

# MTC Module Descriptor

<b>Title</b>		<b>Academic Session</b>	2020-2021	
<b>PHYSICS PRINCIPLES</b>		<b>Credit Points</b>	N/A	
		<b>FHEQ Level</b>	N/A	
<b>Module Code</b>	MTCG1017	<b>OQF Level</b>	N/A	
<b>Module Short Code</b>	GFPPHY	<b>Notional Hours</b>	144 hrs	
<b>Owning Department</b>	General Studies	<b>Scheduled Hours</b>	72 hrs	
<b>Release &amp; Status</b>	Draft V1.6	<b>Release Date</b>	April 2020	
<b>Delivery Mode</b>	MTC Campus	<b>Review Date</b>		
<b>Module Assessment Board</b>	MTCFdn	<b>Module Lecturer(s)</b>	Ms Geetha Pradeep and others TBD	
<b>Module Co-ordinator</b>	Ms Geetha Pradeep			
<b>JACS Subject/Code</b>	N/A	N/A	<b>External Examiner</b>	TBN

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

<b>Abstract</b>
<p>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.</p>

<b>Notes</b>
<p>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.</p> <p>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.</p>
<b>Requirements of Oman's system of quality assurance (ROSQA-for MTC Internal use)</b>
<p><b>Contribution to ROSQA Learning Outcomes</b> (Knowledge (K), Cognitive Skills (CS), General Competencies (GC)).</p> <p>The attributes delivered in this module are designed to meet ROSQA Learning Outcomes for OQF Level 1 (Certificate).</p>

<b>Requisites Statement</b>
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	<b>Introduction:</b> Base units, basic units, derived units converting units of measurements prefixes, S.I system.
2	<b>Matter:</b> 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	<b>Statics:</b> 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.

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4.	<b>Kinetics:</b> 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.	<b>Dynamics:</b> 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.	<b>Fluid dynamics:</b> 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.	<b>Thermodynamics:</b> 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.	<b>Optics:</b> 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.	<b>Wave motion &amp; Sound:</b> 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
1	Lecture	Lectures covering LO 1, 2, 3, 4, 5, 6 & 7	Lecture 12 wks.x 6 hrs = 72 hrs	72

## Assessment Strategy- Direct Entry/ HEAC (GSD-Exit Exam)

The module will be assessed through summative assessments, namely: Final Exam, to cover **all Learning Outcomes** and will have a duration of 75 minutes.

This assessment plan will be implemented whether online or paper-based testing depending on the MTC Exams regulations.

## Second Attempt Assessment (Re-sit)- Direct Entry/ HEAC (GSD-Exit Exam)

Second attempt assessment will be **75 minutes** examination to cover **all Learning Outcomes**.

The maximum marks obtained by the students will be capped at 60% (minimum passing requirements).

## Direct Entry/ HEAC (GSD-Exit Exam)

Item	Assessment	Weighting	Assessment Type	Final Artefact	Pass Mark	Description
1	Final Exam	100%	Online/Written Exam	Yes	60%	75 Minutes duration

## 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, Simone Hewett, Sue Holt, John Miller

ISBN-13: 978-0748752966