

**都立国際高校 年間授業計画 / Tokyo Metropolitan Kokusai High School Course Syllabus**

**○ 科目基礎情報 ( Course information )**

開講年度 ( Academic year )	令和5年度 ( 2023 年度 )
開講学科 ( Department )	国際学科国際バカロレアコース / IBDP(International Baccalaureate Diploma Programme)
教科 ( Subject Area )	Science
科目 ( Subject )	Physics HL
学年・クラス ( Grade・Class )	2nd Grade
単位数 ( Number of units )	6
使用教科書 ( Text Books )	Oxford IB Diploma Programme 14th Edition (Physics)
校外学習 ( Field trip )	None

**○ 教科の目標 ( Goals of the subject area )**

<p>【知識及び技能】 ( Knowledge and Skills )</p> <ul style="list-style-type: none"> <li>acquire a body of knowledge, methods and techniques that characterize science and technology</li> <li>develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.</li> </ul> <p>【思考力、判断力、表現力等】 ( Ability to think, make judgements, express themselves )</p> <ul style="list-style-type: none"> <li>apply and use a body of knowledge, methods and techniques that characterize science and technology</li> <li>develop an ability to analyse, evaluate and synthesize scientific information</li> <li>develop experimental and investigative scientific skills including the use of current technologies</li> </ul> <p>【学びに向かう力、人間性等】 ( Motivation to learn, Humanity )</p> <ul style="list-style-type: none"> <li>appreciate scientific study and creativity within a global context through stimulating and challenging opportunities</li> <li>develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities</li> </ul>
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**○ 科目の目標 ( Goals of the subject )**

【知識及び技能】 ( Knowledge and Skills )	【思考力、判断力、表現力等】 ( Ability to think, make judgements, express themselves )	【学びに向かう力、人間性等】 ( Motivation to learn, Humanity )
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.	Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

**○ 授業計画 ( Course schedule )**

	単元の具体的な指導目標 Unit Objectives	指導項目・内容 Topic / Contents	評価規準 Evaluation Criteria	Allocated hours			
				知 ①	思 ②	態 ③	配当 時数
1学期 ( 1st semester )	Mechanics (uncertainties, vectors, and motion) 【Knowledge and Skills】 ・Develop understanding of uncertainties, vectors, and motion with constant acceleration 【Ability to think, make judgements, express themselves】 ・Be able to use the concepts of vectors and equations of motion to solve problems ・Be able to apply the concept of vectors and equations of motion to carry out practical investigation 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Vectors quantities such as displacement, velocity, and acceleration ・ Equations of motion Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	40
	Mechanics (Force, Work, and Momentum) 【Knowledge and Skills】 ・Develop understanding of force, energy, and momentum ・Be able to explain the motion from the perspective of force, energy, and momentum 【Ability to think, make judgements, express themselves】 ・Be able to use Newton's laws and the concepts of work and momentum to solve problems 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Newton's Laws, Work & Energy Theorem, Impulse & Momentum Theorem, Law of Conservation of Energy and Momentum Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	35
	定期考査 Examination			○	○		2

	単元の具体的な指導目標 Unit Objectives	指導項目・内容 Topic / Contents	評価規準 Evaluation Criteria	知 ①	思 ②	態 ③	配当 時数
2学期 (2nd semester)	Thermal Physics and Thermodynamics 【Knowledge and Skills】 ・Develop understanding of heat exchange and phase change ・Develop understanding of thermal equilibrium and the relationship between internal energy, heat, and work done on or by a system 【Ability to think, make judgements, express themselves】 ・Be able to use $Q=mc\Delta T$ to solve problems ・Be able to analyze PV-graph of a thermodynamic cycle 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・Heat, temperature, $Q=mc\Delta T$ , types of heat transfer, Laws of Thermodynamics, Entropy Teaching materials: ・Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	25
	Waves & Wave Phenomenon 【Knowledge and Skills】 ・Develop understanding of harmonic motion the relationships between period, frequency, amplitude, displacement, and phase difference ・Develop understanding of the properties of mechanical waves (transverse, longitudinal, standing waves) and the concepts of diffraction and interference 【Ability to think, make judgements, express themselves】 ・Be able to solve problems involving the superposition of waves and the inverse square law 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals.	Contents: ・ Different kinds of mechanical waves and their characteristics, single-slit and double-slit diffraction, inverse square law, constructive and destructive interference, Doppler Effect Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	25
	Electricity and magnetism (Electricity) 【Knowledge and Skills】 ・Develop understanding of static electricity ・Develop understanding of electric circuits and ohm's law 【Ability to think, make judgements, express themselves】 ・Be able to calculate voltage, current or resistance for a given electric circuits 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Charges, Ohm's Law, parallel and series circuits, Joule heating effect, direct and alternating current Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	25
	Electricity and magnetism (Magnetism) 【Knowledge and Skills】 ・Develop understanding of magnetic field around a solid magnet ・Develop understanding of magnetic field around current 【Ability to think, make judgements, express themselves】 ・Be able to use right-hand grip rule and left-hand Fleming's rule to determine the direction of induced magnetic field 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Magnetic field around a solid magnet and induced by electric current, electromagnetic induction, Lenz's law, transformer Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	26
定期考査 Examination			○	○		2	
3学期 (3rd semester)	Atomic and Nuclear Physics 【Knowledge and Skills】 ・Develop understanding of nuclear decay, radioactivity, nuclear fission and fusion ・Develop understanding of the different elementary particles and their properties 【Ability to think, make judgements, express themselves】 ・Be able to use the decay equation to calculate the half-life of a radioactive material 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Alpha, Beta and Gamma emissions, Radioactive half-life, neutrinos and isotopes, nuclear binding energy, alpha and beta particle scattering, fundamental particles, Feynman diagram Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	30
	Energy Production 【Knowledge and Skills】 ・Develop understanding of the concept of primary and secondary energy sources and the different renewable sources of energy 【Ability to think, make judgements, express themselves】 ・Be able to solve problems involving energy transformation from power plants and from the different renewable sources of energy 【Motivation to learn, Humanity】 ・Engages actively in the practicals ・Work collaboratively with other classmates during practicals	Contents: ・ Fossil fuels, nuclear fission, wind energy, hydroelectricity, solar power, Wien's displacement law, Stefan-Boltzmann law, emissivity, albedo, greenhouse gases and greenhouse effect Teaching materials: ・ Textbook, PowerPoint slides	①【Knowledge/Skills】 ・Short test, Examination, Lab report ②【Ability to think/make judgements/express themselves】 ・Examination, Poster presentation ③【Attitude towards learning proactively】 ・Reflection	○	○	○	22
	定期考査 Examination			○	○		2