



IMMACULATE CONCEPTION HIGH SCHOOL

Department of Science

Grade 10

Physics

Course Outline: September 2024- June 2025

COURSE INSTRUCTORS:

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COURSE DESCRIPTION:

This course introduces grade 10 students to the fundamental principles of physics, providing a solid foundation for understanding the physical world. It covers essential topics such as mechanics and thermal physics. Students will engage in both theoretical and practical work, developing skills in scientific inquiry, problem-solving, and the application of physics concepts to real-world situations. The course is designed to prepare students for the CXC CSEC Physics examination, emphasizing critical thinking and analytical skills.

PREREQUISITES:

- Mastery of Physics concepts introduced at the grade 9 level.
- Proficiency in Mathematics- good grasp of Mathematical concepts especially algebra, basic geometry and trigonometry.
- Proficiency in English Language- strong reading and comprehension skills.

COURSE OBJECTIVES:

Upon completion of this course, students will:

- develop an understanding and knowledge of technological and scientific applications of Physics, especially within the Caribbean context;
- develop the ability to apply an understanding of the principles and concepts involved in Physics to situations which may or may not be familiar;
- develop good laboratory skills and in the practice of safety measures when using equipment;
- develop critical thinking and problem solving skills;
- plan, design and perform experiments to test theories and hypotheses
- collect and represent data in an acceptable form, reporting it accurately and concisely;
- develop the ability to appraise information critically, identify patterns, cause and effect, stability and change, and evaluate ideas;
- develop the ability to work independently and collaboratively with others when necessary;

- appreciate the significance and limitations of science in relation to social and economic development;
- develop an awareness of the applications of scientific knowledge and a concern about the consequences of such applications, particularly the impact on the environment;
- enhance their interest in and love for the study of Physics;
- integrate Information and Communication Technology (ICT) tools and skills.

(Adopted from the CXC CSEC Physics Syllabus, 2019)

Students' Learning Outcomes:

At the end of the course students will be able to:

1. **Explain Fundamental Mechanics Concepts:** Describe motion in terms of distance, displacement, speed, velocity, and acceleration. Differentiate between scalar and vector quantities. Describe different types of forces including turning and stretching forces.
2. **Apply Newton's Laws of Motion:** Analyze the behavior of objects using Newton's laws. Solve problems related to linear motion, momentum and impulse.
3. **Understand Work, Energy, and Power:** Calculate work done by a force, energy transformations, and power. Apply the principle of conservation of energy to solve physics problems.
4. **Understand and Apply Thermal Physics Concepts:** Differentiate between temperature and heat, understanding their relationship and how they are measured. Explain methods of heat transfer: conduction, convection, and radiation. Solve problems related to thermal expansion, specific heat capacity, and changes of state.
5. **Describe the Gas Laws:** Understand Boyle's Law, Charles's Law, and the Pressure Law. Apply the combined gas law to solve related problems.

**For an extensive list of specific objectives aligned with this course please refer to the CXC CSEC Physics syllabus.*

CHRISTMAS TERM**(SEPTEMBER 2-DECEMBER 19, 2025)**

Week	Topics	Lesson/Method of Delivery	Student Assessment
1	<p><u>Welcome and Introduction</u></p> <p><u>Revision:</u></p> <p>-Fundamental and Derived Quantities;</p> <p>-Measurement</p> <p>-Graphs</p>	<ul style="list-style-type: none"> • Welcome and Introduction. -The teacher and students will discuss course goals, class rules and expectations. • Lecture-Demonstration using visuals/PowerPoint presentations. 	<p><i>-In-class Diagnostic Test</i></p> <p><i>-Learning Styles Inventory (Online)</i></p> <p>-Coursework #1: Graph Plotting</p>
2	<p>-Density/Writing Lab Reports</p> <p>-Galileo Galilei-The Scientific Approach</p>	<ul style="list-style-type: none"> • Lecture-Demonstration using visuals/PowerPoint presentations. • Cooperative learning. • Hands-on laboratory experiment. 	<p>-INTRODUCTORY LAB – Density Lab Report</p> <p>Homework-Students will research and discuss:</p>

