DP Country Alignment Studies: Alignment of the French Baccalauréat (FB)

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Ecctis

Acronyms

AA	mathematics: analysis and approaches
AHL	additional higher level
AI	mathematics: applications and interpretation
ATL	approaches to teaching and learning
BFI	Baccalauréat Français International
CAS	Creativity, activity, service
CP	Career-related Programme
DP	Diploma Programme
FB	French Baccalauréat
HL	higher level
IB	International Baccalaureate
IBO	International Baccalaureate Organisation
MYP	Middle Years Programme
PYP	Primary Years Programme
RfP	Request for Proposal
RQ	Research Question
SB	Spanish Bachillerato
SL	standard level
STEM	Science, technology, engineering and mathematics
TOK	Theory of knowledge
WIAIBE	What is an IB education?

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1. Executive Summary

Project Aims and Context

The International Baccalaureate (IB) Organization is a not-for-profit educational foundation offering four programmes across the world. One of them – the Diploma Programme (DP) – is a two-year upper secondary programme, primarily intended to prepare students for university matriculation and higher education.

Following previous studies focused on the education systems of Australia, Canada, the USA, Singapore, South Korea, and Finland,[1] Ecctis has been commissioned by the IB to deliver a series of critical and in-depth alignment studies to assess the level of alignment between the DP and comparison points within the upper secondary education systems of France and Spain.[2] More specifically, the studies aim to identify areas of similarity and difference between the DP and these educational systems by comparing philosophical underpinnings, structure, requirements, assessment methods, learning pathways, content, and specifically to determine how the DP compares to the selected benchmarks in terms of intended student learning outcomes at subject level. The studies include, for all countries, a focus on DP mathematics and DP sciences (i.e. physics, chemistry and biology), with an additional focus on DP philosophy and DP Theory of knowledge (TOK) for France, and DP economics and DP business management for Spain.

This report aims to specifically evaluate alignment between the DP and the upper-secondary programme of education in France. The comparison qualification in question is the French Baccalauréat (FB).

Research Questions and Methods

All comparative studies in this series have been framed by responses to Research Questions (RQs), both at programme and subject levels. For this study, these RQs were the following:

RQ1: To what degree does the DP curriculum align with the French upper secondary curriculum? In what way are the curricula similar and in what way are they different in demand and difficulty? To what degree are the curricula compatible?

RQ2: To what degree do the curricula align with regards to their:
2.1: Philosophical underpinnings
- Objectives
- Principles
- Values.

2.2: Structure
- Learning areas
- Subject offerings

[1] The full reports can be accessed at: www.ibo.org/research/curriculum-research/dp-studies/dp-country-alignment-studies-2023/

[2] The series of studies responds to the following Request for Proposals (RFP), issued by the IB: *The International Baccalaureate Diploma Programme: Alignment with Upper Secondary Education System in France and Spain.*

- Degree of specialization
- Time allocation.

2.3: Requirements
- Programme entry requirements
- Time requirements (i.e. programme duration, teaching hours, study hours)
- Certificate requirements (i.e. credits, passing and failing conditions, compensation options).

2.4: Assessment
- Nature of assessment (i.e. number, type, duration, question types, availability of marks)
- Assessment model (i.e. relative weighting of assessments to overall grades).

2.5: Student learning pathways
- Degree of specialization
- Options in subject (area) choice (i.e. compulsory subjects, electives).

RQ3: To what degree do the subjects align with regards to:

3.1: Content
- Topics (i.e. scope of content area, breadth, depth)
- Learning activities (i.e. difficulty, demand).

3.2: Expected learning outcomes
- Knowledge
- Competences (i.e. subject-specific, 21st century competences).

To answer the above RQs, Ecctis developed and applied a bespoke methodology.

At programme-level, this involved the comparative analysis of key components of the DP and the FB, including: philosophical underpinnings, structure, requirements and associated outcomes, student learning pathways, and assessment methods (where possible). At subject-level, it involved the comparative analysis of key components of the DP and the FB subjects, including: learning outcomes, content, and demand.

Where appropriate, Ecctis complemented its standard comparative methodology with a comprehensive mapping method, extracting themes from the DP to evaluate their presence in the comparison point(s). Additionally, to assess demand at subject level, Ecctis designed and deployed an expert panel approach, scoring each individual subject against a common set of demand criteria.[3]

Key Findings

Programme-level

The student learning pathways constitute the most significant point of similarity between the two programmes, while the philosophical underpinnings constitute the most significant point of difference. In all other respects, there are some notable differences, though with points of clear alignment with regard to how students would be likely to experience the programmes in practice. Key similarities and differences include:

[3] Each individual subject was scored for: cognitive skills evidenced in the learning outcomes (based on the Revised Bloom's Taxonomy), depth of knowledge (adapted from Webb's Depth of Knowledge levels), volume of work (a tri-factor score considering breadth, depth and allocated timeframe), and outstanding areas of subject demand (stretch areas).

- **Philosophical underpinnings:** some of the themes that make up the DP's philosophical underpinnings have a stronger presence in the FB than others, namely 'international outlook, diversity, and intercultural understanding', 'principled and community-oriented' and 'grounded in real world contexts'. Less present in the FB is the DP theme of 'Communicative and collaborative competence', and least evident are the themes of 'independence/self-management, critical inquiry and reasoning' and 'conceptual thought and understanding', though there is evidence that these may be incorporated throughout the study of specific subjects. Conversely, there are some philosophical underpinning themes that are more evidenced in the FB than the DP, namely sustainable development and secularism (laïcité).

- **Programme structure**: both programmes take a baccalaureate-style approach, requiring study of subjects from similar subject areas and allowing students to specialise in a few subjects of their choice. The number of subjects studied in the FB is higher than in the DP, although students specialise in two subjects in their final year, whereas at least three subjects are taken at higher level (HL) in the DP. Moreover, the FB does not require additional components to pass the qualification, whereas DP students must complete the DP core. Lastly, while the DP is delivered over two years, the FB spans over three years, with the *Seconde* year (Grade 10) acting as a preparatory, foundational year.

- **Entry requirements**: both the DP and the FB present a flexible approach to entry requirements at the start of their programmes. The IB encourages students and teachers to consult subject guides around expected prior learning but does not provide fixed entry requirements. For the FB, there are no formal entry requirements beyond the successful completion of lower secondary education. One difference between the two programmes is that, contrary to the DP, some FB optional courses in Grades 11 and 12 have prerequisites for enrolment which are outlined in the programme curriculum and policy documentation. For example, in *Terminale* (Grade 12), only students who have taken the mathematics specialty can select the optional subject of expert mathematics.[4] The DP does not stipulate a similar type of entry requirement for its subjects; instead, it states that, to study *some* subjects at HL, some prior study in the specific subject area is advisable.

- **Student learning pathways**: both programmes provide some level of optionality in relation to subjects studied and both require students to study subjects from a wide range of subject groupings. The approach to combining subject-specialisation with breadth is, therefore, very similar. The main difference between the student learning pathways of both programmes is the number of subjects students can choose to specialise in. While DP students take a minimum of three and a maximum of four subjects at HL, FB students may only take three specialist subjects in their *Première* year, dropping to two specialist subjects in their *Terminale* year.

[4] Eurydice (2022) France: Teaching and learning in general up[per secondary education https://eurydice.eacea.ec.europa.eu/national-education-systems/france/teaching-and-learning-general-upper-secondary-education

- **Assessment methods**: both the DP and the FB make use of both internal and external assessments, but award greater weighting to the latter. The FB features a higher focus on oral examinations, although oral work is part of some DP subjects. In terms of assessment objectives, while the FB curriculum does not describe clear assessment objectives for each subject, the skills targeted by the FB *général* subjects' syllabi are similar to those present in the assessment objectives of the DP subjects.

Subject-level

In this study, Ecctis carried out subject-level comparative analysis between the DP and FB in mathematics, physics, chemistry, biology, philosophy, and Theory of knowledge (TOK) focusing on the following DP standard level (SL) and higher level (HL) subjects and comparison subjects:

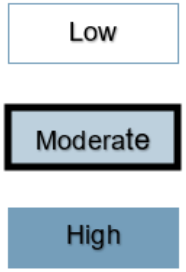
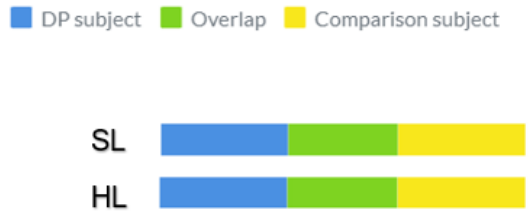
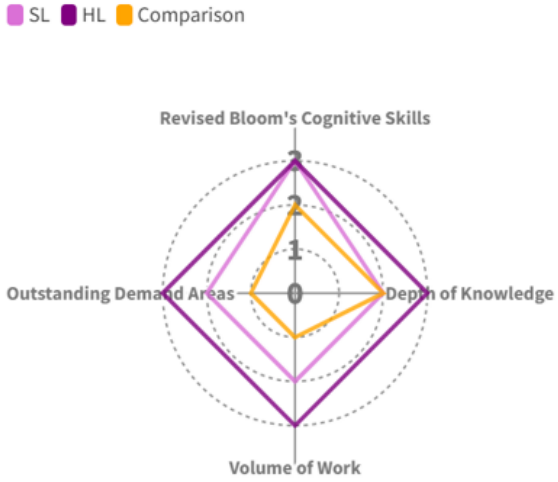
Table: Subject areas for comparison of the DP and the FB curricula

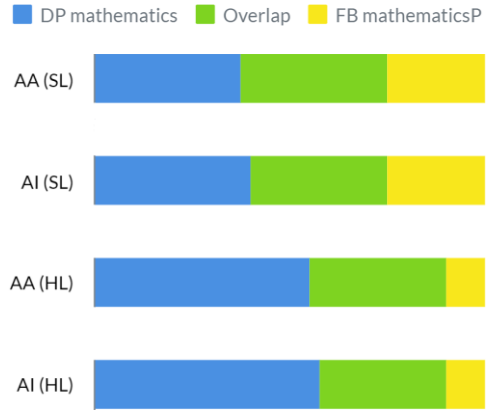
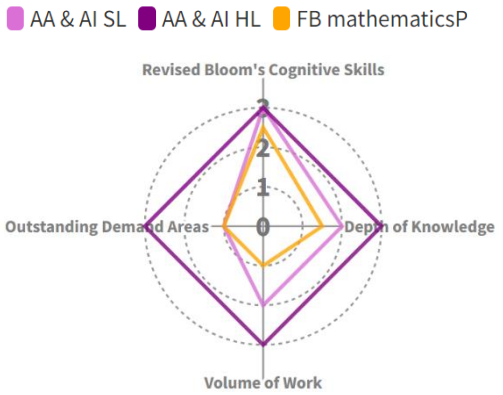
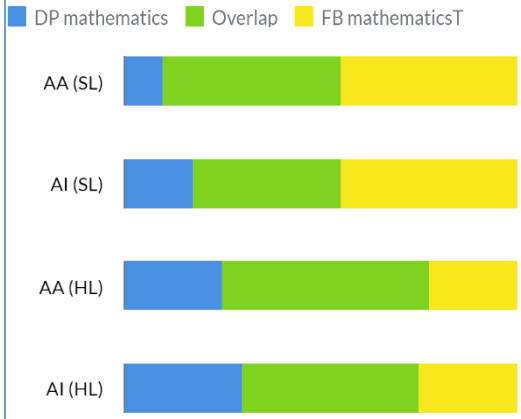
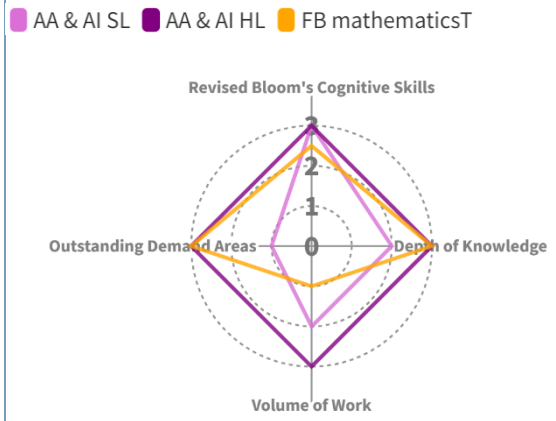
DP subjects (area)	**FB subjects**
MATHEMATICS	*SPECIALITY SUBJECT*
mathematics: analysis and approaches (AA) SL and HL	mathematics
mathematics: applications and interpretation (AI) SL and HL	
SCIENCES	*SPECIALITY SUBJECTS*
physics SL and HL	physics-chemistry
chemistry SL and HL	
biology SL and HL	life and earth science
INDIVIDUALS AND SOCIETIES	*COMMON SUBJECT*
philosophy SL and HL	philosophy
DP CORE	
Theory of knowledge (TOK)	

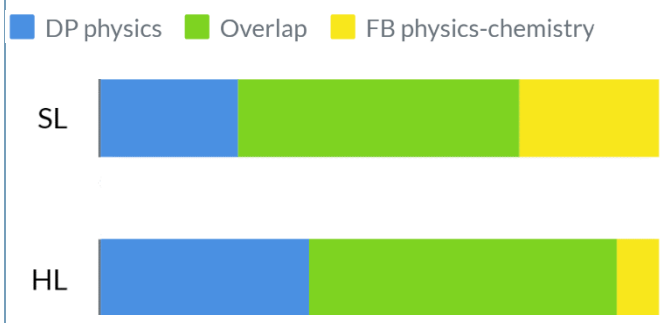
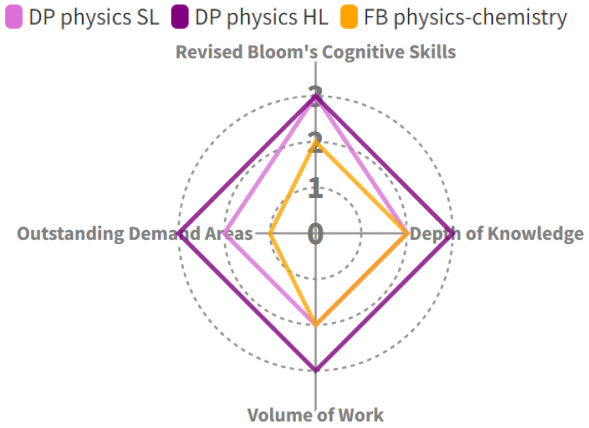
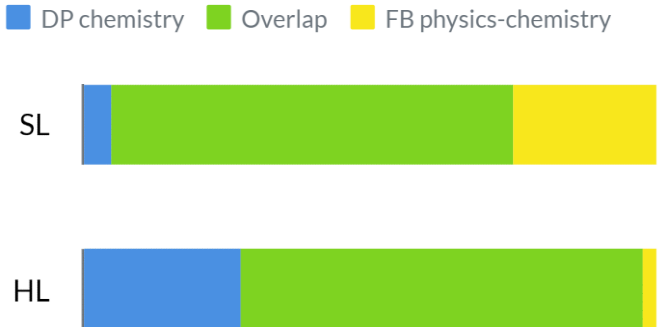
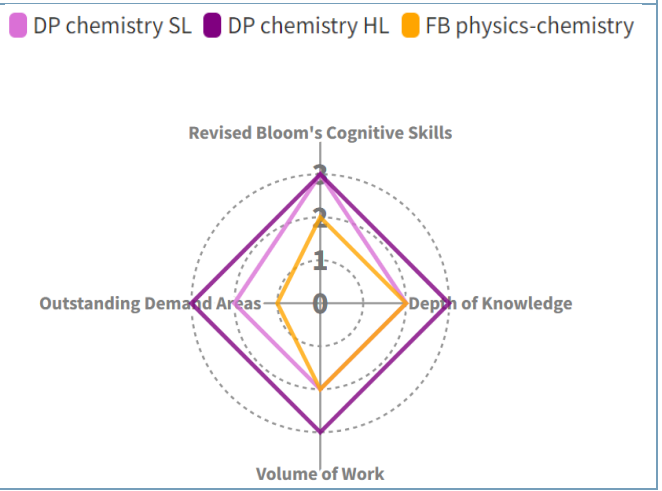
The findings from the subject-level analysis are summarised in the tables below:

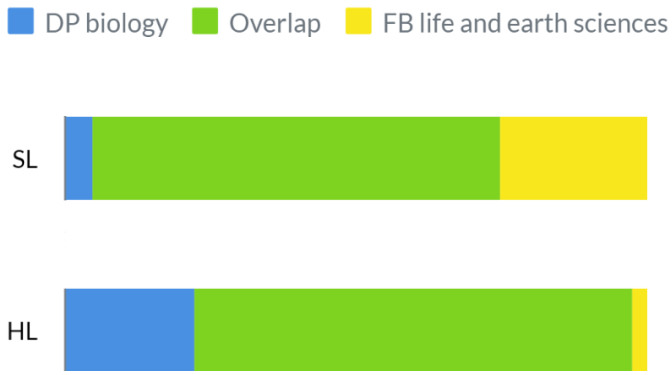
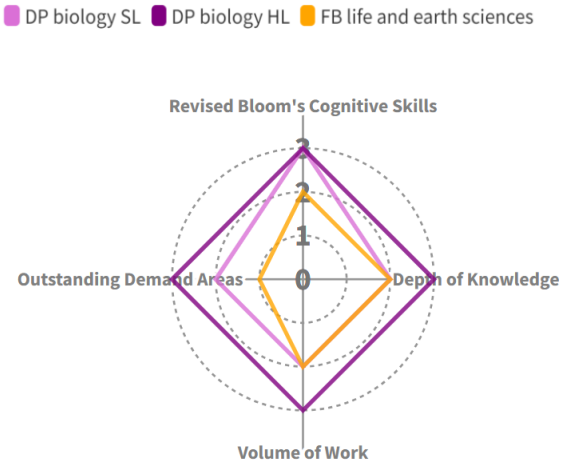
Figures: Visual representation of alignment between DP subjects and comparison subjects

