International Baccalaureate Diploma Programme Subject Brief Sciences:

Biology—Higher level

First assessments 2016 – Last assessments 2022

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints. Approaches to teaching and learning (ATL) within the DP are deliberate strategies, skills and attitudes that permeate the teaching and learning environment. In the DP students develop skills from five ATL categories: thinking, research, social, self-management and communication.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

Biology is the study of life. The vast diversity of species makes biology both an endless source of fascination and a considerable challenge. Biologists attempt to understand the living world at all levels from the micro to the macro using many different approaches and techniques. Biology is still a young science and great progress is expected in the 21st century. This progress is important at a time of growing pressure on the human population and the environment.

By studying biology in the DP students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes the sciences. Teachers provide students with opportunities to design investigations, collect data, develop manipulative skills, analyse results, collaborate with peers and evaluate and communicate their findings.

Through the overarching theme of the nature of science, the aims of the DP biology course are to enable students to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science
8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

II. Curriculum model overview

Component	Recommended teaching hours
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)	25
A. Neurobiology and behaviour	25
B. Biotechnology and bioinformatics	25
C. Ecology and conservation	25
D. Human physiology	25
Practical scheme of work	60
Prescribed and other practical activities	40
Individual investigation	10
Group 4 project	10

The group 4 project

The group 4 project is a collaborative activity where students from different group 4 subjects, within or between schools, work together. It allows for concepts and perceptions from across disciplines to be shared while appreciating the environmental, social and ethical implications of science and technology. It can be practically or theoretically based and aims to develop an understanding of the relationships between scientific disciplines and their influence on other areas. The emphasis is on interdisciplinary cooperation and the scientific processes

III. Assessment model

It is the intention of this course that students are able to fulfill the following assessment objectives:

1. Demonstrate knowledge and understanding of:
   - facts, concepts, and terminology
   - methodologies and techniques
   - communicating scientific information.
2. Apply:
   - facts, concepts, and terminology
   - methodologies and techniques
   - methods of communicating scientific information.
3. Formulate, analyse and evaluate:
   - hypotheses, research questions and predictions
   - methodologies and techniques
   - primary and secondary data
   - scientific explanations.
4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		4.5	80
Paper 1	40 multiple-choice questions	1	20
Paper 2	Data-based, short answer and extended response questions	2.25	36
Paper 3	Data-based, short answer and extended response questions	1.25	24
Internal		10	20
Individual investigation	Investigation and write-up of 6 to 12 pages	10	20

IV. Sample questions

- Membrane proteins of mice cells were marked with green and membrane proteins of human cells were marked with red. The cells were fused together. What would be seen after two hours? (Paper 1)

- The species is the basis for naming and classifying organism.
  - o Explain how new species can emerge by
    - directional selection
    - disruptive selection
    - polyploidy.
  - o Outline the advantages to scientists of the binomial system for naming species.
  - o Describe the use of dichotomous keys for the identification of specimens. (Paper 2)

- Brain death is a clinical diagnosis based on the absence of neurological function, with a known irreversible cause of coma.
  - o Explain a named method to assess brain damage.
  - o Distinguish between a reflex arc and other responses by the nervous system.
  - o Describe the events that occur in the nervous system when something very hot is touched. (Paper 3)

International Baccalaureate Diploma Programme Subject Brief Individuals and societies:
Business management—Higher level

First assessments 2016 – Last assessments 2022

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To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

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I. Course description and aims

The business management course is designed to develop students' knowledge and understanding of business management theories, as well as their ability to apply a range of tools and techniques. Students learn to analyse, discuss and evaluate business activities at local, national and international levels. The course covers a range of organizations from all sectors, as well as the sociocultural and economic contexts in which those organizations operate.

The course covers the key characteristics of business organization and environment, and the business functions of human resource management, finance and accounts, marketing and operations management. Links between the topics are central to the course. Through the exploration of six underpinning concepts (change, culture, ethics, globalization, innovation and strategy), the course allows students to develop a holistic understanding of today's complex and dynamic business environment. The conceptual learning is firmly anchored in business management theories, tools and techniques and placed in the context of real world examples and case studies.

The course encourages the appreciation of ethical concerns at both a local and global level. It aims to develop relevant and transferable skills, including the ability to: think critically; make ethically sound and well-informed decisions; appreciate the pace, nature and significance of change; think strategically; and undertake long-term planning, analysis and evaluation. The course also develops subject-specific skills, such as financial analysis.

The aims of the business management course at HL and SL are to:

1. encourage a holistic view of the world of business
2. empower students to think critically and strategically about individual and organizational behaviour
3. promote the importance of exploring business issues from different cultural perspectives
4. enable the student to appreciate the nature and significance of change in a local, regional and global context
5. promote awareness of the importance of environmental, social and ethical factors in the actions of individuals and organizations
6. develop an understanding of the importance of innovation in a business environment.

II. Curriculum model overview

Component	Recommended teaching hours
Unit 1: Business organization and environment 1.1 Introduction to business management 1.2 Types of organizations 1.3 Organizational objectives 1.4 Stakeholders 1.5 External environment 1.6 Growth and evolution 1.7 Organizational planning tools	50

Unit 2: Human resource management 2.1 Functions and evolution of human resource management 2.2 Organizational structure 2.3 Leadership and management 2.4 Motivation 2.5 Organizational (corporate) culture 2.6 Industrial/employee relations	30
Unit 3: Finance and accounts 3.1 Sources of finance 3.2 Costs and revenues 3.3 Break-even analysis 3.4 Final accounts 3.5 Profitability and liquidity ratio analysis 3.6 Efficiency ratio analysis 3.7 Cash flow 3.8 Investment appraisal 3.9 Budgets	50
Unit 4: Marketing 4.1 The role of marketing 4.2 Marketing planning (including introduction to the four Ps) 4.3 Sales forecasting 4.4 Market research 4.5 The four Ps (product, price, promotion, place) 4.6 The extended marketing mix of seven Ps 4.7 International marketing 4.8 E-commerce	50
Unit 5: Operations management 5.1 The role of operations management 5.2 Production methods 5.3 Lean production and quality management 5.4 Location 5.5 Production planning 5.6 Research and development 5.7 Crisis management and contingency planning	30
Internal assessment	30

III. Assessment model

By the end of the business management HL course, students are expected to reach the following assessment objectives.

1. Demonstrate knowledge and understanding of:
   - the business management tools, techniques and theories specified in the syllabus content
   - the six concepts that underpin the subject
   - real-world business problems, issues and decisions
   - the HL extension topics.
2. Demonstrate application and analysis of:
   - knowledge and skills to a variety of real-world and fictional business situations
   - business decisions by explaining the issue(s) at stake, selecting and interpreting data, and applying appropriate tools, techniques, theories and concepts
   - the HL extension topics.
3. Demonstrate synthesis and evaluation of:
   - business strategies and practices, showing evidence of critical thinking
   - business decisions, formulating recommendations
   - the HL extension topics.
4. Demonstrate a variety of appropriate skills to:
   - produce well-structured written material using business terminology
   - select and use quantitative and qualitative business tools, techniques and methods
   - select and use business material, from a range of primary and secondary sources.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		4.5	75
Paper 1	Structured and extended response questions	2.25	35
Paper 2	Structured and extended response questions	2.25	40
Internal		30	25
Research project	Students research and report on an issue facing an organization or a decision to be made by an organization (or several organizations). Maximum 2,000 words.	30	25

IV. Sample questions

- Analyse the appropriateness of a cost-plus pricing strategy for B-Pharma's drugs.
- Evaluate the effectiveness of the democratic leadership style of the partners at Hands.
- With reference to one or two organization(s) that you have studied, discuss how marketing strategies may differ in two cultures that you are familiar with.

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International Baccalaureate Diploma Programme Subject Brief Diploma Programme Core: Creativity, action, service

2010–2016

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Elements of CAS

Creativity, action, service (CAS) is at the heart of the DP, involving students in a range of activities that take place alongside their academic studies. The component's three strands, often interwoven with particular activities, are characterized as follows:

- Creativity—exploring and extending ideas leading to an original or interpretive product or performance. This may include visual and performing arts, digital design, writing, film, culinary arts and crafts.
- Action—physical exertion contributing to a healthy lifestyle. Pursuits may include individual and team sports, dance, outdoor recreation, fitness training, and any other form of physical exertion that purposefully contributes to a healthy lifestyle.
- Service—collaborative and reciprocal engagement with the community in response to an authentic need. Through Service, students develop and apply personal and social skills in real-life situations involving decision-making, problem solving, initiative, responsibility, and accountability for their actions.

Service experiences can be approached using the Service Learning model. Service Learning is the development and application of knowledge and skills towards meeting an identified community need. In this research-based approach, students undertake service initiatives often related to topics studied in the curriculum, utilising skills, understanding and values developed in these studies. Service Learning builds upon students' prior knowledge and background, enabling them to make links between their academic disciplines and their Service experiences.

CAS encourages students to be involved in local, national and international activities as individuals and as part of a team, enabling them to enhance their personal, interpersonal, social and civic development. It can be both challenging and a personal journey of self-discovery. CAS activities are usually real and purposeful with significant outcomes, extending the student while involving planning, reviewing progress, reporting and reflection on outcomes and personal learning.

International dimensions

CAS activities are seen in a broader context, bearing in mind the maxim "Think globally, act locally". Working with people from different social or cultural backgrounds in the vicinity of the school can do as much to increase mutual understanding as large international projects.

CAS and ethical education

Because it involves real activities with significant outcomes, CAS provides a major opportunity for ethical education, understood as involving principles, attitudes and behaviour. The emphasis in CAS is on helping students to develop their own identities, in accordance with the ethical principles embodied in the IB mission statement and the IB learner profile. Various ethical issues will arise naturally, and may be experienced as challenges to a student's ideas, instinctive responses or ways of behaving.

Aims

Within the DP, CAS provides the main opportunity to develop many of the attributes described in the IB learner profile. For this reason, the aims of CAS have been written in a form that highlights their connections with the IB learner profile. The CAS programme aims to develop students who:

- enjoy and find significance in a range of CAS experiences involving intellectual, physical, creative, emotional and fun elements
- meaningfully reflect upon their experiences
- identify goals, develop strategies and initiate further actions for personal growth
- explore new possibilities, embrace new challenges and adapt to new roles
- actively participate in planned, sustained, and collaborative CAS Projects
- understand that they are members of local and global communities with responsibilities towards each other and the environment.

Learning outcomes

Successful completion of CAS is a requirement for the award of the IB diploma. CAS is not formally assessed but students need to document their activities and provide evidence that they have achieved all eight key learning outcomes.

Learning outcomes are differentiated from assessment objectives because they are not rated on a scale. The completion decision for the school in relation to each student is, simply, "Have these outcomes been achieved?" This focus on learning outcomes emphasizes that it is the activity's contribution to the student's development that is most important. The guideline for the minimum amount of CAS activity is 150 hours, with a reasonable balance between creativity, action and service.
As a result of their CAS experience as a whole, including reflections, there should be evidence that students have:

- increased their awareness of their own strengths and areas for growth - They are able to see themselves as individuals with various skills and abilities, and understand that they can make choices about how to move forward.
- undertaken new challenges - A new challenge may be an unfamiliar activity, or an extension to an existing one.
- planned and initiated activities - Planning and initiation is often in collaboration with others. It can be shown in activities that are part of larger projects, as well as in small student-led activities.
- worked collaboratively with others - Collaboration can be shown in many different activities. At least one project, involving collaboration and the integration of at least two of creativity, action and service, is required.
- shown perseverance and commitment in their activities - At a minimum, this implies attending regularly and accepting a share of the responsibility for dealing with problems that arise in the course of activities.
- engaged with issues of global importance - Students may be involved in international projects but there are many global issues that can be acted upon locally or nationally.
- considered the ethical implications of their actions - Ethical decisions arise in almost any CAS activity, and evidence of thinking about ethical issues can be shown in various ways.
- developed new skills - As with new challenges, new skills may be shown in activities that the student has not previously undertaken, or in increased expertise in an established area.