		<ul style="list-style-type: none"> • Students will do independent research on the Scientific Approach and discuss the next class. 	<p><i>How does the methodology employed by Galileo contribute to the development of Physics?</i></p>
3	The Simple Pendulum	<ul style="list-style-type: none"> • Differentiated Instruction • Lecture-Demonstration of key concepts and calculations using a whiteboard. • Cooperative learning. • Students will conduct hands-on laboratory experiments to determine the period of a simple pendulum and the factors that affect the period. 	<p>Simple Pendulum Lab Report</p>
4	Vectors	<ul style="list-style-type: none"> • Students will watch video presentations on scalars and vectors and on how to draw scale diagrams of vectors. 	<p>-Formative Assessments: discussions and classwork</p> <p>-Graded Worksheet</p>

		<ul style="list-style-type: none"> Lecture-demonstration on combining vectors. 	
5	REVISION WEEK		
6	STANDARDIZED TEST WEEK		
7	TEST REVIEW		
8	MID-TERM BREAK Heroes Day		
9	-Forces	<ul style="list-style-type: none"> Lecture and discussion on key concepts with the aid of PowerPoint presentations. Using real-world scenarios to explore the different types of forces. Whiteboard demonstration of calculating the weight of an object using the relationship: weight = mass x gravitational field strength that is, $W = mg$ 	Online quiz-Google forms

10	Deformation	<ul style="list-style-type: none"> ● Lecture-Demonstration of key concepts and calculations using a whiteboard. ● PHET Physics simulation ● Cooperative learning. ● Students will discover the relationship between extension and force (Hooke's Law) through a laboratory experiment. 	Hooke's Law Lab Report
11	Centre of Gravity	<ul style="list-style-type: none"> ● Lecture-Demonstration using visuals/PowerPoint presentations of key concepts to guide students' knowledge and understanding. ● Discovery learning: students will conduct a lab experiment to deduce their understanding of the concept <i>centre of gravity</i> and to determine the centre of gravity of irregular objects such as a lamina. 	Centre of Gravity Lab Report

12	Statics-Turning Forces	<ul style="list-style-type: none"> • Laboratory experiment to facilitate students' discovery of the <i>principle of moments</i>. • Lecture and discussion on key concepts with the aid of PowerPoint presentations. • Whiteboard demonstration of <i>Moments</i> calculations. 	-Moments Lab Report
11	Statics-Turning Forces Cont'd	<p><u>Extended Practice</u></p> <ul style="list-style-type: none"> • Whiteboard demonstration of <i>Moments</i> calculations • Problem-solving techniques using real-world scenarios. 	<p>-Classwork: Solving problems from sample past paper questions and sharing solutions.</p> <p>-Moments Worksheet- Graded Paired Activity</p>
12	REVISION WEEK		
13	STANDARDIZED TEST WEEK		

EASTER TERM**(JANUARY 6-APRIL 30, 2025)**

Week	Topics	Lesson/Method of Delivery	Student Assessment
1	Kinematics	<ul style="list-style-type: none"> • Lecture-Demonstration using visuals/PowerPoint presentations to explore core concepts. • Cooperative learning strategy for drawing and interpreting motion graphs. 	Motion in a Straight Line –Workbook Activity
2	Kinematics	<ul style="list-style-type: none"> • Demonstration on how to determine the acceleration due to gravity using a free fall method using experiment/video presentation. • Class discussion on Aristotle’s arguments in support of his “law of motion”, that is, v is proportional to F. 	Classwork: Practice problems
3	- Newton’s Laws	<ul style="list-style-type: none"> • Lecture and discussion on the three laws of motion with the aid of PowerPoint presentations. 	Classwork: Sample CSEC past paper questions and sharing solutions.