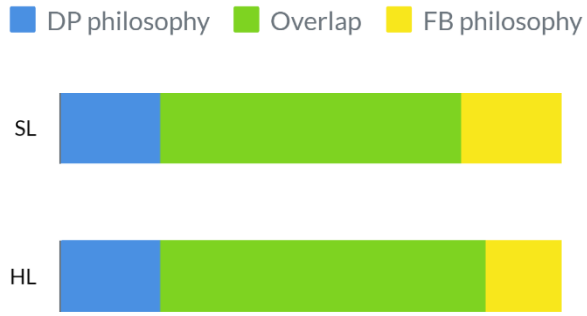
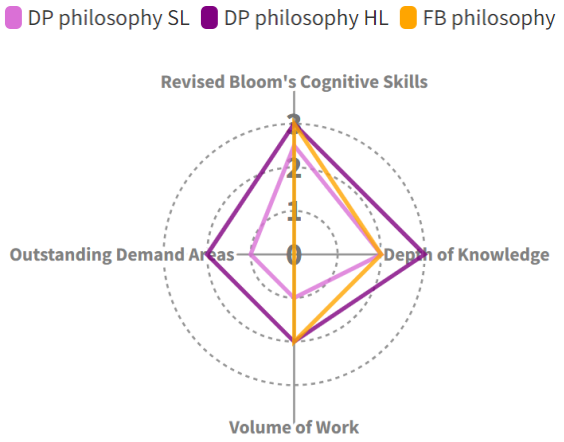
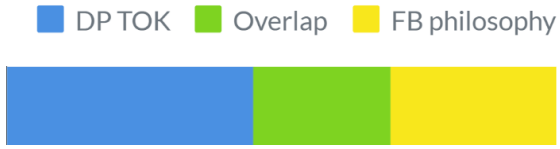
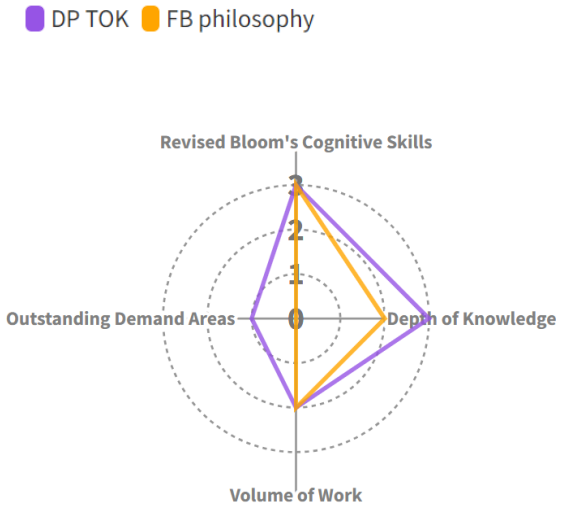
Key:

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
Displays the name of the comparison subject	 This represents the learning outcome alignment between the DP subject and the comparison subject. A black border is placed around the selected judgement – 'Moderate' in this example.	 These bars represent the content alignment between the DP subject and the comparison. There is one bar showing alignment with SL content and another for HL content (inclusive of SL content). The **green** section of the bar represents the overlap of content between the subjects. The **blue** section represents content which was in the DP subject only. The **yellow** section represents content which was in the comparison subject only. Therefore, if, say, the blue section was longer than the yellow, this can be interpreted as the DP subject having more content unique to itself than the comparison did. A large green bar would indicate that a substantial proportion of content is common to both the DP and comparison subject.	 This radar diagram displays the demand judgement scores for the comparison subject(s) and the DP subject – both SL and HL.

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
mathematicsP	Low **Moderate** High		
mathematicsT	Low **Moderate** High		

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
physics-chemistry (focusing on physics)	Low Moderate **High**		
physics-chemistry (focusing on chemistry)	Low Moderate **High**		

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
life and earth sciences	Low Moderate High		

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
philosophy	Low Moderate **High**		
philosophy	Low Moderate **High**		

Key highlights of the subject-level analysis are summarised below.

Mathematics

- **Learning outcomes alignment:** the level of alignment between the learning outcomes of both DP mathematics subjects, both at SL and HL, and those of the FB subjects is moderate, as most, though not all, DP themes are present in the FB curricula.

- **Content alignment:** the level of content alignment between DP mathematics subjects and FB subjects is generally moderate. Indeed, although FB subjects may have similar breadth and depth to the DP subjects, the topics and subtopics covered in each curriculum vary, resulting in a moderate amount of shared content. The breadth and depth of FB mathematicsP is aligned with DP SL subjects and FB mathematicsT is aligned with DP HL subjects. FB mathematics overall has slightly more alignment with DP AA content than DP AI.

- **Demand alignment:** FB mathematics is well aligned with the DP SL and HL subjects with regards to demand, scoring similarly in most categories. FB mathematicsP is most aligned with DP SL subjects and FB mathematicsT is most aligned with DP HL subjects. However, a key difference is that FB mathematics scores lower for volume of work than DP subjects, at both SL and HL.

Physics, chemistry, and biology

All DP science subjects – physics, chemistry and biology – have been individually analysed and compared against the designated comparison subject. However, as they share a number of features – including similar learning outcomes, assessment objectives and assessment requirements – the findings for all courses were similar and are, thus, collectively presented below.

- **Learning outcomes alignment**: the level of alignment between the learning outcomes of the DP and FB science subjects is significant, with all themes extracted from the DP learning outcomes being present, to some extent, in the FB's 'skills developed' or 'preamble'. While there are some small differences in focus, the level of overlap is substantial.

- **Content alignment**: the FB science subjects show greater overall alignment with the DP at SL than at HL. FB subjects being taught as combined subjects rather than single science disciplines has consequences for their content alignment with the DP. At both SL and HL, there is a reasonable amount of content covered by the DP which is not covered by the FB, though greater overall alignment was found with DP subjects at SL than at HL.

- **Demand alignment**: the FB subjects show stronger alignment with the DP SL than DP HL. However, the DP exceeds the FB in relation to areas of outstanding demand. The DP HL generally exceeds the FB science subjects in terms of demand,

demonstrating a higher volume of work, greater range of cognitive skills, and greater depth of knowledge covered in the course.

Philosophy

- **Learning outcomes alignment**: the level of alignment between the DP and FB philosophy learning outcomes is high. This is due to a high number of DP themes being present in the FB, with no significant additional themes identified in the latter.

- **Content alignment**: there is moderate content alignment between DP and FB philosophy. The concepts and authors listed in FB philosophy indicate some alignment with the concepts of the DP's core theme, as well as the optional themes. However, the FB philosophy curriculum is less prescriptive and does not detail specific texts or subtopics to be studied. Therefore, inferences had to be made when assessing alignment, and comparisons of content depth could not be fully drawn.

- **Demand alignment**: FB philosophy aligns with DP SL for depth of knowledge and with DP HL for Bloom's cognitive skills and volume of work. Both DP subjects score higher than FB philosophy for outstanding demand areas, though it should be noted that the FB curriculum is less detailed and, as such, it is possible that additional areas of challenge are present when the subject is taught. Overall, FB philosophy is slightly more aligned with the demand of DP philosophy SL, though does demonstrate similarity with DP HL in some categories.

Philosophy / Theory of knowledge

- **Learning outcomes alignment**: the level of alignment between the DP's TOK and FB philosophy's learning outcomes is high. This is due to all the DP TOK themes being either strongly or partially evidenced in the learning outcomes of FB philosophy, with no additional themes being present in the latter.

- **Content alignment**: there is some content alignment between DP TOK and FB philosophy; however, this is fairly limited. Overlapping content tends to be partially, rather than strongly, aligned. Furthermore, each subject has different themes/concepts which are not present in the other. Moreover, the FB philosophy curriculum is notably non-prescriptive and does not detail specific texts or subtopics to be studied, only authors. Therefore, inferences had to be made when assessing alignment and comparisons of content depth could not be fully drawn.

- **Demand alignment**: FB philosophy is closely aligned with the demand of DP TOK in some categories, scoring equally highly for Bloom's cognitive skills and volume of work. However, DP TOK exceeds FB philosophy in demand for depth of knowledge and outstanding areas of demand. It should be noted that the FB philosophy curriculum is particularly non-prescriptive; thus, not being able to identify areas of demand does not preclude their existence.

Summary

The programme-level features of the DP and FB are moderately aligned. The two programmes observe similar student learning pathways, both combining breadth with subject specialisation, and share similarities in their assessment approaches. However, they differ somewhat in their entry requirements, philosophical underpinnings, and programme structure. At subject-level, alignment between the FB and DP is generally moderate, though it varies across subjects. For FB mathematics, there is moderate alignment with the DP with regards to learning outcomes, content, and demand. For FB science subjects, there is high learning outcome alignment, moderate demand alignment, and varying content alignment. This results in moderate alignment with DP physics and moderate-high alignment with DP chemistry and DP biology. With regards to FB philosophy, the subject has moderate alignment with DP philosophy and DP TOK, with learning outcomes and demand being the most significant points of alignment. FB philosophy content indicates that some similar themes and concepts are covered – more so when comparing to DP philosophy than to DP TOK.

2. Introduction

2.1 Context and Scope

The International Baccalaureate (IB) Organization is a not-for-profit educational foundation offering four programmes across the world, including the Primary Years Programme (PYP), Middle Years Programme (MYP), Diploma Programme (DP) and the Career-related Programme (CP). The DP – the IB's two-year upper secondary Diploma Programme – is conceived as a preparatory programme for university matriculation and higher education, aimed at developing students with 'excellent breadth and depth of knowledge' who 'flourish physically, intellectually, emotionally and ethically'.[5]

Following previous studies focused on the education systems of Australia, Canada, the USA, Singapore, South Korea, and Finland,[6] Ecctis has been commissioned by the IB to deliver a series of critical and in-depth alignment studies to assess the level of alignment between the DP and comparison points within the upper secondary education systems of France and Spain.[7] More specifically, the studies aim to identify areas of similarity and difference between the DP and these educational systems by comparing philosophical underpinnings, structure, requirements, assessment methods, learning pathways, content, and specifically to determine how the DP compares to the selected benchmarks in terms of intended student learning outcomes at subject level. The studies include, for all countries, a focus on DP mathematics and DP sciences (i.e. physics, chemistry and biology), with an additional focus on DP philosophy and DP Theory of knowledge for France, and DP economics and DP business management for Spain.

Ultimately, this series of comparative studies aims to inform the IB's development of tools and resources for IB teachers, helping them navigate between the IB and the local curriculum in the target countries where needed. In doing so, it also contributes to further supporting fair recognition of the DP by institutions, employers, and other key stakeholders, supporting progression and mobility for DP graduates.

This report constitutes one of the project's deliverables and aims to specifically answer the research questions pertaining to how the DP aligns with the French upper-secondary programme of education.

2.2 Research Questions

All comparative studies in this series have been framed by responses to Research Questions (RQs), both at programme level and subject level. For this study specifically, the RQs are as follows:

[5] International Baccalaureate. (2022). *Diploma Programme*. https://www.ibo.org/programmes/diploma-programme/
[6] The full reports can be accessed at: www.ibo.org/research/curriculum-research/dp-studies/dp-country-alignment-studies-2023/
[7] The series of studies responds to the following Request for Proposals (RFP), issued by the IB: *The International Baccalaureate Diploma Programme: Alignment with Upper Secondary Education System in France and Spain.*

France Research Questions

Table 1: France research questions

RQ1: To what degree does the DP curriculum align with the French upper secondary curriculum? In what way are the curricula similar and in what way are they different in demand and difficulty? To what degree are the curricula compatible?

RQ2: To what degree do the curricula align with regards to their:

2.1: Philosophical underpinnings
- Objectives
- Principles
- Values.

2.2: Structure
- Learning areas
- Subject offerings
- Degree of specialization
- Time allocation.

2.3: Requirements
- Programme entry requirements
- Time requirements (i.e. programme duration, teaching hours, study hours)
- Certificate requirements (i.e. credits, passing and failing conditions, compensation options).

2.4: Assessment
- Nature of assessment (i.e. number, type, duration, question types, availability of marks)
- Assessment model (i.e. relative weighting of assessments to overall grades).

2.5: Student learning pathways
- Degree of specialization
- Options in subject (area) choice (i.e. compulsory subjects, electives).

RQ3: To what degree do the subjects[8] align with regards to:

3.1: Content
- Topics (i.e. scope of content area, breadth, depth)
- Learning activities (i.e. difficulty, demand).

3.2: Expected learning outcomes
- Knowledge
- Competences (i.e. subject-specific, 21st century competences).

With regards to subjects to be compared in the subject-level comparative analysis, the following table indicates the agreed scope:

Table 2: Subjects/courses for comparison of the DP and the FB (per DP subject group)

DP subjects	FB subjects
MATHEMATICS	
mathematics: analysis and approaches (AA) SL & HL	mathematics
mathematics: applications and interpretation (AI) SL & HL	
SCIENCES	
physics SL & HL	physics-chemistry
chemistry SL & HL	physics-chemistry
biology SL & HL	life and earth sciences
INDIVIDUALS AND SOCIETIES	
philosophy SL and HL	philosophy

[8] With regards to subjects within scope, see Table 2.

CORE	
Theory of knowledge (TOK)	philosophy

All DP curricula has been considered at both standard level (SL) and higher level (HL).

2.3 Report Structure

In responding to the above RQs, this report included the following sections:

- 3. Methodology: this section provides a brief overview of the methodology applied in this study. This includes details of how the document selection and identification of comparison points for the study took place; a definition of 'alignment'; an outline of the methodology used for comparisons at both programme and subject levels; and an outline of the methodology used to assess demand.

- 4. Programme-Level Alignment: this section presents the synthesised analysis from the programme-level comparisons between the DP and the French upper secondary curriculum. In doing so, it includes brief programme overviews for both qualifications, followed by the comparative analysis on their philosophical underpinnings, structure, requirements and associated outcomes, student learning pathways and the general nature of assessment practices.

- 5. Subject-Level Alignment: this section presents the synthesised analysis from the subject-level comparisons between DP and French upper secondary curriculum subjects. For each comparison subject, this includes the comparative analysis on their learning outcomes, content, and demand.

- 6. Key Findings: this section outlines the key findings from both the programme- and subject-level comparisons undertaken in this study. In doing so, it provides a top-level conclusion on alignment at both programme and subject levels, and a succinct summary of key similarities and key differences.

- 7. Bibliography: this section references all sources cited in the study, including the documents used for both programme- and subject-level curriculum analyses.

3. Methodology

3.1 Document Selection and Identification of Comparison Points

To undertake these comparative analyses, the following core documentation was reviewed (supplemented by additional documentation – detailed in the Bibliography – where relevant and available):

IB Documentation

- What is an IB education? (WIAIBE)
- WIAIBE Teacher Support Material
- DP: From Principles into Practice
- Programme Standards and Practices
- DP subject guides:
    - mathematics: analysis and approaches
    - mathematics: applications and interpretation
    - physics
    - chemistry
    - biology
    - philosophy
    - TOK.

FB Documentation

- French Baccalaureate curriculum (website), including information about underpinning philosophy and pedagogy
- The French Baccalaureate – subject programmes:
    - Mathematics *Général Première*
    - Mathematics *Général Terminale*
    - Philosophy *Général Terminale*
    - Earth and Life Science *Général Première*
    - Earth and Life Science *Général Terminale*
    - Physics and Chemistry *Général Première*
    - Physics and Chemistry *Général Terminale*
    - Philosophy *Terminale.*

Philosophical Underpinnings Comparison

For the programme-level comparisons between the philosophical underpinnings of each programme, Ecctis used the following elements of the curriculum documentation:

Table 3: Philosophical underpinnings for comparison of the DP and the FB

Documentation containing philosophical underpinnings	
DP	**FB**
'What is an IB Education', particularly the following sections: ○ IB learner profile ○ International-mindedness	French Ministry of Education and Youth's website, particularly:

○ Approaches to teaching and approaches to learning (ATL).[9]	○ Values and engagement.[10] French legislation, particularly the Code of Education, Articles L121-1 to L121-8 – 'General Dispositions' (*Dispositions Générales*).[11]

While the document 'What is an IB Education?' provides detailed information about the IB's educational philosophy, the philosophy and pedagogy of the FB are articulated to a lesser extent in the curriculum and legislative documentation available. Nevertheless, the 'Values and engagement' section of the Ministry of Education and Youth's website and the 'General Dispositions' described in Articles L121-1 to L121-8 of the Education Code of Practice were deemed to provide sufficient detail for a meaningful comparison between the two programmes' philosophical underpinnings and were used as such.

For more information on the mapping process, see the Measuring Alignment section below.

Learning Outcomes Comparison

For the Learning Outcomes comparisons, as neither of the two qualifications explicitly defines 'learning outcomes' in their curriculum documentation, Ecctis used the following categories of the curriculum documentation for comparison:

Table 4: Learning outcomes for comparison of the DP and the FB

DP subject (group)	Categories utilised as learning outcomes
MATHEMATICS	
mathematics: analysis and approaches	DP mathematics subject group – aims and assessment objectives
mathematics: applications and interpretation	
SCIENCES	
physics	DP sciences subject group – aims and assessment objectives
chemistry	
biology	
INDIVIDUALS AND SOCIETIES	
philosophy SL and HL	DP philosophy – aims and assessment objectives
DP CORE	
TOK	DP Theory of knowledge – aims and objectives
FB subjects	**Documentation and Sections**
SPECIALIST COURSES	
mathematics	Major Intentions, which include the six 'Math Skills' which are to be developed
physics-chemistry	Skills developed as part of scientific research
life and earth sciences	Skills developed as part of scientific research
CORE CURRICULUM	
philosophy	Overarching objectives, and perspectives

[9] International Baccalaureate. (2017). *What is an IB Education?*

[10] Ministry of Education and Youth. (2023). *Valeurs et engagement* https://www.education.gouv.fr/valeurs-et-engagement-89246

[11] Legifrance, 'Code de l'éducation', Articles L121-1 à L121-8, 'Dispositions Générales'. https://www.legifrance.gouv.fr/codes/article_lc/LEGIARTI000043982346

Although not labelled as learning outcomes per se, the above categories were chosen as they were deemed to provide the most complete picture of the skills and knowledge that students should obtain upon completion of each subject.

For more information on the mapping process, see the Measuring Alignment section below.

3.2 Measuring Alignment (Similarities and Differences)

Alignment is a key concept for this series of studies. The aim of this study is to ascertain the level of alignment between the DP and the FB. Although Ecctis has sought to represent the alignment findings as straightforwardly as possible in this report, alignment is not a simple concept, so it is important to establish Ecctis' approach in this regard.