International Baccalaureate Diploma Programme Subject Brief Sciences:

Chemistry—Higher level

First assessments 2016 – Last assessments 2022

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I. Course description and aims

Chemistry is an experimental science that combines academic study with the acquisition of practical and investigational skills. Chemical principles underpin both the physical environment in which we live and all biological systems. Chemistry is often a prerequisite for many other courses in higher education, such as medicine, biological science and environmental science.

Both theory and practical work should be undertaken by all students as they complement one another naturally, both in school and in the wider scientific community. The DP chemistry course allows students to develop a wide range of practical skills and to increase facility in the use of mathematics. It also allows students to develop interpersonal and information technology skills, which are essential to life in the 21st century.

By studying chemistry students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes the subject.

Teachers provide students with opportunities to develop manipulative skills, design investigations, collect data, analyse results and evaluate and communicate their findings.

Through the overarching theme of the nature of science, the aims of the DP chemistry course are to enable students to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science
8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

II. Curriculum model overview

Component	Recommended teaching hours
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)	25
A. Materials	25
B. Biochemistry	25
C. Energy	25
D. Medicinal chemistry	25
Practical scheme of work	60
Prescribed and other practical activities	40
Individual investigation (internally assessed)	10
Group 4 project	10

The group 4 project

The group 4 project is a collaborative activity where students from different group 4 subjects, within or between schools, work together. It allows for concepts and perceptions from across disciplines to be shared while appreciating the environmental, social and ethical implications of science and technology. It can be practically or theoretically based and aims to develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge. The emphasis is on interdisciplinary cooperation and the scientific processes.

III. Assessment model

Studying this course, students should be able to fulfill the following assessment objectives:

1. Demonstrate knowledge and understanding of:
   - facts, concepts, and terminology
   - methodologies and techniques
   - communicating scientific information.
2. Apply:
   - facts, concepts, and terminology
   - methodologies and techniques
   - methods of communicating scientific information.
3. Formulate, analyse and evaluate:
   - hypotheses, research questions and predictions
   - methodologies and techniques
   - primary and secondary data
   - scientific explanations.
4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		4.5	80
Paper 1	40 multiple-choice questions (Core and AHL)	1	20
Paper 2	Short answer and extended response questions (Core and AHL)	2.25	36
Paper 3	Data- and practical –based questions, plus short answer and extended response questions on the option	1.25	24
Internal		10	20
Individual investigation	Investigation and write-up of 6 to 12 pages	10	20

IV. Sample questions

- What is the sum of the coefficients when the equation for the combustion of ammonia is balanced using the smallest possible whole numbers?

A. 6
B. 12
C. 14
D. 15 (Paper 1)

- The two isomers of $[Pt(NH_3)_2Cl_2]$ are crystalline. One of the isomers is widely used in the treatment of cancer.
  i. Draw both isomers of the complex,
  ii. Explain the polarity of each isomer using a diagram of each isomer to support your answer,
  iii. State a suitable method (other than looking at dipole moments) to distinguish between the two isomers
  iv. Compare and contrast the bonding types formed by nitrogen in $[Pt(NH_3)_2Cl_2]$ (Paper 2)

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International Baccalaureate Diploma Programme Subject Brief Language acquisition:
Classical languages—Higher level

First assessments 2016 – Last assessments 2021

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I. Course description and aims

The classical languages higher level (HL) course can be taken in Latin or Classical Greek. The course provides students with the opportunity to study an historically significant language that is also embedded in many modern languages. Latin and Classical Greek are separate subjects, but they share the same syllabus and assessment criteria.

The DP classical languages course provides an opportunity for students to explore the languages, literatures and cultures of ancient Greece or Rome. The study of classical languages gives important insights into the cultures that produced them, and leads to a greater understanding of contemporary languages, literature and cultures. Fundamentally, the study of classical languages trains the mind, developing skills of critical thought, memory and close analysis, as well as an appreciation of the beauty and power of language.

It is a fundamental principle that the texts be studied in their origi- nal language. Linguistic skills lie at the heart of the course, since it is through a deep understanding of the workings of a language that true intellectual contact can be made with the peoples of the past. Students learn to translate Latin or Classical Greek works accurately and sensitively. Students also study different genres of classical texts, examining the ideas in these works and their artistry within their historical, political and cultural contexts. Teachers explicitly teach thinking and research skills such as comprehension, text analysis, transfer, and use of primary sources.

Aims

1. Enable the student to reach an appropriate level of knowledge and understanding of the language and to use this understanding for a variety of purposes, including translation, comprehension and research.
2. Develop the student's appreciation of the literary merit of classical texts and an awareness of the issues raised in them, as well as their connections and relevance to our times.
3. Encourage, through the study of texts and other products of classical cultures, an awareness and appreciation in the student of the different perspectives of people from those cultures.
4. Provide the student with an opportunity for intellectual engagement through the process of inquiry and the development of critical thinking and learning skills.
5. Provide the student with a basis for further study, work and enjoyment in a variety of contexts.

II. Curriculum model overview

Component	Recommended teaching hours
Part 1: Study of language Latin: The study of Cicero or Ovid in order to develop language skills. One extract from each author will be set and students will be required to translate one of the extracts. Classical Greek: The study of Xenophon in order to develop language skills. Students will be required to translate an extract written by that author. *Part 2: Study of literature* A detailed study of literature from two options in the original language chosen from five prescribed options.	220
Part 3: Individual study—research dossier A collection of annotated primary source materials demonstrating an in-depth exploration of an aspect of classical language, literature or civilization chosen by the student.	20

III. Assessment model

It is expected that by the end of the classical languages course, students will be able to:

1. understand and translate texts in the original language
2. demonstrate their knowledge and understanding of texts in the original language and other products of classical culture within their historical, political, cultural and geographical contexts
3. analyse the style of, and demonstrate a critical understanding of, a variety of classical texts in the original language
4. construct an argument supported by relevant examples in the original language or supplementary reading.

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Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		3.5	80
Paper 1	Translation of one extract from a prescribed author in Part 1 of the syllabus.	1.5	35
Paper 2	Questions based on ten extracts, two from each option in Part 2 of the syllabus. Students answer questions on four extracts from two options, and provide a written response to a prompt on one option.	2	45
Internal			20
Research dossier	An annotated collection of 10 to 12 primary source materials relating to a topic in classical history, literature, language, religion, mythology, art, archeology or some aspect of classical influence		20

IV. Sample questions

Text for translation: Cicero, Pro Cluentio 50–51 (Cicero describes a previous case and his nervousness at speaking.)
(Latin HL, paper 1)

Text for translation: Xenophon, Anabasis 6.1.5–8 (At a banquet offered by the Athenians to the Paphlagonian envoys, some Thracians provide entertainment by performing very elaborate dancing.)
(Classical Greek HL, paper 1)

(Question based on Tibullus, Elegies 3.11) Analyse the poem showing how Tibullus's poetic style emphasizes major themes of Roman love poetry. Support your argument by quoting the Latin text.
(Latin HL, paper 2, section A)

(Question based on Herodotus, The Histories 7.12.1–13.3) Briefly describe Xerxes's dream. Analyse the dream as an example of Herodotus's use of dreams and/or divine knowledge as a narrative device in the prescribed reading from The Histories.
(Classical Greek HL, paper 2, section A)

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For more on how the DP prepares students for success at university, visit: ***www.ibo.org/recognition*** *or email:* ***recognition@ibo.org****.*

International Baccalaureate Diploma Programme Subject Brief Sciences:

Computer science – Higher level

First assessments 2014 – Last assessments 2020

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP computer science HL course requires an understanding of the fundamental concepts of computational thinking as well as knowledge of how computers and other digital devices operate. The course, underpinned by conceptual thinking, draws on a wide spectrum of knowledge, and enables and empowers innovation, exploration and the acquisition of further knowledge. Students study how computer science interacts with and influences cultures, society and how individuals and societies behave, and the ethical issues involved. During the course the student will develop computational solutions. This will involve the ability to:

- identify a problem or unanswered question
- design, prototype and test a proposed solution
- liaise with clients to evaluate the success of the proposed solution and make recommendations for future developments.

The aims of the computer science HL courses are to:

- provide opportunities for study and creativity within a global context that will stimulate and challenge students developing the skills necessary for independent and lifelong learning
- provide a body of knowledge, methods and techniques that characterize computer science
- enable students to apply and use a body of knowledge, methods and techniques that characterize computer science
- demonstrate initiative in applying thinking skills critically to identify and resolve complex problems
- engender an awareness of the need for, and the value of, effective collaboration and communication in resolving complex problems
- develop logical and critical thinking as well as experimental, investigative and problem-solving skills
- develop and apply the students' information and communication technology skills in the study of computer science to communicate information confidently and effectively
- raise awareness of the moral, ethical, social, economic and environmental implications of using science and technology
- develop an appreciation of the possibilities and limitations associated with continued developments in IT systems and computer science
- encourage an understanding of the relationships between scientific disciplines and the overarching nature of the scientific method.

II. Curriculum model overview

Component	Recommended teaching hours
Core syllabus content SL/HL core • Topic 1: System fundamentals • Topic 2: Computer organization • Topic 3: Networks • Topic 4: Computational thinking, problem-solving and programming	80
HL extension • Topic 5: Abstract data structures • Topic 6: Resource management • Topic 7: Control	45
Case study Additional subject content introduced by the annually issued case study	30

Option SL/HL core HL extension Students study one of the following options: • Option A: Databases • Option B: Modelling and simulation • Option C: Web science • Option D: Object-oriented programming (OOP)	 30 15
Internal assessment Solution Practical application of skills through the development of a product and associated documentation	30
Group 4 project	10

III. Assessment model

Having followed the computer science higher level course, students will be expected to:

Know and understand:
- relevant facts and concepts
- appropriate methods and techniques
- computer science terminology
- methods of presenting information.

Apply and use:
- relevant facts and concepts
- relevant design methods and techniques
- terminology to communicate effectively
- appropriate communication methods to present information.

Construct, analyse, evaluate and formulate:
- success criteria, solution specifications including task outlines, designs and test plans
- appropriate techniques within a specified solution.

Demonstrate the personal skills of cooperation and perseverance as well as appropriate technical skills for effective problem-solving in developing a specified product.

e t at a ce

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			80
Paper 1	• Section A consists of several compulsory short answer questions. • Section B consists of five compulsory structured questions.	2 hours, 10 min.	40
Paper 2	An examination paper of between three and seven compulsory question; linked to the option studied.	1 hour, 20 min.	20
Paper 3	An examination paper consisting of four compulsory questions based on a pre-seen case study.	1 hour	20
Internal			20
Written commentary	A report of The development of a computational solution. Students must produce: • a cover page that follows the prescribed format • a product • supporting documentation (word limit 2,000 words).	30 hours	25
Group 4 project	To be assessed using the criterion Personal skills.	10 hours	

IV. Sample questions

- Draw the representation of the binary search tree if the following data were inserted in this order:
  - FALCON, CANARY, PIGEON, TURKEY, OSPREY.
- Discuss the methods used by criminals to hide or disguise certain files. For each method, identify the countermeasures that can be taken by a computer forensic scientist.

Core requirements: Extended essay, theory of knowledge and creativity, action, service subject brief

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About the IB: For over 40 years the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and able to contribute to creating a better, more peaceful world.

The IB subject brief illustrates the key components of the core requirements in the IB Diploma Programme.

The IB core elements of extended essay, theory of knowledge and creativity, action, service are described below.

