Science Academy

Erindale College

UNIT OUTLINE

Year: 11 Accreditation: T

Timetable Period: Semester 2, 2019

Classroom Teacher: Vince Tee **Executive Teacher: Jodie Beaumont**

Course Title	PHYSICS	**Course Code:**	2172
Semester Unit	Unit 2: Thermal, Nuclear and Electrical	**Unit Value/Code:**	30251/1.0
Term Unit (a)	Unit 2a: Thermal, Nuclear and Electrical	**Unit Value/Code:**	30252/0.5
Term Unit (b)	Unit 2b: Thermal, Nuclear and Electrical	**Unit Value/Code:**	30253/0.5

Specific Unit Goals:

By the end of this unit, students:

- understand how the kinetic particle model and thermodynamics concepts describe and explain heating processes
- understand how the nuclear model of the atom explains radioactivity, fission, fusion and the properties of radioactive nuclides
- understand how charge is involved in the transfer and transformation of energy in electrical circuits
- understand how scientific models and theories have developed and are applied to improve existing, and develop new, technologies
- use science inquiry skills to design, conduct and analyse safe and effective investigations into heating processes, nuclear physics and electrical circuits, and to communicate methods and findings
- use algebraic and graphical representations to calculate, analyse and predict measurable quantities associated with heating processes, nuclear reactions and electrical circuits
- evaluate, with reference to empirical evidence, claims about heating processes, nuclear reactions and electrical technologies
- communicate physics understanding using qualitative and quantitative representations in appropriate modes and genres.

Content Summary:

Science Inquiry Skills

identify, research, construct and refine questions for investigation; propose hypotheses; and predict possible outcomes (PHYT01)

design investigations, including the procedure/s to be followed, the materials required, and the type and amount of primary and/or secondary data to be collected; conduct risk assessments; and consider research ethics (PHYT02)

conduct investigations, including using temperature, current and potential difference measuring devices, safely, competently and methodically for the collection of valid and reliable data (PHYT03)

represent data in meaningful and useful ways, including using appropriate Système Internationale (SI) units and symbols; organise and analyse data to identify trends, patterns and relationships; identify sources of random and systematic error and estimate their effect on measurement results; identify anomalous data and calculate the measurement discrepancy between experimental results and a currently accepted value, expressed as a percentage; and select, synthesise and use evidence to make and justify conclusions (PHYT04)

interpret a range of scientific and media texts, and evaluate processes, claims and conclusions by considering the quality of available evidence; and use reasoning to construct scientific arguments (ACSPH005) (PHYT05)

select, construct and use appropriate representations, including text and graphic representations of empirical and theoretical relationships, flow diagrams, nuclear equations and circuit diagrams, to communicate conceptual understanding, solve problems and make predictions (PHYT06)

select, use and interpret appropriate mathematical representations, including linear and non-linear graphs and algebraic relationships representing physical systems, to solve problems and make predictions (PHYT07)

communicate to specific audiences and for specific purposes using appropriate language, nomenclature, genres and modes, including scientific reports (PHYT08)

Science as a Human Endeavour

science is a global enterprise that relies on clear communication, international conventions, peer review and reproducibility (PHYT09)

development of complex models and/or theories often requires a wide range of evidence from multiple individuals and across disciplines (PHYT10)

advances in science understanding in one field can influence other areas of science, technology and engineering (PHYT11)

the use of scientific knowledge is influenced by social, economic, cultural and ethical considerations (PHYT12)

the use of scientific knowledge may have beneficial and/or harmful and/or unintended consequences (PHYT13)

scientific knowledge can enable scientists to offer valid explanations and make reliable predictions (PHYT14)

scientific knowledge can be used to develop and evaluate projected economic, social and environmental impacts and to design action for sustainability (PHYT15)

Science Understanding

Heating processes

heat transfer occurs between and within systems by conduction, convection and/or radiation (PHYT16)

the kinetic particle model describes matter as consisting of particles in constant motion, except at absolute zero (PHYT17)

all systems have thermal energy due to the motion of particles in the system (PHYT18)

temperature is a measure of the average kinetic energy of particles in a system (PHYT19)

provided a substance does not change state, its temperature change is proportional to the amount of energy added to or removed from the substance; the constant of proportionality describes the heat capacity of the substance (PHYT20)

change of state involves internal energy changes to form or break bonds between atoms or molecules; latent heat is the energy required to be added to or removed from a system to change the state of the system (PHYT21)

two systems in contact transfer energy between particles so that eventually the systems reach the same temperature; that is, they are in thermal equilibrium (PHYT22)

a system with thermal energy has the capacity to do mechanical work (that is, to apply a force over a distance); when work is done, the internal energy of the system changes (PHYT23)

because energy is conserved, the change in internal energy of a system is equal to the energy added or removed by heating plus the work done on or by the system (PHYT24)

energy transfers and transformations in mechanical systems (for example, internal and external combustion engines, electric motors) always result in some heat loss to the environment, so that the usable energy is reduced and the system cannot be 100 percent efficient (PHYT25)

