MTC Module Descriptor

Title			Academic Session	2018-2019
PHYSICS PRINCIPLES			Credit Points	N/A
			FHEQ Level	N/A
Module Code	MTCG1017		OQF Level	N/A
Module Short Code	GFPPHY		Notional Hours	144 hrs
Owning Department	General Studies		Scheduled Hours	72 hrs
Release & Status	Draft v1.4		Release Date	Sep-18
Delivery Mode	MTC Campus		Review Date	
Module Assessment Board	MTCFdn		Module Lecturer(s)	Dr. Rabin R. Rabe and others TBD
Module Co-ordinator	Dr Rabin R. Rabe			
JACS Subject/Code	N/A	N/A	External Examiner	TBN

Named Awards Using this Module	Code	Type	Teaching Block
General Foundation	R0367F	Core	TB2 & TB3

Abstract

The module starts with an overview of the structure of matter and its properties. The principles of statics, kinetics and dynamics are explained. Thermodynamics principles and calculations performed using simple and appropriate methodologies. The principles of sound and electromagnetic wave propagation are explored. The propagation of light and basic properties of light are covered with a view to explain its use in fibre optics and engineering applications.

Notes

The contents of this module meet the requirements of Public Authority for Civil Aviation (PACA) Oman and the European Aviation Safety Agency Part 66 Module 2 for Licensed Aircraft Engineering (all the learning outcomes), except their assessment strategies.

Aeronautical Engineering Students: The content of this unit (excluding its assessment), also meets the requirements of the European Aviation Safety Agency Part 66 Module 6.

Requirements of Oman's system of quality assurance (ROSQA-for MTC Internal use)

Contribution to ROSQA Learning Outcomes (Knowledge (K), Cognitive Skills (CS), General Competencies (GC)).
The attributes delivered in this module are designed to meet ROSQA Learning Outcomes for OQF Level 1 (Certificate).

Requisites Statement

None

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Aims (10 max.)	
1	To explain the nature, properties and relationships of solids, fluids, gases, atomic structures, molecules and compounds
2	To understand, relate the terms, explain the principles and evaluate problems associated with statics and kinetics.
3	To relate the concepts of dynamics and fluid dynamics for different applications.
4	To explain the principles and evaluate the problems associated with thermodynamics.
5	To contextualise the terms and principles and evaluate problems associated with light propagation and optics.
6	To explain the principles and evaluate the problems associated with wave motion and sound and perform any associated calculations.

Learning Outcomes (10 max.) **– On successful completion of this module, students should be able to:**	
1	Recognise and distinguish types of matter and interrelated properties.
2	Describe objects/systems for work and energy and experimentally demonstrate work and energy, identify simple applications to mechanics.
3	Demonstrate theories, concepts and applications of fluid dynamics.
4	Describe the theories, concepts and applications of thermodynamics.
5	Define, analyse and demonstrate the concept of light and electromagnetic waves.
6	Define, demonstrate the nature and applications of sound waves.
7	Collect and record basic experimental data and present the results in the form of a report.

Syllabus (10 max)- The Topics covered in the module will include:	
1	**Introduction**: Base units, basic units, derived units converting units of measurements prefixes, S.I system.
2	**Matter**: Nature of matter, structure of an atom, shell, nucleus, molecules, periodic table, chemical compounds, different states of matter (solid, liquid gas and plasma), changes of states.
3	**Statics:** Vector & scalar quantities, adding vectors (using force concept), graphical method, triangular forces, equilibrium, polygon of forces, mathematical solution, moment & couples, moment & equilibrium, mechanical properties of matter stress, tension compression, torsion, bending, shear, strain and Young's modulus.