I. Extended essay

The extended essay of some 4,000 words offers the opportunity for IB students to investigate a topic of special interest, usually one of the student's six Diploma Programme subjects, and acquaints them with the independent research and writing skills expected at university. It is intended to promote high-level research and writing skills, intellectual discovery and creativity—resulting in approximately 40 hours of work. It provides students with an opportunity to engage in personal research on a topic of choice, under the guidance of a supervisor.

This leads to a major piece of formally presented, structured writing of no more than 4,000 words, in which ideas and findings are communicated in a reasoned and coherent manner, appropriate to the subject. It is recommended that students follow the completion of the written essay with a short, concluding interview—*viva voce*—with the supervisor. In countries where normally interviews are required prior to acceptance for employment or for a place at university, the extended essay has proved to be a valuable stimulus for discussion.

Extended essay assessment

Students are expected to demonstrate the ability to do the following:

- plan and pursue a research project with intellectual initiative and insight
- gather and interpret material from sources appropriate to the research question
- structure a reasoned argument in response to the research question on the basis of the material gathered
- present their extended essay in a format appropriate to the subject, acknowledging sources in one of the established academic ways
- use the terminology and language appropriate to the subject with skill and understanding
- apply analytical and evaluative skills appropriate to the subject, with an understanding of the implications and the context of their research.

The extended essay contributes to the overall diploma score through the award of points in conjunction with theory of knowledge. A maximum of three points are awarded according to a student's combined performance in both the extended essay and theory of knowledge.

II. Theory of knowledge

The interdisciplinary theory of knowledge course is designed to develop a coherent approach to learning that transcends and unifies the academic areas and encourages appreciation of other cultural perspectives. The theory of knowledge course is in part intended to encourage students to reflect on the huge cultural shifts worldwide around the digital revolution and the information economy. The extent and impact of the changes vary greatly in different parts of the world, but everywhere their implications for knowledge are profound. Theory of knowledge encourages critical thinking about knowledge itself and aims to help young people make sense of what they encounter. Its core content focuses on questions such as the following.

- What counts as knowledge?
- How does it grow?
- What are its limits?
- Who owns knowledge?
- What is the value of knowledge?
- What are the implications of having, or not having, knowledge?

Theory of knowledge activities and discussions aim to help students discover and express their views on knowledge issues. The course encourages students to share ideas with others and to listen to and learn from what others think. In this process students' thinking and their understanding of knowledge as a human construction are shaped, enriched and deepened. Connections may be made between knowledge encountered in different Diploma Programme subjects, in creativity, action, service experience or in extended essay research; distinctions between different kinds of knowledge may be clarified.

The aims of the theory of knowledge course are to:

- develop a fascination with the richness of knowledge as a human endeavour, and an understanding of the empowerment that follows from reflecting upon it
- develop an awareness of how knowledge is constructed, critically examined, evaluated and renewed, by communities and individuals

- encourage students to reflect on their experiences as learners, in everyday life and in the Diploma Programme, and to make connections between academic disciplines and between thoughts, feelings and actions
- encourage an interest in the diversity of ways of thinking and ways of living of individuals and communities, and an awareness of personal and ideological assumptions, including participants' own
- encourage consideration of the responsibilities originating from the relationship between knowledge, the community and the individual as citizen of the world.

Theory of knowledge assessment

The theory of knowledge assessment model contains two components, both of which should be completed within the 100 hours designated for the course. Presentations are an integral part of the course.

Type of assessment	Format of assessment	Weighting of final grade (%)
External assessment	Essay (1,200 to 1,600 words) on a prescribed title	**65**
	Essay on a title chosen from a list of 10 titles prescribed by the IB for each examination session	
Internal assessment	One 10-minute presentation to the class	**35**
	The theory of knowledge presentation requires students to identify and explore the knowledge issues raised by a substantive real-life situation that is of interest to them.	

The two assessment tasks, the essay and the presentation, are seen as complementary opportunities for students to show the extent to which they have achieved the theory of knowledge course objectives. Students should be able to demonstrate the ability to:

- analyse critically knowledge claims, their underlying assumptions and their implications
- generate questions, explanations, conjectures, hypotheses, alternative ideas and possible solutions in response to knowledge issues concerning areas of knowledge, ways of knowing and students' own experience as learners
- demonstrate an understanding of different perspectives on knowledge issues
- draw links and make effective comparisons between different approaches to knowledge issues that derive from areas of knowledge, ways of knowing, theoretical positions and cultural values
- demonstrate an ability to give a personal, self-aware response to a knowledge issue
- formulate and communicate ideas clearly with due regard for accuracy and academic honesty.

Both assessment tasks have at their centre reflection on knowledge issues but this reflection is demonstrated differently in each. The emphasis in the theory of knowledge presentation is on demonstrating an understanding of knowledge at work in the world.

Diploma points matrix for extended essay and theory of knowledge

Performance in the extended essay and in theory of knowledge is assessed using IB assessment criteria. Using the two performance levels and the diploma points matrix, a maximum of three diploma points can be awarded for a student's combined performance in theory of knowledge and the extended essay.

III. Creativity, action, service

Creativity, action, service is at the heart of the Diploma Programme, involving students in a range of activities that take place alongside their academic studies throughout the IB Diploma Programme. The component's three strands, often interwoven with particular activities, are characterized as follows.

- **Creativity**—arts and other experiences that involve creative thinking
- **Action**—physical exertion contributing to a healthy lifestyle, complementing academic work elsewhere in the IB Diploma Programme
- **Service**—an unpaid and voluntary exchange that has a learning benefit for the student

Creativity, action, service encourages students to be involved in activities as individuals and as part of a team that take place in local, national and international contexts. Creativity, action, service enables students to enhance their personal and interpersonal development as well as their social and civic development, through experiential learning, lending an important counterbalance to the academic pressures of the rest of the IB Diploma Programme. It should be both challenging and enjoyable—a personal journey of self-discovery that recognizes each student's individual starting point.

Activities should provide:

- real, purposeful activities, with significant outcomes
- personal challenge—tasks must extend the student and be achievable in scope
- thoughtful consideration, such as planning, reviewing progress and reporting
- reflection on outcomes and personal learning.

Creativity, action, service evaluation

Creativity, action, service is not formally assessed, but students need to reflect on their activities and be able to demonstrate that they have:

- increased their awareness of their own strengths and areas for growth
- undertaken new challenges and developed new skills
- planned and initiated activities and worked collaboratively with others
- shown perseverance and commitment in their activities
- engaged with issues of global importance
- considered the ethical implications of their actions.

IB economics higher level subject brief

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About the IB: For over 40 years the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and able to contribute to creating a better, more peaceful world.

The IB subject briefs illustrate key course components in the IB Diploma Programme.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

Overview of the economics higher level course and curriculum model

I. Course description and aims

The IB Diploma Programme economics higher level course aims to provide students with a core knowledge of economics, encourage students to think critically about economics, promote an awareness and understanding of internationalism in economics and encourage students' development as independent learners. Alongside the empirical observations of positive economics, students of the subject are asked to formulate normative questions and to recognize their own tendencies for bias.

In addition, the course is designed to:

- encourage the systematic and critical study of human experience and behaviour; physical, economic and social environments; and the economics and development of social and cultural institutions
- develop the capacity to identify, analyse critically and evaluate theories, concepts and arguments about the nature and activities of the individual and society
- enable students to collect, describe and analyse data used in studies of society; test hypotheses; and interpret complex data and source material
- promote an appreciation of the way learning is relevant to both the culture in which the student lives and the culture of other societies
- develop an awareness that human attitudes and beliefs are widely diverse and that the study of society requires an appreciation of such diversity
- enable the student to recognize that the content and methodologies of the subjects in group 3 are contestable and that their study requires the toleration of uncertainty.

II. Curriculum model overview

Economics higher level

Components
Introduction to economics
Microeconomics Markets Elasticities Theory of the firm Market failure
Macroeconomics Measuring national income Introduction to development Macroeconomic models Demand-side and supply-side policies Unemployment and inflation Distribution of income
International economics Reasons for trade Free trade and protectionism Economic integration World Trade Organization (WTO) Balance of payments Exchange rates Balance of payment problems Terms of trade
Development economics Sources of economic growth and/or development Consequences of growth Barriers to economic growth and/or development Growth and development strategies Evaluation of growth and development strategies

III. Assessment model

Assessment for economics higher level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

The assessments aim to test all students' knowledge and understanding of key concepts through various activities that demonstrate their ability to:

- understand and apply economic concepts and theories to a range of circumstances and a variety of situations
- analyse information through the use of economic concepts and theories
- evaluate concepts and theories from different economic perspectives.

Students' success in the economics higher level course is measured by combining their grades on external and internal assessment.

In external assessment components, students must be able to demonstrate an understanding of both basic facts and complex concepts related to the full economics syllabus. The internal assessment measures students' ability to produce a portfolio of four commentaries—each 650 to 750 words—based on a news media extract that links economic theory to a real-world situation. Three of the four commentaries must have as their main focus a different section of the syllabus, although commentaries may reference other sections. A fourth commentary can focus either on a single section or on two or more sections of the syllabus.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**80**
Paper 1	Four extended-response questions based on all five sections of the syllabus	1	20
Paper 2	Six short-answer questions based on all five sections of the syllabus	1	20
Paper 3	A data-response paper on all five sections of the syllabus	2	40
Internal			**20**
Portfolio	A portfolio of four commentaries		

IV. Sample Questions

1. (a) Using examples, describe various sources of funds available to developing countries through trade and aid.
   (b) Evaluate trade and aid as means of achieving economic growth and development. (Paper 1)
2. Explain why Veblen goods are an exception to the law of demand. (Paper 2)
3. Study the extract below and answer the questions that follow. (Paper 3)

   Devaluation's downbeat start

   "If Argentina falls one more step, there will be a disaster," said Eduardo Duhalde, its new president, urging Congress to grant him emergency powers to cope with the country's economic collapse. Congress duly granted those powers. Mr. Duhalde promptly used them to order a devaluation and launched Argentina into the unknown.

   After a decade in which the Argentinean peso has been fixed to the US dollar, many of the emergency measures unveiled are designed to cushion the impact of the devaluation on ordinary Argentines. Instead of a free float, the government has set an official exchange rate of 1.4 pesos to the dollar (i.e. a 29 % devaluation) for exports, those imports judged to be essential, and most capital transactions.

   In a move to make the public less upset, the prices charged by privatized telephone, water and energy companies will not change. These had been pegged to the dollar and indexed to inflation in the US. Now, they will be switched to pesos at par and the link to US prices will be scrapped. Congress has also given official powers to impose price controls, but they say that they will only use them on sensitive products, such as fuels and medicines.

   In a country with a history of hyperinflation, the government is clearly scared that an uncontrolled devaluation would lead to massive price rises. In fact, though some prices have already gone up, the economy's deep recession may restrain inflation. If inflation and the exchange rate are to be restrained, Congress will have to approve a convincingly balanced budget. Last year, as the economy collapsed, the government's deep spending cuts failed to keep up with plunging tax revenues, causing a deficit of $9 billion. Now the government will save money by not servicing most of its debt, but in order to balance the books further, deeper cuts will be required.

   Source: © The Economist Newspaper Limited, London, January 12th 2002 (adapted with permission)

   (a) Define the following terms indicated in bold in the text:
      (i) devaluation
      (ii) inflation.
   (b) Using an appropriate diagram, explain why "an uncontrolled devaluation would lead to massive price rises."
   (c) Using an appropriate diagram, explain the likely impact of imposing price controls on "sensitive products."
   (d) Using information from the text and your knowledge of economics, evaluate the advantages and disadvantages of Argentina adopting a contractionary fiscal policy.