Assessment:

TASK	DUE DATE	WEIGHTING %
Practical 1	Week 5	20
Exam 1	Exam Week T3	30
Practical 2	Week 13	20
Exam 2	Exam Week T4	30

SPECIFIC ENTRY & EXIT REQUIREMENTS FOR TERM UNITS:

This is a Semester Unit, students wishing to enter or exit after the end of term must have the change approved by the Academy Executive Leader and need to complete 50% of the assessment

ASSESSMENT CRITERIA FOR ASSESSMENT AND REPORTING OF STUDENT ACHIEVEMENT

See Science Unit Grade Descriptors for T courses attached

Attendance and Participation

It is expected that students will attend and participate in all scheduled classes/contact time/structured learning activities for the units in which they are enrolled, unless there is due cause and adequate documentary evidence is provided. Any student whose attendance falls below 90% of the scheduled classes/contact time or 90% participation in structured learning activities in a unit, without having due cause with adequate documentary evidence will be deemed to have voided the unit. However, the principal has the right to exercise discretion in special circumstances if satisfactory documentation is supplied.

Completion of Assessment Items

Students are expected to substantially complete and submit all assessment items. Exemption from an item and/or alternative assessment without penalty is available to students providing adequate documentary evidence. In order to meet the minimum assessment requirements of a unit, a student must substantially complete and submit at least 70% of the total assessment. However, the principal has the right to exercise discretion in the award of a grade or score in special circumstances where satisfactory documentation is supplied.

Late Submission of Assessment Items

Students are encouraged to submit work on time as this is a valuable organisational skill. Students are also encouraged to complete work even if it is late as there are educational benefits in so doing. The following policy is to ensure equity for all students:

• All assessment tasks are expected to be submitted by the specified due date

• Where marks are awarded for assessment tasks, a late penalty will apply unless an extension is granted. The penalty for late submission is 5% of possible marks per calendar day late, including weekends and public holidays, until a notional zero is reached. If an item is more than 7 days late, it receives the notional zero. Submission on weekends or public holidays is not acceptable. Calculation of a notional zero is based on items submitted on time or with an approved extension (Refer to Notional Zeros)

• Where marks are not awarded, and a grade only is given for an assessment task, teachers will take into account the extent to which students have demonstrated their ability to complete and submit the task by the due date (taking into account any extensions granted) in awarding the grade

• Unless there are exceptional circumstances, students must apply for an extension to the specified due date in advance, providing due cause and adequate documentary evidence for late submission

• It may not be possible to grade or score work submitted late after marked work in a unit has been returned to other students

• The principal has the right to exercise discretion in the application of the late penalty in special circumstances where satisfactory documentation has been provided.

Notional Zeros

Where students fail to hand in assessment items for which marks are awarded, they will be awarded a notional zero for that assessment item. The notional zero will be a score, which lies between 0.1 of a standard deviation below the lowest genuine score for that item and zero. Note: if the lowest genuine score is zero, the notional zero is zero.

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. Plagiarism is the copying, paraphrasing or summarising of work, in any form, without acknowledgement of sources, and presenting this as a student's own work. Examples of plagiarism could include, but are not limited to:

• submitting all or part of another person's work with/without that person's knowledge

• submitting all or part of a paper from a source text without proper acknowledgement

• copying part of another person's work from a source text, supplying proper documentation, but leaving out quotation marks

• submitting materials which paraphrase or summarise another person's work or ideas without appropriate documentation

• submitting a digital image, sound, design, photograph or animation, altered or unaltered, without proper acknowledgement of the source.

Right to Appeal

The ACT system operates a hierarchy of reviews and appeals:

• Student seeks review from teacher regarding assessment task mark/grade, unit score, unit grade, course score

• Student seeks review from head of department, if required following review by teacher

• Student appeals to her/his college principal for a review of college assessment relating to assessment task grade/mark, unit grade, unit score, course score, penalty imposed for breach of discipline in relation to assessment

• Student, who has been through the college appeal process, may appeal to the Board against the college procedures by which the appeal decision was reached.

Executive Teacher: Jodie Beaumont **Class Teacher: V. Tee**

FURTHER INFORMATION ON RELEVANT BSSS POLICIES CAN BE FOUND HERE:

http://www.bsss.act.edu.au/__data/assets/pdf_file/0010/313777/P_and_P_Manual_2019_V5.pdf

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