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| LOGO XV | **XV. GIMNAZIJA**  **International Baccalaureate Department**  **Middle Years Programme**  **Sciences -Physics** | Worldschool-small |

**Course description 2016/2017**

**WHAT IS THE COURSE ABOUT?**

Physics is not only the ***science about the laws of nature***; it is nowadays equivalent of what used to be called ***natural philosophy***, from which most of our modern sciences arose.

We observe ***physical quantities*** by putting ***physical bodies*** in space and time and let them ***influence*** each other: ***motion, energy, work and power*** are the result. Setting bodies and particles in motion we produce ***electricity*** and ***waves***: studying ***light*** waves we open the door between physics and philosophy.

**The school offers three lessons on physics per week.**

**One extra lesson per week for each level** is a special offer by the teacher for specific help for students who were absent for some time, have never studied physics before, want to discuss something to understand it better, want to check their own ideas experimentally or any other purpose. Students should announce themselves.

**TEXTBOOK:**

**S.Pople: Complete Physics for Cambridge IGCSE, Oxford University Press, 2010**

**R.A.Serway, J.S.Faughn: Holt McDougal Physics, Houghton Mifflin Harcourt, 2012**

**WHAT ELSE IS NEEDED?**

- A4 notebook, squared

-pencil, (sharpener,) eraser, ruler, triangle and compass

-1 coloured pen and 4 coloured pencils (to point out specific parts as done on the board)

-calculator

-folder (for extra materials given by the teacher)

-basic physics knowledge including entrance exam level mathematics

-basic ATL skills as active listening, reading and note taking

**TOPICS:**

**MYP4**

**SCIENTIFIC METHOD**

**How are scientists able to understand the work of others?**

- performing and analysing measurements using mathematical statistics

- concept of significant digits and appropriate measuring units

- how to write a scientific report

- world as a scientific community

**special: CERN - community**

# FORCES

**What makes the world go around?**

- Newton’s laws

- concept of force

- elementary forces vs. elementary particles

- other examples of forces (gravity, weight, friction, elastic force)

**special: CERN – objectives and results**

# MOTION

# How is it possible to predict a path of a ball?

- speed, velocity and acceleration

- motion graphs and equations of motion

- 2D, 3D and 4D motion ("time machine")

**special: motion in time**

**ENERGY, WORK AND POWER**

**How does the world get its energy?**

-concept of energy, work and power

-energy in different systems

-efficiency

-conservation laws

**special: dark energy and antimatter**

**MYP5**

**PRESSURE**

**How are humans affected by change of pressure?**

**-**pressure

**-**atmospheric, hydrostatic and hydraulic pressure

**-**buoyancy, floating and sinking

-simple hydrodynamics

**HEAT AND THERMAL EFFECTS**

**How do heat engines work?**

**-**internal energy, temperature and heat

-heat transfer and thermal expansion

-the gas laws

-laws of thermodynamics

-heat engine

**WAVES**

**How do waves influence our life?**

**-**origin and propagation of waves

-describing waves: wave length and frequency

-reflection and refraction

-diffraction and interference

-musical notes and colours

-sound and geometrical optics

**ELECTRICITY AND ELECTROMAGNETISM**

**How has electricity changed our lives?**

**-**electric charge

-voltage, current and electric circuits

-magnetism

-magnetic effect of a current and electromagnetic induction

-electric motors and generators

**MODERN PHYSICS**

**What is new, unsolved, interesting, puzzling...?**

Everything can be discussed: dark matter and energy, antimatter, time machines, black holes, parallel universes...every answer lead to a new question...

**ASSESSMENT:**

-written tests (**A**, B, C)

-short quizzes (**A,** B, C)

-scientific investigations / lab reports (**B, C,** D-iii)

-investigation design and data processing tasks (**B, C**)

-essays (**D**)

-some of the homework (according to criteria or individual strands)

-oral exams through particular individual questions during the lessons (**A, B, C**)

-observations and notes on class participation (according to criteria or individual strands)

Students are assessed according to the prescribed (MYP5) and interim (MYP4) descriptors for grading. The students are given task specific descriptors together with each investigation or essay.

At the end of the school year points are given in each criteria taking into account achievements in all individual tasks (formative and summative assessment).

Final grades are derived according to the grade boundaries provided by the IB:

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| **Grade** | **Points** |
| **1** | **0 – 5** |
| **2** | **6 – 9** |
| **3** | **10 – 14** |
| **4** | **15 – 18** |
| **5** | **19 – 23** |
| **6** | **24 – 27** |
| **7** | **28 – 32** |