Alignment, as a term, is often used in education circles to refer to *internal* coherence between learning outcomes, assessment methods, teaching practices and other features of teaching and learning. This report does not consider *internal* alignment, but what might appropriately be labelled *external* alignment. Alignment of this type looks at the extent to which a programme (in this case, the DP) aligns with other educational programmes (in this case, the FB). This form of external alignment is particularly key to understand for an organisation like the IB which operates in so many international contexts, often alongside national curricula, where teachers and students may seek to move back and forth between IB and national pathways of education.

Within this narrower definition of *external* alignment, the idea is still broad and could be viewed from any number of perspectives. In this series of studies, the IB has specifically asked Ecctis to consider alignment from the specific perspectives outlined by the RQs. The RQs thereby define the limits of the type of alignment that will be considered within the reports. Namely:

- At the programme level:
    - Alignment of philosophical underpinnings
    - Alignment of structure
    - Alignment of requirements and associated outcomes
    - Alignment of student learning pathways
    - Alignment of approaches to assessment.

- At the subject level (in selected subjects):
    - Alignment of learning outcomes
    - Alignment of content
    - Alignment of demand.

To form a comprehensive picture of alignment, Ecctis' approach has used multiple repeating steps within each report. For France, it sought to:

- Analyse to what extent the FB has similarities with the DP.
- Analyse to what extent the FB lacks features contained within the DP.
- Analyse to what extent the DP lacks features contained within the FB.

In this respect, **alignment is a measure of the extent to which there are similarities and differences between key selected criteria of two educational programmes**. High alignment indicates significant similarities, with few differences in key areas, whereas low alignment results from many differences in important aspects, with perhaps only few or non-impactful similarities. Alignment judgements in this study took a holistic view of similarities and differences and the likely impact these will have on what skills and knowledge students possess upon completion of a programme of study. As such, the study did not use fixed quantitative criteria to differentiate high from low alignment, but rather utilised the expert panels to produce informed, holistic judgements drawing on an outcomes-focused perspective.

Mapping

To accurately measure the alignment of the DP to the FB, it is necessary to map the similarities and differences across the selected alignment criteria. This necessitates identification of the same structural features in the DP and in the FB (the comparison programme) so that a mapping process can be undertaken.

Mapping, in this case, refers to detailed analysis of a feature of an education programme (generally as represented within that programme's documentation). Specifically, mapping applies the same analytical method to two separate sets of data (for example, the learning outcomes of two different curricula), enabling similarities and differences between those two data sets to be understood through the different results of applying the same mapping method to both. Another important feature of mapping is that there is a paper trail of the analysis, as the approach is methodical, testable, and repeatable.

For more information on how mapping has been applied in this study, see sections 3.2.1 and 3.2.2.

3.2.1 Method: Programme-Level Comparison

Each aspect of the programme-level comparison is achieved through slightly different approaches to mapping and assessing alignment, the results of which inform the overall alignment evaluation. Each method is described in the appropriate subsection below.

Philosophical Underpinnings

In the DP, the ATL, the learner profile, and the framework of international-mindedness were used to represent the philosophical underpinnings, while the 'Transferrable Skills' and 'Cross-curricular and Integrated Learning' sections were used for the FB.

In order to carry out the comparative analysis, six themes were extracted from the DP's philosophical underpinnings:

Table 5: Philosophical underpinning themes

Philosophical underpinning themes
• International outlook, diversity, and intercultural understanding • Grounded in real world contexts

- Principled and community-oriented
- Independence/self-management, critical inquiry, and reasoning
- Communicative and collaborative competence
- Conceptual thought and understanding.

This list of themes was mapped against both the DP's philosophical underpinnings and the philosophical underpinnings of the FB to identify what aspects of the DP's philosophical underpinnings are shared with the FB and what aspects are unique to either the FB's philosophical underpinnings or the DP's. The detail of this mapping was carried out in the mapping spreadsheets, while a visual summary and written explication of the findings can be found in the Philosophical Underpinnings section below (see section 4.2).

Structure

Comparing the structures of the DP and a national programme does not require a mapping process. Instead, subject offerings, how duration interacts with subjects/progression, and the general structure of the qualification (including exit points) have been represented with visuals for each programme. These curriculum structure diagrams use block colours and simple box and arrow graphics to demonstrate structure and progression.

Curriculum structure diagrams have been placed next to each other in this report to show the similarities and differences at a glance. The visual presentation is followed by a short write-up of the key similarities and differences, to maintain analytical focus on the alignment of the two programmes.

Requirements and Associated Outcomes

The requirements and associated outcomes of each programme are, like the structure, also simple, core features which do not require a mapping process in order to be compared. Comparisons and contrasts are drawn between the different requirements (e.g. entry requirements, pass/fail requirements) linked to both programmes and the associated outcomes of both.

Student Learning Pathways

By 'student learning pathways', we refer to the learning route that each student can take through a programme – with focus on scope for subject-specific specialisation. As with the comparative analysis of structure, diagrams resembling flow charts have been used to visually demonstrate the core and optional subject choices, providing an example to indicate how students follow different potential learning pathways in both programmes. A short textual write-up has been included after the diagrams to highlight and discuss the key similarities and differences – maintaining analytical focus on the issue of alignment.

Assessment Methods

Although detailed comparative analysis of assessment is not a main component of the analysis of alignment, Ecctis has briefly considered the high-level assessment features within the programmes being compared.

A simple table has been used, followed by a short textual description of the key similarities and differences. The types/numbers of assessment used in the programme are a source of comparison, and the subjects analysed in the subject-level alignment analysis in each report

have been used as examples to consider assessment in more detail (i.e. question types and marking approaches, where this information is available).

3.2.2 Method: Subject-Level Comparison

As previously described, a number of subjects has been selected by the IB for a closer look at alignment at the subject level. This includes a closer look at the learning outcomes for each subject, the subject content, and the demand level. Each approach is outlined below.

Learning Outcomes

To analyse the alignment of learning outcomes at the subject level, the process began by extracting six to eight themes from the DP's subject-level learning outcomes for each subject being analysed, encompassing both skills and knowledge areas. This thematic code was then mapped onto the learning outcomes of the DP subject and the comparison subject from the FB.

The top-level results of the mapping process are represented with a table per subject area. Following the tables, a written commentary is provided regarding the presence of DP knowledge areas and skills (represented by themes) in the FB and any knowledge areas and skills found in the FB but not in DP.

Content

To compare the content of the DP subject and the comparison FB subject, both are first presented next to each other in the document in a simple tabular format. Additionally, content mapping took place through a simple process of establishing whether each content subtopic covered by the DP subject in question has 'clear alignment' with any content in the FB comparison subject. The mapping spreadsheets demonstrate the full logic of all judgements.

A commentary is provided on DP subject content not found to have alignment points in the FB subject and on FB subject content topics not found to have alignment points in the DP subject.

Demand

Comparing the demand of subject curricula is perhaps the most complex mapping and alignment analysis within this report. Ecctis' approach views demand from multiple perspectives to capture its relationship to skills as well as to the detail and scope of content.

To allow for a comprehensive assessment of the level of demand of the DP selected subjects against the respective comparison points, Ecctis has created a Demand Profile for each subject in the study. Each Demand Profile comprises four criteria designed to judge complexity, depth, breadth, workload levels and potential for intellectual stretch. These criteria have been applied uniformly across all subjects in the study, using an expert panel-approach (as outlined below).

Demand Profile – Subject-level Judgement

The Demand Profile is comprised of four scores (each between zero and three) based on specific criteria. Each score within each category has a specific definition which is listed in Appendix A. A panel of subject, teaching, and curriculum design experts analysed each

subject curriculum and arrived at a consensus on which score descriptor in each category best matched with the curriculum in question. The categories which comprise the Demand Profile are as follows:

- **Revised Bloom's Cognitive Skills** score (0-3): this is an overall score of course demand, based entirely on a review of learning outcomes. Levels have been defined based on increasing emphasis of higher order cognitive skills taken from Bloom's Revised Taxonomy.[12]

- **Depth of Knowledge** (adapted from Webb's) score (0-3): this is an overall score evaluating the depth of knowledge or complexity of knowledge and skills required by curriculum standards and expectations. The score is focused on subject content and learning outcomes, complemented by assessment where relevant/possible. Levels have been defined based on the level of detail studied per topic, as well as the levels of thinking described in Webb's depth of knowledge framework.[13]

- **Volume of Work** score (0-3): this is a trifactor score, considering:
  a. breadth of content – i.e. how many topic and subtopics are covered
  b. depth of content – i.e. the extent to which the topics and subtopics are focused upon, amplified and explored.[14]
  c. specified timeframe – i.e. the time allocated for studying the subject.

  The three factors – breadth, depth, and time – were all considered in defining the levels.

- **Outstanding Areas of Subject Demand** score (0-3): this score reflects the number of content areas viewed as more challenging and/or conducive to intellectual stretching of students. Levels have been defined on a scale of increasing number of 'stretch areas'.

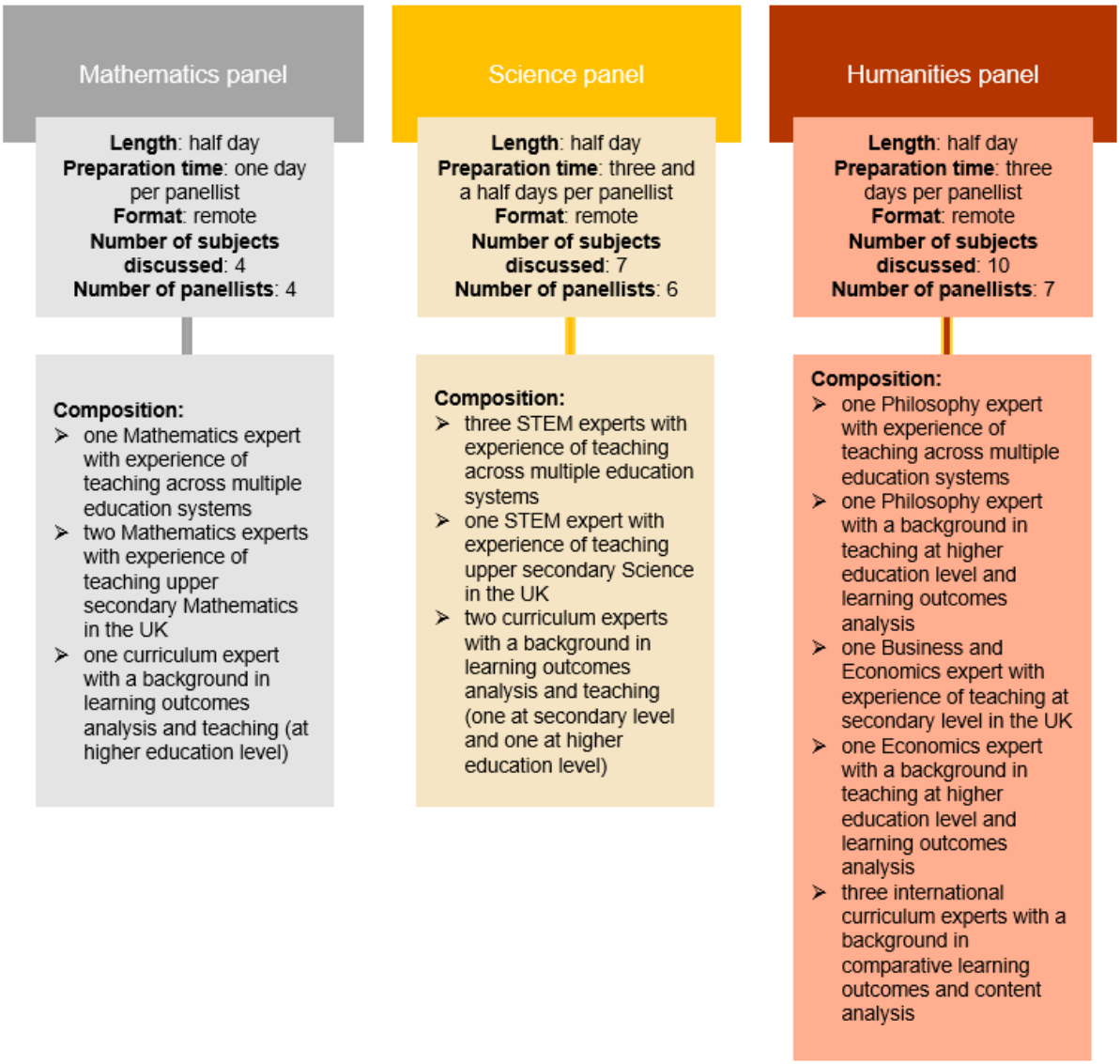
Demand Panel: Expert Judgement Procedure

Demand analysis and judgements against the above criteria rested with a panel of experts comprised of both curriculum and teaching experts – i.e. international education researchers experienced in comparative secondary curriculum evaluation – and subject experts – i.e. researchers and consultants with a subject specialism in the relevant subject areas. For both expert types, teaching experience, understanding of appropriate national/international teaching contexts, and experience of curriculum and learning outcomes comparisons were prioritised.[15]

[12] Krathwohl, D. (2002). A Revision of *Bloom's taxonomy: An Overview.* Theory Into Practice, Vol 41(4). Available from: www.tandfonline.com/doi/abs/10.1207/s15430421tip4104_2?journalCode=htip20
[13] Webb, N. L. (2002). *Depth-of-knowledge levels for four content areas*. Language Arts. Microsoft Word - Webb DOK all content.doc (pbworks.com)
[14] Note: 'depth of content' primarily describes what is on the curriculum (i.e. the level of detail comprised in each topic), whereas 'depth of knowledge' describes what the students need to be able to do (i.e. how complex and extensive the thinking processes involved are).
[15] To minimise potential biases and subjectivity, Ecctis' recruitment procedure excluded candidates with experience of teaching any of the comparison qualifications in this study.

For the panels discussing the demand level of the DP subjects and respective comparison subjects in the FB and Spanish Bachillerato (SB) reports, the composition of each panel was as follows:

Figure 1: Demand panels details



All panellists were provided with the relevant extracts from the appropriate qualifications' specifications,[16] including (where available):

- Learning outcomes and aims of the qualification
- Assessment structure
- Information about guided learning hours or curriculum time
- Assessment objectives
- Content.

The experts were also provided with a document containing:

- An introduction to the comparative analysis task

[16] The documents were shared both in their original languages and in English.

- Descriptions of the demand taxonomies
- The demands instrument (used to record findings).

Panellists conducted between one and four days of panel preparation, reviewing the appropriate curriculum documentation in detail and scoring each subject against the demand criteria provided (the template utilised for this has been included in Appendix C). Following this preparation, participants then took part in their respective panels, which were all hosted remotely on Microsoft Teams. All panels lasted for half a day.

All judgements resulted in scores from 0-3 for each demand criterion mentioned above, with each score for each criterion being pulled into each course's demand profile. The panel approach was used to debate the findings and scores reached by each member of the panel and arrive at an evidence-based consensus on every demand score for every subject.[17]

Visually, each demand profile is represented by radar diagrams to facilitate demand comparison between subjects.

NB: all demand scores produced should be interpreted as approximate judgements given the varying degrees of documentation and detail available for each curriculum, as well as likely variation on how the curricula are implemented in practice.

[17] Note: each score was debated by the panel until a unanimous agreement was reached.

4. Programme-Level Alignment

This section focuses on answering RQ2 and the sub-questions associated with it, namely:

Table 6: Research question 2

RQ2: To what degree do the curricula align with regards to their: 2.1: Philosophical underpinnings • Objectives • Principles • Values? 2.2: Structure • Learning areas • Subject offerings • Degree of specialization • Time allocation? 2.3: Requirements • Programme entry requirements • Time requirements (i.e. programme duration, teaching hours, study hours) • Certificate requirements (i.e. credits, passing and failing conditions, compensation options)? 2.4: Assessment • Nature of assessment (i.e. number, type, duration, question types, availability of marks) • Assessment model (i.e. relative weighting of assessments to overall grades)? 2.5: Student learning pathways • Degree of specialization • Options in subject (area) choice (i.e. compulsory subjects, electives)?

It starts by offering top-level overviews of both the DP and the FB, followed by presenting the results from the programme-level comparative analysis for each core component outlined above.

4.1 Programme Overviews

4.1.1 The International Baccalaureate Diploma Programme

The Diploma Programme (DP) was established in 1968 as a two-year pre-university programme for 16–19-year-old students.[18]

Students who aim to achieve the Diploma award must generally select one subject from each of the six subject groups:

- Studies in language and literature
- Language acquisition
- Individuals and societies
- Sciences
- Mathematics

[18] DP *From Principles into Practice* (2015), p. 5.

- The arts.[19]

Students who do not wish to take a subject from the arts subject group may opt to study an additional Sciences, Individuals and societies, or languages course instead.

All subjects are studied concurrently over the two-year duration of the programme and most subjects can be taken at either HL or SL. In terms of teaching hours, the DP's documentation recommends 150 teaching hours for individual subjects at SL and 240 teaching hours are at HL.[20]

In addition to the six subjects taken from these groups, DP students will also need to complete three further curriculum components. Theory of knowledge (TOK) allows students to reflect on the nature of knowledge by considering their subjects from a broader perspective.[21] The extended essay is a self-directed piece of research which results in a 4000-word essay.[22] Creativity, activity, service (CAS) is not formally assessed but requires that students undertake a creative endeavour, take part in something physically active, and participate in a voluntary or unpaid activity.[23] Together, these three components comprise the DP 'core'.

To achieve the IB Diploma a student must take at least three HL subjects.[24] The maximum number of subjects that can be taken at higher level is four. HL subjects are intended to prepare learners for the discipline specialisation of higher education, whilst the SL subjects balance this by broadening the range of subjects studied.[25]

The DP curriculum framework is based on a concentric circle model (see below), whereby the learner profile is positioned at the centre to represent its relevance to all aspects of the programme. The next circle comprises the core requirements of TOK, The extended essay, and CAS. The six subject groups are then encircled by international-mindedness and the programme title – indicating that everything students study is unified by the underpinning philosophy of encouraging thinking from a perspective that embraces points of view outside one's own frame of reference.

