

**WABE International School**

**IB Diploma Programme**

*Course Descriptions*





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## IB DP COURSE SELECTION AT A GLANCE

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Before entering the International Baccalaureate (IB) Diploma Programme (DP), all students select six courses that they will take for the duration of the two-year programme. The IB has split these courses into subject groups:

*Group 1: Studies in Language and Literature*

*Group 2: Language Acquisition*

*Group 3: Individuals and Societies*

*Group 4: Sciences*

*Group 5: Mathematics*

*Group 6: The Arts*

In selecting their six courses, there are a few requirements that students must fulfill:

1. Students must select at least one course from each of Groups 1-5.
2. It is possible to replace a Group 2 course with an additional Group 1 course.
3. If a student chooses not to take a course from Group 6, they must select another course from Groups 1-4.

Additionally, with few exceptions, each of these courses is offered at both “Standard Level” (SL) and “Higher Level” (HL). A SL course typically has less breadth and depth than a HL course. Students are required to select three courses at SL and three courses at HL.

At WABE International School (WIS), we provide a balanced offering of courses that allows students to find the best fit for their needs and goals. Before entering the programme, students and parents work with teachers, the college and career counsellor and the IB DP Coordinator to find a good fit of courses that best plays to the students’ strengths, interests, and future goals.

Should a student wish to take another course not offered at WIS, there is the possibility of completing this independently through the online provider Pamoja, which has been approved to teach these courses by the IB Organization; an additional fee for this would be incurred by the family. For more information, please speak to Ms. Schöler or go to [pamojaeducation.com/ib-diploma](http://pamojaeducation.com/ib-diploma).

*Note that, while it is allowed by the IB for a student to take an additional seventh course and/or four courses at HL, WIS will only allow this in exceptional situations, as it is a very demanding programme as-is.*



## THE CORE

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In addition to the six courses that each student gets to select, all students in the DP are required to complete and pass the following three “Core” elements. The goal of these is to broaden students’ education and to get them to apply their skills and knowledge beyond their subject-specific classrooms.

### EXTENDED ESSAY

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The Extended Essay is an independent research project that takes place over 15 months and culminates in a 4,000-word research paper. Students independently select a topic that corresponds to one of their six subject courses and must construct a focused research question which they will answer in their essay. They then research their topic using a range of appropriate and reliable sources and use their findings as the basis for their argumentation. While students receive support for the project from an assigned supervisor (an IB teacher at WIS), they do not receive detailed feedback on their essay but rather verbal feedback about weaknesses, gaps, inconsistencies, etc. in their argument. As per IB requirements, supervisors should meet with students for check-ins and formal reflection sessions approximately 3-5 hours during the entirety of the project. Formal reflection is one criterion that is included in the final mark of the essay.

The Extended Essay is sent to the IB Organization for external marking by an IB examiner; it is a required component to receive the IB Diploma. In combination with your grade for Theory of Knowledge, the extended essay contributes up to three points to the total score for a student’s IB Diploma.

TOK / EE	A	B	C	D	E
A	3	3	2	2	Failing Condition
B	3	2	2	1	
C	2	2	1	0	
D	2	1	0	0	
E	Failing Condition				

A student who fails to submit an extended essay will be awarded an N and will score no points and will not be awarded a Diploma.

Performance in both the Extended essay and Theory of Knowledge of an elementary standard is a failing condition for the award of the Diploma.



## THEORY OF KNOWLEDGE

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As a thoughtful and purposeful inquiry into different ways of knowing, and into different kinds of knowledge, TOK is composed almost entirely of questions.

The most central of these is "How do we know?", while other questions include:

- What counts as evidence for X?
- How do we judge which is the best model of Y?
- What does theory Z mean in the real world?

Through discussions of these and other questions, students gain greater awareness of their personal and ideological assumptions, as well as developing an appreciation of the diversity and richness of cultural perspectives.

TOK aims to make students aware of the interpretative nature of knowledge, including personal ideological biases – whether these biases are retained, revised or rejected. It offers students and their teachers the opportunity to:

- reflect critically on diverse ways of knowing and on areas of knowledge
- consider the role and nature of knowledge in their own culture, in the cultures of others and in the wider world.

In addition, TOK prompts students to:

- be aware of themselves as thinkers, encouraging them to become more acquainted with the complexity of knowledge
- recognize the need to act responsibly in an increasingly interconnected but uncertain world.