4.	**Kinetics:** Velocity, acceleration, equation of linear motion with examples, linear movement, gravity & weight, centre of gravity, free fall, rotational motion, centripetal and centrifugal forces, periodic motion, pendulum, spring mass system, frequency & period, harmonics, resonance. Velocity ratio, mechanical advantage & efficiency, levers (first, second and third class), pulleys, gears, internal gears, inclined plane, bolts & nuts.
5.	**Dynamics:** Newton's laws of motion, mass, inertia, work, power, energy, conservation of energy, momentum, impulse, conservation of momentum, torque, moment of inertia, angular momentum, conservation of angular momentum, gyroscopes, rigidity, precession, friction, coefficient of friction.
6.	**Fluid dynamics**: Adhesion & cohesion, capillarity, surface tension, diffusion, pressure in liquids, Pascal's vases, calculating pressure in a liquid, hydraulics, pressure measurements, absolute pressure, atmospheric pressure, mercury barometer, aneroid barometer, buoyancy, Pascal's law, Bramah's law, Archimedes' law density with examples, hydrometer, viscosity, fluid resistance & aerodynamic drag, parasitic drag, skin friction, interference drag, the effects of streamlining, the compressibility of fluids, static & dynamic pressure & Bernoulli's theorem.
7.	**Thermodynamics:** Temperature, Celsius scale, Fahrenheit scale, absolute temperature scale, heat, thermometers, heat capacity, specific heat capacity, change of state, latent heat, sensible heat, heat transfer, conduction, convection and radiation. Expansion, contraction, linear, areal, (volume/liquid) expansion, laws of thermodynamics, gas law, volume temperature, pressure, Charles's law, Gay-Lussac's law, Dalton's law, specific heats of gases, pressure & volume graphs, isothermal, adiabatic, isobaric and isometric process, refrigerators, air conditioners, heat pumps, air-source heat pump operation, heat of fusion, heat evaporation, heat vaporisation and heat combustion.
8.	**Optics**: Speed of light (light velocity), laws of reflection, plane & curved mirrors, focus and focal length, real and virtual images, frequency and wavelength, refraction and refractive index, direction of bending of light, Snell's law, and critical angle, and total internal reflection, refraction in convex and concave lenses, fibre optics and fibre optic imaging.
9.	**Wave motion & Sound**: Wave motion, the anatomy of wave, crest, trough, nodes and antinodes, categories of wave, wavelength, frequency and period of wave, interference phenomena, constructive and destructive interference, sound, speed of sound, intensity, pitch, sound interval and Doppler effect.

Learning and Teaching Strategy

Formal lectures will provide the theory of science i.e., (physical sciences) and highlight the application of theory by examples. This will be underpinned with associated laboratory exercises. Students will be provided with course material including worked examples with model answers.

Students will complete practical exercises and verify results using appropriate mathematical concepts. This will develop an understanding of the theoretical content. Students will produce written reports on exercises and assignments.

Students will undertake Guided Self Study including the use of the VLE including web-based physics problems, and directed to resources such as online tutorials, notes, workbooks, interactive presentations and simulations.

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#	Activity Type	Description	QAA Activity	Hours(72)
1	Lecture	Lectures covering LO 1, 2, 3, 4, 5 & 6.	Lecture 10 wks x 6 hrs = 60 hrs 2 wks x 4 hrs = 8 hrs	72
2	Laboratory	Students have to perform 2 experiments and write lab reports, which cover LO 7.	Practical classes and workshops 2 wks x 2 hrs = 4 hrs	

Assessment and Schedule Strategy

The module will be assessed by continuous assessments, namely: Quiz, Mid Term, Laboratory work and Final Exam.

Regular graded continuous assessments will be used to provide guidance and feedback to the students on progress. The marked continuous assessments only Quiz will be reviewed by the students in the class and will be taken back by the teachers, and the generic feedback of Midterm and Final Exam will be provided in the Moodle.

Reporting of laboratory work will be a required component of the LO 7 for which attendance at the laboratory sessions is compulsory. If the student missed the laboratory work, a separate laboratory session will be conducted after working hours.

First Attempt Deferred Assessment

Deferred First Attempt Assessment for quiz, midterm and final exams will be a different set of exam but will cover the same Learning Outcomes of particular exam missed. This deferred assessment will also have the same length of time as the regular exam.

Second Attempt Assessment (Re-sit)

Second attempt assessment will be by one and half hour examination to cover all Learning Outcomes. The maximum marks obtained by the students will be capped at 50% (minimum passing requirements).

Item	Trimester	Assessment	Weighting	Assessment Type	Final Artefact	Pass Mark	Description
1	TB2	Quiz	10%	Written exam	No		30 min
2	TB2	Midterm Exam	30%	Written exam	No		1hr
3	TB2	Laboratory work	10%	Lab Report	No		
4	TB2	Final Exam	50%	Written exam	Yes		1hr 30min
	Overall		100%			50%	

Indicative Reading

Core Text(s):

Recommended text books can be borrowed from the library.

Recommended Reading:

Physics, Walker J, (4th Ed, 2009), Pearson.
A Level Physics, Nelkon & Parker
ISBN-13: 978-0321611116

Advanced Physics for
You by:
Keith Johnson, Simmone Hewett, Sue Holt, John Miller
ISBN-13: 978-0748752966