[19] International Baccalaureate. (2021). *Curriculum*. https://www.ibo.org/programmes/diploma-programme/curriculum/
[20] Ibid.
[21] International Baccalaureate. (2021). *Theory of knowledge*. https://www.ibo.org/programmes/diploma-programme/curriculum/theory-of-knowledge/
[22] International Baccalaureate. (2016). *Guide to the International Baccalaureate Diploma Programme*. p. 2.
[23] International Baccalaureate. (2021). *CAS projects.* https://www.ibo.org/programmes/diploma-programme/curriculum/creativity-activity-and-service/cas-projects/
[24] International Baccalaureate. (2021). *Curriculum*.
[25] International Baccalaureate. (2015). *Diploma Programme: From principles into practice*. p. 6.

Figure 2: IB Diploma Programme curriculum model[26]

Both internal and external assessment methods are used in the DP. In most subjects, students take written examinations at the end of the programme that are marked by external IB examiners. Internally assessed tasks normally comprise between 20-30% of the total mark in each subject.[27]

Question types used in DP assessment vary from subject to subject. Essays, structured problems, short-response questions, data-response questions, case-study questions, and multiple-choice questions are some of the external assessment question types deployed.[28] Coursework forms part of the assessment for areas of the DP such as the extended essay and TOK.[29] This is normally carried out over an extended period under teacher supervision. Where students complete internally assessed tasks, these are marked by teachers and moderated by the IB.[30] Some of the internal assessment methods used include oral work in languages, fieldwork in geography, laboratory work in the sciences, and artistic performances in the arts.[31]

Each DP subject, whether taken at SL or HL, is graded from 1-7 (with 7 representing the highest achievement level).[32] If a student has taken enough subjects at the correct level to be

[26] International Baccalaureate. (2016). *Guide to the International Baccalaureate Diploma Programme*. p. 2.
[27] International Baccalaureate. (2021). *Understanding DP assessment*. https://www.ibo.org/programmes/diploma-programme/assessment-and-exams/understanding-ib-assessment/; International Baccalaureate. (2014). *Diploma Programme: A guide to assessment*. p. 3.
[28] International Baccalaureate. (2021). *Assessment and Exams*. https://www.ibo.org/programmes/diploma-programme/assessment-and-exams/
[29] International Baccalaureate. (2021). *Understanding DP assessment*.
[30] Ibid.
[31] International Baccalaureate. (2021). *Assessment and Exams*.
[32] International Baccalaureate. (2021). *Understanding DP assessment*.

in contention for the Diploma award, a minimum of 24 points is needed to achieve the qualification. A minimum grade of 3 is also needed in at least four subjects to achieve the qualification.[33]

Additionally, 42 total points are available from the combination of the grades for six subjects and a further three points are available to students for successful completion of the core elements of TOK and The extended essay. The TOK and extended essay components of the DP are each marked on an A-E scale, where an A grade is the highest award, and an E grade the lowest.[34] Their combined results can contribute up to three additional numerical points to the overall DP score (see Table below). CAS does not constitute a graded part of the DP, although its completion is mandatory to be awarded the Diploma.

HL and SL subjects are assessed against the same grade descriptors;[35] however, HL candidates are expected to demonstrate the various elements of the grade descriptors across a greater range of knowledge, skills, and understanding.

A bilingual Diploma is awarded to students who achieve:

- Grade 3 or higher in two language subjects from the Studies in language and literature group; or,
- Grade 3 or higher in a language subject from the Studies in language and literature group and a grade 3 or higher in a subject from the Individuals and societies group or Sciences group taken in a different language.

Certificates are awarded to students that have taken individual subjects but not enrolled on the full Diploma, or DP candidates who do not achieve the full DP.[36] Prospective candidates can enrol in as many individual subjects as permitted by their school; these are graded with the same 1-7 system used in the full DP.

Table 7: Letter-Grade: numerical score conversion matrix[37]

		Theory of knowledge (TOK)				
	Grade awarded	A	B	C	D	E
The extended essay	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				

No formal entrance requirements are stipulated as the IB envisages numerous educational pathways leading to the DP.[38] However, the IB recommends consulting the subject guides prior to enrolment to ensure an adequate understanding of programme expectations.[39]

[33] International Baccalaureate. (2016). *Guide to the International Baccalaureate Diploma Programme*. p. 4.
[34] Ibid.
[35] International Baccalaureate. (2021). *Understanding DP assessment*.
[36] International Baccalaureate. (2016) *Guide to the International Baccalaureate Diploma Programme*. p. 4.
[37] International Baccalaureate. (2017). *Assessment principles and practices: Quality assessments in a digital age*. p. 220.
[38] International Baccalaureate. (2015). *Diploma Programme: From principles into practice*. p. 22.
[39] Ibid.

4.1.2 Baccalauréat (FB)

The school system in France is overseen and regulated by the Ministry for National Education and Youth.[40] It is divided into primary school, which spans five years (from ages six to 11), and secondary school, which spans seven years (from ages 11 to 18). Secondary education in France is divided into two cycles, including lower and upper secondary education. Lower secondary education in France is compulsory, lasts four years and is offered in *collèges* to students between 11 and 15 years old. Upper secondary education lasts three years and is provided to students between the ages of 15 and 18 years old. It is offered by general and technological *lycées* or in professional *lycées.* It is the last three years upper secondary education that constitutes the *Baccalauréat* (FB)*,* the focus of this report.[41]

Structure

Upper secondary education in France offers three educational pathways:

- the general pathway, which aims to prepare students for higher education;
- the technological pathway, which aims to prepare students for higher technological studies; and
- the professional pathway, which aims to support students to enter the labour market or access higher education.

This overview focuses primarily on the general and technological pathways. These two pathways are organised into three years and two pedagogical cycles, including namely:

- 1st year: *Seconde* (Grade 10: students aged 15 to 16 years old)
- 2nd year: *Première* (Grade 11: students aged 16 to 17 years old)
- *3rd year: Terminale* (Grade 12: students aged 17 to 18 years old).

The *Seconde* year level provides an opportunity for students to consolidate and develop their foundational knowledge and skills in order to facilitate a successful transfer from lower to upper secondary education. This year aims to support students with deciding what pathway to take on their final years of secondary education – i.e. the general path or the technological path. The curriculum of the *Seconde* year is the same for all students attending the general and technological pathways and includes 26.5 teaching hours per week, making up a total of 954 teaching hours in a school year. Furthermore, this cycle includes 54 hours dedicated to students' career guidance and development.

All students in the *Seconde* year study both common subjects (i.e. subjects studied by all students) and some optional subjects.[42] The common subjects are included in the table below.

[40] Government of France. Ministry for National Education and Youth. https://www.education.gouv.fr/let-s-build-committed-education-system-together-100037
[41] Government of France. Ministry for National Education and Youth. https://www.education.gouv.fr/let-s-build-committed-education-system-together-100037
[42] Government of France. Ministry for National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

Table 8: Common subjects of the Seconde cycle (Grade 10)[43]

Common subjects of the *Seconde* cycle (Grade 10)
French
Modern languages A and B
History and geography
Economic and social sciences
Mathematics
Physics-chemistry
Life and earth sciences
Digital sciences and technology
Physical and sports education
Moral and civic education

Apart from the common subjects, students in the *Seconde* cycle can select up to two optional subjects. The optional subjects allow students to explore different disciplines and areas of knowledge, helping them to identify possible career pathways. More specifically, examples of optional subjects include: scientific and technological subjects, such as engineering and laboratory sciences; literary subjects, such as classics, ancient languages and cultures, and a third modern language; and artistic subjects, such as plastic arts, music and performing arts and other subjects.[44]

After the first year of upper secondary education, students can select whether they want to purse the general, technological or the professional pathway. Like the *Seconde* year, the second and third years of upper secondary education (*Première and Terminale)* also include common subjects studied by all students, but they also include subjects specific to each pathway (i.e. general, technological and professional).

General pathway/General Baccalaureate

In the general pathway, the common subjects constitute approximately 60% of the total teaching hours of the *Première* year (i.e. 16 teaching hours per week and 576 teaching hours per school year) and approximately 55% of the *Terminale* year (i.e. 15.5 teaching hours per week and 558 teaching hours per school year).

The table below presents the list of common and specialty subjects studied in the general pathway's *Première and Terminale* years.

Table 9: Subjects studied in the Première and Terminale years of the general pathway (Grades 11 and 12)[45]

Common subjects of the *Première* cycle of the general pathway (Grade 11)	Common subjects of the *Terminale* cycle of the general pathway (Grade 12)
French	Modern languages A and B
Modern languages A and B	History and geography
History and geography	Philosophy
Scientific education	Scientific education
Physical and sports education	Physical and sports education
Moral and civic education	Moral and civic education

[43] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee
[44] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee
[45] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

<table>
<tr><th colspan="2">Specialty subjects of the Première and Terminale years
(Grades 11 and 12) of the general pathway</th></tr>
<tr><td colspan="2">• Arts
• Biology-ecology (agricultural lycées only)
• History-geography, geopolitics and political science
• Humanities, literature and philosophy
• Foreign and regional languages, literature and cultures
• Literatures and languages and cultures of Antiquity
• Mathematics
• Digital and computer sciences
• Physics-chemistry
• Life and Earth Sciences
• Engineering Sciences
• Economic and Social Sciences</td></tr>
<tr><th>Optional subjects of the Première cycle (Grade 11) of the general pathway</th><th>Additional optional subjects of the Terminale cycle (Grade 12) of the general pathway</th></tr>
<tr><td>• Modern language C (foreign or regional)
• Ancient languages and cultures: Latin
• Ancient languages and cultures: Greek
• Physical and sports education
• Arts (choose from visual arts, audiovisual cinema, dance, history of the arts, music or theatre)
• French sign language
• Hippology and horse riding (agricultural lycées only)
• Agronomy, economy, territories (agricultural lycées only)
• Social and cultural practices (agricultural lycées only)</td><td>• Complementary mathematics (for students who have not taken the mathematics specialty)
• Expert mathematics (for students who have taken the mathematics specialty)
• Rights and major issues of the contemporary world</td></tr>
</table>

In addition to the common subjects, in the *Première* year students must select three specialty subjects from a list of 12. In the *Terminale* year, students have the option to drop one subject, keeping two of the three specialty subjects. The teaching hours allocated to the specialty subjects are the following: four hours per specialty subject in the *Première* year and six hours per specialty subject in the *Terminale* year. In total, teaching hours for specialty subjects in *Première and Terminale* equal 432 hours per year. The table below presents the list of specialty subjects that students can choose from in the *Première and Terminale* years.

Alongside their common and specialty subjects, students at the *Première and Terminale* years also choose some optional subjects. In the *Première* year, students can choose one optional subject (three hours per week, 108 hours per school year) from a list of nine optional subjects. In the *Terminale* year, students can choose up to two optional subjects – one from the list of optional subjects already offered at *Première* and one from a list of optional subjects offered at *Terminale.* The table below presents a list of optional subjects offered at the *Première and Terminale* cycles.

Technological pathway/ Technological Baccalaureate

The aim of the technological pathway is to prepare students for further technological studies in the disciplines of science and technology. Students on this pathway study the same common subjects as those in the general pathway, with exception of 'Modern Languages A and B' which, in the technological pathway, also covers an additional element of technological teaching in modern Language A. However, the teaching hours dedicated to common subjects

are slightly lower than in the general pathway: students have 14 teaching hours per week (two hours less than in the general pathway) in the *Première* year (i.e. 504 teaching hours per school year) and 13 hours per week (two and half hours less than in the general pathway) in the *Terminale* year (i.e. 468 teaching hours per school year).

Students choosing the technological pathway can select one specialty sub-pathway from those listed on the table below:

Table 10: Specialty sub-pathways of the Première and Terminale years (Grade 11 and 12) of the technological pathway[46]

Specialty sub-pathways of the *Première* and *Terminale* years (Grades 11 and 12) of the technological pathway
Science and Technology in Industry and Sustainable Development (STI2D)
Laboratory Science and Technology (STL)
Management sciences and technologies (STMG)
Health and social sciences and technologies (ST2S)
Science and technology of design and applied arts
Music and Dance (TMD)
Hospitality and Catering sciences and technologies (STHR)
Agronomy and living sciences and technologies (STAV). This training is taught in secondary schools under the Ministry of Agriculture.
Optional subjects in *Première and Terminale* years (Grades 11 and 12) of the technological pathway
Students can choose two of the following: Art: • visual arts • audio visual cinema • dance • history of the arts • music • theatre Physical education and sports A third modern foreign or regional language

In addition, students attending the technological pathway can also choose two optional subjects of art (either visual arts, audio visual cinema, dance, history of the arts, music or theatre); physical education and sports; and a third modern foreign or regional language.

Assessment

Exams

Assessment in the FB is conducted through written tests which occur throughout the school year. Additionally, during the final year of studies, students undertake mock examinations which aim to prepare them for the *Baccalauréat* examinations.

[46] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

Students in the FB also undertake a number of standardised diagnostic assessments throughout the course of their studies. At the start of the *Seconde* year, they undertake a 'Positioning Test' which tests their written and oral expression skills and essential mathematical skills. Later, at the start of the *Première* year, students undertake two 50-minute examinations – one covering the subject of French and one the subject of Mathematics. These tests help students to identify their areas of strengths as well as potential areas for further development.

Students also take several national examinations in order to be awarded the *Baccalauréat.* These examinations make up 60% of the student's final FB grade and typically include:

- A written and oral examination on the subject of French at the end of the Première year;
- Three written and oral examinations on Philosophy and the student's two specialty subjects on the *Terminale* year;
- One oral examination at the end of the *Terminale* year based on a personal project linked to a specialty subject.[47]

The grading system and marking scheme used in the FB is on a scale from 0 to 20, with a pass grade of 10. Based on their final grade, students will receive one of the following grade classifications outlined in the table below:

Table 11: Baccalauréat grade classifications

Grade	Grade classification
16.00 to 20.00	Very good (*très bien)* (TB)
14.00 to 15.99	Good (*bien*) (B)
12.00 to 13.99	Fairly good (*assez bien*) (AB)
10.00 to 11.99	Pass (*Passable*)

Continuous assessment

In addition to examinations, the FB also features continuous assessment amounting to 40% of students' final FB grade. 30% of this grade is allocated based on students' performance on nationally-designed exercises focused on History and Geography, Foreign Languages A and B, Science culture, Physical Education and one of the specialty subjects chosen by students, and which take place over the final two years of upper secondary education. The remaining 10% is based on student results in teacher-designed tests for each of their common subjects (also administered over the *Première* and *Terminale* years).

Baccalauréat Diploma

Each subject in the FB is awarded a score out of 20, and the students' overall FB grade corresponds to their overall average score. Students must achieve an overall average score of at least 10 out of 20 in order to be awarded the FB diploma.

[47] French Embassy in the United States (n.d.), 'French Baccalaureate'. Available at: https://frenchlanguagek12.org/french-curriculum-schools/french-baccalaureate [accessed 19th July 2023]

Curriculum Design Principles

The French Ministry of Education and Youth's website outlines some values which are applicable to the French education system as a whole. The values are based on the general principles of the French revolution in 1789, including: **academic freedom, free provision, neutrality, secularism (laïcité), and compulsory education**.[48]

These values are complemented by some general principles of education (Principes généraux de l'éducation, Articles L111-1 to L167-1)[49] which underpin the French education system as a whole. Although these general principles are not clearly laid out in the Ministry of Education and Youth's website, they can be extracted from French legislation. Of particular relevance are Articles L121-1 to L121-8 – 'General Dispositions' (*Dispositions Générales*) of the Education Code (*Code de l'éducation*). For the purposes of this study, key extracts from some of Article L121's sub-articles have been included below:

Table 12: French Education system: select extracts from Education Code, Article L121

Sub-article	Topic	Extract
Article L121-1[50]	Responsibilities of schools, colleges and education establishments	*"Schools, colleges, high schools and higher education establishments are responsible for transmitting and acquiring knowledge and working methods. They help to* ***promote diversity and equality between men and women…****They contribute to education in* ***civic responsibility****, including in the use of the Internet and online public communication services, and participate in the prevention of delinquency. They provide training in knowledge of and respect for* ***human rights*** *as well as in understanding the concrete situations that infringe them. They provide training adapted in its content and methods to* ***economic, social and cultural developments in the country*** *and its* ***European and international environment****...*
Article L121-3[51]	Language education	*"Mastery of the* ***French language*** *and* ***knowledge of two other languages*** *are part of the* ***fundamental objectives of education****."*
Article L121-4-1[52]	Citizenship education	*"As part of its mission of citizenship education, the* ***public education service prepares students to live in society and to become responsible and free citizens,*** *aware of the principles and rules on which* ***democracy*** *is based."*
Article L121-5[53]	Physical education	*"Physical education and sports and school and university sport contribute to the renovation of the education system, to the* ***fight against school failure, to health and citizenship education and to the reduction of social and cultural inequalities****."*
Article L121-6[54]	Artistic and cultural education	*"Artistic and cultural education contributes to the* ***development of individual abilities and equal access to culture****. It promotes* ***knowledge of cultural heritage and contemporary creation and participates in the development of creativity and artistic practices****."*

[48] Government of France. Ministry of National Education and Youth. https://www.education.gouv.fr/valeurs-et-engagement-89246
[49] République Française (2021), 'Code de l'éducation'. Available at: Article L111-1 to L167-1.[accessed 24th July 2023].
[50] République Française (2021), 'Code de l'éducation'. Available at: Article L121-1.[accessed 24th July 2023].
[51] République Française (2021), 'Code de l'éducation'. Available at: Article L121-3.[accessed 24th July 2023].
[52] République Française (2021), 'Code de l'éducation'. Available at: Article L121-4-1.[accessed 24th July 2023].
[53] République Française (2021), 'Code de l'éducation'. Available at: Article L121-5.[accessed 24th July 2023].
[54] République Française (2021), 'Code de l'éducation'. Available at: Article L121-6.[accessed 24th July 2023].