The structure of the TOK course is centered around the core theme, Knowledge and the Knower, two of five optional themes – for us, Knowledge and Politics and Knowledge and Technology – and the five Areas of Knowledge: Human Science, Natural Sciences, Mathematics, Arts, and History. Each is looked at through the framework of scope, perspectives, method and tools, and ethics.

The TOK course is assessed in two ways: one, the Exhibition, which is marked internally and moderated by examiners, and two, the Essay, which is marked externally. The Exhibition is 33% of the student's grade and the Essay 67%, and both are graded on a scale of A-E. The number of points a student receives for this is determined in conjunction with the grade of the Extended Essay and according to the matrix shown above.



## CREATIVITY, ACTION, SERVICE (CAS)

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CAS consists of several, various experiences within three strands: Creativity, Activity, and Service. CAS experiences are completed outside of the students' IB courses. However, WIS does provide time to complete reflections, meet with their supervisor, and collaborate with peers.

### **What is CAS?**

**Creativity:** exploring and extending ideas leading to an original or interpretive product or performance (may include music, drama, arts and other experiences that involve creative thinking outside of the curriculum)

**Activity:** Physical exertion contributing to a healthy and active lifestyle (may include expeditions, individual or team sports)

**Service:** Collaborative and reciprocal engagement with the community and/or school community in response to an authentic need.

### **CAS Experiences are:**

- Unpaid
- Challenging
- Ongoing and/or individual
- Not part of the curriculum
- Purposeful
- Have real outcomes

### **For student development to occur, CAS should involve:**

- Real, purposeful activities with significant outcomes
- Personal challenge: tasks must extend the student
- Thoughtful consideration and work through the stages (investigation, preparation, action, reflection, demonstration)

### **Responsibilities of the Student for passing the CAS programme:**

- Plan and undertake meaningful activities that lead to the listed learning outcomes over the course of 18 months
- Achieve all learning outcomes (listed below)
- Complete meaningful reflections that contribute to the completion of a portfolio
- Take part in at least one extended project which requires collaboration, initiative, decision making, and leadership
- Accomplish three interviews with your CAS Coordinator (to be uploaded to the portfolio)

**The Portfolio:**

- Must include reflections, written or in other form
- Must include one project
- Provides evidence of the completed experiences and achieved learning outcomes
- May be creative and reflect the student's personality and experiences

**Learning Outcomes:**

1. Identify own strengths and develop areas for growth
2. Demonstrate that challenges have been undertaken, developing new skills in the process
3. Demonstrate how to initiate and plan a CAS experience
4. Show commitment to and perseverance in CAS experiences
5. Demonstrate the skills and recognise the benefits of working collaboratively
6. Demonstrate engagement with issues of global significance
7. Recognise and consider the ethics of choices and actions

## GROUP 1: STUDIES IN LANGUAGE AND LITERATURE

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All courses in studies in language and literature are designed for students from a wide variety of linguistic and cultural backgrounds, who have experience of using the language of the course in an educational context. The focus of the study developed in each of the subjects varies depending on their individual characteristics.

The language profile of students taking these courses will vary, but their receptive, productive and interactive skills should be strong and the expectation is that the course will consolidate them further. Students are expected to develop their proficiency, fluency and linguistic range, and in particular to acquire the vocabulary appropriate to the analysis of texts. They will also deepen their understanding of a wide variety of concepts explored through literary and non-literary texts in order to interpret, analyse, evaluate and then communicate this understanding in clear, organized and developed products.<sup>1</sup>

### LANGUAGE A: LITERATURE - *OFFERED IN ENGLISH*

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The Language A: Literature course consists of three main areas of exploration: Readers/writers/texts, time and space, and intertextuality. These areas of exploration are tackled using a range of literary texts and genres: poetry, prose fiction, dramatic literature, and prose nonfiction. Students will examine the use of language, various approaches to shaping narrative structure, and will be introduced to various forms of literary criticism.

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<sup>1</sup> *Language A: Language and literature guide*. (2019). IBO. p. 6.



## **Literature SL**

This course is suitable for all IB students whose native language is in the respective language or for students whose abilities in this language is fairly strong. Non-native speakers with a relatively fluent language level can be successful.

Students will explore the ways through which authors shape meaning, both through the use of different literary forms as well as specific content of texts. The historical and cultural context of a work or text as well as its relationship to other works or texts is also explored. Students will also pay special attention to their own response as readers: where does their role in the process of reading and writing begin and where does it end; what responsibility do readers have when considering the impact that a text may have on them personally or how it may be used to understand the world, a culture, or a larger historical period or context?