International Baccalaureate Diploma Programme Subject Brief Sciences:

Environmental systems and societies – Standard level

First assessments 2010 – Last assessments 2016

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To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP environmental systems and societies standard level course aims to provide students with a coherent perspective of the interrelationships between environmental systems and societies; one that enables them to adopt an informed personal response to the wide range of pressing environmental issues that they will inevitably come to face. Students' attention is constantly drawn to their own relationship with their environment and the significance of choices and decisions that they make in their own lives. It is intended that students develop a sound understanding of the interrelationships between environmental systems and societies, rather than a purely journalistic appreciation of environmental issues. The teaching approach strives to be conducive to students evaluating the scientific, ethical and socio-political aspects of issues.

The aims of the environmental systems and societies standard level course are to:

- promote understanding of environmental processes at a variety of scales, from local to global
- provide a body of knowledge, methodologies and skills that can be used in the analysis of environmental issues at local and global levels
- enable students to apply the knowledge, methodologies and skills gained
- promote critical awareness of a diversity of cultural perspectives
- recognize the extent to which technology plays a role in both causing and solving environmental problems
- appreciate the value of local as well as international collaboration in resolving environmental problems
- appreciate that environmental issues may be controversial, and may provoke a variety of responses
- appreciate that human society is both directly and indirectly linked to the environment at a number of levels and at a variety of scales.

II. Curriculum model overview

Component	Recommended teaching hours
Topic 1: Systems and models	5
Topic 2: The ecosystem • Structure • Measuring abiotic components of the system • Measuring biotic components of the system • Biomes • Function • Changes • Measuring changes in the system	31

Topic 3: Human population, carrying capacity and resource use • Population dynamics • Resources—natural capital • Energy resources • The soil system • Food resources • Water resources • Limits to growth • Environmental demands of human populations	39
Topic 4: Conservation and biodiversity • Biodiversity in ecosystems • Evaluating biodiversity and vulnerability • Conservation of biodiversity	15
Topic 5: Pollution management • Nature of pollution • Detection and monitoring of pollution • Approaches to pollution management • Eutrophication • Solid domestic waste • Depletion of stratospheric ozone • Urban air pollution • Acid deposition	18
Topic 6: The issue of global warming	6
Topic 7: Environmental value systems	6

III. Assessment model

Having followed the environmental systems and societies standard level course, students should achieve the following objectives.

- Demonstrate an understanding of information, terminology, concepts, methodologies and skills with regard to environmental issues.
- Apply and use information, terminology, concepts, methodologies and skills with regard to environmental issues.
- Synthesize, analyse and evaluate research questions, hypotheses, methods and scientific explanations with regard to environmental issues.
- Using a holistic approach, make reasoned and balanced judgments using appropriate economic, historical, cultural, socio-political and scientific sources.
- Articulate and justify a personal viewpoint on environmental issues with reasoned argument while appreciating alternative viewpoints, including the perceptions of different cultures.
- Demonstrate the personal skills of cooperation and responsibility appropriate for effective investigation and problem solving.
- Select and demonstrate the appropriate practical and research skills necessary to carry out investigations with due regard to precision.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			80
Paper 1	Short-answer and data-based questions	1	30
Paper 2	• Section A – analysis of data related to a case study • Section B – responses to two structured essay questions from a choice of four	2	50
Internal			20
Practical scheme of work (PSOW)	• A series of practical and fieldwork activities	30	20

IV. Sample questions

- With reference to a named ecosystem, identify one direct and one indirect threat to the ecosystem's biodiversity.
- Compare the attitudes towards the natural environment of two named contrasting societies, and discuss the consequences of these attitudes to the way in which natural resources are used.

International Baccalaureate Diploma Programme Subject Brief The arts:

Film – Higher level

First assessments 2010 – Last assessments 2016

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model

I. Course description and aims

The IB DPiploma Programme film course aims to develop students' skills so that they become adept in both interpreting and making film texts.

Through the study and analysis of film texts and exercises in film-making, the course explores film history, theory and socio-economic background. The course develops students' critical abilities, enabling them to appreciate the multiplicity of cultural and historical perspectives in film. To achieve an international understanding within the world of film, students are taught to consider film texts, theories and ideas from the points of view of different individuals, nations and cultures.

Students also develop the professional and technical skills (including organizational skills) needed to express themselves creatively in film. The course emphasizes the importance of working individually and as a member of a group. A challenge for students following this course is to become aware of their own perspectives and biases and to learn to respect those of others. This requires willingness to attempt to understand alternative views, to respect and appreciate cultural diversity, and to have an open and critical mind.

In addition, the course is designed to promote:

- an appreciation and understanding of film as a complex art form
- an ability to formulate stories and ideas in film terms
- the practical and technical skills of production
- critical evaluation of film productions by the student and by others
- a knowledge of film-making traditions in more than one country.

II. Curriculum model overview

Component	Recommended teaching hours
Part 1: Textual analysis • Construction according to narrative or other formal organizing principles • Representation of characters and issues • Camera angles, shots and movement • Editing and sequencing • Lighting, shade and colour • Sound • Location and set design • Features determining genre • Target audience • Historical, economic, sociocultural and institutional factors	60

Part 2: Film theory and history Aspects of film theory and history can be introduced to students by asking such questions as: • Who made this? • Why? • What can we tell about the film-maker(s)? • For whom was it made? How does it address its audience? What is the nature of our engagement with film? • What outside influences can we perceive in terms of finance, ownership, institution and sociocultural context? • What tradition is it in (for example, American gangster film, Bollywood musical)? • To what other works might it be connected?	60
Part 3: Creative process—techniques and organization of production Initial planning • Finding the idea • Research • Treatment and script development Pitch and approval • Developing the proposal • Negotiating the proposal with the teacher • Receiving approval to proceed Technical planning • Conceptualization • Visualization • Production scheduling • Editing and sound strategies Physical production • Pre-production • Production • Post-production Production journal Retention of materials	120

III. Assessment model

Having followed the higher level film course, students are expected to demonstrate the following:

- An understanding of the variety of ways in which film creates meaning.
- An understanding and effective use of appropriate film language.
- Originality and creativity in developing an idea through the various stages of film-making, from conception to finished production.
- Technical skills and an appropriate use of available technology.
- The ability to draw together knowledge, skills, research and experience, and apply them analytically to evaluate film texts.
- A critical understanding of the historical, theoretical, sociocultural, economic and institutional contexts of film in more than one country
- The ability to research, plan and organize working processes
- The ability to reflect upon and evaluate film production processes and completed film texts.

Assessment at a glance

Type of assessment	Format of assessment	Weighting of final grade (%)
External		50
Independent study	Rationale, script and list of sources for a short documentary production of 12–15 pages on an aspect of film theory and/or film history, based on a study of a minimum of four films. The chosen films must originate from more than one country.	25
Presentation	An oral presentation of a detailed critical analysis of a continuous extract from a prescribed film. Maximum length of presentation: 15 minutes.	25
Internal		50
Production portfolio	One completed film project with an associated trailer and written documentation encompassing and connecting both: no more than 1,750 words. Length of film project: 6-7 minutes.	50

International Baccalaureate Diploma Programme Subject Brief Mathematics: Further mathematics – Higher level

First assessments 2014 – Last assessments 2020

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To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP further mathematics higher level (HL) course caters for students with a very strong background in mathematics who have attained a high degree of competence in a range of analytical and technical skills, and who display considerable interest in the subject. Most of these students will expect to study mathematics at university, either as a subject in its own right or as a major component of a related subject. The course is designed specifically to allow students to learn about a variety of branches of mathematics in depth and also to appreciate practical applications. It is expected that students taking this course will also be taking mathematics HL.

The nature of the subject is such that it focuses on different branches of mathematics to encourage students to appreciate the diversity of the subject. Students should be equipped at this stage in their mathematical progress to begin to form an overview of the characteristics that are common to all mathematical thinking, independent of topic or branch.

The aims of all mathematics courses in group 5 are to enable students to:

- enjoy mathematics, and develop an appreciation of the elegance and power of mathematics
- develop an understanding of the principles and nature of mathematics
- communicate clearly and confidently in a variety of contexts
- develop logical, critical and creative thinking, and patience and persistence in problem-solving
- employ and refine their powers of abstraction and generalization
- apply and transfer skills to alternative situations, to other areas of knowledge and to future developments
- appreciate how developments in technology and mathematics have influenced each other
- appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
- appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
- appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course.

II. Curriculum model overview

Component	Recommended teaching hours
Topic 1 Linear algebra	48
Topic 2 Geometry	48
Topic 3 Statistics and probability	48
Topic 4 Sets, relations and groups	48

Topic 5 Calculus	48
Topic 6 Discrete mathematics	48

Note: One of topics 3–6 will be assumed to have been taught as part of the mathematics HL course and therefore the total teaching hours will be 240 not 288.

III. Assessment model

Having followed the further mathematics HL course, students will be expected to demonstrate the following.

- Knowledge and understanding: recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.
- Problem-solving: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.
- Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation.
- Technology: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.
- Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
- Inquiry approaches: investigate unfamiliar situations, both abstract and real-world, involving organizing and analysing information, making conjectures, drawing conclusions and testing their validity.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		5	
Paper 1 (graphical display calculator required)	Compulsory short- to medium-response questions based on the whole syllabus.	2.5.	50
Paper 2 (graphical display calculator required)	Compulsory medium- to extended-response questions based on the whole syllabus.	2.5	50

IV. Sample questions

- The group {G,+} is defined by the operation of addition on the set $G=\{2n|n\varepsilon Z\}$.
  The group {H, +} is defined by the operation of addition on the set $H = \{4n|n\varepsilon Z\}$.
  Prove that {G, +} and {H, +} are isomorphic.

- The positive integer N is represented by 4064 in base b and 2612 in base b +1.
  Determine the value of b.
  Find the representation of N
  i. in base 10;
  ii. in base 12.

IB history higher level subject brief

International Baccalaureate®
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The IB Diploma Programme, for students aged 16 to 19, is an academically challenging and balanced programme of education that prepares students for success at university and life beyond. Students take courses in six different subject groups, maintaining both breadth and depth of study. History higher level is in group 3, individuals and societies. In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

About the IB: For over 40 years the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and able to contribute to creating a better, more peaceful world.

The IB subject briefs illustrate key course components in the IB Diploma Programme.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

Overview of the history higher level course and curriculum model

I. Course description and aims

The IB Diploma Programme higher level history course aims to promote an understanding of history as a discipline, including the nature and diversity of sources, methods and interpretations. Students are encouraged to comprehend the present by reflecting critically on the past. They are further expected to understand historical developments at national, regional and international levels and learn about their own historical identity through the study of the historical experiences of different cultures. In addition, the course is designed to:

- encourage the systematic and critical study of human experience and behaviour; physical, economic and social environments; and the history and development of social and cultural institutions
- develop the capacity to identify, analyse critically and evaluate theories, concepts and arguments about the nature and activities of the individual and society
- enable students to collect, describe and analyse data used in studies of society; test hypotheses; and interpret complex data and source material
- promote an appreciation of the way learning is relevant to both the culture in which the student lives and the culture of other societies
- develop an awareness that human attitudes and beliefs are widely diverse and that the study of society requires an appreciation of such diversity
- enable the student to recognize that the content and methodologies of the subjects in group 3 are contestable and that their study requires the toleration of uncertainty.

