

Applied Physics 2

Basic Course Information			
Course Number	1106024	Subject Category	Compulsory BM
Class Format	Lecture	Credit Type and Number of Credits	1
Department	Mechatronics	Student Category	Year 4
Period of Study	Semester 2	Classes per Week	2
Required Materials	Reference materials based on: Academic process of Physics - ISBN:978-1-107-15106-5 Institute: Victoria University		

Course Objective

This course aims to assess the following physical phenomena using mathematical expressions but able to understand the use of the mathematical methods and are applicable events.
 - Mechanics: elastic body, stress and strain, vibration (single degree of freedom system)
 - Fluid dynamics: nature of fluids, fluid statics, properties of fluid
 - Thermal dynamics: state of ideal gas, 1st law of thermal dynamics, 2nd law of thermal dynamics/Specifically.
 Each item of the following subject will be the target.

Evaluation Point	Good Level of Achievement (Very Good)	Standard Level of Achievement (Good)	Unacceptable Level of Achievement (Fail)
Explain the deformation of materials under load.	Good:70-79 L-V3 You can solve assignments correctly about this category and submit them by the deadline. Excellent:80-100 L-V4 Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Explain the deformation of materials under load	Can not explain the deformation of materials under load
Understand and apply the definition of fluid and mechanical treatment.	Good:70-79 L-V3 You can solve assignments correctly about this category and submit them by the deadline. Excellent:80-100 L-V4 Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Understand and apply the definition of fluid and mechanical treatment	Can not understand and apply the definition of fluid and mechanical treatment
Explain the types of vibration and harmonic oscillation.	Good:70-79 L-V3 You can solve assignments correctly about this category and submit them by the deadline. Excellent:80-100 L-V4 Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Explain the types of vibration and harmonic oscillation.	Can not explain the types of vibration and harmonic oscillation.
Explain the definitions and units of physical quantities used in relation to thermal dynamics.	Good:70-79 L-V3 You can solve assignments correctly about this category and submit them by the deadline. Excellent:80-100 L-V4 Ability to solve not only basic problems but also applied problems on midterm and/or final exams about this category.	Explain the definitions and units of physical quantities used in relation to thermal dynamics.	Can not explain the definitions and units of physical quantities used in relation to thermal dynamics.

Relationships with Learning Outcomes

(O1) Wide knowledge on Science and Engineering and practical ability to apply them to solve problems in the industry.

(B1) Ability to design, process and develop robotic/ mechatronic systems to solve specific problems

Please choose

Teaching Method

Outline: Discussion of physical phenomena in mechanics, fluid dynamics, thermal dynamics in addition to the goal is set to be able to explain their physical quantities can.

Class Format: Lecture and seminar

Please Note : All materials will be posted on the Moodle classroom. This student is encouraged to visit the course or view all submitted material to ensure further study for.

Course Plan	Semester 2	Contents and Method of Course	Goals	Related MCC
1st week	Guidance, mechanics, elastic body, stress and strain	Explain the deformation of materials when loading elastic, stress, strain, Poisson's law, elastic coefficient, allowable stress and safety factor	V.A. 3-26 V.A. 3-27 V.A. 3-28 V.A. 3-29 V.A. 3-30 V.A. 3-31 V.A. 3-32	
2nd week	Fluid dynamics I (nature of fluid)	Understand and apply the definition of fluid and units of physical quantities in the field of fluid dynamics, Newton's law of viscosity, Newtonian fluid and non-Newtonian fluid	V.A. 3-33 V.A. 3-34 V.A. 3-35 V.A. 3-36 V.A. 3-37 V.A. 3-38	
3rd week	Fluid dynamics II (fluid static)	Explain absolute pressure in fluid static systems, fluid statics, fluid statics, Pascal's principle, total pressure and buoyancy	V.A. 3-39 V.A. 3-40 V.A. 3-41 V.A. 3-42	
4th week	Fluid dynamics III (dynamics of fluid)	Explain the difference between steady flow and unsteady flow, Bernoulli's equation, continuity, flow velocity, flow rate, Euler's equation, Bernoulli equation, lift and drag	V.A. 3-43 V.A. 3-44 V.A. 3-45 V.A. 3-46 V.A. 3-47	
5th week	vibration I (harmonic oscillation, damped oscillation, forced oscillation)	Explain the types of vibration and harmonic oscillation, free vibration with damping and without damping, harmonic excitation	V.A. 3-48 V.A. 3-49 V.A. 3-50	
6th week	vibration II (waves and wave equation)	Explain the wave function and displacement due to vibration	V.A. 3-51 V.A. 3-52 V.A. 3-53	
7th week	Perform calculations using knowledge of elastic body and fluid dynamics.	Mock examination		
8th week	Wrap-up of 1st half of semester (Review)	Review and summarize learning		
9th week	Midterm Examination	For week 1-8		
10th week	Return Midterm Exam Papers and Feedback	Review learning		
11th week	Basics of thermal dynamics	Explain the definitions and units of physical quantities in the field of thermal dynamics, difference between the open system and closed system.	V.A. 4-105 V.A. 4-106 V.A. 4-107 V.A. 4-108 V.A. 4-109 V.A. 4-110	
12th week	First law of thermodynamics I	Explain the first law of thermodynamics and calculate the work, heat, internal energy and enthalpy to solve an energy equation	V.A. 4-111 V.A. 4-112 V.A. 4-113	
13th week	First law of thermodynamics II	Explain the work of open and closed system using the surroundings for compression or expansion	V.A. 4-114 V.A. 4-115 V.A. 4-116	
14th week	Properties and change in state of ideal gas	Explain the relationship between the temperature, volume, pressure, specific heat, gas constant, internal energy and enthalpy	V.A. 4-117 V.A. 4-118 V.A. 4-119	
15th week	Second law of thermodynamics I	Explain the second law of thermodynamics and understand the meaning of entropy and calculate the amount of entropy of a thermal energy	V.A. 4-120 V.A. 4-121 V.A. 4-122 V.A. 4-123 V.A. 4-124	
16th week	Second law of thermodynamics II	Explain the derivation of Carnot cycle and its thermal efficiency, understand the definition of entropy in the case of reversible change and irreversible change, process a cycle for heat engine	V.A. 4-125 V.A. 4-126 V.A. 4-127 V.A. 4-128 V.A. 4-129 V.A. 4-130	
17th week	Perform calculations using knowledge of thermal dynamics.	Mock examination		
18th week	Wrap-up of 1st half of semester (Review)	Review and summarize learning		
19th week	Final Examination	For week 11-18		
20th week	Return Exam Papers and Feedback and special sessions	Review and summarize learning		

(Unit)

Assessment	Unit	Mid-Semester Examination	Assignments	Final Exam	Total
Basic Ability	60	0	0	40	100
Mechanical Ability	10	0	0	10	20
Interdisciplinary Ability	10	0	0	10	20