At the standard level students will study nine literary works (including three in translation). They will keep a portfolio of their work and complete an individual oral exam.

### **Assessments in Language & Literature SL**

- *Paper 1 (1 hour 15 minutes, 35%)* guided textual analysis
- *Paper 2 (1 hour 45 minutes, 35%)*: comparative essay based on two literary works studied in class
- *Individual oral assessment (15 minutes, 30%)*

## **Literature HL**

This course is suitable for all IB students, who either speak the language natively or for students whose abilities in this language are strong. Non-native speakers with a relatively fluent language level can be successful if they are committed to the writing process and possess the vocabulary needed to read, comprehend, and discuss the works and texts in sufficient depth.

In addition to the Literature SL material, Language & Literature HL students will cover four additional literary works and supplementary texts. Topics will be explored in more depth and across a greater range, with further study on links to additional areas of knowledge and study and the portrayal of human nature through our study of the works. A wider range of texts and genres forms will also be used, and the portfolio will be more extensive.

At the higher level, students will study thirteen literary works (including four in translation) as well as a wider range of non-literary texts.

### **Assessments in Literature HL**

- *Paper 1 (1 hour 15 minutes, 35%)* guided textual analysis
- *Paper 2 (1 hour 45 minutes, 25%)*: comparative essay based on two literary works studied in class
- *HL Essay (20%)*: 1,200-1,500-word essay
- *Individual oral assessment (15 minutes, 30%)*





## LANGUAGE A: LANGUAGE & LITERATURE - OFFERED IN GERMAN

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The Language A: Language and Literature course consists of three main areas of exploration: Readers/writers/texts, time and space, and intertextuality. These areas of exploration are tackled using a range of literary and non-literary texts across media types. Students will examine the nature and the role of language in its various forms and will look at how both content and structure convey meaning through a range of lenses.

### **Language & Literature SL**

This course is suitable for all IB students whose native language is in the respective language or for students whose abilities in this language is fairly strong. Non-native speakers with a relatively fluent language level can be successful.

Students will look at an author's purpose and meaning as well as how an audience receives and interprets this meaning through an examination of various text types. The historical and cultural context of a work or text as well as its relationship to other works or texts is also explored. We will be critically considering and responding to texts, discussing how meaning is constructed within a belief or value system, and evaluating what a text says about human nature. Language as a communication tool is also an important focus of the course.

Engagement with these topics will help students understand their own relationship to language and its role in shaping identity.

At the standard level students will study four literary works (including one in translation) as well as a range of non-literary texts. They will keep a portfolio of their work and complete an individual oral exam.

### **Assessments in Language & Literature SL**

- *Paper 1 (1 hour 15 minutes, 35%)* guided textual analysis
- *Paper 2 (1 hour 45 minutes, 35%)*: comparative essay based on two literary works studied in class
- *Individual oral assessment (15 minutes, 30%)*

### **Language & Literature HL**

This course is suitable for all IB students whose either speak the language natively or for students whose abilities in this language are strong. Non-native speakers with a relatively fluent language level can be successful if they are committed to the writing process and possess the vocabulary needed to read, comprehend, and discuss the works and texts in sufficient depth.

In addition to the Language & Literature SL material, Language & Literature HL students will cover two further literary works and supplementary non-literary texts. Topics will be explored in more depth and across a greater range, with further study on links to additional areas of knowledge and study and the portrayal of human nature through our study of the works. Our non-literary texts will include additional considerations of the role of format, context, and purpose of a text, with more nuanced study of previously addressed elements



such as grammar and syntax. A wider range of text forms will also be used, and the portfolio will be more extensive.

At the higher level, students will study seven literary works (including two in translation) as well as a wider range of non-literary texts. They will keep a portfolio of their work and complete an individual oral exam.

### **Assessments in Language & Literature HL**

- *Paper 1 (1 hour 15 minutes, 35%)* guided textual analysis
- *Paper 2 (1 hour 45 minutes, 25%)*: comparative essay based on two literary works studied in class
- *HL Essay (20%)*: 1,200-1,500-word essay
- *Individual oral assessment (15 minutes, 30%)*

## **GROUP 2: LANGUAGE ACQUISITION**

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Language acquisition courses are 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 allows the learner to go beyond the confines of the classroom, expanding their awareness of the world and fostering respect for cultural diversity.<sup>2</sup>

### **LANGUAGE B – OFFERED IN ENGLISH, GERMAN, OR SPANISH**

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Language B is a language acquisition course intended for students who are non-native speakers of the given language but who have had some prior experience in the target language. The course promotes written and oral fluency in a range of contexts and focuses on cultural aspects connected to the given language communities. At both levels of language B (SL and HL) students learn to communicate in the language in familiar and unfamiliar contexts.