II. Curriculum model overview

History higher level

Route 1	
History of Europe and the Islamic world—study one of two prescribed subjects • The origins and rise of Islam c500–661 • The kingdom of Sicily 1130–1302	40 hours
History of Europe and the Islamic world—study two of the following topics • Dynasties and rulers • Society and economy • Wars and warfare • Intellectual, cultural and artistic developments • Religion and the state	90 hours
Higher level option—study three sections in the selected option • Aspects of the history of medieval Europe and the Islamic world	90 hours
Historical investigation	20 hours
Total teaching hours	**240 hours**

Route 2	
20th century world history—study one of three prescribed subjects • Peacemaking, peacekeeping—international relations 1918–36 • The Arab–Israeli conflict 1945–79 • Communism in crisis 1976–89	40 hours
20th century world history—study two of the following topics • Causes, practices and effects of wars • Democratic states—challenges and responses • Origins and development of authoritarian and single-party states • Nationalist and independence movements in Africa and Asia and post–1945 Central and Eastern European states • The Cold War	90 hours
Higher level option—study three sections in the selected option • Aspects of the history of Africa • Aspects of the history of the Americas • Aspects of the history of Asia and Oceania • Aspects of the history of Europe and the Middle East	90 hours
Historical investigation	20 hours
Total teaching hours	**240 hours**

III. Assessment model

Assessment for history higher level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

The assessments aim to test all students' knowledge and understanding of key concepts through various activities that demonstrate:

- knowledge and comprehension of specified content, such as an ability to recall and select relevant historical knowledge
- application and analysis, including the ability to apply historical knowledge as evidence
- synthesis and evaluation abilities
- the selection and use of historical skills.

Students' success in the history higher level course is measured by combining their grades on external and internal assessment.

On external assessments, students must be able to demonstrate an understanding of both basic facts and complex concepts related to the historical periods studied, depending on the chosen route of study. The internal assessment measures students' ability to use their own initiative to take on a historical inquiry. Students should be able to develop and apply the skills of a historian by selecting and analysing a good range of source material and managing diverse interpretations. The activity demands that students search for, select, evaluate and use evidence to reach a relevant conclusion.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**80**
Paper 1	Route 1: short answer/structured questions from one of two prescribed subjects Route 2: short answer/structured questions from one of three prescribed subjects	1	20
Paper 2	Routes 1 and 2: two extended-response questions chosen from five topics	1.5	25
Paper 3	Three extended-response questions	2.5	35
Internal			**20**
Study report	Historical investigation on any area of the syllabus		

IV. Sample questions

The following questions appeared in previous IB Diploma Programme history higher level examinations.*

1. Using these sources and your own knowledge, analyse how and why Henry VI became King of Sicily in December 1194. (Route 1, paper 1)
2. Analyse the reasons for, and impact of, the Sunni/Shia divide. (Route 1, paper 2)
3. Compare and contrast the domestic policies of Disraeli and Gladstone. (Route 2, paper 3 Europe and the Middle East)

* the syllabus for examinations current until 2016

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IB language A: literature higher level subject brief

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The International Baccalaureate® Diploma Programme, for students aged 16 to 19, is an academically challenging and balanced programme of education that prepares students for success at university and life beyond. Students take courses in six different subject groups, maintaining both breadth and depth of study. Language A: literature higher level is in group 1, studies in language and literature. In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

About the IB: For over 40 years the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and able to contribute to creating a better, more peaceful world.

The IB subject briefs illustrate key course components in the IB Diploma Programme.

Overview of the language A: literature higher level course and curriculum model

I. Course description and aims

The IB Diploma Programme language A: literature course develops understanding of the techniques involved in literary criticism and promotes the ability to form independent literary judgments. In language A: literature, the formal analysis of texts and wide coverage of a variety of literature—both in the language of the subject and in translated texts from other cultural domains—is combined with a study of the way literary conventions shape responses to texts.

Students completing this course will have a thorough knowledge of a range of texts and an understanding of other cultural perspectives. They will also have developed skills of analysis and the ability to support an argument in clearly expressed writing, sometimes at significant length. This course will enable them to succeed in a wide range of university courses, particularly in literature but also in subjects such as philosophy, law and language.

Texts studied are chosen from the prescribed literature in translation (PLT) list and the prescribed list of authors (PLA) or elsewhere. The PLT list is a wide-ranging list of works in translation, from a variety of languages, allowing teachers to select works in a language different from the language of the examination. The PLA lists authors from the language of the examination. The authors on the list are appropriate for students aged 16 to 19.

All group 1 courses are suitable for students experienced in using a language in an academic context. It is also recognized that students have language backgrounds that vary significantly. For one student the target language may be his or her only proficient language; another student may have a complex language profile and competence in more than one language. While students in the group 1 courses will undergo significant development in their ability to use language for a range of purposes, these are not language-acquisition courses. In group 1, it is assumed that students are highly competent in the target language, whether or not it is their mother tongue.

The aims of the language A: literature course at both higher and standard levels are to:

- encourage a personal appreciation of literature and develop an understanding of the techniques involved in literary criticism
- develop the students' powers of expression, both in oral and written communication, and provide the opportunity of practising and developing the skills involved in writing and speaking in a variety of styles and situations
- introduce students to a range of literary works of different periods, genres, styles and contexts
- broaden the students' perspective through the study of works from other cultures and languages
- introduce students to ways of approaching and studying literature, leading to the development of an understanding and appreciation of the relationships between different works
- develop the ability to engage in close, detailed analysis of written text
- promote in students an enjoyment of, and lifelong interest in, literature.

II. Curriculum model overview

Language A: literature higher level

Components		
Works in translation	Study of three works All works are chosen from the titles in the prescribed literature in translation list.	65 hours
Detailed study	Study of three works All works are chosen from the prescribed list of authors for the language being studied, each from a different genre.	65 hours
Literary genres	Study of four works All works are chosen from the prescribed list of authors for the language being studied, chosen from the same genre.	65 hours
Options	Study of three works Works are freely chosen in any combination.	45 hours
Total teaching hours		**240 hours**

Assessment for language A: literature higher level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

Students' success in the language A: literature higher level course is measured by combining their grades on external and internal assessment.

Students must demonstrate their ability to provide literary commentary about prose and poetry, both in written form and orally.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**70**
Paper 1	Literary commentary and analysis of one unseen text	2	20
Paper 2	Essay on at least two works studied	2	25
Written assignment	Reflective statement and literary essay on one work studied		25
Internal			**30**
Oral work	Formal oral commentary and interview (20 minutes)		15
	Individual oral presentation (10-15 minutes)		15

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IB language A: literature standard level subject brief

The International Baccalaureate® Diploma Programme, for students aged 16 to 19, is an academically challenging and balanced programme of education that prepares students for success at university and life beyond. Students take courses in six different subject groups, maintaining both breadth and depth of study. Language A: literature standard level is in group 1, studies in language and literature. In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

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The IB subject briefs illustrate key course components in the IB Diploma Programme.

Overview of the language A: literature standard level course and curriculum model

I. Course description and aims

The IB Diploma Programme language A: literature course develops understanding of the techniques involved in literary criticism and promotes the ability to form independent literary judgments. In language A: literature, the formal analysis of texts and wide coverage of a variety of literature—both in the language of the subject and in translated texts from other cultural domains—is combined with a study of the way literary conventions shape responses to texts.

Students completing this course will have a thorough knowledge of a range of texts and an understanding of other cultural perspectives. They will also have effectively developed skills of analysis and the ability to support of an argument in clearly expressed writing, sometimes at significant length. The course will enable them to succeed in a wide range of university courses, particularly in literature but also in subjects such as philosophy, law and language.

Texts studied can be chosen from the prescribed literature in translation (PLT) list, prescribed list of authors (PLA) or elsewhere. The PLT list is a wide-ranging list of works in translation, from a variety of languages, allowing teachers to select works in a language different from the language of the examination. The PLA lists authors from the language of the examination. The authors on the list are appropriate for students aged 16 to 19.

All group 1 courses are suitable for students experienced in using a language in an academic context. It is also recognized that students have language backgrounds that vary significantly. For one student the target language may be his or her only proficient language; another student may have a complex language profile and competence in more than one language. While students in the group 1 courses will undergo significant development in their ability to use language for a range of purposes, these are not language-acquisition courses. In group 1, it is assumed that students are highly competent in the target language, whether or not it is their mother tongue. The aims of the language A: literature course at both higher and standard levels are to:

- encourage a personal appreciation of literature and develop an understanding of the techniques involved in literary criticism
- develop the students' powers of expression, both in oral and written communication, and provide the opportunity of practising and developing the skills involved in writing and speaking in a variety of styles and situations
- introduce students to a range of literary works of different periods, genres, styles and contexts
- broaden the students' perspective through the study of works from other cultures and languages
- introduce students to ways of approaching and studying literature, leading to the development of an understanding and appreciation of the relationships between different works
- develop the ability to engage in close, detailed analysis of written text
- promote in students an enjoyment of, and lifelong interest in, literature.

II. Curriculum model overview

Language A: literature standard level

Components		
Works in translation	Study of two works All works are chosen from the titles in the prescribed literature in translation list.	40 hours
Detailed study	Study of two works All works are chosen from the prescribed list of authors for the language being studied, each from a different genre.	40 hours
Literary genres	Study of three works All works are chosen from the prescribed list of authors for the language being studied, chosen from the same genre.	40 hours
Options	Study of three works Works are freely chosen in any combination.	30 hours
Total teaching hours		**150 hours**

Assessment for language A: literature standard level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

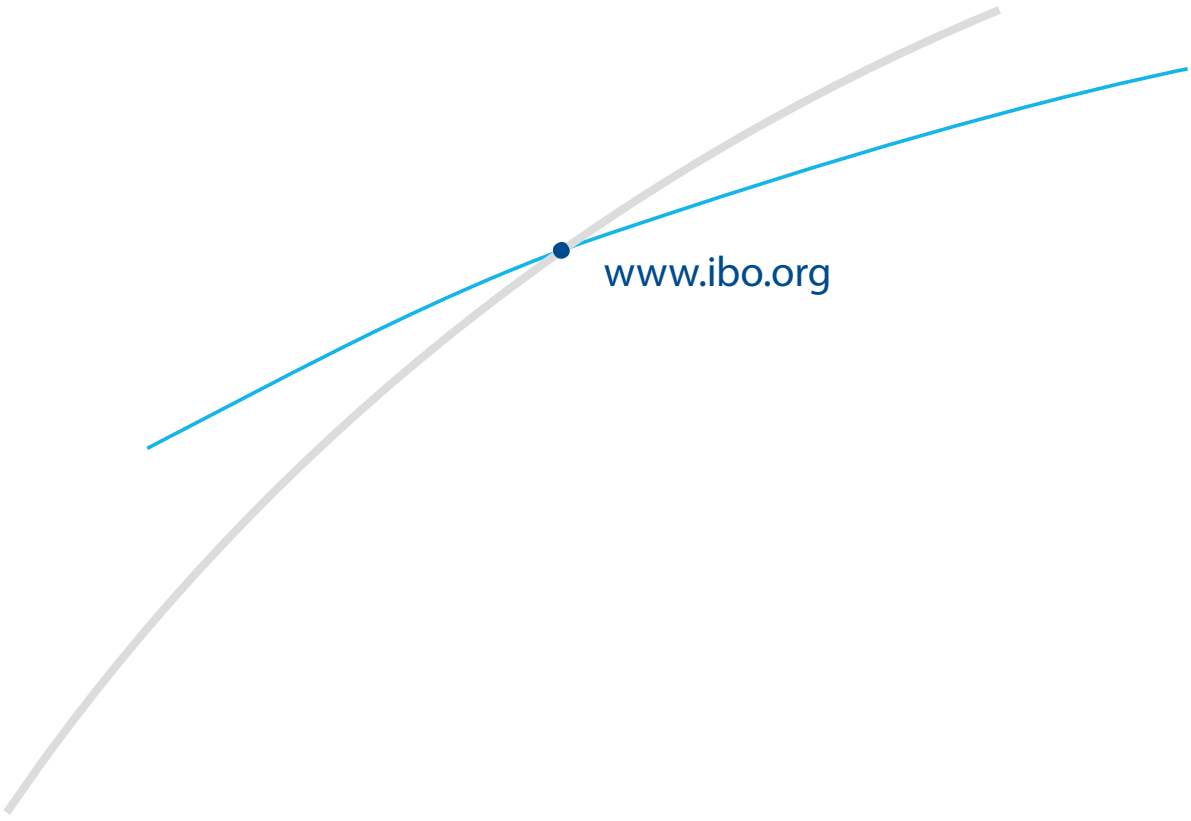
- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

Students' success in the language A: literature standard level course is measured by combining their grades on external and internal assessment.

