



IB WORLD SCHOOL 1309 (ZSO13 Gdańsk)



PHYSICS

syllabus

(based on Physics guide, first assessment 2016)

HL: 6h/week, SL: 4h/week

1. Aims

- appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
- acquire a body of knowledge, methods and techniques that characterize science and technology
- apply and use a body of knowledge, methods and techniques that characterize science and technology
- develop an ability to analyse, evaluate and synthesize scientific information
- develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
- develop experimental and investigative scientific skills including the use of current technologies
- develop and apply 21st-century communication skills in the study of science
- become critically aware, as global citizens, of the ethical implications of using science and technology
- develop an appreciation of the possibilities and limitations of science and technology
- develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

2. Assessment objectives

- Demonstrate knowledge and understanding of:

- a. facts, concepts and terminology
 - b. methodologies and techniques
 - c. communicating scientific information.
- Apply:
 - a. facts, concepts and terminology
 - b. methodologies and techniques
 - c. methods of communicating scientific information.
 - Formulate, analyse and evaluate:
 - a. hypotheses, research questions and predictions
 - b. methodologies and techniques
 - c. primary and secondary data
 - d. scientific explanations.
 - Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

3. Course overview

3.1 Course content

Syllabus component	Recommended teaching hours	
	SL	HL
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	15	25
A. Relativity	15	25
B. Engineering physics	15	25
C. Imaging	15	25
D. Astrophysics	15	25
Practical scheme of work	40	60
Practical activities	20	40
Individual investigation (internal assessment – IA)	10	10
Group 4 project	10	10
Total teaching hours	150	240

3.2 Textbook

K. A. Tsokos, Physics for the IB Diploma, Sixth Edition

3.3 Other requirements

Mathematical requirements

All Diploma Programme physics students should be able to:

- perform the basic arithmetic functions: addition, subtraction, multiplication and division
- carry out calculations involving means, decimals, fractions, percentages, ratios, approximations and reciprocals
- carry out manipulations with trigonometric functions
- carry out manipulations with logarithmic and exponential functions (HL only)
- use standard notation (for example, 3.6×10^6)
- use direct and inverse proportion
- solve simple algebraic equations
- solve linear simultaneous equations
- plot graphs (with suitable scales and axes) including two variables that show linear and non-linear relationships
- interpret graphs, including the significance of gradients, changes in gradients, intercepts and areas
- draw lines (either curves or linear) of best fit on a scatter plot graph
- on a best-fit linear graph, construct linear lines of maximum and minimum gradients with relative accuracy (by eye) taking into account all uncertainty bars
- interpret data presented in various forms (for example, bar charts, histograms and pie charts)
- represent arithmetic mean using \bar{x} notation (for example, \bar{x})
- express uncertainties to one or two significant figures, with justification.

Data booklet

The data booklet must be viewed as an integral part of the physics programme and should be used throughout the delivery of the course and not just reserved for use during the external assessments. The data booklet contains useful equations, constants, data, structural formulae and tables of information.

Scientific calculator

4. Assessment

4.1 External assessment SL

Paper 1

Duration: 3/4 hour

Weighting: 20%

Marks: 30

- 30 multiple-choice questions on core, about 15 of which are common with HL.
- The questions on paper 1 test assessment objectives 1, 2 and 3.
- The use of calculators is not permitted.
- No marks are deducted for incorrect answers.
- A physics data booklet is provided.

Paper 2

Duration: 1¼ hours

Weighting: 40%

Marks: 50

- Short-answer and extended-response questions on core material.
- The questions on paper 2 test assessment objectives 1, 2 and 3
- The use of calculators is permitted. (See calculator section on the OCC.)
- A physics data booklet is provided.

Paper 3

Duration: 1 hour

Weighting: 20%

Marks: 35

- This paper will have questions on core and SL option material.
- Section A: one data-based question and several short-answer questions on experimental work.
- Section B: short-answer and extended-response questions from one option.
- The questions on paper 3 test assessment objectives 1, 2 and 3.
- The use of calculators is permitted. (See calculator section on the OCC.)
- A physics data booklet is provided.

5.2 External assessment HL

Paper 1

Duration: 1 hour

Weighting: 20%

Marks: 40

- 40 multiple-choice questions on core and AHL, about 15 of which are common with SL.
- The questions on paper 1 test assessment objectives 1, 2 and 3.
- The use of calculators is not permitted.
- No marks are deducted for incorrect answers.
- A physics data booklet is provided.

Paper 2

Duration: 2¼ hours

Weighting: 36%

Marks: 95

- Short-answer and extended-response questions on the core and AHL material.
- The questions on paper 2 test assessment objectives 1, 2 and 3.
- The use of calculators is permitted. (See calculator section on the OCC.)
- A physics data booklet is provided.

Paper 3

Duration: 1¼ hours

Weighting: 24%

Marks: 45

- This paper will have questions on core, AHL and option material.
- Section A: one data-based question and several short-answer questions on experimental work.
- Section B: short-answer and extended-response questions from one option.
- The questions on paper 3 test assessment objectives 1, 2 and 3.
- The use of calculators is permitted. (See calculator section on the OCC.)
- A physics data booklet is provided.

5.3 Internal assessment

Duration: 10 hours

Weighting: 20%

- Individual investigation

Internal assessment criteria

The new assessment model uses five criteria to assess the final report of the individual investigation with the following raw marks and weightings assigned:

Personal engagement	Exploration	Analysis	Evaluation	Communication	Total
2 (8%)	6 (25%)	6 (25%)	6 (25%)	4 (17%)	24 (100%)

5.4 The group 4 project

The group 4 project is an interdisciplinary activity in which all Diploma Programme science students must participate. The intention is that students from the different group 4 subjects analyse a common topic or problem. The exercise should be a collaborative experience where the emphasis is on the processes involved in, rather than the products of, such an activity.