The course is divided into five themes:

- Identities
- Experiences
- Human ingenuity
- Sharing the planet
- Social organization



## Language B SL

Students in Language B SL describe situations, narrate events, make comparisons, explain problems, and state and support their personal opinions on a variety of topics relating to course content.

### Assessments in Language B SL

- *Paper 1 (1 hour 15 minutes, 25%)* Productive skills – writing: one writing task of 250-400 words from a choice of three, each from a different theme, choosing a text type from among those listed in the examination instructions.
- *Paper 2 (1 hour 45 minutes, 50%)*: Receptive skills – listening comprehension (45 minutes) and reading comprehension (1 hour): comprehension exercises on three audio passages and three written texts, drawn from all five themes.
- *Individual oral assessment (15 minutes, 25%)*: productive skills – speaking: conversation with the teacher, based on a visual stimulus, followed by discussion based on an additional theme. Internally assessed.

## Language B HL

Students in Language B HL are expected to extend the range and complexity of the language they use and understand in order to communicate and they study **two literary works** originally written in the target language.

### Assessments in Language B HL

- *Paper 1 (1 hour 30 minutes, 25%)* Productive skills – writing: one writing task of 450-600 words from a choice of three, each from a different theme, choosing a text type from among those listed in the examination instructions.
- *Paper 2 (2 hours, 50%)*: Receptive skills – listening comprehension (1 hour) and reading comprehension (1 hour): comprehension exercises on three audio passages and three written texts, drawn from all five themes.
- *Individual oral assessment (15 minutes, 25%)*: productive skills – speaking: conversation with the teacher, based on a visual stimulus, followed by discussion based on an additional theme. Internally assessed.

## GROUP 2 ONLINE COURSE OFFERINGS

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Should a student not find a good fit in English B, German B, or Spanish B, it is possible to take French ab initio, Mandarin ab initio, or Spanish ab initio through Pamoja. Ab initio courses are intended for students with no or very little background in the target language and are only offered at SL.

<sup>2</sup> <https://www.ibo.org/programmes/diploma-programme/curriculum/language-acquisition/>



## GROUP 3: INDIVIDUALS AND SOCIETIES

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Individuals and societies subjects help young people to develop a connection to our shared planet, exploring how to live sustainably and promoting the well-being of all people in our pursuit of a more peaceful world. The aims of all the individuals and societies subjects are to equip young people to explore and critically engage with multiple perspectives and ways of thinking, investigate and evaluate the interactions between individuals and societies, think and act as informed and principled individuals in societies, and understand and value the variety and diversity of the human experience across time and place.<sup>3</sup>

### GEOGRAPHY

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IB DP Geography takes an in-depth study of the world through the core subjects which explore the future of the world population and its relationship with the Earth in a scientific and cultural context. It is a future-facing subject, concerned with contextually understanding the world and using that understanding to prepare for, and positively shape the future.

At both SL and HL, students complete a self-led project called an IA. This provides an opportunity for their development of data interpretation and analysis skills as life skills for problem-solving in a wide variety of professional and personal settings. IB DP Geography equips students to approach a globalised future in any career with a progressive and complex approach.

At Higher Level, this is taken a step further as we consider Global Interactions as we move into the future. These core topics are accompanied by optional units whereby the students are able to identify their particular interests and topics which will complement the studies and career paths they are interested in.

#### **Geography SL**

Geography SL students study the core geographic perspectives – global change – and two optional themes. Additionally, they complete a fieldwork study for internal assessment.

##### **Assessment in Geography SL**

- *Paper 1 (1 hour 30 minutes, 35%):* geographic themes – two options
- *Paper 2 (1 hour 15 minutes, 40%):* geographic perspectives – global change
- *Internal assessment: Fieldwork (25%)*

#### **Geography HL**

In addition to the content covered in Geography SL, Geography HL students cover an additional theme, providing further breadth. HL students also study the HL extension geographic perspectives – global interactions – and further examine, evaluate and synthesize the prescribed concepts, which by their nature are complex, contestable, interlinked and require holistic treatment, providing further depth in the course.