Article L121-7[55]	Technology education	*"**Technology is one of the fundamental components of culture**. Schools, colleges, high schools and higher education establishments under the ministries of national education and agriculture provide technology education."*
Article L121-8[56]	Environmental and sustainable development education	*"**Environmental and sustainable development education**, in which all disciplines contribute, enables students to understand the **environmental, health, social and economic issues of ecological transition and sustainable development**. It is provided throughout school education, in a way adapted to each level and each specialization, in order to develop the **scientific knowledge and skills** of students in order to enable them to master these issues, in particular those relating to **climate change, environmental health and the preservation of terrestrial and marine biodiversity, throughout the national territory, to master know-how and to prepare students to exercise their responsibilities as citizens**."*

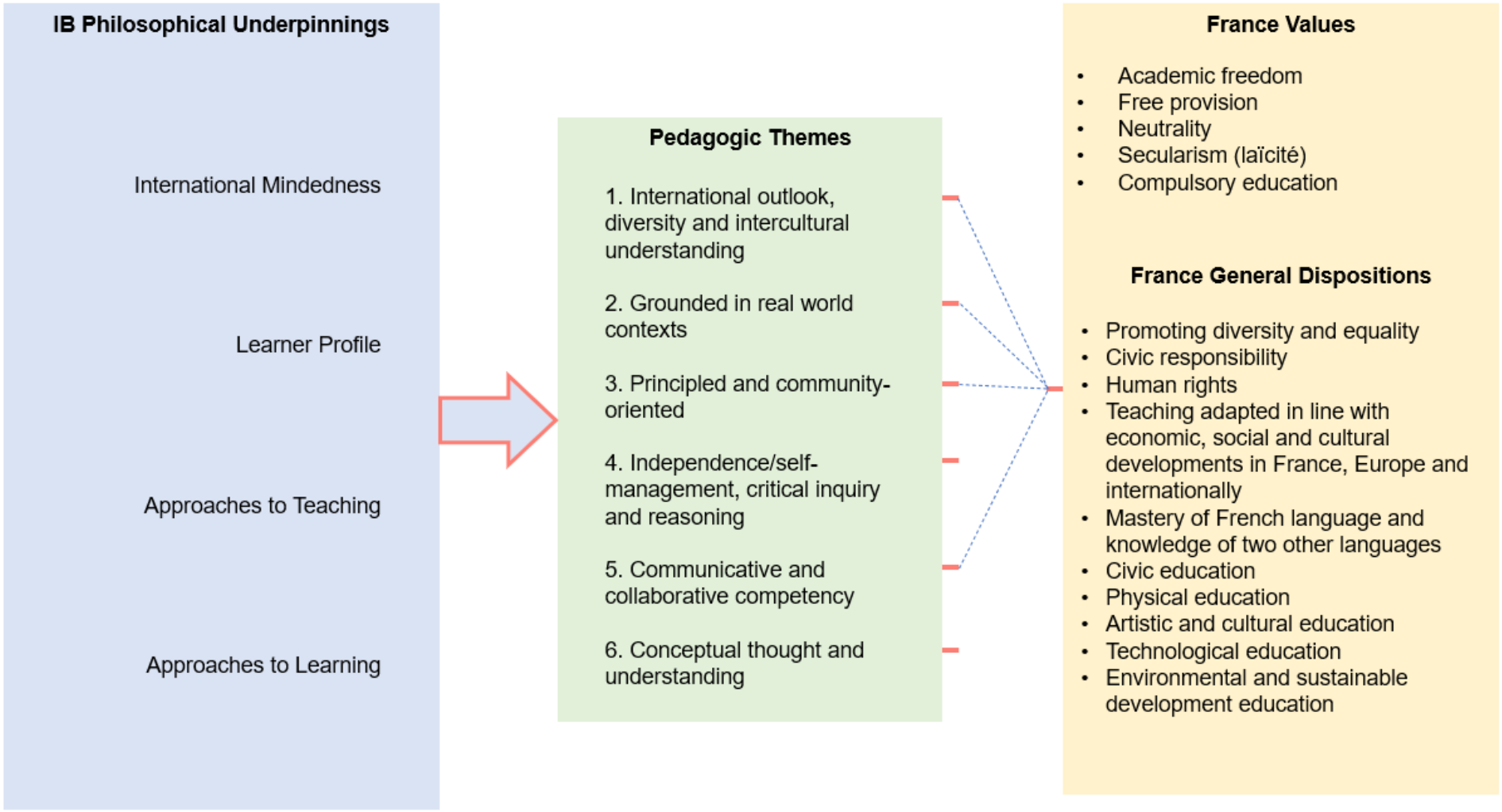
As a French secondary qualification, the FB has been designed to incorporate the above values and fundamental principles of education. The Ministry of Education and Youth provides little additional detail on the curriculum design principles and educational philosophy specifically underpinning the FB, apart from describing the general and technological pathways of the qualification as being designed to:

- Provide a curriculum organisation which is accessible to all;
- Value the work and consistency of high school students;
- Support students in the design of their orientation project;
- Support students to succeed in higher education.[57]

[55] République Française (2021), 'Code de l'éducation'. Available at: Article L121-7.[accessed 24th July 2023].
[56] République Française (2021), 'Code de l'éducation'. Available at: Article L121-8.[accessed 24th July 2023].
[57] Government of France. Ministry of National Education and Youth. (2023) Diaporama « Lycée d'enseignement général et technologique. Présentation aux personnels de l'Éducation nationale » https://eduscol.education.fr/2221/presenter-le-lycee-general-et-technologique-ressources-et-outils-d-information

4.2 Philosophical Underpinnings

Figure 3: Philosophical underpinnings comparative analysis diagram



The IB learner profile, which is used across all IB programmes including the DP, outlines 10 attributes that all students should strive towards.[58] Linked to these attributes, there are five categories of approaches to learning skills that all IB programmes aim to develop as well as six categories of approaches to teaching principles. The table in Appendix B presents these qualities of the IB's underpinning philosophies along with the overview used in IB documentation to describe the quality of international-mindedness that also encircles all IB teaching and learning.

The six themes identified within the IB literature have relatively consistent presence across all component parts (learner profile, ATL and international-mindedness). As a result, these themes present a 'boiled-down' version of the DP's philosophical underpinnings.

To identify the level of alignment in relation to the philosophical underpinnings between the DP and the FB, the project team mapped the philosophical underpinnings of the FB against six themes extracted from the DP's philosophical underpinnings.

Table 13: Philosophical underpinning themes

Philosophical underpinning themes
• International outlook, diversity, and intercultural understanding • Grounded in real world contexts • Principled and community-oriented • Independence/self-management, critical inquiry, and reasoning • Communicative and collaborative competence • Conceptual thought and understanding

When mapping the six DP themes onto the French fundamental principles of education, it is apparent that some themes have stronger presence in the French context than others. The theme of 'International outlook, diversity, and intercultural understanding', for instance, is well evidenced, with the French principles making several references to promotion of 'diversity and equality between men and women', 'knowledge and respect for human rights', and 'reduction of social and cultural inequalities'.

The theme of 'principled and community-oriented', too, is evidenced, with the French legislation including various references to provision of 'civic responsibility' and 'prepar[ing] students to live in a society and to become responsible free citizens, aware of the principles and rules on which democracy is based'.

Grounded in real world contexts is evidenced when emphasising that training and teaching is 'adapted in its content and methods to economic, social and cultural developments in the country and its European and international environment', enabling students 'to understand the environmental, health, social and economic issues of ecological transition and sustainable development'.

Additionally, French legislation refers to the 'mastery of the French language and knowledge of two other languages are part of the fundamental objectives of education', which somewhat

[58] International Baccalaureate. (2017). *What is an IB education?*

alludes to the IB's 'communicative and collaborative competence' theme, though the focus is on the development of linguistic skills, rather than the wider communication and collaboration competence aspect.

The themes of 'independence/self-management, critical inquiry and reasoning' and 'conceptual thought and understanding' are not well evidenced in the French Code of Education. They may be implied and may be developed as part of students' engagement with civic education and in their study of specific subjects, but these aspects are not explicitly referred to in general principles of education for the French education system.

There are also some themes that are more evidenced in the French general principles of education than in the IB's philosophical underpinning themes. Sustainable development, for example, receives explicit attention in French Code of Education's General Disposition section, which states that environmental and sustainable development education aims to 'enable students to understand the environmental, health, social and economic issues of ecological transition and sustainable development'. Secularism (laïcité), too, is more strongly emphasised by the French system, constituting one of its key values.

Overall, while there is certainly overlap between the IB's philosophical principles and the French general principles of education, there are also some key differences in focus; with the IB more explicitly emphasising the development of critical thinking, independence, self-management and conceptual thought, and the French system on the whole more explicitly emphasising sustainable development and the principle of secularism (laïcité).

4.3 Structure

There are six subject groups comprising the DP and students pursuing the Diploma award are normally required to select one subject from each of the six groups.[59] The DP also has three core components which are compulsory and are carried out alongside subjects. The FB also includes both mandatory and optional subjects. More specifically, in the general pathway of the FB students are required to take 10 common subjects and up to two optional subjects in *Seconde* (Grade 10); six common subjects, up to three specialty subjects and one optional subject in *Première* (Grade 11); and six common subjects, up to two specialty subjects and up to two optional subjects in *Terminale* (Grade 12). The figures below present the subject groups of the DP in comparison with the subjects that cover similar areas of learning in the FB.[60]

[59] International Baccalaureate. (2021). *How the Diploma Programme works*. https://www.ibo.org/programmes/diploma-programme/what-is-the-dp/how-the-diploma-programme-works/

[60] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

Figure 4: Structural overview of the DP

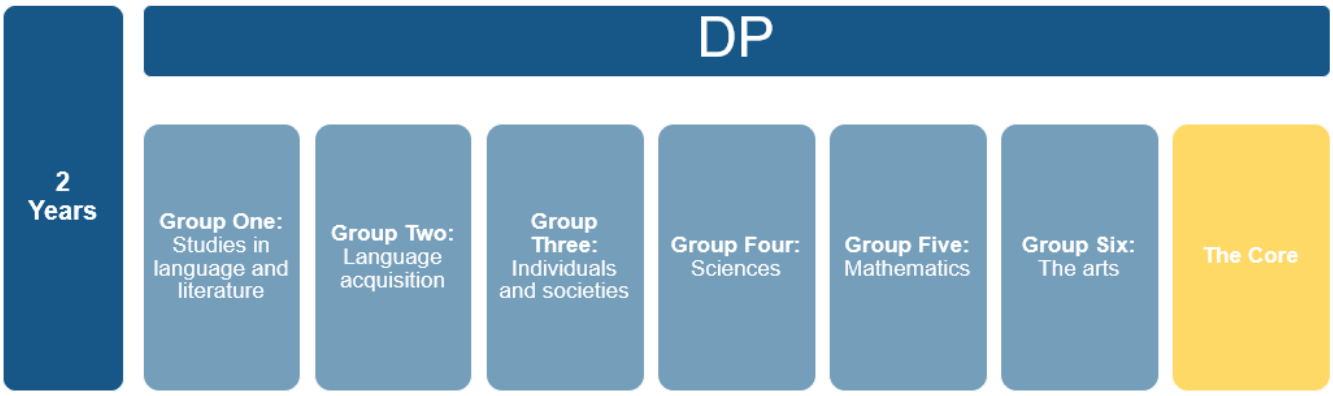
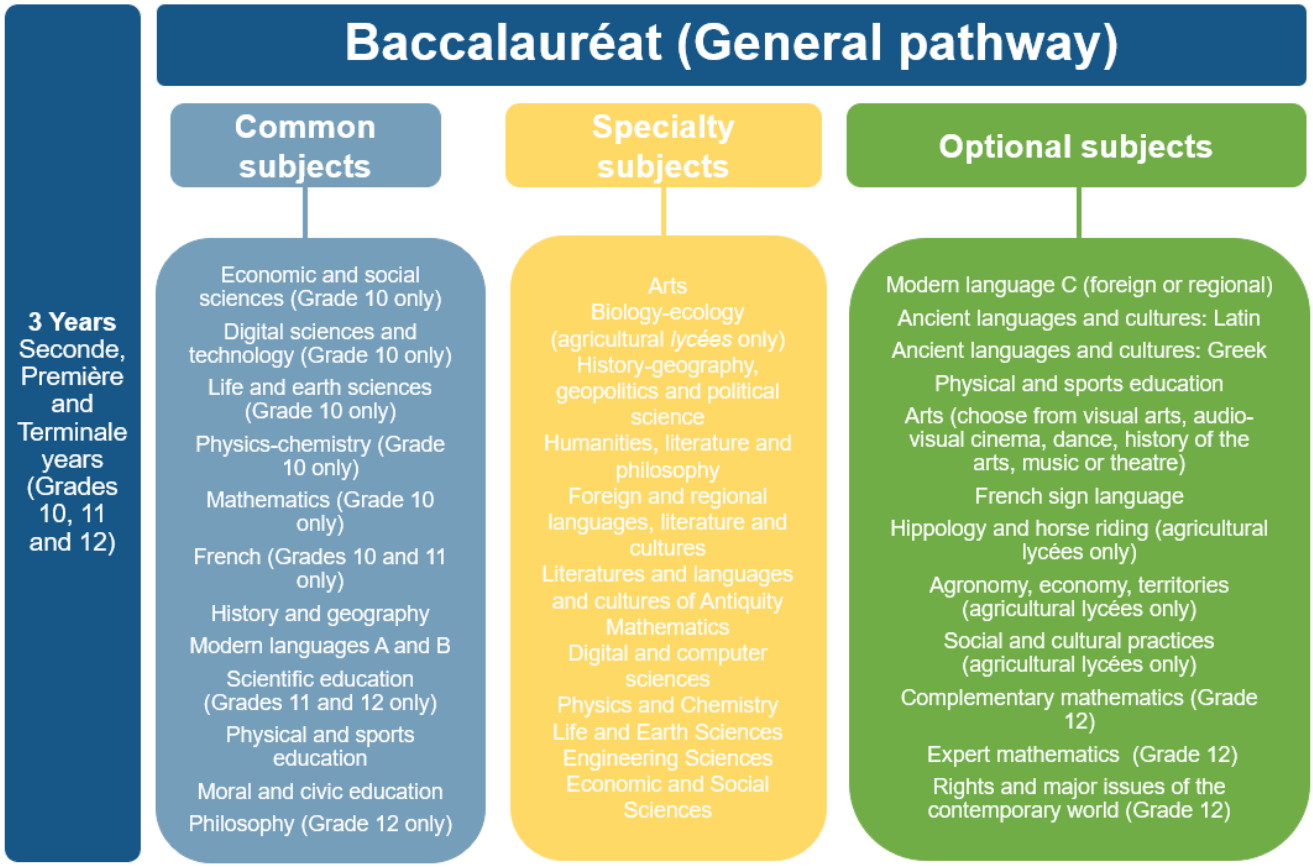


Figure 5: Structural overview of the Baccalauréat



In terms of similarities in the programme structure and subjects taught, both programmes follow a baccalaureate-style approach, prioritising breadth; both include many similar subjects in their programmes of study; and both programmes include common core subjects, optional and specialty and pathway specific subjects.

Subjects common to both the DP and the FB include languages (including a variety of classical and modern languages), history, science, mathematics, arts, geography, information technology, economic education and physical education. Additionally, both programmes include social, cultural, political, civic education, philosophy and humanities subjects.

Regarding differences in the structure of the programme of study, one obvious difference is the overall duration – while the DP spans over two years, the FB is three years long. Additionally, while DP subjects are offered at two levels – SL and HL – this division in levels is not offered in the FB at the subject level; if students want to specialise, they can do so by studying a higher number of specialty subjects in a particular subject area (e.g. science). Alternatively, the FB also offers different pathways (see 4.2 section above) – while this report focuses mostly on the general pathway, students can also study the technological pathway or vocational pathway, which also span over three years but allow for further specialisation.

Although both programmes outline the teaching hours for individual subjects, the number of subjects and hours of study per subject differ. In the DP, students must complete six subjects – up to four at higher level – and achieve a minimum pass grade of 3 in all of them. The recommended teaching hours per subject, as outlined in the DP curriculum documentation, are 150 at standard level and 240 at higher level.[61] In the FB, students study up to 12 subjects in their *Seconde* year – 10 common subjects and two optional subjects; 10 subjects in their *Première* year – six common subjects, three specialty subjects and one optional subject; and 10 subjects in their *Terminale* year – six common subjects, two specialty subjects and up to two optional subjects. In terms of teaching hours, in the *Seconde* students experience a total of 26.5 teaching hours per week, totalling 954h a year. In the *Première*, they experience a total number of 1,116 teaching hours per year, with 576h (16h per week) being allocated to common subjects (96h per subject), 432h (12h per week) to specialty subjects (144h per subject), and 108h (3h per week) to the optional subject. In the *Terminale,* this has the potential to increase to a total of 1,206 teaching hours, with 558h (15h30min per week) being allocated to common subjects (93h per subject), 432h (12h per week) to the two specialty subjects (216h per subject), and up to 216h (6h per week) to two optional subjects (108h per subject).

Another notable difference between the two programmes is that the TOK and extended essay core components are only evident in the DP and the FB does not include any similar courses.

4.4 Requirements and Associated Outcomes

Regarding entry requirements, there are no formal entrance requirements stipulated for the DP as the IB envisages numerous educational pathways leading to upper secondary education.[62] However, the IB recommends consulting the subject guides prior to enrolment to ensure an adequate understanding of programme expectations.[63] Similar to the DP, the Baccalauréat has no formal entrance requirements beyond the expectation of having successfully completed lower secondary education. More specifically, after successfully completing Grade 9, FB students attend *Seconde* (Grade 10), which includes general education subjects and aims to prepare them to select specialty subjects in the *Première* and *Terminale* (Grades 11 and 12). At the start of Seconde (Grade 10), students sit the positioning test which allows them to demonstrate their knowledge and skills, receive personalised support (as needed) and explore different career pathways available to them. Additionally, in the FB, some optional courses in Grades 11 and 12 have prerequisites for enrolment which are outlined in the programme curriculum and policy documentation. For example, in

[61] International Baccalaureate. (2021). *Curriculum*.
[62] International Baccalaureate. (2015). Diploma Programme: *From principles into practice*. p. 5.
[63] Ibid. p. 22.

Terminale (Grade 12), only students who have taken the mathematics specialty can select the optional subject of expert mathematics.[64] The DP does not stipulate a similar type of entry requirement for its subjects; instead, it simply states that, to study *some* subjects at HL, some prior study in the specific subject area is advisable.

