Erindale College

UNIT OUTLINE

Mathematics, Science & Information Technology Academy

Science

SEMESTER 1 2018

Course Title	**Flight**	**Course Code**	2317
Semester Unit	Aviation Science	**Unit Code/Value**	22654/1.0
Term Units	Aviation Science a Aviation Science b	**Unit Code/Value**	22660/0.5 22661/0.5

Specific Unit Goals

By the end of this unit, students:

A course	T course	M course
• describe the science behind the principles of flight	• demonstrate depth and breadth of scientific knowledge of the principles of flight	• describe how wing and aircraft design enable flight
• design and carry out experiments and simulations	• hypothesise, design and modify experiments and simulations	• participate in experiments and conduct simulations
• identify and describe aircraft components and instruments	• analyse aircraft components, instrumentation and design elements	• identify and describe aircraft components and instruments
• describe and discuss control systems and their operation	• communicate specialised information about control systems and their effect on flight	• describe aircraft controls
• describe the need for aircraft weight and balance and their effect on safe flight	• demonstrate understanding of aircraft weight and balance and their effect on safe flight	• understand that aircraft must be correctly balanced for safe flight

Content

A course	T course	M course
Science Inquiry Skills		
• conduct research that explores the design, structure and operation of various types of aircraft	• identify, research and construct questions that investigate the design and structure and operation of aircraft	• explore the design, structure and operation of various types of aircraft alone or in groups
• conduct simple investigations using equipment and models to safely explore the requirements for flight using scientific method	• design investigations, conduct risk assessments and consider research ethics relating to the design and flight of aircraft using scientific method	• experiment with equipment and models to safely explore the requirements for flight

A course	T course	M course
• represent data in meaningful and useful ways, including using appropriate SI units and symbols	• represent and organise data in meaningful and useful ways, including using appropriate SI units and symbols, to identify trends, patterns and relationships	• use appropriate language and symbols to describe aircraft operations
• interpret and compare a range of aviation and media texts and identify important information by considering the quality of available evidence	• interpret a range of aviation and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments	
• use appropriate mathematical models, including graphs and tables of data, to solve problems and make predictions concerning aircraft performance	• select, use and interpret appropriate mathematical models, including graphs and tables of data, to solve problems and make predictions concerning aircraft performance	
• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports	• communicate to audiences using appropriate language
Science as Human Endeavour		
• describe the history and development of aviation and aircraft design	• analyse the effects of experimentation on the development of aviation and aircraft design	• describe some of the ways in which aircraft design has changed over time
• understand and discuss the roles of specialist professions in the development, design, construction and maintenance of aircraft	• analyse and explain the roles of researchers from a variety of fields in the development and design of aircraft, engines and technologies.	• identify many of the specialist professions that contribute to the construction and maintenance of aircraft
• discuss ethical, legal and environmental issues related to the use of aircraft	• critique the ethical, legal and environmental issues that influence the development and use of aircraft	• recognise legal and environmental issues related to the use of aircraft
• Recognise that social, economic, cultural and ethical considerations influence the adoption of new technology	• Identify social, economic, cultural and ethical considerations that have influenced the adoption of new technology in aviation	

A course	T course	M course
Science Understanding		

• understand and apply measurement, units and uncertainty used in aviation	• understand and apply measurement, units and uncertainty used in aviation	• use correct aviation units of measurement
• Investigate and report on a research topic	• design and conduct an investigation and report the findings	• use appropriate text to describe an investigation
• use graphical techniques to solve vector problems	• accurately use graphical and trigonometric methods to solve vector problems	
• describe light aircraft structure, major systems and airframe design	• understand and communicate the principles of light aircraft structure	• describe the structure of light aircraft
• describe the effect of the four aerodynamic forces – lift, drag, thrust and weight	• analyse and quantify the four aerodynamic forces – lift, drag, thrust and weight	• identify the four aerodynamic forces – lift, drag, thrust and weight
• describe the effect of torque and balance on aircraft loading and operation	• understand and calculate torque and balance and its effect on aircraft loading and operation	
• identify flight controls and describe their operation	• identify flight controls and describe their operation, including first and second order effects of control	• describe the controls used to operate an aircraft
• understand the causes of stalling, spinning & spiral dives and their outcome	• understand the causes of stalling, spinning & spiral dives and methods of recovery	• describe spins and spiral dives and their outcome
• describe static and dynamic pressure and their application for flight instruments	• discuss the differences between static and dynamic pressure and their application for specific flight instruments	
• investigate wing aerodynamics, including fluid flow, Bernoulli's theorem, turbulent and laminar airflow and boundary layer effects	• understand and illustrate wing aerodynamics, including fluid flow, Bernoulli's theorem, turbulent and laminar airflow and boundary layer effects	• describe wing shape and the role of the airfoil in producing lift
• describe the major components of piston engines and compare them to jet turbine engines	• discuss in detail the major components of piston engines and jet turbine engines and their operation and management	• Identify engine types and their use for low-level and high level flight
• describe the structure and operation of propellers	• explain the structure and operation of propellers referring to their geometric pitch and blade shape	• identify types of propeller
• understand the effects of moisture, temperature and pressure on engine operation and carburettor icing	• explain the causes of carburettor icing and the effects of temperature and pressure on engine operation	