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<sup>3</sup> *Individuals and societies guide, IBO 2014.*



### **Assessment in Geography HL**

- *Paper 1 (1 hour 30 minutes, 35%):* geographic themes – three options
- *Paper 2 (1 hour 15 minutes, 25%):* geographic perspectives – global change
- *Paper 3 (1 hour, 20%):* geographic perspectives – global interactions
- *Internal assessment: Fieldwork (20%)*

## **HISTORY**

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History serves as an investigative field that nurtures a spirit of curiosity. It is also an evaluative discipline, providing room for interaction with various viewpoints and interpretations. The study of history cultivates an awareness of bygone eras, leading to a more profound comprehension of human nature and the contemporary world.

The history course adopts a global perspective, employing a comparative and multi-dimensional approach to historical events. It revolves around fundamental historical concepts such as change, causation, and significance. This course encompasses diverse forms of history, encompassing political, economic, social, and cultural aspects, prompting students to engage in historical thinking and refine their historical skills.

Students in the DP History course are tasked with exploring and drawing comparisons between examples from various global regions, promoting an international mindset. Students develop a historiographical toolbox and lens to evaluate sources and events through. Educators have considerable flexibility in selecting pertinent examples for investigation, ensuring that the course is tailored to meet the diverse needs and interests of students, irrespective of their location or background.

### **Prescribed subjects (one to be studied)**

1. *Military leaders*
2. *Conquest and its impact*
3. ***The move to global war***
4. *Rights and protest*
5. *Conflict and intervention*

### **World history topics (two to be studied)**

1. *Society and economy (750-1400)*
2. *Causes and effects of wars (750-1500)*
3. *Dynasties and rulers (750-1500)*
4. *Societies in transition (1400-1700)*
5. *Early Modern states (1450-1789)*
6. *Causes and effects of Early Modern wars (1500-1750)*
7. *Origins, development and impact of industrialization (1750-2005)*
8. *Independence movements (1800-2000)*
9. *Emergence and development of democratic states (1848-2000)*
10. ***Authoritarian states (20th century)***



### **11. Causes and effects of 20th-century wars**

### **12. The Cold War: superpower tensions and rivalries (20th century)**

**HL options:** Depth studies (one to be studied)

1. *History of Africa and the Middle East*

2. *History of the Americas*

3. *History of Asia and Oceania*

4. ***History of Europe***

**Internal assessment** (both SL and HL)

*Historical investigation*

#### **Assessment in History SL**

- *Paper 1 (1 hour, 30%):* source-based paper on the five prescribed subjects
- *Paper 2 (1 hour 30 minutes, 45%):* essay paper on the 12 world history topics
- *Internal assessment (25%): historical investigation*

#### **Assessment in History HL**

- *Paper 1 (1 hour, 20%):* source-based paper on the five prescribed subjects
- *Paper 2 (1 hour 30 minutes, 25%):* essay paper on the 12 world history topics
- *Paper 3 (2 hours 30 minutes, 35%):* essay paper on one of the four regional options
- *Internal assessment (25%): historical investigation*

## **GROUP 3 ONLINE COURSE OFFERINGS**

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Should a student wish to take more than just Geography or find that their interests lie in another subject in this group, it is possible to take Business Management, Economics, Psychology, Digital Society (all at either SL or HL) or Philosophy (SL) through Pamoja.

## **GROUP 4: SCIENCES**

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Experimental science subjects promote understanding the concept of science, its principle and applications in the respective disciplines. Students will understand and experience the scientific reasoning behind the nature of science. Together with the help of various experimental methodology, important skills such as critical thinking, problem solving ability, independent and collaborative working in the team will develop among the students for the modern and advance research-based learning in 21<sup>st</sup> century.

No particular pre-requisites are required from student to undertake SL subjects. However, for students considering HL subjects, at least some previous exposure to formal science education and understanding on statistics and data management would be necessary.

At WIS, the subjects available for Group 4 are Biology and Chemistry. Both subjects will follow the same assessment model as shown here:



### **Assessment in Group 4 SL**

- *Paper 1 (1 hour 30 minutes, 36%)*: multiple-choice and data-based questions addressing all themes
- *Paper 2 (1 hour 30 minutes, 44%)*: data-based, short answer and essay questions
- *Internal assessment (20%)*: scientific investigation involving 10 hours of data collection

### **Assessment in Group 4 HL**

- *Paper 1 (2 hours, 36%)*: multiple-choice and data-based questions addressing all themes
- *Paper 2 (2 hours 30 minutes, 44%)*: data-based, short answer and essay questions
- *Internal assessment (20%)*: scientific investigation involving 10 hours of data collection

Students will also take part in a collaborative project work (related to the global issues) with students from other field, where they will be able to develop their scientific research skills, logical thinking, time management and independent working ability.