In terms of associated outcomes, both programmes aim to prepare students for higher education and/or employment. According to the DP documentation, although the DP is conceived as a preparatory programme for university matriculation and higher education focusing primarily on rigorous academic study, the programme can also prepare students for employment. Similarly, the FB describes its purpose as one of supporting students to make decisions about their future pathway and specialities, preparing them towards their post-FB life – be it higher education, the professional world or both.[65]

Both programmes intend students to study towards a diploma at the end of their period of study. That said, while the IB is two years in duration, the FB spans three years, with the *Seconde* year (Grade 10) acting as a preparatory, foundational year.

4.5 Student Learning Pathways

In terms of learning pathways, both programmes include compulsory and optional subjects. See the programme overviews in section 4.1 for further details on subject selection. To understand the levels of optionality and potential specialisation in each programme, it is instructive to look at what an individual student would be able to choose in practice. The following diagrams demonstrate the subject options available to an imagined student who knows that they would like to study physics at university after the completion of their upper secondary studies.

[64] Eurydice (2022) France: Teaching and learning in general up[per secondary education https://eurydice.eacea.ec.europa.eu/national-education-systems/france/teaching-and-learning-general-upper-secondary-education

[65] Government of France. Ministry of National Education and Youth. (2023) Diaporama « Lycée d'enseignement général et technologique. Présentation aux personnels de l'Éducation nationale » https://eduscol.education.fr/2221/presenter-le-lycee-general-et-technologique-ressources-et-outils-d-information

Figure 6: DP imagined pathway for a student wishing to study physics at university

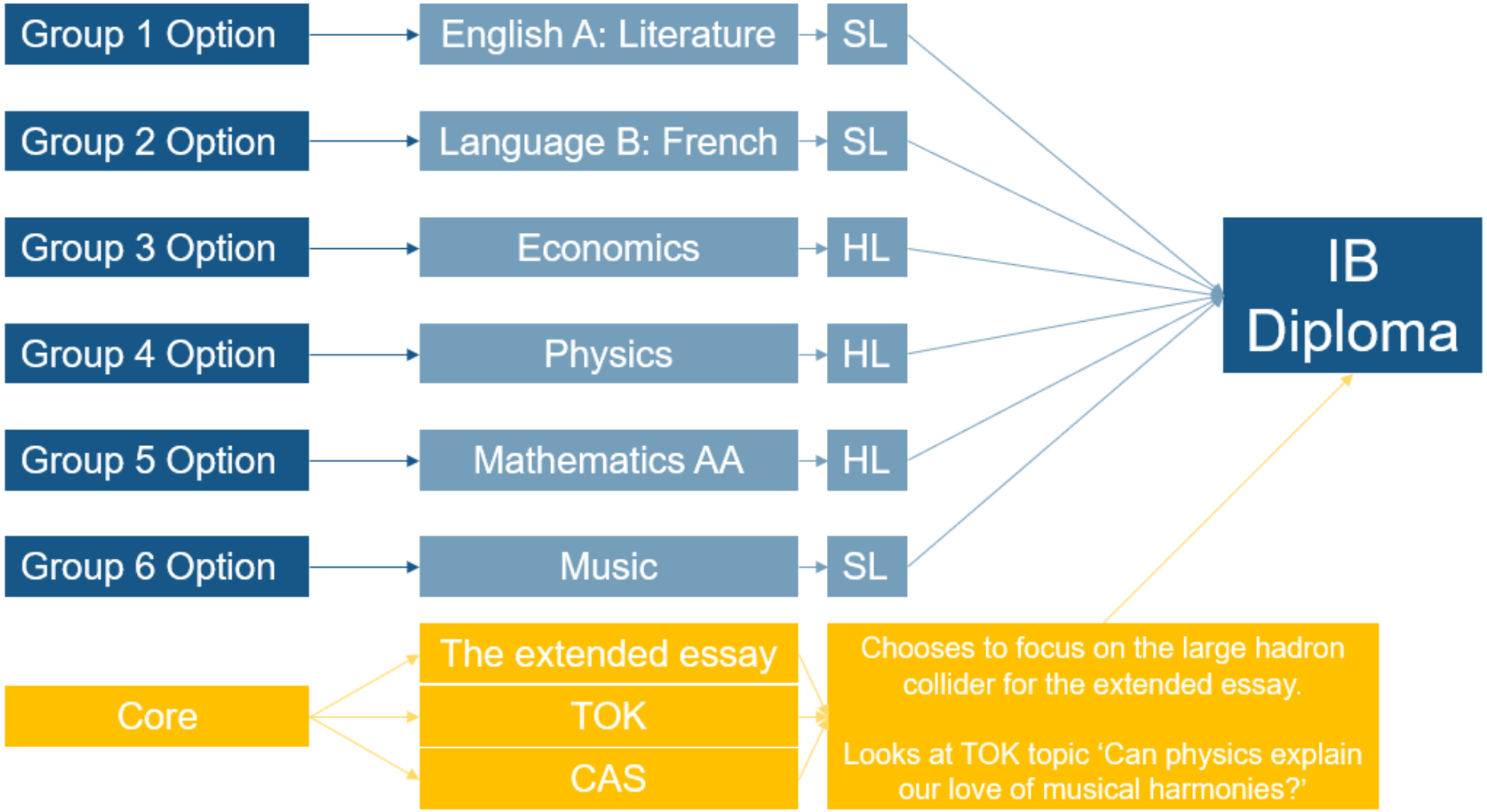
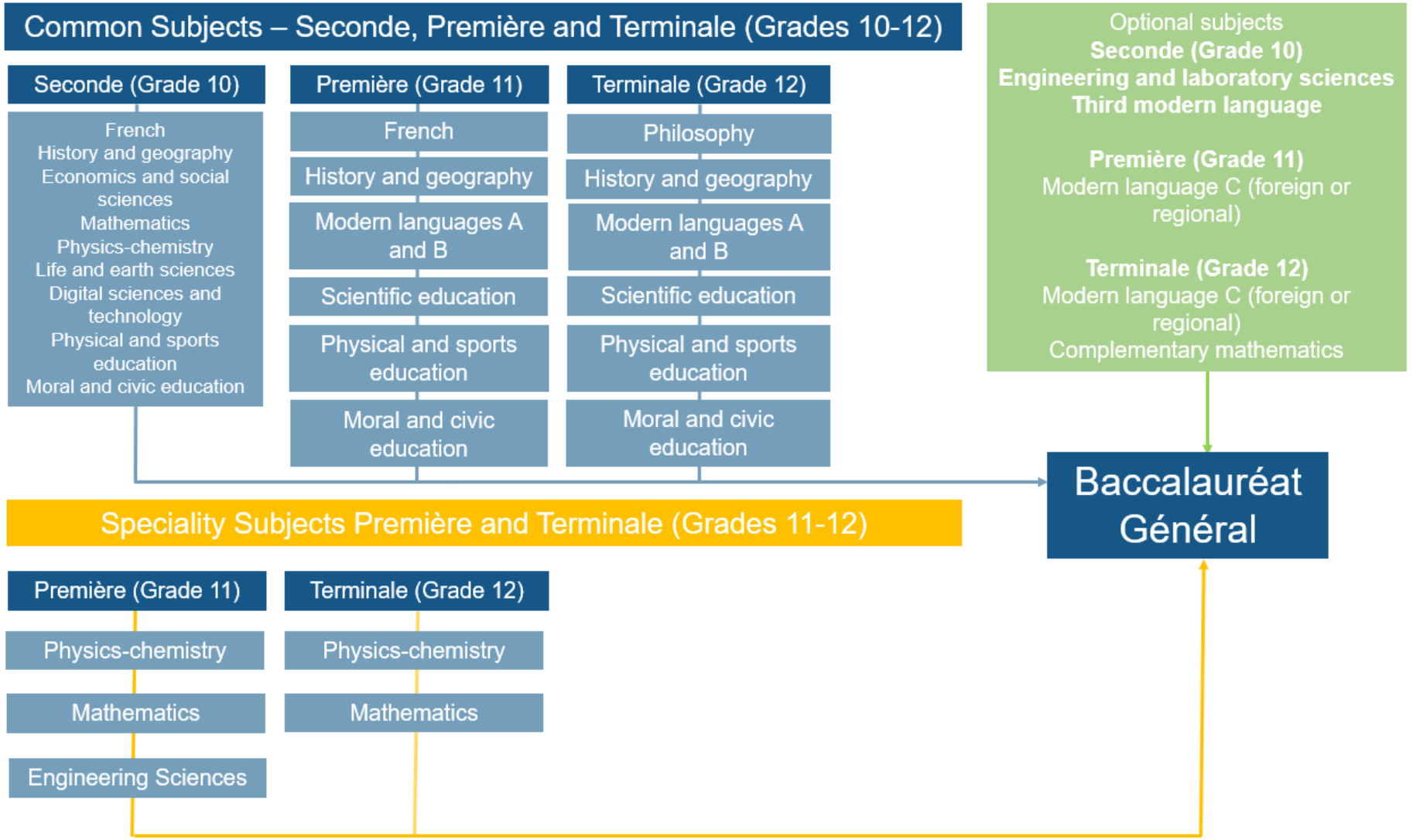


Figure 7: FB Général imagined pathway for a student wishing to study physics at university



As can be seen from the diagrams, both FB and DP students experience significant levels of breadth in their upper secondary studies. Both study subjects from various subject areas – i.e. languages and literature, sciences, mathematics, and humanities and social sciences. Additionally, students from both programmes are allowed to specialise in certain subject areas – i.e. in the FB, this is achieved through students selecting specific subjects as their specialty subjects in the *Première* and *Terminale* years; [66] in the DP, it is achieved through studying specific subjects at HL.

Furthermore, the DP offers a bilingual Diploma to those who fulfil specific subject grade criteria. Similarly, students in France may study the international form of the French baccalaureate, the *Baccalauréat Français International* (BFI). The BFI provides further opportunities for students to enhance their abilities in modern languages. On this programme, students follow the same courses as those leading to the *baccalauréat général*, with the addition of complementary courses and optional teaching.[67]

Nonetheless, there are some notable differences in the pathways students follow in each programme. One key difference is that students in the FB experience a considerably higher number of subjects than students in the DP. DP students are required to study a total of six subjects, typically one from each subject group; though the programme allows students to opt for an additional sciences, individuals and societies or languages subjects instead of a subject in the arts group. In contrast, in the FB *général* students are required to study 12 subjects in their *Seconde* year (10 common subjects and two optional subjects), 10 subjects in their *Première* year (6 common subjects, three specialty subjects and one optional subject), and up to 10 subjects in their *Terminale* year (6 common subjects, two specialty subjects, and up to two optional subjects).[68]

Additionally, the number of subjects in which students are allowed to specialise differs between programmes, as do the hours dedicated to specialist subjects. Students in the DP will typically study three subjects at HL, though they can also choose to study four at this level. This represents a total of 720h (for three subjects at HL) or 960h (for four subjects at HL) dedicated to subjects that students want to specialise in. In contrast, students in the FB will study a maximum of three specialty subjects in their *Première* year, dropping to two on their *Terminale* year. This represents a total of 864h dedicated to specialty subjects. As such, while the DP allows students to specialise in a greater number of subjects, the FB requires students to dedicate more time to their subjects of specialisation. Notably, nonetheless, this difference may be somewhat offset by the fact that some specialty subjects in the FB combine two different subject areas (e.g. physics-chemistry combines physics and chemistry); this is in contrast to the DP, where students study each subject separately. When taking this into account, the number of specialty subjects and the time dedicated to each specialty subject in the two programmes may, in fact, be more similar than it may first appear.

[66] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee
[67] Government of France. Ministry of National Education and Youth. Le baccalauréat Français international (BFI). Le baccalauréat Français international (BFI) | Ministère de l'Education Nationale et de la Jeunesse
[68] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

4.6 Assessment Methods

This section looks at the key features of assessment in both programmes by using a simple table followed by a short textual description of the key similarities and differences.

Table 14: Top level assessment comparisons

	DP	FB *Général*
External assessment	✓	✓
Weighting	Varies by subject	90% of the student's final grade 60% consists of terminal examinations: • One French written and oral examination at the end of *Première* • Three written and oral examinations at the end of *Terminale* (one on Philosophy and two on the student's chosen specialty subjects) • One oral examination at the end of the *Terminale* year based on a personal project linked to a specialty subject.[69] 30% consists of other nationally-designed tests – all of which take place over the final two years of upper secondary education.
Mathematics	**SL & HL**: 80%	See above
Sciences	**SL & HL**: 80%	See above
Philosophy	**DP philosophy:** **SL:** 75% **HL:** 80% **DP TOK:** 67%	See above
Methods	Exam (Typically, two-three exam papers per subject)	Exams (Oral and written) Nationally-designed tests (written)
Mathematics	**SL**: 2 papers of 90 minutes in duration, worth 40% each. **HL**: 3 papers with durations of 120, 120, and 60 minutes, worth 30%, 30% and 20% respectively **Question Types**: compulsory short-response and extended response questions, incorporating problem solving in HL paper 3.	See above
Sciences	**SL**: 2 papers worth 36% and 44% of total weighting, with duration of 90 minutes each. **HL**: 2 papers worth 36% and 44% of total weighting, with duration of 120 minutes and 150 minutes, respectively **Question Types**: multiple choice, short and extended response, data-based questions, questions on experimental work.	See above

[69] French Embassy in the United States (n.d.), 'French Baccalaureate'. Available at: https://frenchlanguagek12.org/french-curriculum-schools/french-baccalaureate [accessed 19th July 2023]

Philosophy	**DP philosophy:** **SL:** 2 papers worth 50% and 25% of total weighting, with duration of 1h and 45 minutes and 1 hour, respectively. **HL**: 3 papers worth 40%, 20% and 20% of total weighting, with duration of 2h and 30 minutes, 1 hour and 1h and 15 minutes, respectively. **Question Types**: stimulus-based questions, essay questions. **DP TOK:** TOK essay	See above
Internal assessment	✓ (Often used)	✓ (Used in all subjects)
Weighting	Varies by subject	10% of the student's final grade Based on student results in teacher-designed tests for all subjects (also administered over the *Première* and *Terminale* years).
Mathematics	**SL & HL**: 20%	See above
Sciences	**SL & HL**: 20%	See above
Philosophy	**SL:** 25% **HL**: 20%	See above
Methods	Vary by subject but should follow IB guidance.	Vary by subject.
Mathematics	**SL & HL**: A 'mathematical exploration' involving a piece of written work for 20 marks.	Combination of approaches designed by schools and teachers.
Sciences	**SL & HL**: A practical, individual investigation with 10 hours duration and 3,000 words of write-up.	Combination of approaches designed by schools and teachers.
Philosophy	**DP philosophy SL & HL**: A philosophical analysis of a non-philosophical stimulus **DP TOK**: an exhibition exploring how TOK manifests in the real world.	Combination of approaches designed by schools and teachers.

This table shows some similarities and differences between the two programmes' overall approach to assessment methods. Both the DP and the FB prioritise external assessment in the form of exams. In the DP, external assessment typically makes up approximately 70-80% of student's final grades, with the remaining 20-30% being made up of terminal internal assessment. In the FB *général*, 90% of the student's final grade is based on external assessment. 60% of it consists of a French examination at the end of *Première* (Grade 11), three exams (written and oral) at the end of *Terminale* (Grade 12) in two selected specialities and Philosophy (written), and an oral examination also at the end of the *Terminale* year based on a personal project linked to a specialty subject.[70] The remaining 30% is based on three series of continuous assessment in the form of nationally-designed tests during the 2nd quarter of *Première* (Grade 11), the 3rd quarter of *Première* (Grade 11), and then in the 2nd and 3rd quarters of *Terminale* (Grade 12). Finally, the remaining 10% is awarded to continuous assessment – i.e. teacher-designed tests in each subject.

Therefore, it is evident that both the DP and the FB *général* give predominant weighting to external assessment, which in the DP typically constitutes 70-80% of the student's overall grade per subject and in the FB constitutes 90% of the student's overall grade. Nonetheless,

[70] French Embassy in the United States (n.d.), 'French Baccalaureate'. Available at: https://frenchlanguagek12.org/french-curriculum-schools/french-baccalaureate [accessed 19th July 2023]

the DP places slightly more emphasis on internal assessment, with 20-30% of the students' final grade being allocated to terminal internal assessment; compared to the 10% awarded to continuous internal assessment in the FB.[71]

In terms of assessment objectives, while the FB curriculum does not describe clear assessment objectives for each subject, there are some similarities between the assessment objectives of the DP subjects and the skills targeted by the FB *général* subjects' syllabi. The tables below present the comparison of the DP and the FB *général* skills per subject for the various subjects compared in this study.