	-Momentum	<ul style="list-style-type: none"> ● Cooperative learning- Students collaborate to research and use Newton's laws to explain dynamic systems. ● Lecture-Demonstration using visuals/PowerPoint presentations to explore core concepts. ● Class discussion on situations that demonstrate the law of conservation of linear momentum 	
4	Momentum Cont'd	<ul style="list-style-type: none"> ● Whiteboard demonstration of calculations using the law of conservation of momentum. 	Momentum Practice Worksheet-Paired Activity
5	REVISION WEEK		
6	MID TERM BREAK		

7	STANDARDIZED TEST WEEK		
8	Energy	<ul style="list-style-type: none"> • Guided learning on the different types of energy and energy transformations using visual presentations and real world scenarios. • Whiteboard demonstration of solving problems using energy formulas and the law of conservation of energy. • Research project and collaboration on renewable sources of energy. 	<p>Classwork: Workbook Activity</p> <p>Group Poster Display and Presentation on Renewable Sources of Energy</p>
9	MID TERM BREAK		
10	Power & Efficiency	<ul style="list-style-type: none"> • Lecture-Demonstration using visuals/PowerPoint presentations to explore core concepts. • Whiteboard demonstration of solving problems. 	Google Forms Quiz on Power and Efficiency

11	<p style="text-align: center;">Hydrostatics - Pressure</p>	<ul style="list-style-type: none"> ● Lecture-Demonstration using visuals/PowerPoint presentations to explore key concepts. ● PHET simulation. ● Whiteboard demonstration of applying formulas. ● Socratic Method to engage students with a number of real-world applications. 	<p>Class Activity: Workbook Activity</p>
	<p style="text-align: center;">-Pressure Cont'd</p>	<ul style="list-style-type: none"> ● Drill practice and feedback using sample questions. 	
	<p style="text-align: center;">Archimedes' Principle</p>	<ul style="list-style-type: none"> ● Story telling-The history of Archimedes' Principle ● Discovery learning/experiment: students will conduct an experiment to find the upthrust acting on an object. ● Lecture-Demonstration using visuals/PowerPoint 	<p>-Classwork: Practice problems</p> <p>-*Planning and Design Lab</p> <p>-Peer Teaching on the applications of Archimedes' principle.</p>

		<p>presentations to explore core concepts.</p> <ul style="list-style-type: none"> • Group research and peer teaching on the different applications of Archimedes' principle. 	
	Presentation Week	Group Presentations on Renewable Energy	
	EASTER BREAK		

SUMMER TERM

(MAY 1-JULY 4, 2025)

Week	Topics	Lesson/Method of Delivery	Student Assessment
1	<p>Thermal Physics and Kinetic Theory</p> <p>-Nature of Heat</p>	<p>Peer Teaching presentations on:</p> <ol style="list-style-type: none"> 1. the caloric and kinetic theories of heat as they 	<p>Group presentation (see attached rubric on page 20)</p>

	<p>--Temperature</p>	<p>existed in the eighteenth century.</p> <p>2. role of Joule’s experiments in establishing the principle of conservation of energy.</p> <p>Peer teaching presentations on:</p> <p><u>Temperature</u></p> <ul style="list-style-type: none"> ● relate temperature to the direction of net thermal energy transfer ● identify physical properties which vary with temperature and may be used as the basis for measuring temperature ● relate the temperature of a body to the kinetic energy of molecules; ● relate the use of a thermometer to its design; (Highlight design features which make a thermometer suitable for its particular task. Note temperature ranges for each) ● Draw and explain design of: (a) laboratory; thermometer; 	<p>Group presentation (see attached rubric on page 20)</p>
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		(b) clinical thermometer (c) thermocouple. <ul style="list-style-type: none"> define the fixed points on the Celsius scale; (discuss the Lower and upper fixed points) 	
2	REVISION WEEK		
3	STANDARDIZED TEST WEEK		
4	Mid-Term Break-Labour Day May 23		
5	-Phases of Matter	Peer teaching presentations on: <ul style="list-style-type: none"> distinguish among solids, liquids and gases; (use the Kinetic theory to explain the different macroscopic properties of solids, liquids and gases;) 	Group presentation (see attached rubric on page 20)