## BIOLOGY

Explore the intricacies of life with the IB Biology course. From cells to ecosystems, this program delves into the wonders of the living world. Investigate how structure and function intersect across scales, empowering you to decipher the mechanisms that drive living systems. Through hands-on experiments, data analysis, and scientific communication, you'll develop essential skills while unraveling the mysteries of biology. Whether you're aspiring to be a biologist or simply curious about life's complexities, IB Biology offers a dynamic journey of discovery and understanding.

Theme	Level of organization			
	1. Molecules	2. Cells	3. Organisms	4. Ecosystems
<b>A</b> Unity and diversity	Common ancestry has given living organisms many shared features while evolution has resulted in the rich biodiversity of life on Earth.			
	<b>A1.1</b> Water <b>A1.2</b> Nucleic acids	<b>A2.1</b> Origins of cells <i>[HL only]</i> <b>A2.2</b> Cell structure <b>A2.3</b> Viruses <i>[HL only]</i>	<b>A3.1</b> Diversity of organisms <b>A3.2</b> Classification and cladistics <i>[HL only]</i>	<b>A4.1</b> Evolution and speciation <b>A4.2</b> Conservation of biodiversity
<b>B</b> Form and function	Adaptations are forms that correspond to function. These adaptations persist from generation to generation because they increase the chances of survival.			
	<b>B1.1</b> Carbohydrates and lipids <b>B1.2</b> Proteins	<b>B2.1</b> Membranes and membrane transport <b>B2.2</b> Organelles and compartmentalization <b>B2.3</b> Cell specialization	<b>B3.1</b> Gas exchange <b>B3.2</b> Transport <b>B3.3</b> Muscle and motility <i>[HL only]</i>	<b>B4.1</b> Adaptation to environment <b>B4.2</b> Ecological niches
<b>C</b> Interaction and interdependence	Systems are based on interactions, interdependence and integration of components. Systems result in emergence of new properties at each level of biological organization.			
	<b>C1.1</b> Enzymes and metabolism <b>C1.2</b> Cell respiration <b>C1.3</b> Photosynthesis	<b>C2.1</b> Chemical signalling <i>[HL only]</i> <b>C2.2</b> Neural signalling	<b>C3.1</b> Integration of body systems <b>C3.2</b> Defence against disease	<b>C4.1</b> Populations and communities <b>C4.2</b> Transfers of energy and matter
<b>D</b> Continuity and change	Living things have mechanisms for maintaining equilibrium and for bringing about transformation. Environmental change is a driver of evolution by natural selection.			
	<b>D1.1</b> DNA replication <b>D1.2</b> Protein synthesis <b>D1.3</b> Mutations and gene editing	<b>D2.1</b> Cell and nuclear division <b>D2.2</b> Gene expression <i>[HL only]</i> <b>D2.3</b> Water potential	<b>D3.1</b> Reproduction <b>D3.2</b> Inheritance <b>D3.3</b> Homeostasis	<b>D4.1</b> Natural selection <b>D4.2</b> Stability and change <b>D4.3</b> Climate change

*Biology syllabus roadmap (IB Biology Course Guide, IBO 2023)*





## CHEMISTRY

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The IB Chemistry course offers insights into a broad variety of topics that provide students with a better and more detailed understanding of concepts covered in middle and high school. It also extends further and gives students insight into the foundations of interactions between energy and matter as well as the analysis and synthesis of different substances and materials.

The course is structured into two main strands: Structure and Reactivity. Each strand contains multiple topics, subtopics and chapters designed to give students an understanding of a variety of important chemical concepts.

