IB Physics Syllabus: UWC – USA, 2016/17.
Instructor: Dr. Ronald C. Persin. Website: www.Lnk2Lrn.com

I-Course Overview:

IB Physics is a science course delivered at two levels Standard (SL) and Higher (HL), using advanced algebra and trig as the primary tools for problem solving. SL and HL cover the same core of 8 topics: Measurement & Uncertainty, Mechanics, Thermal, Waves, E&M, Circular Motion/ Gravitation, Atomic/Particle Physics, and Energy Production.
HL goes on to cover Wave Interactions, Fields, E/M Induction, and Quantum/Nuclear Physics. Optional Topics for SL and HL include Relativity, Imaging, Engineering Physics, and Astrophysics. Both levels complete a Practical Scheme of work which involves lab activities, an Independent Investigation (IA), and a Group 4 Project. Total hours: SL = 150, HL = 240.

II-Grading:

Homework: 10% of Grade

You will be assigned homework sets on a daily basis. All homework is expected to be completed by the next class meeting. The pace is dictated by the amount of material we must cover to prepare for the IB Physics test, and by the IB Physics testing date. A completed set of chapter homework problems is worth 15-25 points.

Notebook (3-ring binder): 10 % of grade

You will be required to maintain a 3-ring binder on a daily basis. It must be organized by chapters with tabbed dividers. All binders are checked on the next test day with the class-notes, completed handouts, and homework. When corrected work is returned to you, it must be placed in the section of the binder that pertains to it. Binder checks are worth 25 points.

Labs: 20% of Grade

We will conduct labs in groups every week. Each individual is responsible for recording their lab work and processing her/his own data. You are to include the names of your lab partners below your name in your lab report. Lab reports will generally be worth 50 points.

Tests & Quizzes: 50% of Grade

There will be Chapter Tests, and Unit Exams that will cover multiple chapters. Unit exams will include a multiple choice section in which you are not allowed to use your calculator and a free response section in which you can use both your calculator and an equation sheet that will be supplied for you. The free response section is the portion with significant calculations and will typically include a graphical analysis question and a lab-based question among other question types. You are required to show your work for the free response section. Chapter tests are generally worth 100 points.

Class Participation: 10% of Grade

Class participation includes meaningful, active involvement in all class sessions, class discussions, and all course-related activities outside the classroom, as well as displaying professional, ethical conduct in class. You are required to build a set of notes in your binder during class, and not losing class focus by "taking notes on my laptop." Professional conduct for IB Physics students includes being respectful to your peers, being on time and staying until class ends, and observing due-dates for assignments. **Therefore, no late work is accepted.**

Grading Scale:

(100 – 94)%	(93 – 87)%	(86 – 80)%	(79 – 73)%	(72 – 66)%	(65 – 59)%	(58 – 0) %
7	6	5	4	3	2	1

III- General Policies:

We will follow the school's attendance and grading policies. If you miss class, it is your responsibility to schedule make-up work. Be prepared for class with notebook, text, and calculator. Maintain a 3-ring binder (collected and checked every test day). Communicate with your instructor outside of class using the email link.

IV- Academic Honesty:

As a student at UWC-USA, you are expected to uphold the honor and mission statement of the institution at all times. Please refer to the student handbook for a full description of the code of conduct, especially as it pertains to academic irregularities and students' academic grievances. The most important thing to remember is that cheating of any kind will have very severe repercussions and will not be tolerated. This includes cheating on tests and quizzes, plagiarism, or having others complete your work for you. Here are some helpful hints to ensure that you maintain academic integrity at all times especially with regards to plagiarism.

1. You cannot use the ideas or words of another and present them as your own. You can, however, use ideas from others in a paper or speech, provided that you properly acknowledge the source of your material.
2. If you paraphrase information from a website and include it in work that you submit, you must properly acknowledge the website and author. UWC-USA instructors have access to a software program that automatically detects work that is plagiarized from the internet.
3. Stealing (pinching) information from the internet is a serious violation of the code of student conduct. Many students are accused of plagiarism because they are not aware of the appropriate procedures for acknowledging sources. If you are unsure how to site your sources, or if you don't understand plagiarism, consult your teacher.

V- I.B. PHYSICS: Dr. Persin (Program Summary)

1. **Measurement and Uncertainty**
   limits to precision; random and systematic uncertainties (errors); precision and accuracy; graphical techniques; vectors and scalars…
2. **Mechanics**
   kinematics: (displacement, speed, velocity, acceleration); motion (relative motion); force, mass and acceleration; Newton's laws of motion; equilibrium of forces; friction; projectiles; work, energy and power; conservation of energy and momentum; orbital motion;…
3. **Thermal Physics**
   temperature and temperature scales; heat and its effects; heat capacity; specific heat capacity; latent heat; inter-molecular forces and potential energies; the gas laws; the laws of thermodynamics; entropy; heat engines; refrigerators; the simple kinetic theory of matter…

4. **Wave Motion**
   travelling waves; standing (stationary) waves; reflection, refraction, interference, diffraction; Huygen's principle; Doppler effect; beats; Schrödinger model of the hydrogen atom; x rays…
5. **Electricity and Magnetism**
   static electricity; the gold leaf electro-scope, lightning rods etc; electric fields and potential difference; electric current (Kirchhoff's laws and Ohm's law etc); electro-magnetism; magnetic field "shapes"; electro-magnetic-induction; Faraday's Law (Neumann's Law); Lenz's Law; simple a.c. electric generators; simple d.c. motor…
6. **Circular Motion and Gravitation**
   period, frequency, angular displacement and angular velocity, centripetal force, centripetal acceleration, Newton's law of gravitation, Gravitational field strength,
7. **Atomic and Particle Physics**
   the electron and its properties; Millikan's experiment; electro-magnetic radiation and quantum theory; the Bohr model of the atom; the de Broglie hypothesis (wave particle duality); radio-activity (half-life); Einstein's mass-energy relation; fission and fusion of nuclei; particle accelerators; the discovery of the proton; the discovery of the neutron; energy levels in the nucleus; anti-particles; mass spectrometer; α and β decay, the neutrino; the quark theory (exchange particles as force carriers…
8. **Energy Production**
   specific energy and energy density of fuel sources, Sankey diagrams, primary energy sources electricity as a secondary and versatile form of energy, renewable and non-renewable energy sources, Conduction, convection and thermal radiation, black-body radiation, albedo and emissivity, the solar constant, the greenhouse effect, energy balance in the Earth surface–atmosphere system

Optional Topics
The two options you will be studying *in lessons* are

- Engineering Physics
- Imaging

Other topics which will also be covered in the exam are: Relativity and Astro-physics. Anyone wanting to attempt questions on these topics in the IB Exam should see me for a copy of the program, and any extra help needed.

Theory of Knowledge (TOK):
Examples of TOK questions include:

1. What has influenced the common language used in science? To what extent does having a common standard approach to measurement facilitate the sharing of knowledge in physics?
2. How do scientists work around their intuitions? How do scientists make use of their intuitions?
3. Does sense perception play different roles in different areas of knowledge?
4. What role do paradigm shifts play in the progression of scientific knowledge?
5. Are explanations in science different from explanations in other areas of knowledge such as history?