1-4 | KC |
| | 25/10/18 | Optics : Nature of Light, Properties of Light Physical Optics | 1-3 | KC |
| 11 | 29/10/18 | Optics : Geometrical Optics | 1-3 | KC |
| | 1/11/18 | Geometrical Optics, Application in AG | 1-4 | KC |
| 12 | 5/11/18 | EM : Electric Charge & Electric Field, Electric Potential, Capacitance & Capacitor | 1-3 | KC |
| | 8/11/18 | Current, Resistance, DC Circuits, Magnetic Field & Magnetic Force | 1-3 | KC |
| 13 | 12/11/18 | EM : Electromagnetic Induction, AC Current | 1-3 | KC |
| | 15/11/18 | Electromagnetic Waves, Application in AG | 1-4 | KC |
| 14 | 19/11/18 | Quantum Mechanics : Concepts of QM, Wave-Particle Duality | 1-3 | KC |
| | 22/11/18 | Atomic Spectra, Laser, Application in AG | 1-4 | KC |
| 15 | 26/11/18 | Nuclear Physics : Nucleus & Radioactivity, | 1-3 | KC |
| | 29/11/18 | Radioactive Decay, Nuclear Reaction | 1-3 | KC |
| 16 | 3/12/18 | Nuclear Physics : Interaction of Radiation with | 1-3 | KC |
| | 6/11/18 | Matter, Radiation Detection & Measurement, Application in AG | 1-4 | KC |
| 17 | Final Examination | | | |
| 18 | | | | |

NOTE: Schedule is subject to change as appropriate.

11. Course Assessment

| No. | Methods / Activities | Regulations | CLOs | Week | Weight |
|-----|----------------------|-------------|------|------|--------|
|-----|----------------------|-------------|------|------|--------|

| | | | | | Distribution (%) |
|------|--|---|-----|--------------|------------------|
| 11.1 | The 1 st Exam The 2 nd Exam The 3 rd Exam | <input checked="" type="checkbox"/> Content #1 (Week 1-4) #2 (Week 5-8, 10) #3 (Week 10-16) <input checked="" type="checkbox"/> A4 Note <input checked="" type="checkbox"/> Calculator | 1-4 | - | 20 20 20 |
| 11.2 | Oral exam | <input checked="" type="checkbox"/> Content (Week 1-16) | 1-4 | 18 | 10 |
| 11.3 | Quiz / Homework / Assignments / Experiments | - Quiz on the content learned - Review the contents by worksheet in class and homework | 1-4 | All | 20 |
| 11.4 | Class participation | Student must attend a class more than 80% of the whole course | 1-4 | All | 10 |
| | | | | Total | 100 |

12. Grading System

Criterion-referenced evaluation

| Grade | Score | Grade | Score | Grade | Score | Grade | Score |
|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
| A | $\geq 80\%$ | B | 70 – 74.99% | C | 60 – 64.99% | D | 50 – 54.99% |
| B+ | 75 – 79.99% | C+ | 65 – 69.99% | D+ | 55 – 59.99% | F | < 50 % |

Norm-referenced evaluation

*If use both criterion and norm-referenced evaluation, please tick two boxes.

13. References

13.1 Hugh D. Young and Roger A. Freedman. University Physics, 13th ed., Addison-Wesley, 2012.

13.2 Raymond A. Serway and John W. Jewett. Physics for Scientists and Engineers with Modern Physics, 8th ed., Brooks/Cole, 2010.

13.3 Bauer W. and Westfall D.G., University Physics with Modern Physics, McGraw Hill, 2011.

13.4 David Halliday, Robert Resnick and Jearl Walker, Fundamentals of Physics, 9th ed. Extended, Wiley, 2011.

13.5 Search the Web