Students must demonstrate their ability to provide literary commentary about prose and poetry, both in written form and orally.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**70**
Paper 1	Literary analysis of one unseen text	1.5	20
Paper 2	Essay based on two works studied	1.5	25
Written assignment	Reflective statement and literary essay on one work studied		25
Internal			**30**
Oral work	Formal oral commentary and interview	10 minutes	15
	Individual oral presentation	10–15 minutes	15



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International Baccalaureate Diploma Programme Subject Brief Language acquisition:
Language B – Higher level

First assessments 2013 – Last assessments 2019

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Student may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language.

Language B is designed for students who possess a degree of knowledge and experience in the target language. Those learning a language B at higher level should be able to follow university courses in other disciplines in the language B that is studied.

The aims of the language B higher level course are to:

- develop students' intercultural understanding
- enable students to understand and use the language they have studied in a range of contexts and for a variety of purposes
- encourage, through the study of texts and through social interaction, an awareness and appreciation of the different perspectives of people from other cultures
- develop students' awareness of the role of language in relation to other areas of knowledge
- develop students' awareness of the relationship between the languages and cultures with which they are familiar
- provide students with a basis for further study, work and leisure through the use of an additional language
- provide the opportunity for enjoyment, creativity and intellectual stimulation through knowledge of an additional language.

II. Curriculum model overview

Component	Recommended teaching hours
Core *Instruction on three topics* • communication and media • global issues • Social relationships	240
Options *Two options from the following five* • cultural diversity • customs and traditions • health • leisure • science and technology	
Literature • Read 2 works of literature	

III. Assessment model

The assessments aim to test all students' ability to understand and use the language of study as well as key concepts through:

- learning a language by engaging with its use and meaning within a social framework
- developing receptive, productive and interactive skills to meet the objectives of the course.

Students' success in the language B higher level course is measured by combining their grades on external and internal assessment.

Students will be assessed on their ability to:

- communicate clearly and effectively in a range of situations, demonstrating linguistic competence and intercultural understanding
- use language appropriate to a range of interpersonal and/or cultural contexts
- understand and use language to express and respond to a range of ideas with accuracy and fluency
- organize ideas on a range of topics, in a clear, coherent and convincing manner
- understand, analyse and respond to a range of written and spoken texts
- understand and use works of literature written in the target language of study

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			70
Paper 1	Receptive skills Text handling exercise on 4 written texts.	1.5	25
Paper 2	Written productive skills through 2 writing exercises	1.5	25
Written assignment	Receptive and written productive skills Creative writing and rationale based on one literary text read during the course		20
Internal			30
Oral work	Individual oral presentation Interactive oral activities.		20 10

IV. Sample questions

Students are asked to write 250-400 words based on one of five available topics, such as:

- Social isolation can be considered a problem for today's teenagers. In class, you have been asked to give a speech to your classmates informing them about the problem. Write the text of your speech. [based on Option: Health]
- You are a student at an international school in a (target language) speaking country. Write an article to be published in the school magazine on how your experience at the international school will affect your future job prospects. [based on Option: Cultural diversity]

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Language B – Higher level

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To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Student may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP language B course provides students with the opportunity to acquire or develop an additional language and to promote an understanding of other cultures through the study of language.

Language B is designed for students who possess a degree of knowledge and experience in the target language. Those learning a language B at higher level should be able to follow university courses in other disciplines in the language B that is studied.

The aims of the language B higher level course are to:

- develop students' intercultural understanding
- enable students to understand and use the language they have studied in a range of contexts and for a variety of purposes
- encourage, through the study of texts and through social interaction, an awareness and appreciation of the different perspectives of people from other cultures
- develop students' awareness of the role of language in relation to other areas of knowledge
- develop students' awareness of the relationship between the languages and cultures with which they are familiar
- provide students with a basis for further study, work and leisure through the use of an additional language
- provide the opportunity for enjoyment, creativity and intellectual stimulation through knowledge of an additional language.

II. Curriculum model overview

Component	Recommended teaching hours
Core *Instruction on three topics* • communication and media • global issues • Social relationships	240
Options *Two options from the following five* • cultural diversity • customs and traditions • health • leisure • science and technology	
Literature • Read 2 works of literature	

III. Assessment model

The assessments aim to test all students' ability to understand and use the language of study as well as key concepts through:

- learning a language by engaging with its use and meaning within a social framework
- developing receptive, productive and interactive skills to meet the objectives of the course.

Students' success in the language B higher level course is measured by combining their grades on external and internal assessment.

Students will be assessed on their ability to:

- communicate clearly and effectively in a range of situations, demonstrating linguistic competence and intercultural understanding
- use language appropriate to a range of interpersonal and/or cultural contexts
- understand and use language to express and respond to a range of ideas with accuracy and fluency
- organize ideas on a range of topics, in a clear, coherent and convincing manner
- understand, analyse and respond to a range of written and spoken texts
- understand and use works of literature written in the target language of study

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			70
Paper 1	Receptive skills Text handling exercise on 4 written texts.	1.5	25
Paper 2	Written productive skills through 2 writing exercises	1.5	25
Written assignment	Receptive and written productive skills Creative writing and rationale based on one literary text read during the course		20
Internal			30
Oral work	Individual oral presentation Interactive oral activities.		20 10

IV. Sample questions

Students are asked to write 250-400 words based on one of five available topics, such as:

- Social isolation can be considered a problem for today's teenagers. In class, you have been asked to give a speech to your classmates informing them about the problem. Write the text of your speech. [based on Option: Health]
- You are a student at an international school in a (target language) speaking country. Write an article to be published in the school magazine on how your experience at the international school will affect your future job prospects. [based on Option: Cultural diversity]

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International Baccalaureate Diploma Programme Subject Brief Language acquisition:
Language ab initio – Standard level

First assessments 2013 – Last assessments 2019

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP language ab initio course is designed to provide students with the necessary skills and intercultural understanding to enable them to communicate successfully in an environment where the language studied is spoken. This process encourages the learner to go beyond the confines of the classroom, expanding an awareness of the world and fostering respect for cultural diversity. The language ab initio course develops students' linguistic abilities through the development of receptive, productive and interactive skills by providing them opportunities to respond and interact appropriately in a defined range of everyday situations. Language ab initio is available at standard level only.

The aims of the language ab initio course are to:

- develop students' intercultural understanding
- enable students to understand and use the language they have studied in a range of contexts and for a variety of purposes
- encourage, through the study of texts and through social interaction, an awareness and appreciation of the different perspectives of people from other cultures
- develop students' awareness of the role of language in relation to other areas of knowledge
- develop students' awareness of the relationship between the languages and cultures with which they are familiar
- provide students with a basis for further study, work and leisure through the use of an additional language
- provide the opportunity for enjoyment, creativity and intellectual stimulation through knowledge of an additional language.

II. Curriculum model overview

Three areas of study – language, themes and texts – provide the basis of the language ab initio course. These three fundamental areas, as well as intercultural understanding, are all interrelated and should be studied concurrently.

Areas of Study
Language • Receptive skills: the ability to comprehend straightforward written and spoken language. • Productive skills: the ability to write and speak the target • language effectively. • Interactive skills: the ability to understand and respond effectively to written and spoken language.
Themes • Individuals and society – Daily routines; education; food and drink; personal details; appearance and character physical health; relationships; shopping • Leisure and work – Employment; entertainment; holidays; media; sport; technology; transport • Urban and rural environment – Environmental concerns; global issues; neighbourhood; physical geography; town and services; weather
Texts During the course, students are taught to understand and produce a variety of spoken, written and visual texts. Use of authentic texts is encouraged. Examples of texts to be studied include articles, letters, maps, timetables and web pages.

III. Assessment model

Having followed the language ab initio standard level course, students will be assessed on their ability to:

- demonstrate an awareness and understanding of the intercultural elements related to the prescribed topics
- communicate clearly and effectively in a range of situations
- understand and use accurately the basic structures of the language
- understand and use an appropriate range of vocabulary
- use a register and a format that are appropriate to the situation.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			75
Paper 1: Receptive skills	Understanding of four written texts. Text-handling exercises.	1.5	30
Paper 2: Productive skills	Two compulsory writing exercises. Section A: One question to be answered from a choice of two. Section B: One question to be answered from a choice of three.	1	25
Written assignment: Receptive and productive skills	A piece of writing, 200–300 words, in the target language carried out under teacher guidance.	2	20
Internal			25
Individual oral: Interactive skills	1. Presentation of a visual stimulus (from a choice of two) by the student 2. Follow-up questions on the visual stimulus 3. General conversation including at least two questions on the written assignment	10 minutes	25

IV. Sample questions

- Your teacher has asked you to speak about the disadvantages of using public transport. Write the text of your speech. Mention at least three disadvantages.
- You are on holiday in a (target language) speaking country. On your personal blog you post a message about someone you have just met. In your blog entry you explain:
  - three details about this person
  - where you met
  - what you have been doing together
  - what your future plans are

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International Baccalaureate Diploma Programme Subject Brief Mathematics: Mathematical studies – Standard level

First assessments 2014 – Last assessments 2020

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP mathematical studies standard level (SL) course focuses on important interconnected mathematical topics. The syllabus focuses on: placing more emphasis on student understanding of fundamental concepts than on symbolic manipulation and complex manipulative skills; giving greater emphasis to developing students' mathematical reasoning rather than performing routine operations; solving mathematical problems embedded in a wide range of contexts; using the calculator effectively. There is an emphasis on applications of mathematics and statistical techniques. It is designed to offer students with varied mathematical backgrounds and abilities the opportunity to learn important concepts and techniques and to gain an understanding of a wide variety of mathematical topics, preparing them to solve problems in a variety of settings, develop more sophisticated mathematical reasoning and enhance their critical thinking.

The aims of all DP mathematics courses are to enable students to:

- enjoy and develop an appreciation of the elegance and power of mathematics
- develop an understanding of the principles and nature of mathematics
- communicate clearly and confidently in a variety of contexts
- develop logical, critical and creative thinking, and patience and persistence in problem-solving
- employ and refine their powers of abstraction and generalization
- apply and transfer skills to alternative situations, to other areas of knowledge and to future developments
- appreciate how developments in technology and mathematics have influenced each other
- appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
- appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
- appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course.

II. Curriculum model overview

Component	Recommended teaching hours
Topic 1 Numbers and algebra	20
Topic 2 Descriptive statistics	12
Topic 3 Logic, sets and probability	20
Topic 4 Statistical application	17
Topic 5 Geometry and trigonometry	18
Topic 6 Mathematical models	20
Topic 7 Introduction to different calculus	18
Project An individual piece of work involving the collection of information or the generation of measurements, and subsequent the analysis and evaluation.	25

III. Assessment model

Having followed the mathematical studies SL course, students will be expected to demonstrate the following:

- Knowledge and understanding: recall, select and use knowledge of mathematical facts, concepts and techniques in a variety of contexts.
- Problem-solving: recall, select and use knowledge of mathematical skills, results and models to solve problems.
- Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; create mathematical diagrams, graphs or constructions; record methods, solutions and conclusions using standardized notation.
- Technology: use technology accurately, appropriately and efficiently to explore new ideas and to solve problems.
- Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
- Investigative approaches: investigate unfamiliar situations involving organizing and analysing information or measurements, drawing conclusions, testing their validity, and considering their scope and limitations.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		3	80
Paper 1 (graphical display calculator required)	15 compulsory short-response questions based on the whole syllabus.	1.5	40
Paper 2 (graphical display calculator required)	6 compulsory extended-response questions based on the whole syllabus.	1.5	40
Internal			20
Project	An individual piece of work involving the collection of information or the generation of measurements, and subsequent analysis and evaluation.		20

IV. Sample questions

- A liquid is heated so that after 20 seconds of heating its temperature, T, is 25 °C and after 50 seconds of heating its temperature is 37 °C. The temperature of the liquid at time t can be modelled by T = at + b, where t is the time in seconds after the start of heating.