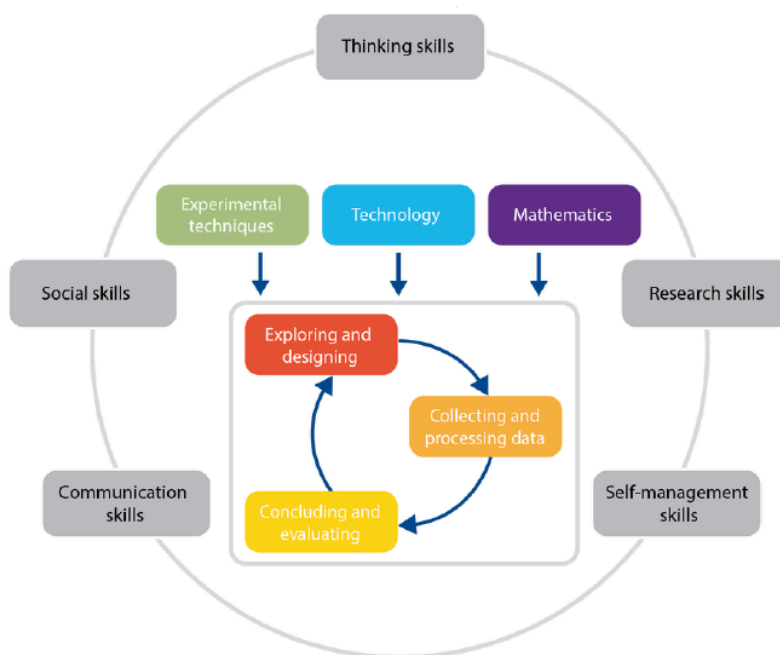
Skills in the study of chemistry			
Structure Structure refers to the nature of matter from simple to more complex forms		Reactivity Reactivity refers to how and why chemical reactions occur	
Structure determines reactivity, which in turn transforms structure			
<b>Structure 1.</b> <b>Models of the particulate nature of matter</b>	Structure 1.1—Introduction to the particulate nature of matter	<b>Reactivity 1.</b> <b>What drives chemical reactions?</b>	Reactivity 1.1—Measuring enthalpy changes
	Structure 1.2—The nuclear atom		Reactivity 1.2—Energy cycles in reactions
	Structure 1.3—Electron configurations		
	Structure 1.4—Counting particles by mass: The mole		Reactivity 1.3—Energy from fuels
	Structure 1.5—Ideal gases		Reactivity 1.4—Entropy and spontaneity (Additional higher level)
<b>Structure 2.</b> <b>Models of bonding and structure</b>	Structure 2.1—The ionic model	<b>Reactivity 2.</b> <b>How much, how fast and how far?</b>	Reactivity 2.1—How much? The amount of chemical change
	Structure 2.2—The covalent model		Reactivity 2.2—How fast? The rate of chemical change
	Structure 2.3—The metallic model		Reactivity 2.3—How far? The extent of chemical change
	Structure 2.4—From models to materials		
<b>Structure 3.</b> <b>Classification of matter</b>	Structure 3.1—The periodic table: Classification of elements	<b>Reactivity 3.</b> <b>What are the mechanisms of chemical change?</b>	Reactivity 3.1—Proton transfer reactions
	Structure 3.2—Functional groups: Classification of organic compounds		Reactivity 3.2—Electron transfer reactions
			Reactivity 3.3—Electron sharing reactions
			Reactivity 3.4—Electron-pair sharing reactions

*Chemistry roadmap via structure and reactivity (IB Chemistry Guide, IBO 2023)*



Throughout this course students will develop their skills in different areas regarding the application of experimental techniques, technology and mathematics.

Students learn how to produce and evaluate data and apply this work in their own chemical investigation as part of their internal assessment. Students practice their analytical and practical skills while solving scientific problems through research as well as practical work. They also improve their presentation and communication skills using different ways to publicize their findings and understandings.



*Skills for Chemistry (IB Chemistry Guide, IBO 2023)*

## GROUP 5: MATHEMATICS

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All DP mathematics courses serve to accommodate the range of needs, interests and abilities of students, and to fulfill the requirements of various university and career aspirations.

The aims of these courses are to enable students to develop mathematical knowledge, concepts and principles; develop logical, critical and creative thinking; and employ and refine their powers of abstraction and generalization. Students are also encouraged to appreciate the international dimensions of mathematics and the multiplicity of its cultural and historical perspectives.<sup>4</sup>

There are two important aspects of the IB Mathematics curriculum. One is the use of technology. The curriculum emphasizes the use of a Graphic Display Calculator (GDC) and other, graphic and analytical tools and spreadsheets, not only for numeric computations but also



to learn important concepts of different areas of mathematics such as functional analysis, calculus, statistics, financial mathematics, geometry, trigonometry etc. In these courses, students are encouraged to develop the skills of writing and presenting mathematics. This is achieved through ‘mathematics exploration’. It is a part of the internal assessment. In mathematics exploration a student will select a math problem, solve it and present it for assessment. Internal assessment in mathematics has 20% weight in final math grade.

