

Group 4: Sciences

Course Title: Biology, Chemistry, Physics

Level offered: HL and SL

Course Description:

Biology: The Biology diploma program is a rigorous two-year pre-university curriculum that focuses on the components - cell theory, evolution, gene theory and homeostasis. Students' critical thinking skills are challenged through independent investigations and collaborative efforts.



The KCCIS Biology diploma program delivers the foundations of modern Biology at two complexity levels, Standard (SL) and Higher (HL). A total of 6 core topics are covered for SL and an additional 5 more for HL. One option topic will be covered along with the core topics. At KCCIS the Option available for the Biology Diploma program is Option D: Human Physiology. Students are given the opportunity to choose at which complexity level they wish to pursue the diploma. Both levels encourage independent, creative thinking in students who are educated in global awareness and international understanding especially on issues like climate change and its global impact. By the end of the two years students will develop an appreciation for ethically controversial issues in the biological sciences like stem cell research, cloning, genetically modified organisms, assisted reproductive technologies, contraception and birth control.

Chemistry: The first year of the course covers the standard level material for topics like Stoichiometric Relationships, Atomic Structure, Periodicity and Bonding. Higher level material of the same topic is taught concurrently to higher level students. There is an emphasis on developing practical research skills.

The second year of the course involves the study of an option in addition to the remaining standard and higher level material. The option that is offered at present in Chemistry is Option D: Medicinal Chemistry. Emphasis is placed on presenting the core concepts of Chemistry in ways that emphasize its practical use in the laboratory and its applicability to real-world issues and problems. Through class discussions, readings, visual aids, oral

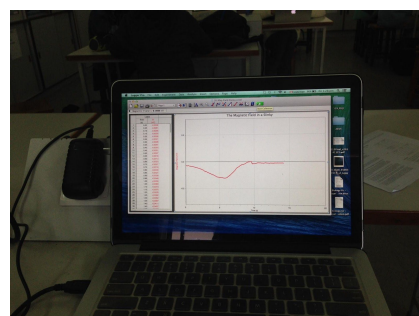


presentations, practice questions and laboratory investigations, students learn to combine real-world data, experimentation, and theoretical concepts to make sense of empirical findings and solve practical problems.

Physics: If you are curious to know about weightlessness experienced by Astronauts or want to know about the energy generated by a gram of nuclear fuel or want to explore the various intricacies of nature, then Physics at the IBDP level is where you get all the answers.

The Physics course (both HL and SL) covers the following core topics during the first year of the programme: Measurement, Mechanics, Thermal Physics, Wave Behaviour, Electricity & Magnetism, and Atomic, Nuclear & Particle Physics. While both HL and SL courses study the same topics, at SL the topics are covered in less depth making this course more suitable for those who have an interest in Physics, but do not expect to continue studying it at university.

Students will also study an Option at depth during the course. At present the option offered at KCCIS is Option C: Imaging which touches on the application of different kinds of waves in Engineering and Medical fields. By the end of the program, students at both HL and SL, would have been introduced to all the core concepts in Physics with much emphasis on critical thinking and problem solving skills.



Course Structure / Topics covered:

		DP curriculum components	
		Total teaching hours	
		150	240
		Teaching hours	
		SL	HL
Physics	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		60
	9. Wave phenomena		17
	10. Fields		11
	11. Electromagnetic induction		16
	12. Quantum and nuclear physics		16
	Option (Choice of one out of four)	15	25
	A. Relativity	15	25
	B. Engineering physics	15	25
	C. Imaging	15	25
	D. Astrophysics	15	25
Biology	Core	95	
	1. Cell biology	15	
	2. Molecular biology	21	
	3. Genetics	15	
	4. Ecology	12	
	5. Evolution and biodiversity	12	
	6. Human physiology	20	
	Additional higher level		60
	7. Nucleic acids		9
	8. Metabolism, cell respiration and photosynthesis		14
	9. Plant biology		13
	10. Genetics and evolution		8
	11. Animal physiology		16
	Option (Choice of one out of four)	15	25