A course	T course	M course
• understand the factors affecting take-off and landing performance	• understand and calculate the factors affecting take-off and landing performance using p-charts	•

Science Unit Grade Descriptors for T courses

	A student who achieves an **A** grade typically	A student who achieves a **B** grade typically	A student who achieves a **C** grade typically	A student who achieves a **D** grade typically	A student who achieves an **E** grade typically
Knowledge and Understanding	• demonstrates thorough and extensive knowledge and understanding of scientific concepts • justifies and applies knowledge to familiar and unfamiliar contexts and across different concept areas and experiences, displays originality and lateral thinking in problem solving	• demonstrates broad and in-depth knowledge and understanding of scientific concepts • applies knowledge to familiar and unfamiliar contexts and across different concept areas and experiences, displaying originality and effective thinking in problem solving	• demonstrates broad and general knowledge and understanding of scientific concepts • is able to apply knowledge in a variety of contexts and different concept areas to solve problems	• demonstrates general and basic knowledge and understanding of scientific concepts • is able to use knowledge in different areas to solve problems	• demonstrates a limited knowledge of scientific concepts • displays emerging awareness of strategies to solve problems
Critical Thinking	• evaluates, synthesises and analyses patterns and trends in data, observations and investigations and makes valid and perceptive inferences • applies highly effective analytical and evaluative skills, makes perceptive connections between scientific concepts, draws accurate conclusions and proposes appropriate improvements	• analyses and synthesises patterns and trends in data, observations and investigations and makes valid inferences • applies effective analytical skills, makes insightful connections between scientific concepts, draws mostly accurate conclusions and proposes appropriate improvements	• describes and explains patterns and trends in data, observations and investigations and makes general inferences • describes and explains general connections between scientific concepts, draws conclusions and proposes improvements	• identifies and describes patterns in data, observations and investigations and makes simple inferences • describes connections between scientific concepts, draws conclusions and proposes improvements	• identifies patterns in data, observations and investigations • identifies connections between scientific concepts
Investigative Skills	• demonstrates logical and coherent investigations, acknowledges information using referencing conventions and operates equipment highly effectively and safely	• demonstrates well considered investigations, acknowledges information using referencing conventions and operates equipment effectively and safely	• demonstrates considered investigations, acknowledges information using referencing conventions and operates equipment safely with some general effectiveness	• outlines investigations, inconsistently acknowledges information using referencing conventions and mostly operates equipment effectively and safely	• displays emerging skills in investigations, attempts to acknowledge information and operates equipment with limited awareness of safety procedures
Communication	• presents highly complex concepts accurately and coherently in a wide range of written and non written formats using appropriate terminology with flair	• presents concepts clearly and logically in a range of written and non written formats using appropriate terminology with confidence	• presents general concepts clearly in a range of written and non written formats using appropriate terminology generally using terminology appropriately	• presents basic concepts in a narrow range of written and non written formats using terminology inconsistently	• presents some basic concepts in a limited range of written & non written formats using minimal terminology
Work practices	• organises time and resources to work in a highly productive and safe manner both independently and in a team • evaluates and analyses risks, acts highly appropriately in all investigations	• organises time and resources to work in a productive and safe manner both independently and in a team • analyses and explains risks and acts appropriately in all investigations	• organises time and resources to work in a generally productive and safe manner both independently and in a team • identifies and describes risks and acts appropriately in all investigations	• demonstrates inconsistent organisation of time & resources, works with occasional productivity & some awareness of safety independently or in a group • identifies risks and acts mostly appropriately in investigations	• demonstrates limited organisation of time & resources to work with an emerging awareness of safety • demonstrates an emerging awareness of risks, developing approaches to investigations

ASSESSMENT

TASK	DUE DATE	WEIGHTING
Assignment 1	**Week 6**	**20 %**
Test 1	**Week 8**	**30 %**
Assignment 2	**Week 14**	**20 %**
Test 2	**Week 18**	**30 %**

Specific Entry & Exit Requirements for Term Units
This is a Semester Unit.