Table 15: Comparison of DP mathematics (AA and AI) subject's assessment objectives and the FB mathematics general intentions and maths skills

DP mathematics assessment objectives	Baccalauréat *Général* Mathematics general intentions and maths skills (*Première* and *Terminale*)
AO1: Knowledge and understanding	*…develop mathematical knowledge and skills…* *…consolidate knowledge and methods…*
AO2: Problem solving	*Problem solving…* *…appropriation of mathematical notions and the resolution of problems…* *…solving exercises or problems…*
AO3: Communication and interpretation	*…communicate a result orally or in writing, explain a procedure.* *…interpret solutions geometrically…*
AO4: Technology	*…students…learn how to write, design, and run a simple [computer] program.* *…research, experiment, in particular using software tools…* *…use the concept of computer function and list…*
AO5: Reasoning	*…concepts and types of reasoning are studied…* *…gives the opportunity to work on recurrence reasoning…*
AO6: Inquiry approaches	*Students must be encouraged to engage in mathematical research, individually or in teams…*

Table 16: Comparison of DP sciences subjects' assessment objectives and the FB life and earth sciences and physics-chemistry skills developed

DP sciences assessment objectives	FB life and earth sciences skills developed (*Première* and *Terminale*)	FB physics-chemistry skills developed (*Première* and *Terminale*)
AO1: demonstrate knowledge	*…reinforce the mastery of scientifically validated knowledge and modes of reasoning specific to science and, more generally, ensure the acquisition of a scientific culture based on the fundamental concepts of biology and geology…*	*… acquisition of a body of knowledge and know-how essential in the context of learning engineering sciences and of life and the Earth…* *…nature of scientific knowledge and on the processes of developing knowledge in science…*
AO2: knowledge understanding and application	*…understanding of scientific objects and methods and education in matters of the environment, health, safety…* *Understand that an effect can have several causes…* *Discerning, in the apparent complexity of observable phenomena, fundamental elements and principles…*	*Implement the steps of a process…* *Perform common procedures (calculations, representations, collection of data, etc.)*

[71] Government of France. Ministry of National Education and Youth. https://eduscol.education.fr/2876/upper-secondary-school-le-lycee

DP sciences assessment objectives	FB life and earth sciences skills developed (*Première* and *Terminale*)	FB physics-chemistry skills developed (*Première* and *Terminale*)
AO3: analyse, evaluate, and synthesize	*A scientific background develops critical analysis skills to enable students to verify sources of information and their legitimacy, and distinguish reliable information…* *Interpret results and draw conclusions.* *Identify and choose concepts, tools and techniques, or simple models to implement a scientific approach.*	*…putting knowledge into perspective with the history of science and scientific news…* *Formulating hypotheses…* *Demonstrate critical thinking…*
AO4: investigation skills	*…Experimental activities occupy a central place in [life and earth sciences]: to answer a scientific problem, the student examines the validity of a hypothesis by developing a protocol; compares the results of the experiment with the theoretical expectations or with a model…*	*…particular attention may be paid to the experimental dimension, in particular, the use of authentic data, modeling activity, simulation and openness to the scientific, economic and industrial world* *… Research and organize information related to the problem studied…* *Implement an experimental protocol respecting the rules of security…*

Table 17: Comparison of DP philosophy subject's assessment objectives and the FB philosophy overarching objectives and perspectives

DP subject	DP assessment objectives	FB philosophy overarching objectives and perspectives *Terminale* (Grade 12)
Philosophy	AO1: Knowledge and understanding	*Define and identify the questions which require prior reflection in order to receive an answer.*
		Mobilize in a timely manner the knowledge they acquire by reading and studying texts and philosophical works.
	AO2: Application and analysis	*Confronts different points of view on a problem before finding an appropriate solution*
		Define and identify the questions which require prior reflection in order to receive an answer.
	AO3: Synthesis and evaluation	*Examine ideas and knowledge to test their validity.*
		Justify what they affirm and what they deny by formulating constructed propositions and educated arguments.
	AO4: Use and application of appropriate skills	*Mobilize in a timely manner the knowledge they acquire by reading and studying texts and philosophical works*

Table 18: Comparison of DP TOK assessment objectives and the FB philosophy overarching objectives and perspectives

DP subject	DP assessment objectives	FB philosophy overarching objectives and perspectives Terminale (Grade 12)
TOK	AO1: Critical examination	*Examine ideas and knowledge to test their validity.* *… the teaching of philosophy aims to form the critical judgment of students*
	AO2/AO3: Identify and explore links between knowledge questions and both the real world and different areas of knowledge	*Open to the achievements of other disciplines and to the multiple links it can establish with them…*
	AO4/AO5: Develop relevant, clear and coherent arguments, using examples to and evidence	*Justify what they affirm and what they deny by formulating constructed propositions and educated arguments.*
	AO6: Demonstrate awareness of different points of view	*Confronts different points of view on a problem before finding an appropriate solution*

DP subject	DP assessment objectives	FB philosophy overarching objectives and perspectives Terminale (Grade 12)
	AO7: Consider implications of different arguments and conclusions	*Examine his ideas and his knowledge to test their validity.*

As can be seen from these tables, many of the same broad skills are seemingly targeted and assessed in both the DP and FB mathematics, sciences and philosophy subjects. The table demonstrates that both programmes recognise the importance of developing foundational knowledge and understanding but also seek to develop and assess how students can use, explore, and articulate that understanding. In this sense, the skills-based criteria for assessment show broad alignment.

In the same way as the DP, a numerical grading system is used in the FB, with a minimum grade required to pass a study unit. For each subject, the pass mark is 10 out of 20, with students with the following scores of 12 or above receiving a specific type of honours:

- Score between 12 and 13.99 – *'fairly good' ('assez bien'*)
- Score between 14 and 15.99 – *'good' ('bien')*
- Score between 16 and 17.99 – *'very good' ('très bien')*
- Score above 18 – *'excellent' ('félicitations du jury').*[72]

Overall, there is significant similarity between the assessment methods and types used by the DP and FB, with both featuring internal and external assessments, but awarding greater weighting to the latter. Despite not featuring assessment objectives, the skills broadly targeted by the FB subjects also share similarities with those assessed by the comparison DP subjects, with both programmes targeting the development of foundational knowledge and understanding but also application and higher order thinking skills.

[72] Resultants Examens 2023 (2023), 'Comment obtenir une mention au bac?'. Available at: https://www.admis-examen.fr/blog/bac/mention-bac.html. [Accessed: 15th July 2023].

5. Subject-Level Alignment

This section focuses on answering RQ3 and the sub-questions associated to it, namely:

Table 19: Research question 3

RQ3: To what degree do the subjects align with regards to: 3.1: Content • Topics (i.e. scope of content area, breadth depth) • Learning activities (i.e. difficulty, demand). 3.2: Expected learning outcomes • Knowledge • Competences (i.e. subject-specific, 21st century competences).

For each subject area, there is a brief introduction to the subjects being compared, followed by an overview of the findings from the comparative analysis between the IB subjects and the FB comparison points regarding learning outcomes, content, and demand.

5.1 Mathematics

The following is the list of subjects used in the mathematics subject comparison analysis.

Mathematics: analysis and approaches[73]
Mathematics: analysis and approaches (AA) is a subject option from the mathematics group in the DP curriculum – offered at both SL and HL. This subject is intended for students who are interested in both real and abstract applications of mathematical concepts and enjoy problem solving and generalisation. SL is suitable for students who want to study a good level of mathematics, but not at an advanced level. Therefore, SL prepares students for further study in areas involving mathematical elements, such as geography. HL is suitable for students who want an in-depth study of mathematics and enjoy solving challenging problems. Therefore, HL prepares students for further study in mathematics, as well as other areas with a strong mathematical focus, such as physics and engineering.

Mathematics: applications and interpretation[74]
Mathematics: applications and interpretation (AI) is a subject option from the mathematics group in the DP curriculum – offered at both SL and HL. This subject is intended for students who are interested in exploring more practical applications of mathematics and would enjoy using mathematical models and technology. SL is most suitable for those who want to obtain a good level of knowledge of mathematics, with a focus on real-world applications. Therefore, SL prepares students for further study in areas with some practical mathematics elements, such as biology and business. HL is suitable for students wishing to gain more in-depth knowledge of mathematics, with a focus on real-world situations and the applications of mathematics.

[73] International Baccalaureate. (2019). *Mathematics: analysis and approaches guide*.
[74] International Baccalaureate. (2019). *Mathematics: applications and interpretation guide.*

Specialty subjects – FB mathematics (*Première* and *Terminale*)[75,76]
FB mathematics *Première* (FB mathematicsP) and mathematics *Terminale* (FB mathematicsT) are the mathematics specialty subjects offered in the General path of the French Baccalaureate. The subjects follow on from mathematics in the *Seconde* class and students can study FB mathematicsP and FB mathematicsT, or FB mathematicsP only. FB mathematicsP provides a substantial amount of knowledge in the areas of Algebra, Analysis, Geometry, Probability and Statistics and "Algorithmics and Programming. FB mathematicsT builds on the knowledge of FB mathematicsT and prepares students for studying mathematics in higher education.

5.1.1 Learning Outcomes – Mathematics

This section compares and contrasts the learning outcomes of curricula falling within the category of mathematics.

For its mathematics learning outcomes, the DP sets out aims and assessment objectives for all subjects within the mathematics subject group – hence the extracted themes are the same for mathematics: analysis and approaches and mathematics applications and interpretation. The learning outcomes for the FB can be drawn from the 'Major Intentions' set out in the curriculum documentation, which include the six 'Math Skills' that are to be developed. The 'Major Intentions' and 'Math Skills' are mostly the same for the *Seconde* class, and the first and final year of the eneral pathway, with only slight contextual differences – e.g. *Seconde* class prepares students to enter the general or technology pathways, and FB mathematicsT prepares them for higher education. These small differences do not affect the overall alignment to the DP; as such, the analysis has considered the FB learning outcomes as one set.

The following summary table demonstrates the learning outcome themes that were extracted from DP mathematics and indicates if and where they were judged to have presence within the learning outcomes of the FB subjects reviewed.

Table 20: Presence of the DP mathematics subject group learning outcome themes in FB curricula

Themes extracted from the learning outcomes in the DP mathematics subject group	Presence in FB	
1. Being aware of, and engaging with, mathematics in its wider context		Not present in the Major Intentions
2. Developing learning skills; having a positive and resilient attitude, working both independently and collaboratively, being reflective and evaluating work		Not present in the Major Intentions, but some skills are referred to in the 'guidelines for teachers' section

[75] Ministry of National Education and Youth, France. (2019). *Annexe. Programme de mathématiques de première générale* spe632_annexe_1063168.pdf (education.gouv.fr)
[76] Ministry of National Education and Youth, France. (2019). Annexe. Programme de spécialité de mathématiques de terminale Générale. https://eduscol.education.fr/document/24568/download

3. Using inquiry-based approaches		Mathematical research is one of the six math skills to be developed
4. Understanding the concepts, principles and nature of mathematics and applying concepts and procedures to a range of contexts		Present in the Major Intentions and math skills
5. Making links and generalisations		Using generalisations and abstraction is present in the Major Intentions. Making links, such as to other subjects, between mathematical concepts, or to real-life is not present
6. Developing critical/creative thinking skills e.g. problem-solving and reasoning		Reasoning and modelling are math skills to be developed. All math skills are to be utilized during problem-solving
7. Communicating mathematics clearly and in various forms		Communication is one of the six math skills to be developed.
8. Knowing how technology and math influence each other and using technology to develop ideas and solve problems		Software tools referenced in relation to the research math skill

Key:

	This theme is well-evidenced in the learning outcomes of the FB.		*This theme is partially evidenced in the learning outcomes of the FB.*		*This theme is not evident in the learning outcomes of the FB.*

Presence of the DP's Learning Outcome Themes

There is reasonable alignment between the DP's mathematics learning outcomes and those of FB, with most of the DP's themes being well evidenced in its Major Intentions. However, it can be noted that the FB's 'Math Skills' are not described in as much detail as the aims and assessment objectives in the DP.

1. Being aware of, and engaging with, mathematics in its wider context

The DP theme of awareness and engagement with wider contexts is not clearly evidenced in the FB's 'Major Intentions' section. Indeed, the FB skills do not include considering moral, social, and ethical questions, or appreciating the universality of mathematics and multicultural, international and historical perspectives. However, it can be noted that each main topic begins with a 'History of Mathematics' section which teachers may choose to explore with students.

2. Developing learning skills; having a positive and resilient attitude, working both independently and collaboratively, being reflective and evaluating work

The DP theme of transferable learning skills is not evidenced in the FB's 'Major Intentions' section. Indeed, there is no reference to reflecting on work, developing a positive and resilient attitude, or working collaboratively. However, it can be noted that some transferable learning skills are referenced in other sections of the FB curriculum, such as in 'Some guidelines for teaching'.

3. Using inquiry-based approaches

'Mathematical research' is one of the 'Mathematics Skills' targeted by the FB curriculum. This aligns well with the DP's learning outcome theme of using inquiry-based approaches throughout the study of mathematics.

4. Understanding the concepts, principles and nature of mathematics and applying concepts and procedures to a range of contexts

The DP theme of understanding mathematics is evidenced in the FB curriculum through references to applying mathematical techniques and exploring the effectiveness of such mathematical techniques.

5. Making links and generalisations

The DP's theme of making links and generalisations is partially evidenced in the FB curriculum. The use of generalisation and abstraction is explicitly mentioned in the 'Major Intentions' section, which aligns with one of the aims outlined for the DP mathematics subject group. However, making links, such as within mathematics, to other disciplines, or to real-world contexts is not well evidenced in the 'Major Intentions'.

6. Developing critical/creative thinking skills e.g. problem-solving and reasoning

Similarly to the DP, the FB focuses on critical thinking by listing six 'Math Skills' (research, model, represent, calculate, reason, and communicate) that are to be utilised in problem-solving. The presence of critical thinking is further evidenced in the FB in its description that oral communication "allows everyone to change their thinking, even to question it if necessary, to gradually access the truth through proof".[77]

7. Communicating mathematics clearly and in various forms

Communication is well-evidenced in the FB, as it is one of the six 'Math Skills' to be developed. In the FB, students are expected to communicate both orally and in writing. There is also an oral communication section within the 'Major Intentions' section which describes students using oral skills to explain and justify their reasoning and lists various learning situations where students can demonstrate this.

8. Knowing how technology and math influence each other and using technology to develop ideas and solve problems

The use of technology is highlighted through the research skill listed in the FB, as well as linking this to the inquiry-based approach to learning. Furthermore, additional reference to the 'Use of software tools' in the 'Major Intentions' section prescribes the regular use of technology by teachers and students, thus reinforcing that this is a similarly important theme in the FB.

Other Themes in the FB

Most of the themes or skills described in FB are in the DP; however, it can be noted that the skill of representations is highlighted more strongly in the FB. Indeed 'represent' is listed as one of the six 'Math Skills' and describes students being able to choose and change between numerical, algebraic, geometric, and other representations. Furthermore, whilst communication is an important theme in the DP, the FB places an additional explicit emphasis specifically on oral communication.

[77] Ibid.

Summary

Overall, there is a moderate level of alignment between FB and the DP with regards to mathematics learning outcomes. Like the DP, FB promotes critical thinking skills, communication in different contexts, the use of technology in investigation and problem-solving, using generalisation and abstraction, understanding concepts and application, and the use of inquiry approaches. However, themes focused on contemplation of wider contexts and development of transferable learning skills have less emphasis in FB. Conversely, FB makes more explicit reference to the use of mathematical representations and particularly emphasises oral communication of mathematics.

5.1.2 Content – Mathematics

This section compares and contrasts the content of the DP and FB curricula falling within the category of mathematics. In order to support visual comparison at-a-glance, the DP and FB mathematics curricula are presented below in diagrams which show the key topics and subtopics included in each.

Figure 8: DP mathematics: analysis and approaches content visualiser

	Standard level topics	Additional higher level topics
Topic 1 Number and algebra	1.1 Standard form; 1.2 Arithmetic sequences and series; 1.3 Geometric sequences and series; 1.4 Financial applications and geometric sequences and series; 1.5 Integer exponents and intro to logarithms; 1.6 Simple proof; 1.7 Rational exponents and laws of logarithms; 1.8 Sum of infinite convergent geometric sequences; 1.9 Binomial theorem (natural number)	1.10 Counting principles and extended binomial theorem; 1.11 Partial fractions; 1.12 Complex numbers intro; 1.13 Polar and Euler form; 1.14 Complex roots, De Moivre's theorem and powers/roots of complex numbers; 1.15 Proof by counter example, contradiction, and induction; 1.16 Solutions of systems of linear equations
Topic 2 Functions	2.1 Gradients and equations of straight lines; 2.2 Intro to functions; 2.3 Graphing functions; 2.4 Key features of graphs; 2.5 Composite, identity, and inverse functions; 2.6 Quadratic functions; 2.7 Solving quadratic equations and inequalities & the discriminant; 2.8 Reciprocal and rational functions; 2.9 Exponential and logarithmic functions; 2.10 Graphical and analytical solutions; 2.11 Transformations	2.12 Polynomial functions; 2.13 Harder rational functions; 2.14 Odd, even, and inverse functions; 2.15 Graphical and analytical solutions of inequalities; 2.16 Further graphs, including modulus and solutions
Topic 3 Geometry and trigonometry	3.1 Geometry recap; 3.2 Trigonometry recap; 3.3 Applications and diagrams; 3.4 Circles and radians; 3.5 Definitions, exact values, and sine rule for ambiguous case; 3.6 Identities and relationships; 3.7 Functions and transformations of sin, cos, and tan; 3.8 Solving trigonometric equations graphically and analytically	3.9 Reciprocal trigonometric ratios, identities, and inverse functions; 3.10 Compound angle identities and double angle for tan; 3.11 Symmetry properties; 3.12 Intro to vectors; 3.13 Scalar product and application; 3.14 Vector equation of a line and application; 3.15 Coincident, parallel, skew, and intersecting lines; 3.16 Cross product of vectors; 3.17 Planes; 3.18 Intersections and angles (planes)
Topic 4 Statistics and probability	4.1 Sampling; 4.2 Presenting data (tables, histograms, cumulative freq.); 4.3 Measures of central tendency and dispersion; 4.4 Correlation and regression line; 4.5 Intro to probability; 4.6 Diagrams, conditional probability, combined or independent events; 4.7 Discrete random variables; 4.8 Binomial distribution; 4.9 Normal distribution; 4.10 Equation of regression line of x on y; 4.11 Formulae for conditional probabilities and independent events; 4.12 Standardisation of normal variables (z-values)	4.13 Bayes' theorem; 4.14 Continuous random variables
Topic 5 Calculus	5.1 Intro to limits and derivatives; 5.2 Increasing and decreasing functions; 5.3 Derivative of $f(x)=ax^n$; 5.4 Tangents and normal; 5.5 Definite integrals; 5.6 More derivatives and use of product, chain, and quotient rules; 5.7 The second derivative; 5.8 Maximum, minimum and inflection points, and optimization; 5.9 Kinematic problems; 5.10 Indefinite integrals and integration by inspection and substitution; 5.11 Definite integrals and area of a curve	5.12 Continuity, differentiability, limits, and higher derivatives; 5.13 Evaluation of limits and L'hopitals rule; 5.14 Implicit differentiation; 5.15 Further derivatives and indefinite integrals; 5.16 Integration by substitution and by parts; 5.17 Volumes of revolution; 5.18 First order differential equations; 5.19 Maclaurin series
The toolkit and mathematical exploration	The exploration is a piece of written work that involves investigating an area of mathematics.	