	A. Neurobiology and behavior	15	25
	B. Biotechnology and bioinformatics	15	25
	C. Ecology and conservation	15	25
	D. Human physiology	15	25
Chemistry	Core	95	
	1. Stoichiometric relationships	13.5	
	2. Atomic structure	6	
	3. Periodicity	6	
	4. Chemical bonding and structure	13.5	
	5. Energetics/thermochemistry	9	
	6. Chemical kinetics	7	
	7. Equilibrium	4.5	
	8. Acids and bases	6.5	
	9. Redox processes	8	
	10. Organic chemistry	11	
	11. Measurement and data processing	10	
	Additional higher level (AHL)		60
	12. Atomic structure		2
	13. The periodic table—the transition metals		4
	14. Chemical bonding and structure		7
	15. Energetics/thermochemistry		7
	16. Chemical kinetics		6
	17. Equilibrium		4
	18. Acids and bases		10
	19. Redox processes		6
	20. Organic chemistry		12
	21. Measurement and analysis		2
	Option (Choice of one out of four)	15	25
	A. Materials	15	25

	B. Biochemistry	15	25
	C. Energy	15	25
	D. Medicinal chemistry	15	25
Sciences	Practical scheme of work	40	60
	• Practical activities	20	40
	• Individual investigation	10	10
	• Group 4 project	10	10

Assessments:

Internal Assessment

- End of topic tests in Year 12 and Year 13
- Report Writing on Experiments
- Mid Term Assessment in Year 12
- Individual Investigation - end of Year 12
- Year End Exam in Year 12
- Mock Exam in Year 13

External Assessment

DP Sciences Assessment Components				
Component	Overall weighting (%)		Duration (hours)	
	SL	HL	SL	HL
External Assessment				
Paper 1	20	20	0.75	1
Paper 2	40	36	1.25	2.25
Paper 3	20	24	1	1.25
Internal Assessment	20	20	10	10

Resources and Texts: (some suggestions)

Oxford University Press	9780198392125	IB Chemistry Course Book 2014 edition
Oxford University Press	9780198392132	IB Physics Course Book 2014 edition
Oxford University Press	9780198392118	IB Biology Course Book 2014 edition
Oxford University Press	9780198393559	Physics Study Guide 2014 edition: Oxford IB Diploma Programme
Oxford University Press	9780198390053	IB DP Chemistry: Course Companion (2 nd edition)
IB	9781927173930	IB Biology: Student Workbook 2 nd edition

Teacher(s) to speak to:

Physics	Chemistry	Biology
Dr. M. Aravind	Ms. S. Lee	Ms. A. Ali
		Ms. S. Bailey

Group 4: Sciences

Course Title: Sports, Exercise and Health Science

Level offered: SL/HL

Course Description:

The course incorporates the traditional disciplines of Anatomy, Physiology, Biomechanics, Psychology and Nutrition and will be studied in the context of Sport, Exercise and Health. Students will study a range of core and option topics. They will undertake practical (experimental) investigations in both laboratory and field settings. This will provide an opportunity to acquire the knowledge and understanding necessary to apply scientific principles and critically analyze human performance. Where relevant, the course will address issues of internationalism and ethics by considering Sport, Exercise and Health relative to the individual and in a global context.

Course Structure / Topics covered:

Core Topics 80 hours

- Anatomy
- Exercise Physiology
- Energy Systems
- Movement Analysis
- Skill in Sport
- Measurement and Evaluation of Human Performance

Additional Higher Level Topics 50 hours

- Further anatomy
- The endocrine system
- Fatigue
- Friction and drag
- Skill acquisition and analysis
- Genetics and athletics performance
- Exercise and immunity

Options 30/50 hours (SL/HL)

Students are required to study two of the following options:

- Optimizing Physiological Performance
- Psychology of Sport
- Physical Activity and Health
- Nutrition for Sport, Exercise and Health

Practical Investigations (A mixture of short and long-term investigations) 40/60 hours

Assessment:

Internal Assessment (20 %)

Exploration (25 %)

Analysis (25 %)

Evaluation (25 %)

Communication (17 %)

Personal Engagement (8 %)

External Assessment (80 %)

For SL

- Paper 1 - 45 mins

Multiple choice on core topics 20%

- Paper 2 - 1 Hour 15 mins 35%

Section A - One data- based question and several short answer questions.

Section B – One extended response question. Both on core topics

- Paper 3 – 1 hour short answer questions on two options. 25%

For HL

- Paper 1 – 1 hour

Multiple choice on core and AHL topics

20%

- Paper 2 - 2 Hour 15 mins

35%

Section A - One data- based question and several short answer questions.

Section B – Two extended response questions on the core and AHL.

Paper 3 – 1 hour 15 mins

Short-answer and extended-response questions on two options.

25%

Resources and Texts:

Oxford IB Diploma Programme: Sports, Exercise and Health Science

Teacher(s) to speak to: Ms. Sally Wong