POLICIES AND PROCEDURES
All students are encouraged to read and understand the full policies and procedures available from the BSSS website http://www.bsss.act.edu.au/__data/assets/pdf_file/0010/313777/PandPManual_2015_Version_19.pdf. The following items are of particular relevance to many students.

ATTENDANCE AND PARTICIPATION
Students are expected to submit all assessment items and attend all classes, participate in a positive manner and seek support whenever it is required. Excursions, simulations and presentations by visitors (including lunchtime) may form part of class work. It is your responsibility to catch up on missed work when absent from class.

Any student whose attendance falls below the 90% of the scheduled classes/contact time and has not provided substantial documentary evidence to cover the absence will be awarded a V grade. This means that 4 unexplained absences in a term or 8 unexplained absences in a semester could mean that a V grade may be awarded. However, the Principal has the right to exercise discretion in special circumstances if satisfactory documentation is supplied.

LATE SUBMISSION OF WORK
Students are encouraged to submit work on time as it is a valuable organisational skill. Students are also encouraged to complete work even if it is late, as there are educational benefits in doing so.

Late work will receive a penalty of 5% (of possible marks) per calendar day late, unless an extension is granted by the class teacher prior to the deadline. This means that 5% is taken off the possible marks that could have been achieved eg. If a student achieved a score of 75/100, and the item is one day late, then five marks (5% of 100) would be taken from 75, which leaves the score as 70/100. 'Per calendar day late' means each day late whether it be a weekend or public holiday. Items due on any date must be submitted to the class teacher, faculty staff room, or front office at the college by 3.30pm on that day. After 3.30pm, the item will attract the late penalty. Submission of work on a weekend or public holiday is not acceptable. If you do not submit your work to your class teacher, make sure that it is signed and dated by either another member of staff in the faculty staffroom, or a member of the front office staff.

After 7 days, late work will be awarded the Notional Zero. Calculation of a Notional Zero is based on genuine scores, (items submitted on time or with an extension). The Notional Zero will be a score that lies between 0.1 of the standard deviation below the lowest genuine score for that item and zero. If the lowest genuine score is zero, then the notional score is zero.

No work will be accepted after marked work has been returned, or accepted after the unit has completed. Computer and/or printer failure will not be accepted as a valid reason for late work. Make sure you backup, keep hard copies and rough notes.

Unless prior approval is granted, any student who fails to submit assessment tasks worth in total 70% or more of the assessment for the unit will be considered to be unassessable and will receive a V grade. The Principal has the right to exercise discretion in the application of the late penalty in special circumstances where satisfactory documentation is supplied.

CHEATING AND DISHONEST PRACTICE

The integrity of the College's assessment system relies upon all involved acting in accordance with the highest standards of honesty and fairness. Any departure from such standards will be viewed very seriously. Accordingly:

- Plagiarism - claiming authorship of someone else's work (intentionally or otherwise) - is a serious misdemeanour, and attracts severe penalties.
- Students are required to acknowledge the source of all material that is incorporated into their own work.
- Students may not submit the same item for assessment in more than one unit, unless specific agreement has been reached with the class teacher.

MODERATION

Throughout the semester, moderation in the form of common marking schemes, cross marking and joint marking occurs across all units in the Moderation Group to ensure comparability of standards. Moderation is a process whereby student's work is compared so that student performance can be graded fairly and consistently. Moderation takes some time, and so students may not receive their work back until ACT wide moderation of grades across all colleges has occurred. Small Group Moderation is carried out in courses with small class sizes.

UNIT SCORES

- Raw scores are calculated by adding Z scores according to the weightings in the assessment table.
- All raw unit scores are then combined into two rank order lists, one for each cohort Year 11 and 12. Each list is reviewed by the Executive Teachers concerned to identify any anomalies.
- Each of the rank order lists is then standardised for each semester using historical parameters or back scaling.

RIGHT TO APPEAL

You can appeal against your assessment if you feel that the result you obtained is not fair. You should first talk to your class teacher, and if you are not satisfied with the explanation you must discuss the situation with the Executive Teacher of the faculty concerned. If you still do not feel that your result is fair you should talk to the Deputy Principal Programs for further advice on the 'appeal process'.

Executive Teacher: Ruth Edge **Date 5/2/2018**

Class Teacher: Gary Lawson