	<p>--Thermal Expansion</p> <p>--Revision for Final Six Weeks Test</p>	<ul style="list-style-type: none"> ● explain observations of the effects of thermal expansion; ● Demonstrations which illustrate expansion of solids, liquids, for example, ball and ring, bar breaking, bimetallic strip. 	
6	FINAL STANDARDIZED TEST		
7	Gas Laws	<ul style="list-style-type: none"> ● Discovery learning/hands-on experiments to explore the three gas laws. ● Lecture-Demonstration using visuals/PowerPoint presentations to explore key concepts to include drawing graphs of pressure or volume against temperature to the establishment of the Kelvin temperature scale 	<p>Graph Activity</p> <p>-Google Forms Quiz</p>

		<ul style="list-style-type: none"> • Questioning techniques to solve various problems. • Guided group discussion on qualitative explanations of the gas laws in terms of the Kinetic theory 	
8	*Specific Heat Capacity	<ul style="list-style-type: none"> • Lecture-Demonstration using visuals/PowerPoint presentations to explore key concepts and calculations. • Lab experiment to determine the specific heat capacity of a substance using the <i>method of mixtures</i>. • Visual presentations of other methods to determine the specific heat capacity of a material. 	<p>-Classwork: Practice problems</p> <p>-Specific Heat Capacity Lab Report: Method of Mixtures</p>

	-Revision for End of Year Examinations		
	FINAL EXAMINATION		

SUGGESTED READING TEXTS:

- Physics for CSEC by Nelson Thorne.
- Collins Concise Revision Course - CSEC Physics by Peter Defreitas

ADDITIONAL READING TEXTS:

- Physics for CSEC – A Caribbean Examinations Council Study Guide by Nelson Thorne

BIBLIOGRAPHY:**Internet Resources**

- BBC Bitesize - Physics (GCSE Level): BBC Bitesize Physics
- Khan Academy.org. [Khan Academy - Physics](https://www.khanacademy.org/physics)
- Physics Classroom <https://www.physicsclassroom.com/>

Youtube Channel links:

[Cognito](#)

[Khan Academy - Physics](#)

[The Organic Chemistry Tutor](#)

THERMAL PHYSICS PRESENTATION RUBRIC

Criteria	Excellent (5)	Good (4)	Satisfactory (3)	Needs Improvement (2)	Poor (1)	Score
Content	Thoroughly covers the assigned topic and stays focused throughout.	Covers the topic well, with minor deviations.	Adequately covers the topic but includes some irrelevant information.	Partially covers the topic with significant off-topic content.	Does not adequately cover the topic; mostly irrelevant.	
Organization	Presentation has a clear and logical structure.	Mostly clear structure; minor lapses.	Basic structure present; some parts unclear.	Poorly structured; hard to follow.	No clear structure; very confusing.	
Knowledge and Understanding	Provides comprehensive understanding of the topic.	Good understanding with some depth.	Basic understanding ; lacks depth.	Minimal understanding ; very shallow coverage.	Lacks understanding and depth.	
Clarity	Speech is very clear and articulate.	Speech is clear with minor articulation issues.	Speech is understandable but needs more clarity.	Speech is often unclear and hard to understand.	Speech is mostly unclear and difficult to follow.	
Engagement	Highly engaging; maintains	Engages the audience well; good eye	Engages the audience to some extent;	Rarely engages the audience;	Does not engage the audience; no	

	strong eye contact.	contact.	inconsistent eye contact.	limited eye contact.	eye contact.	
Visual aids	Visual aids are clear, professional, and enhance the presentation.	Visual aids are clear and mostly professional.	Visual aids are adequate but not very polished.	Visual aids are unclear or poorly designed.	No visual aids or very poorly designed aids.	
Teamwork	All team members contribute equally and work well together.	Most team members contribute equally and work well together.	Some team members contribute more than others; some collaboration issues.	Few team members contribute; poor collaboration.	One or two members do all the work; no collaboration.	
Total Score						<u> </u> /35