



XV. GIMNAZIJA
International Baccalaureate Department
Diploma Programme



PHYSICS

Course description 2019/2020

WHAT IS THE COURSE ABOUT?

Physics explores energy and matter, interactions and motion. On this foundation, students build understanding of basic principles and relations in nature, using many examples of natural phenomena as building blocks. They explore some phenomena in hands-on experiments, or investigate through observation, or develop understanding further by means of creating or using mathematical models that resemble physical reality. Besides presenting fundamental principles the nature lays on, the course bonds natural laws with applications in every-day life and technology that surrounds us. Modest insight into recent discoveries is also within the scope of the course.

Physics course teaches about the nature of science: students become well aware of necessity of observation, measurement, building theories to explain phenomena and performing experiments to verify them.

Physics course develops many skills: critical thinking, capacity of asking questions, debating using arguments, as well as planning and creativity in solving experimental or theoretical problems. Capacity of scientific communication is also nurtured by requirements in presenting own experimental investigations.

IMPLEMENTATION:

Physics is taught at standard level (SL) or high level (HL) in the mixed class.

DP Year 1: The school offers 5 lessons per week for all students.

DP Year 2: The school offers 5 lessons per week for HL students and 3 lessons per week (on average) for SL students.

AIMS:

The aims of teaching and studying Physics are to:

- Motivate students to engage in observation and exploration of natural phenomena
- Acquire sound knowledge of physical facts and principles
- Apply the acquired knowledge, scientific methods and experimental skills
- Develop the ability to analyse and evaluate scientific facts
- Upgrade scientific communication and collaboration skills
- Develop understanding of limitations of science
- Discuss the impact of science to other areas of life

OBJECTIVES:

Students should be able to meet following objectives

A KNOWLEDGE AND UNDERSTANDING

- i) Describe phenomena, identify and define physical variables
- ii) State basic principles or explain concepts
- iii) State relations between variables
- iv) Apply scientific knowledge to solve problems

B PRACTICAL INVESTIGATION

- i) Identify physical variables in observed phenomenon
- ii) State relevant and focused research question
- iii) Plan the method of investigation
- iv) Apply scientific method and techniques
- v) Analyse the data
- vi) Evaluate results
- vii) Present results using appropriate terminology

C WRITTEN EXAM

- i) Demonstrate sound knowledge of basic principles and concepts
- ii) Solve numerical problems
- iii) Apply data analysis skills

| OBJECTIVE/CRITERION | MAXIMUM LEVEL OF ACHIEVEMENT/ grade |
|------------------------------------|-------------------------------------|
| A: KNOWLEDGE AND UNDERSTANDING | 7 |
| B: PRACTICAL WORKS AND LAB REPORTS | 7 |
| C: WRITTEN EXAMS | 7 |

Grade Boundaries

| | |
|----------|-----------------|
| 1 | 0-30% |
| 2 | 31-40% |
| 3 | 41-50% |
| 4 | 51-60% |
| 5 | 61-74.3 |
| 6 | 75%-84% |
| 7 | 85%-100% |

Final school grades are derived according to the formula which combines grades in all criteria: Written exam (WE), Knowledge and understanding (K&U) and Practical works and lab reports (LAB).

$$\text{Final grade} = \text{WE} \times 0,4 + \text{K\&U} \times 0,4 + \text{LAB} \times 0,2$$

IB exam grades are awarded according to IB criteria by external examiners, as result of written tests (Paper 1, Paper 2 and Paper 3) and practical investigation performed at school, but presented to external moderator.

TOPICS:

| DP Year 1 | |
|------------------|---|
| UNIT 1 | Uniform and accelerated motion |
| UNIT 2 | Forces, momentum and impulse |
| UNIT 3 | Work and energy |
| UNIT 4 | Circular motion and gravity |
| UNIT 5 | Thermal physics |
| UNIT 6 | Oscillations and waves |
| UNIT 7 | Wave phenomena (HL only) |
| UNIT 8 | Option (Engineering physics, Relativity or Imaging) |

| DP Year 2 | |
|------------------|-------------------------------------|
| UNIT 1 | Static electricity and DC circuits |
| UNIT 2 | Magnetic forces |
| UNIT 3 | Fields and forces (HL only) |
| UNIT 4 | Electromagnetic induction (HL only) |
| UNIT 5 | Atomic physics |
| UNIT 6 | Quantum physics (HL only) |
| UNIT 7 | Nuclear and particle physics |
| UNIT 8 | Nuclear physics (HL only) |
| UNIT 9 | Energy production |