  Using this model one equation that can be formed is 20a + b = 25
  A. Using the model, write down a second equation in a and b.
  B. Using your graphic display calculator or otherwise, find the value of a and of b.
  C. Use the model to predict the temperature of the liquid 60 seconds after the start of heating.

- Yun Bin invests 5000 euros in an account which pays a nominal annual interest rate of 6.25 %, compounded monthly. Give all answers correct to two decimal places.

  Find
  A. the value of the investment after 3 years;
  B. the difference in the final value of the investment if the interest was compounded quarterly at the same nominal rate.

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International Baccalaureate Diploma Programme Subject Brief Mathematics: Mathematics – Higher level

First assessments 2014 – Last assessments 2020

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP higher level mathematics course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way, achieved by a carefully balanced approach. Students are encouraged to apply their mathematical knowledge to solve problems set in a variety of meaningful contexts. Development of each topic should feature justification and proof of results. Students should expect to develop insight into mathematical form and structure, and should be intellectually equipped to appreciate the links between concepts in different topic areas. They are also encouraged to develop the skills needed to continue their mathematical growth in other learning environments. The internally assessed exploration allows students to develop independence in mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas.

The aims of all mathematics courses in group 5 are to enable students to:

- enjoy and develop an appreciation of the elegance and power of mathematics
- develop an understanding of the principles and nature of mathematics
- communicate clearly and confidently in a variety of contexts
- develop logical, critical and creative thinking, and patience and persistence in problem-solving
- employ and refine their powers of abstraction and generalization
- apply and transfer skills to alternative situations, to other areas of knowledge and to future developments
- appreciate how developments in technology and mathematics have influenced each other
- appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
- appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
- appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course.

II. Curriculum model overview

Component	Recommended teaching hours
Topic 1 Algebra	30
Topic 2 Functions and equations	22
Topic 3 Circular functions and trigonometry	22
Topic 4 Vectors	24
Topic 5 Statistics and probability	36
Topic 6 Calculus	48

Option syllabus content Students must study one of the following options. *Topic 7* Statistics and probability *Topic 8* Sets, relations and groups *Topic 9* Calculus *Topic 10* Discrete mathematics	48
Mathematical exploration A piece of individual written work that involves investigating an area of mathematics.	10

III. Assessment model

Having followed the mathematics higher level course, students will be expected to demonstrate the following:

- Knowledge and understanding: recall, select and use knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.
- Problem-solving: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.
- Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation.
- Technology: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.
- Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
- Inquiry approaches: investigate unfamiliar situations, both abstract and real-world, involving organizing and analysing information, making conjectures, drawing conclusions and testing their validity.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		5	80
Paper 1 (non-calculator)	Section A: Compulsory short-response questions based on the core syllabus. Section B: Compulsory extended-response questions based on the core syllabus.	2	30
Paper 2 (graphical display calculator required)	Section A: Compulsory short-response questions based on the core syllabus. Section B: Compulsory extended-response questions based on the core syllabus.	2	30
Paper 3 (graphical display calculator required)	Compulsory extended-response questions based mainly on the syllabus options.	1	20
Internal			20
Mathematical exploration	The individual exploration is a piece of written work that involves investigating an area of mathematics.		

IV. Sample questions

- The vectors a, b, c satisfy the equation a+b+c=0. Show that a×b=b×c=c×a.
- Consider the following system of equations:

  $x + y + z = 1$
  $2x + 3y + z = 3$
  $x + 3y - z = \lambda$

  where $\lambda \in R$.

  A. Show that this system does not have a unique solution for any value of λ.

  B. i. Determine the value of λ for which the system is consistent.
  ii. For this value of λ, find the general solution of the system.

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International Baccalaureate Diploma Programme Subject Brief Mathematics: Mathematics – Standard level

First assessments 2014 – Last assessments 2020

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.
I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

The IB DP mathematics standard level (SL) course focuses on introducing important mathematical concepts through the development of mathematical techniques. The intention is to introduce students to these concepts in a comprehensible and coherent way, rather than insisting on the mathematical rigour required for mathematics HL. Students should, wherever possible, apply the mathematical knowledge they have acquired to solve realistic problems set in an appropriate context.

The internally assessed exploration offers students the opportunity for developing independence in their mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas.

The aims of all mathematics courses in group 5 are to enable students to:

- enjoy mathematics, and develop an appreciation of the elegance and power of mathematics
- develop an understanding of the principles and nature of mathematics
- communicate clearly and confidently in a variety of contexts
- develop logical, critical and creative thinking, and patience and persistence in problem-solving
- employ and refine their powers of abstraction and generalization
- apply and transfer skills to alternative situations, to other areas of knowledge and to future developments
- appreciate how developments in technology and mathematics have influenced each other
- appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
- appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
- appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course.

II. Curriculum model overview

Component	Recommended teaching hours
Topic 1 Algebra	9
Topic 2 Functions and equations	24
Topic 3 Circular functions and trigonometry	16
Topic 4 Vectors	16

Topic 5 Statistics and probability	35
Topic 6 Calculus	40
Mathematical exploration Internal assessment in mathematics SL is an individual exploration. This is a piece of written work that involves investigating an area of mathematics.	10

III. Assessment model

Having followed the mathematics standard level course, students will be expected to demonstrate the following.

- Knowledge and understanding: recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.
- Problem-solving: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.
- Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized notation.
- Technology: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.
- Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
- Inquiry approaches: investigate unfamiliar situations, both abstract and real-world, involving organizing and analysing information, making conjectures, drawing conclusions and testing their validity.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		3	80
Paper 1 (non-calculator)	Section A: Compulsory short-response questions based on the whole syllabus. Section B: Compulsory ex- tended-response questions based on the whole syllabus.	1.5	40
Paper 2 (graphical display calculator required)	Section A: Compulsory short-response questions based on the whole syllabus. Section B: Compulsory ex- tended-response questions based on the whole syllabus.	1.5	40
Internal			20
Mathematical exploration	Internal assessment in mathematics SL is an individual exploration. This is a piece of written work that involves investigating an area of mathematics.		

IV. Sample questions

- A data set has a mean of 20 and a standard deviation of 6.
  A) Each value in the data set has 10 added to it. Write down the value of
  i. the new mean;
  ii. the new standard deviation.
  B) Each value in the original data set is multiplied by 10.
  i. Write down the value of the new mean.
  ii. Find the value of the new variance.

- Given that f(x) = 1/x, answer the following.
  A) Find the first four derivatives of f (x).
  B) Write an expression for $f^{(n)}$ in terms of x and n.

International Baccalaureate Diploma Programme Subject Brief Sciences:

Physics—Higher level

First assessments 2016 – Last assessments 2022

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints. Approaches to teaching and learning (ATL) within the DP are deliberate strategies, skills and attitudes that permeate the teaching and learning environment. In the DP students develop skills from five ATL categories: thinking, research, social, self-management and communication.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

Physics is the most fundamental of the experimental sciences, as it seeks to explain the universe itself, from the very smallest particles to the vast distances between galaxies. Despite the exciting and extraordinary development of ideas throughout the history of physics, observations remain essential to the very core of the subject. Models are developed to try to understand observations, and these themselves can become theories that attempt to explain the observations.

Besides helping us better understand the natural world, physics gives us the ability to alter our environments. This raises the issue of the impact of physics on society, the moral and ethical dilemmas, and the social, economic and environmental implications of the work of physicists.

By studying physics students should become aware of how scientists work and communicate with each other. While the scientific method may take on a wide variety of forms, it is the emphasis on a practical approach through experimental work that characterizes the subject. Teachers provide students with opportunities to develop manipulative skills, design investigations, collect data, analyse results and evaluate and communicate their findings.

Through the overarching theme of the nature of science, the aims of the DP physics course are to enable students to:

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science
8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

II. Curriculum model overview

Component	Recommended teaching hours
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)	25
A. Relativity	25
B. Engineering physics	25
C. Imaging	25
D. Astrophysics	25
Practical scheme of work	60
Prescribed and other practical activities	40
Individual investigation (internally assessed)	10
Group 4 project	10

The group 4 project

The group 4 project is a collaborative activity where students from different group 4 subjects, within or between schools, work together. It allows for concepts and perceptions from across disciplines to be shared while appreciating the environmental, social and ethical implications of science and technology. It can be practically or theoretically based and aims to develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge. The emphasis is on interdisciplinary cooperation and the scientific processes.

III. Assessment model

It is the intention of this course that students are able to fulfill the following assessment objectives:

1. Demonstrate knowledge and understanding of:
   - facts, concepts, and terminology
   - methodologies and techniques
   - communicating scientific information.
2. Apply:
   - facts, concepts, and terminology
   - methodologies and techniques
   - methods of communicating scientific information.
3. Formulate, analyse and evaluate:
   - hypotheses, research questions and predictions
   - methodologies and techniques
   - primary and secondary data
   - scientific explanations.
4. Demonstrate the appropriate research, experimental, and personal skills necessary to carry out insightful and ethical investigations.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External		4.5	80
Paper 1	40 multiple-choice questions	1	20
Paper 2	Short answer and extended response questions (Core and AHL)	2.25	36
Paper 3	Data- and practical-based questions plus, short answer and extended response questions on the option	1.25	24
Internal		10	20
Individual investigation	Investigation and write-up of 6 to 12 pages	10	20

IV. Sample questions

- Why is wave-particle duality used in describing the properties of light?
  A. Light is both a wave and a particle
  B. Both wave and particle models can explain all the properties of light
  C. Different properties of light can be more clearly explained by using one of the wave or particle models
  D. Scientists feel more confident when using more than one model to explain a phenomenon (Paper 1)

- The tower is 120m high with an internal diameter of 3.5m. When most of the air has been removed, the pressure in the tower is 0.96 Pa.
  Determine the number of molecules of air in the tower when the temperature of the air is 300 K. (Paper 2)

- The streamlines above the airfoil are closer to each other than the streamlines below the airfoil. Suggest why this implies that the speed of the air above the airfoil is greater than the speed of air below the airfoil. (Paper 3)

IB psychology higher level subject brief

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The IB Diploma Programme, for students aged 16 to 19, is an academically challenging and balanced programme of education that prepares students for success at university and life beyond. Students take courses in six different subject groups, maintaining both breadth and depth of study. Psychology higher level is in group 3, individuals and societies. In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

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The IB subject briefs illustrate key course components in the IB Diploma Programme.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

Overview of the psychology higher level course and curriculum model

I. Course description and aims

The IB Diploma Programme higher level psychology course aims to develop an awareness of how research findings can be applied to better understand human behaviour and how ethical practices are upheld in psychological inquiry. Students learn to understand the biological, cognitive and sociocultural influences on human behaviour and explore alternative explanations of behaviour. They also understand and use diverse methods of psychological inquiry.

