IB Physics HL Course Outline

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This course is about answering some of the most basic questions about the world around us. Why is the sky blue? Where did the universe come from? How do forces interact with matter to influence everything from nuclear radiation to the expansion of the universe?

Theory of Knowledge is explored in this course with topics like Quantum physics which allows for the exploration of ways of knowing. The Heisenberg uncertainty principle forces the student to consider the concept that the more we know about an object's position, the less we know about its momentum. Students will estimate uncertainties, and then participate in an exercise simulating measurement of the position of a particle. The students find that every measurement involves affecting the object being measured. This spurs an exploration of the relationship between the knower and the object.

International Mindedness is exemplified in a unit like Energy Production. This topic is the perfect example of how local actions can have global consequences. It will be explored how different cultures will have different perspectives on the best strategies for the mitigation of climate change. We will also explore how different cultures will consider different ways of adapting to current and future climate change.

The unit on Astrophysics is a good example of students demonstrating the attributes of the IB Learner Profile. Students will develop their skills as *inquirers* as they use telescopes to locate and study distant objects. They must be *thinkers* as they probe the furthest reaches of the universe and consider the implications of looking back in time towards the big bang. They must be *open-minded* as they consider different models for the expansion of the universe and the theories that have developed to explain the fundamental forces of nature. Students will be *reflective* after completing an experiment as they consider whether their results are consistent with theoretical predictions.

Requirements:

- A scientific calculator. Students may choose to purchase a graphing calculator.

- Initiative and responsibility: Students will be expected to complete a large volume of work and are expected to make up any missed material or tests on their own time, which means seeing me for help or making up tests during lunch. Students should spend at least half an hour every night completing assignments and studying concepts learned in the previous lesson. Those students having difficulty keeping up may be assigned to Success Club.

Topics Covered: (including practical work for each unit)

Topic	Hours	Total
Core		95
1. Measurements and uncertainties	5	
2. Mechanics	22	
3. Thermal physics	11	
4. Waves	15	
5. Electricity and magnetism	15	
6. Circular motion and gravitation	5	
7. Atomic, nuclear and particle physics	14	
8. Energy production	8	
Additional higher level (AHL)		60
9. Wave phenomena	17	
10. Fields	11	
11. Electromagnetic induction	16	
12. Quantum and nuclear physics	16	
Option		25
D. Astrophysics	25	
Practical scheme of work		60
Practical activities	40	
Internal assessment (IA)	10	
Group 4 project	10	
Total teaching hours		240

Group 4 Project

The group 4 project is a collaborative activity which involves students from different disciplines working together on a research topic. This will allow them to gain an understanding of the relationships between the disciplines. Emphasis will be on the processes of scientific investigation rather than the products of such investigation. The project addresses the following aims of group 4 work:

Aim 7: Develop and apply the students' information and communications technology skills in the study of science.

Aim 8: Raise awareness of the moral, ethical, social, economic and environmental implications of using science and technology.

Aim 10: encourage an understanding of the relationships between scientific disciplines and the overarching nature of the scientific method.

Students will meet their peers during year one of the program to start the planning phase of the project. The project implementation will take place in semester one of year two.

Assessment

Formative assessment: will consist of assigned questions and quizzes. Formative assessment does not count towards the final mark

Non IB Assessment – Ministry reporting and student progress during the course. IB scores will be translated into a percent mark for reporting school marks as required by the BC Ministry of Education. Effort marks will follow the NorKam CARES effort mark rubric in the student handbook.

Internal Assessment – makes up 20% of final mark. Students are expected to choose an area of interest, then design and carry out an experiment to deepen their knowledge. Internal assessments are assessed on five criteria:

Personal engagement	8%
Exploration	25%
Analysis	25%
Evaluation	25%
Communication	17%

Predicted Grades - Throughout the course, work will be assessed based on a variety of assessment types. Internal assessment, along with cumulative assessments at the end of year 1 and midway through year two will be the primary tools used for determining predicted grades.

External Assessment – makes up 80% of final mark.

Paper #1	20% - 60 minutes; multiple choice questions worth 40 marks
Paper #2	36% - 135 minutes; extended answer questions worth 95 marks
Paper #3	24% - 75 minutes; short & extended answers worth 45 marks

Materials:

Hamper: Higher Level Physics (Pearson Baccalaureate).
Gore: Physics 1 and Physics 2.
Tsokos: Physics HL

NorKam attributes: students are expected to demonstrate the attributes of Global Citizenship, adaptability, and inquiry. These attributes will be incorporated into the rubrics of student projects.