## **ANALYSIS AND APPROACHES (AA)**

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The Mathematics: Analysis and Approaches course looks at mathematics through a pure mathematics lens. The main focus in this course is to encourage a student to learn to develop analytical proof of a variety of mathematical statements. In addition to the occasional word problem, material is often presented in a more traditional sense: graphing functions, solving equations, proving theorems, etc. It is best for students who enjoy or appreciate the beauty of mathematics in its own right. This course throws the challenge to students of writing proofs in many analytical problems.

### **AA SL**

The AA SL course is best for students who probably do not want to study any math-based subject but who still like solving more traditional mathematical tasks. This course is most similar to the former IB Mathematics SL course.

Topics covered in the AA SL course include:

- Exponents and logarithms
- Sequences and series
- Binomial theorem
- Basic proofs
- Function basics
- Linear, quadratic, and exponential models
- Trigonometry on triangles and circles
- Trigonometric functions and equations
- Basic differential calculus
- Basic integral calculus
- Basic statistics (univariate and bivariate)
- Basic probability
- Probability distributions (normal, binomial)

### **Assessment in AA SL**

- *Paper 1 (1 hour 30 minutes, 40%):* no technology allowed; a mix of short-response and extended-response questions
- *Paper 2 (1 hour 30 minutes, 40%):* GDC required; a mix of short-response and extended-response questions
- *Internal assessment: Exploration (20%)*



## AA HL

This course is best for students who plan to study subjects that are mathematics intensive and who are more interested in pure mathematics. This course is most similar to the former IB Mathematics HL course.

In addition to the topics mentioned in AA SL, AA HL students will cover:

- Counting principles
- Binomial theorem with integer exponents
- Complex numbers
- Further forms of proof
- More types of functions
- Polynomial equations
- Fundamental theorem of algebra
- Inverse and reciprocal trig functions
- Continuity
- Implicit differentiation
- Differential equations
- Complex integration techniques
- More advanced probability
- Vectors

### AA HL Assessments

- *Paper 1 (2 hours, 30%):* no technology allowed; a mix of short-response and extended-response questions
- *Paper 2 (2 hours, 30%):* GDC required; a mix of short-response and extended-response questions
- *Paper 3 (1 hour):* GDC required; two compulsory extended-response problem-solving questions
- *Internal assessment: Exploration (20%)*

## APPLICATIONS AND INTERPRETATION (AI)

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The Mathematics: Applications and Interpretation course aims to look at math as a tool to solve real-world problems. The main focus in this course is constructing or developing a mathematical model from the given data or from given conditions and constraints and using technology, interpreting the results in the given context of the problem and then applying it to explore the mathematical nature of several natural and human systems. As this also includes, of course, students to understand challenging mathematics in the given context, it presents most problems as a word problem.



## **AI SL**

The AI SL course is best for students who wish to pursue a field outside of mathematics, who prefer to see mathematics in a real-world context, and those who may struggle with more traditional math problems. This course is most similar to the former IB Mathematical Studies SL course.

Topics covered in the AI SL course include:

- Geometry of 2D and 3D shapes, including trigonometry
- Voronoi diagrams
- Sequences and series
- Linear, quadratic, cubic, exponential, logarithmic, and sinusoidal modeling
- Basic differential calculus
- Very basic integral calculus and
- Univariate and bivariate statistics, including hypothesis testing (Spearman's, t-test,  $\chi^2$ ...)
- Probability
- Probability distributions (normal, binomial)

### **Assessment in AI SL**

- *Paper 1 (1 hour 30 minutes, 40%):* GDC required; short-response questions
- *Paper 2 (1 hour 30 minutes, 40%):* GDC required; extended-response questions
- *Internal assessment: Exploration (20%)*

## **AI HL**

This course is best for students who plan to study a social science that is heavily math-based, such as Business or Economics.

In addition to the topics mentioned in AI SL, AI HL students will cover:

- Graph theory
- Vectors
- Further differential and integral calculus
- Differential equations
- Slope fields
- Matrices
- Complex numbers

### **Assessment in AI HL**

- *Paper 1 (2 hours, 30%):* GDC required; short-response questions
- *Paper 2 (2 hours, 30%):* GDC required; extended-response questions
- *Paper 3 (1 hour):* GDC required; two compulsory extended-response problem-solving questions
- *Internal assessment: Exploration (20%)*