In addition, the course is designed to:

- encourage the systematic and critical study of human experience and behaviour; physical, economic and social environments; and the history and development of social and cultural institutions
- develop the capacity to identify, analyse critically and evaluate theories, concepts and arguments about the nature and activities of the individual and society
- enable students to collect, describe and analyse data used in studies, test hypotheses; and interpret complex data and source material
- enable the student to recognize that the content and methodologies are contestable and that their study requires the toleration of uncertainty
- develop an awareness of how psychological research can be applied for the better understanding of human behaviour
- ensure that ethical practices are upheld in psychological inquiry
- develop an understanding of the biological, cognitive and sociocultural influences on human behaviour
- develop an understanding of alternative explanations of behavior
- understand and use diverse methods of psychological inquiry.

II. Curriculum model overview

Psychology higher level

Core	90 hours of instruction on three topics • The biological level of analysis • The cognitive level of analysis • The sociocultural level of analysis	90 hours
Options	30 hours of instruction on two additional topics • Abnormal psychology • Developmental psychology • Health psychology • Psychology of human relationships • Sport psychology	60 hours
Additional higher level	Qualitative research in psychology	50 hours
Experimental study	Introduction to experimental research methodology	40 hours
Total teaching hours		**240 hours**

III. Assessment model

Assessment for psychology higher level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

The assessments aim to test all students' knowledge and understanding of key concepts through various activities that demonstrate:

- knowledge and comprehension of specified content, research methods, theories, such as key concepts, biological, cognitive and sociocultural levels of analysis
- application and analysis, including using psychological research and psychological concepts to formulate an argument in response to a specific question
- synthesis and evaluation of psychological theories, empirical studies, and research methods used to investigate behaviour
- selection and use of skills appropriate to psychology, the acquisition of knowledge, skills required for experimental design, data collection and presentation, data analysis and interpretation
- data analysis using an appropriate inferential statistical test and write an organized response.

Students' success in the psychology higher level course is measured by combining their grades on external and internal assessment.

On external assessments, students must be able to demonstrate an understanding of both basic facts and complex concepts related to the biological, cognitive and sociocultural levels of analysis. Students in higher level courses are also assessed on their knowledge and understanding of qualitative research. For their internal assessment, psychology higher level students plan, undertake and report on a simple experimental study.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**80**
Paper 1	Question response and an essay	2	35
Paper 2	Answer 2 of 15 questions in essay form	2	25
Paper 3	Answer three questions	1	20
Internal			**20**
Study report	A report of a simple experimental study conducted by the student		

IV. Sample questions

The following questions appeared in previous IB Diploma Programme psychology higher level examinations.*

1. To what extent does genetic inheritance influence behaviour? Use relevant research studies in your response. (Paper 1)
2. Evaluate two research studies investigating the role of communication in maintaining relationships. (Paper 2)
3. The study outlined above uses the phrase "inductive content analysis". Explain the advantages and disadvantages of using this research strategy in the context of this specific study. (Paper 3, with regard to a supplied study)

* the syllabus for examinations current until 2016

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International Baccalaureate Diploma Programme Subject Brief Diploma Programme core: Theory of knowledge

First assessments 2015 – Last assessments 2021

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To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate four key course components.

I. Course description and aims
II. Curriculum model overview
III. Assessment model
IV. Sample questions

I. Course description and aims

Theory of knowledge (TOK) is a course about critical thinking and inquiring into the process of knowing, rather than about learning a specific body of knowledge. It plays a special role in the DP by providing an opportunity for students to reflect on the nature of knowledge, to make connections between areas of knowledge and to become aware of their own perspectives and those of the various groups whose knowledge they share. It is a core element undertaken by all DP students, and schools are required to devote at least 100 hours of class time to the course. The overall aim of TOK is to encourage students to formulate answers to the question "how do you know?" in a variety of contexts, and to see the value of that question. This allows students to develop an enduring fascination with the richness of knowledge.

The aims of the TOK course are to:

- make connections between a critical approach to the construction of knowledge, the academic disciplines and the wider world
- develop an awareness of how individuals and communities construct knowledge and how this is critically examined
- develop an interest in the diversity and richness of cultural perspectives and an awareness of personal and ideological assumptions
- critically reflect on their own beliefs and assumptions, leading to more thoughtful, responsible and purposeful lives
- understand that knowledge brings responsibility which leads to commitment and action.

II. Curriculum model overview

Component
Knowing about knowing TOK examines how we know what we claim to know, by encouraging students to analyse knowledge claims and explore knowledge questions. A knowledge claim is the assertion that "I/we know X" or "I/we know how to Y", or a statement about knowledge; a knowledge question is an open question about knowledge. The distinction between shared knowledge and personal knowledge is intended to help teachers construct their TOK course and to help students explore the nature of knowledge.
Ways of knowing While there are arguably many ways of knowing (WOKs), TOK identifies eight specific WOKs: language, sense perception, emotion, reason, imagination, faith, intuition, and memory. Students must explore a range of ways of knowing, and it is suggested to study four of these in depth.
Areas of knowledge Areas of knowledge are specific branches of knowledge, each of which can be seen to have a distinct nature and different methods of gaining knowledge. TOK distinguishes between eight areas of knowledge: mathematics, the natural sciences, the human sciences, the arts, history, ethics, religious knowledge systems, and indigenous knowledge systems. Students must explore a range of areas of knowledge, and it is suggested to study six of these eight.

III. Assessment model

Having followed the TOK course, students will be expected to demonstrate the following:

- Identify and analyse the various kinds of justifications used to support knowledge claims.
- Formulate, evaluate and attempt to answer knowledge questions.
- Examine how academic disciplines/areas of knowledge generate and shape knowledge.
- Understand the roles played by ways of knowing in the construction of shared and personal knowledge.
- Explore links between knowledge claims, knowledge questions, ways of knowing and areas of knowledge.
- Demonstrate an awareness and understanding of different perspectives and be able to relate these to one's own perspective.
- Explore a real-life/contemporary situation from a TOK perspective in the presentation.

Assessment at a glance

Type of assessment	Format of assessment	Weighting of final grade (%)
External		
Part I: Essay on a prescribed title	One essay on a title chosen from a list of six prescribed titles.	67
Internal		
Part 2: Presentation	One presentation to the class by an individual or a group (max of three persons); approximately 10 minutes per student. One written presentation planning document for each student.	33

TOK contributes to the overall diploma score through the award of points in conjunction with the extended essay. A maximum of three points are awarded according to a student's combined performance in both TOK and the extended essay.

IV. Sample prescribed titles

- Using history and at least one other area of knowledge, examine the claim that it is possible to attain knowledge despite problems of bias and selection.
- "It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts" (Arthur Conan Doyle). Consider the extent to which this statement may be true in two or more areas of knowledge.
- In what ways may disagreement aid the pursuit of knowledge in the natural and human sciences?

International Baccalaureate Diploma Programme Subject Brief The arts: Visual arts—Higher level

First assessments 2016 – Last assessments 2022

The IB Diploma Programme (DP) is a rigorous, academically challenging and balanced programme of education designed to prepare students aged 16 to 19 for success at university and life beyond. The DP aims to encourage students to be knowledgeable, inquiring, caring and compassionate, and to develop intercultural understanding, open-mindedness and the attitudes necessary to respect and evaluate a range of viewpoints. Approaches to teaching and learning (ATL) within the DP are deliberate strategies, skills and attitudes that permeate the teaching and learning environment. In the DP, students develop skills from five ATL categories: thinking, research, social, self-management and communication.

To ensure both breadth and depth of knowledge and understanding, students must choose at least one subject from five groups: 1) their best language, 2) additional language(s), 3) social sciences, 4) experimental sciences, and 5) mathematics. Students may choose either an arts subject from group 6, or a second subject from groups 1 to 5. At least three and not more than four subjects are taken at higher level (240 recommended teaching hours), while the remaining are taken at standard level (150 recommended teaching hours). In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

These IB DP subject briefs illustrate three key course components.
I. Course description and aims II. Curriculum model overview III. Assessment model

I. Course description and aims

The IB Diploma Programme visual arts course encourages students to challenge their own creative and cultural expectations and boundaries. It is a thought-provoking course in which students develop analytical skills in problem-solving and divergent thinking, while working towards technical proficiency and confidence as art-makers. In addition to exploring and comparing visual arts from different perspectives and in different contexts, students are expected to engage in, experiment with and critically reflect upon a wide range of contemporary practices and media. The course is designed for students who want to go on to further study of visual arts in higher education as well as for those who are seeking lifelong enrichment through visual arts.

The role of visual arts teachers should be to actively and carefully organize learning experiences for the students, directing their study to enable them to reach their potential and satisfy the demands of the course. Students should be empowered to become autonomous, informed and skilled visual artists.

The aims of the arts subjects are to enable students to:

1. enjoy lifelong engagement with the arts
2. become informed, reflective and critical practitioners in the arts
3. understand the dynamic and changing nature of the arts
4. explore and value the diversity of the arts across time, place and cultures
5. express ideas with confidence and competence
6. develop perceptual and analytical skills.

In addition, the aims of the visual arts course at SL and HL are to enable students to:

7. make artwork that is influenced by personal and cultural contexts
8. become informed and critical observers and makers of visual culture and media
9. develop skills, techniques and processes in order to communicate concepts and ideas.

II. Curriculum model overview

Component	Recommended teaching hours
Visual arts in context • Examine and compare the work of artists from different cultural contexts. • Consider the contexts influencing their own work and the work of others. • Make art through a process of investigation, thinking critically and experimenting with techniques. • Apply identified techniques to their own developing work. • Develop an informed response to work and exhibitions they have seen and experienced. • Begin to formulate personal intentions for creating and displaying their own artworks.	80

• Consider the nature of "exhibition", and think about the process of selection and the potential impact of their work on different audiences.	
Communicating visual arts • Explore ways of communicating through visual and written means. • Make artistic choices about how to most effectively communicate knowledge and understanding. • Produce a body of artwork through a process of reflection and evaluation, showing a synthesis of skill, media and concept. • Select and present resolved works for exhibition. • Explain the ways in which the works are connected. • Discuss how artistic judgments impact the overall presentation.	80

Throughout the course students are required to maintain a visual arts journal. Although sections of the journal will be selected, adapted and presented for assessment, the journal itself is not directly assessed or moderated. It is, however, regarded as a fundamental activity of the course.

III. Assessment model

Having followed the visual arts course, students are expected to:

1. Demonstrate knowledge and understanding of specified content
   - Identify various contexts in which the visual arts can be created and presented
   - Describe artwork from differing contexts, and identify the ideas, conventions and techniques employed by the art-makers
   - Recognize the skills, techniques, media, forms and processes associated with the visual arts
   - Present work, using appropriate visual arts language, as appropriate to intentions
2. Demonstrate application and analysis of knowledge and understanding
   - Express concepts, ideas and meaning through visual communication

texts
techniques, media,
ted by themselves and
response
e planning, development and
meaning can be conveyed
udience
highlight success and
ailure in order to progress work
   - Evaluate how and why art-making evolves and justify the choices made in their own visual practice
4. Select, use and apply a variety of appropriate skills and techniques
   - Experiment with different media, materials and techniques in art-making
   - Make appropriate choices in the selection of images, media, materials and techniques in art-making
   - Demonstrate technical proficiency in the use and application of skills, techniques, media, images, forms and processes
   - Produce a body of resolved and unresolved artworks as appropriate to intentions

Assessment at a glance

Type of assessment	Format of assessment	Weighting of final grade (%)
External		60
Comparative study	• 10–15 screens which examine and compare at least 3 artworks, at least 2 of which need to be by different artists • 3–5 screens which analyse the extent to which the student's work and practices have been influenced by the art and artists examined • A list of sources used	20
Process portfolio	• 13–25 screens which evidence sustained experimentation, exploration, manipulation and refinement of a variety of art-making activities	40
Internal		40
Exhibition	• A curatorial rationale that does not exceed 700 words • 8–11 artworks • Exhibition text (stating the title, medium, size and intention) for each artwork	40