Figure 9: DP mathematics: applications and interpretation content visualiser

	Standard level topics	Additional higher level topics
Topic 1 Number and algebra	1.1 Standard form; 1.2 Arithmetic sequences and series; 1.3 Geometric sequences and series; 1.4 Financial applications of geometric sequences and series; 1.5 Integer exponents and intro to logarithms; 1.6 Approximation, estimation, bounds and errors; 1.7 Amortization and annuities using technology; 1.8 Using technology to solve systems of equations and polynomials	1.9 Laws of logarithms; 1.10 Rational exponents; 1.11 The sum of infinite geometric sequences; 1.12 Complex numbers; 1.13 Euler and Polar form; 1.14 Matrices; 1.15 Eigenvalues and eigenvectors
Topic 2 Functions	2.1 Gradients and equations of straight lines; 2.2 Intro to functions; 2.3 Graphing functions; 2.4 Key features of graphs; 2.5 Modelling with functions; 2.6 Modelling skills	2.7 Composite and inverse functions; 2.8 Transformations; 2.9 Modelling further functions; 2.10 Using logarithms to scale numbers and linearize data
Topic 3 Geometry and trigonometry	3.1 Geometry recap; 3.2 Trigonometry recap; 3.3 Applications and diagrams; 3.4 Circles, sectors, and arcs; 3.5 Equations of perpendicular bisectors; 3.6 Voronoi diagrams	3.7 Radians; 3.8 Sin, Cos, Tan definitions, and Pythagorean identity; 3.9 Matrix transformations; 3.10 Vectors introduction and notation; 3.11 Vector equation of a line; 3.12 Vector application to kinematics; 3.13 Scalar and cross product; 3.14 Graph theory and simple, directed and subgraphs; 3.15 Adjacency matrices and weighted adjacency tables; 3.16 Decision math
Topic 4 Statistics and probability	4.1 Sampling; 4.2 Presenting data (tables, histograms, cumulative freq.); 4.3 Measures of central tendency and dispersion; 4.4 Correlation and regression line; 4.5 Intro to probability; 4.6 Diagrams, conditional probability, combined or independent events; 4.7 Discrete random variables; 4.8 Binomial distribution; 4.9 Normal distribution; 4.10 Spearman's rank; 4.11 Hypothesis testing, chi-squared and t-tests	4.12 Collecting and organising data and testing for reliability and validity; 4.13 Regression, residuals, coefficient of determination; 4.14 Linear transformations, linear combinations, unbiased estimations; 4.15 Central Limit theorem; 4.16 Confidence Intervals; 4.17 Poisson Distribution; 4.18 Further hypothesis testing; 4.19 Transition matrices and Markov chains
Topic 5 Calculus	5.1 Intro to limits and derivatives; 5.2 Increasing and decreasing functions; 5.3 Derivative of $f(x)=ax^n$; 5.4 Tangents and normal; 5.5 Definite integrals; 5.6 Maximum and minimum points; 5.7 Optimisation; 5.8 Area using trapezoidal rule	5.9 More derivatives and the chain, product, and quotient rule; 5.10 Second derivatives; 5.11 Finding further integrals and integration by inspection and substitution; 5.12 Area of a region and volumes of revolution; 5.13 Kinematic problems; 5.14 Differential equations; 5.15 Slope fields and their diagrams; 5.16 Euler's method and numerical solutions to differential equations and coupled systems; 5.17 Phase portraits; 5.18 Simple second order differential equations
The toolkit and mathematical exploration	The exploration is a piece of written work that involves investigating an area of mathematics.	

Figure 10: FB mathematics content visualiser for the first and final year of mathematics in the general pathway

FB mathematicsP	Algebra	Numerical sequences, discrete models	Equations, quadratic polynomial functions					
	Analysis	Derivation	Variations and curves representative of functions	Exponential function	Trigonometric function			
	Geometry	Vector calculation and scalar product	Referenced geometry					
	Probability and statistics	Conditional probabilities and independence	Real random variables					
	Algorithms and programming	List						
FB mathematicsT	Algebra and Geometry	Combinatorics and counting	Manipulation of vectors, lines and planes in space	Orthogonality and distances in space	Parametric representations and Cartesian equations			
	Analysis	Suites	Limits of functions	Supplements on derivation	Logarithm function	Sine and cosine functions	Primitive, differential equations	Integral calculus
	Probabilities	Succession of independent proofs, Bernoulli diagram	Concentration, law of large numbers					
	Algorithms and programming	List						

Structure

All FB students study mathematics in the *Seconde* class, which is the first year of high school, before choosing whether to enter the general or technological pathway for their final two years. Students in the general pathway of the FB can choose mathematics as one of their three specialty subjects. The study of mathematics in the general pathway is split into mathematics *Première* and mathematics *Terminale*, studied in the first and final year, respectively. Similar to the DP's SL and HL, this offers different levels of study to FB students, as they can choose to study only *Première*, or *Première* and then *Terminale*. Notably, the FB does not offer students a choice of different mathematics subjects with a distinct thematic focus, as the DP does with AA and AI.

Similar to DP mathematics, the content of FB mathematicsT and FB mathematicsP is divided into four or five main topic areas, though, unlike SL and HL, these slightly change between FB mathematicsT and FB mathematicsP. Generally, the main mathematics topics of the general pathway are: Algebra, Analysis, Geometry, Probability and Statistics, and Algorithms and Programming. This is similar to the DP, except that functions and calculus content is not a separate topic area, but rather studied under 'Analysis'. Furthermore, Algorithms and Programming is not a main topic of the DP and is a cross-cutting content area in the FB.

Content Alignment

The table below presents a simplified summary of the extent to which FB mathematics aligns with the main topics of the DP's subjects. FB mathematicsT is studied following FB mathematicsP; as such, the alignments for the latter are carried over to the former.

Table 21: Summary of the content alignment FB mathematics has with the main topics in AA

AA topics		FB mathematicsP	FB mathematicsT
SL	1. Number and algebra		
	2. Functions		
	3. Geometry and trigonometry		
	4. Statistics and probability		
	5. Calculus		
AHL	1. Number and algebra		
	2. Functions		
	3. Geometry and trigonometry		
	4. Statistics and probability		
	5. Calculus		

Table 22: Summary of the content alignment the FB mathematics has with the main topics in AI

	AI topics	FB mathematicsP	FB mathematicsT
SL	1. Number and algebra		
	2. Functions		
	3. Geometry and trigonometry		
	4. Statistics and probability		
	5. Calculus		
AHL	1. Number and algebra		
	2. Functions		
	3. Geometry and trigonometry		
	4. Statistics and probability		
	5. Calculus		

Key:

	Strong presence of this topic in the FB.		*Partial presence of this topic in the FB.*		*Little or no presence of this topic in the FB.*

* Where applicable, content alignments found in assumed knowledge or pre-requisite subjects are carried forwards and combined with new alignments to represent the cumulative content covered.

FB mathematicsP

Mathematics: analysis and approaches

The mapping of content shows that FB mathematicsP has only partial alignment with DP AA SL content across topics, as often several significant subtopics are not covered.

From DP AA SL Number and Algebra content, FB mathematicsP includes content on arithmetic and geometric sequences and series, though presence of financial applications and sum of infinite converging geometric sequence is unclear. Instead, it can be noted that FB mathematicsP introduces limits with sequences and includes finding limits of sequences in simple cases. FB mathematicsP also covers recursively defined sequences. Alignment with the rest of this topic area is limited due to logarithms not being covered until FB mathematicsT. There are no significant alignments with AHL content.

There is reasonable alignment with DP AA SL Functions content, as function concepts, quadratic equations and inequalities, quadratic functions, and exponential functions are covered. However, the level of alignment is reduced by logarithmic, rational, and composite functions not being covered. Moreover, transformations are also not explicitly included in the FB mathematicsP content. Similarly, FB mathematicsP covers some of DP AA SL's Geometry and Trigonometry content, such as circles and radians, definition and exact values of sin and cos, the Pythagorean identity, and functions of sin and cos. However, it does not include the tan function, other identities, or solving trigonometric equations. Instead, FB mathematicsP builds on the vector content introduced in the 2nd class and looks at the scalar product in detail, solving geometric problems, and circles and parabolas. As such, the FB mathematicsP has partial alignment with AHL content in this topic area.

Furthermore, FB mathematicsP covers probability content, including conditional probability and formula, in similar detail to DP AA SL. FB mathematicsP also introduces random variables, including finding the expectation, variance and standard deviation. Thus, there is partial alignment with DP AA SL's Statistics and Probability content. However, FB

mathematicsP does not cover correlation and linear regression, or the binomial and normal distributions. Similarly, FB mathematicsP covers some of the DP AA SL's Calculus concepts, such as derivatives of some functions, tangents, and derivative rules, though it does not cover any subtopics related to integration.

A significant area that FB mathematicsP covers, which is not included in DP AA, is Algorithms and Programming. This is a cross-cutting area which is embedded and developed in all content areas of FB mathematicsP – i.e. Algebra, Geometry, and Probability. Students use Python and perform tasks such as writing a Python function that returns the mean of a sample size n or a random variable. Building on the *Seconde* year, FB mathematicsP also consolidates the notions of variable, conditional instruction and loop and the use of functions, as well as introducing the concept of list to students.

Overall, FB mathematicsP has only partial alignment with DP AA SL content in all topics, and also features a few AHL subtopics on vectors. In contrast with the DP AA subject, FB mathematicsP includes a strong focus on algorithms and programming, which are embedded in all content areas.

Mathematics: applications and interpretation

Similarly to DP AA, FB mathematicsP partially aligns with DP AI SL content in most topics and has partial alignment with AHL content in Geometry and Trigonometry due to the inclusion of vectors, radians, sin and cos definitions, and Pythagorean identity. Where there are alignments with the DP AI content, this tends to be content shared between DP AA and DP AI; thus, the subtopics flagged above as being present in the FB mathematicsP remain relevant for DP AI. As such, to avoid repetition, this section will focus on comparison to the specific DP AI content that is not covered by the DP AA.

FB mathematicsP has partial alignment with DP AI SL's Number and Algebra content, as there is some evidence of financial applications in FB mathematicsP, including amortization and annuities. There is no alignment with AHL content as logarithms, complex numbers, and matrices are not included. As noted above, FB mathematicsP instead includes recursive sequences and introduces limits of sequences.

FB mathematicsP has partial alignment with DP AI SL's Functions content due to FB mathematicsP including function concepts, and quadratic, exponential and trigonometric functions. FB mathematicsP includes modelling, though it is not explicit that this is with an as broad range of functions as observed in DP AI SL. FB mathematicsP has no alignment with AHL content as it does not feature composite functions, transformations, and modelling with harder functions.

FB mathematicsP has partial alignment with DP AI's Geometry and Trigonometry SL and AHL content due to FB mathematicsP including trigonometry, circles, radians, sin and cos definitions, the Pythagorean identity, and similar vector content. However, FB mathematicsP does not include Voronoi diagrams, matrix transformations, the cross product, graph theory, or decision mathematics.

There is limited alignment between FB mathematicsP and the DP AI SL's Statistics and Probability content due to FB mathematicsP not including content on correlation and linear

regression, the binomial and normal distributions, or hypothesis testing. FB mathematicsP also does not cover DP AI AHL topics in this area. For Calculus, FB mathematicsP has partial alignment with DP AI SL content as it covers derivatives of a few functions, increasing and decreasing functions, tangents, maximum and minimum point, and optimisation problems. However, integration is not introduced in FB mathematicsP.

As noted above, FB mathematicsP has a strong focus on algorithms and programming, which are embedded. Use of technology also has a strong emphasis in DP AI; however, Python is not used.

Overall, FB mathematicsP has partial alignment with DP AI SL content, with a similarly high focus on technology, though differs in its use of algorithms and programming.

*Table 23: FB mathematicsP content which is not covered in the DP**

Significant content not in AA (only)	Significant content not in AI (only)
	• Limits of sequences (simple cases)
Significant content not in either DP mathematics subject	
• Algorithms and programming. Use of Python.	

* Significant content does not include topics which are typically studied *prior* to upper secondary.

FB mathematicsT

Mathematics: analysis and approaches

FB mathematicsT follows FB mathematicsP, meaning that all the subtopic alignments identified above still apply. As such, to avoid repetition, this section focuses on the new content covered by FB mathematicsT.

For DP AA SL's Number and Algebra content, FB mathematicsT's alignment with the DP is increased compared to that of FB mathematicsP through its inclusion of logarithms. FB mathematicsT also has further alignment with the DP AA SL and AHL subtopics of proof and systems of equations; although not a separate topic in themselves, there is evidence students learn some proof techniques over the course and look at solving systems of equations within vectors. That said, the DP AA AHL subtopics relating to complex numbers are not covered in FB mathematicsT. Instead, FB mathematicsT builds further on limits of sequences from FB mathematicsP, including definitions, convergence and divergence, bounded and unbounded sequences, and boundary conditions.

FB mathematicsT also has stronger alignment with the DP AA SL content of Functions as it covers logarithm functions, though most AHL content is not covered, nor are transformations. Trigonometric functions and vectors are revisited, which increases alignment with DP AA SL and AHL content on Geometry and Trigonometry. Indeed, FB mathematicsT covers solving trigonometric equations, vector equations of planes, parametric representations and cartesian equations, and intersections. However, FB mathematicsT does not cover the same range of trigonometric identities, reciprocal functions, or solving harder trigonometric equations as the DP AA.

FB mathematicsT has good alignment with DP AA SL Calculus content as it includes the second derivative, graphical representations of $f, f' and\ f''$, and integration. There is also partial alignment with AHL content as FB mathematicsT covers continuity, differentiability, limits, integration methods, and differential equations. However, it can be noted that implicit differentiation and Maclaurin series are not covered by FB mathematicsT, and the latter covers fewer derivate and antiderivatives of functions, such as $\cot x$, than the DP AA. However, FB mathematicsT covers limits of functions in considerable detail.

For Statistics and Probability, FB mathematicsT covers binomial distributions in detail, but it does not align strongly with DP AA SL as it does not cover correlation and linear regression nor the normal distribution. Instead, FB mathematicsT focuses on sums of random variables – their expectation and variance – and the Bienayme-Chebyshev inequality and the law of large numbers.

As with FB mathematicsP, FB mathematicsT covers Algorithm and Programming content, further consolidating the concepts from FB mathematicsP.

Overall, FB mathematicsT, which represents the cumulative mathematics content of the general pathway, has strong alignment with DP AA SL content in the topics of Number and Algebra, Functions, and Calculus; partial alignment with SL Statistics and Probability and Geometry and Trigonometry; and partial alignment with DP AA AHL content of Number and Algebra, Geometry and Trigonometry, and Calculus. Although not always fully aligning in content, students studying FB mathematicsT will experience a similar breadth and depth of content to that of DP AA HL. This is due to certain topics covering different concepts, the inclusion of algorithms and programming, and the results and theorems that FB mathematicsT frequently incorporates in several topics.

Mathematics: applications and interpretation

The mapping of content shows that the additional content covered in FB mathematicsT only significantly increases alignment with the DP AI topics of Number and Algebra at SL, Statistics and Probability at SL and Calculus at both SL and AHL. The rest of the alignments remain the same, as FB mathematicsT covers content more similar to that of DP AA, such as limits and continuity, proof, and vectors, in addition to content not in the DP.

As mentioned in regard to DP AA, FB mathematicsT covers the binomial distribution but does not cover correlation and linear regression, the normal distribution, and DP AI-specific subtopics, such as hypothesis testing, nonlinear regression, the Poisson distribution, and transition matrices. Instead, FB mathematicsT covers topics such as the Bienayme-Chebyshev inequality and the law of large numbers. For Calculus, FB mathematicsT covers DP AI AHL subtopics, such as the second derivative, derivative rules, integration, area, differential equations, and Euler's method. FB mathematicsT also covers topics which are not in DP AI, such as integration by parts, and limits and continuity. However, it can be noted that FB mathematicsT does not cover the DP AI subtopics of slope fields, phase portraits, and second order differential equations.

For Number and Algebra, FB mathematicsT covers the DP AI SL content of approximation and errors, as well as the DP AI AHL content on laws of logarithms. FB mathematicsT also

covers content not in DP AI, such as combinatorics and limits of sequences. However, FB mathematicsT does not include complex numbers or matrices, which are covered in DP AI.

With regards to other topics, FB mathematicsT does not include graph theory and decision mathematics subtopics that are found in the DP AI AHL Geometry and Trigonometry content, nor does it include modelling with functions covered in AHL.

Table 24: FB mathematicsT content which is not covered in the DP

Significant content not in AA (only)	Significant content not in AI (only)
N/A	• Limits of functions • Continuity and differentiability • Combinatorics • Vector planes • Proof
Significant content not in either DP mathematics subject	
• Algorithms and programming. Use of Python. • Limits of sequences content • The Bienayme-Chebyshev inequality • Law of large numbers	

Overall, FB mathematicsT has strong alignment with the DP AI SL's Number and Algebra and Calculus content, and partial alignment with DP AI SL content in other topics, as well as the DP AI AHL content in Geometry and Trigonometry and Calculus. FB mathematicsT covers a significant amount of content that is not in DP AI, some of which is in DP AA (see section above). As such, although content alignment is not strong, the breadth and depth of FB mathematicsT is comparable to that of DP AI HL.

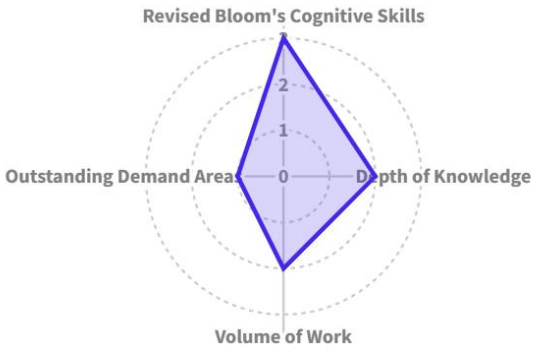
5.1.3 Demand – Mathematics

This section considers the alignment between the DP and FB mathematics curricula in terms of demand.

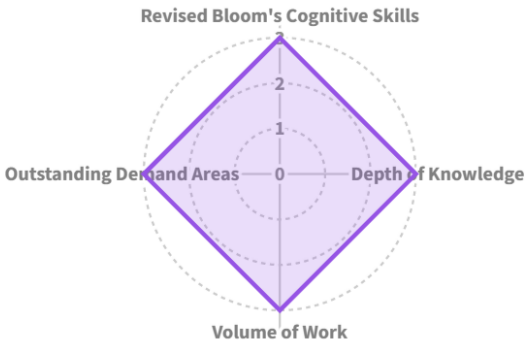
The DP and FB curricula were analysed using the same demand tool in order to create a demand profile for DP AA (SL and HL), DP AI (SL and HL), FB mathematicsP, and FB mathematicsT. FB mathematicsT represents the demand of mathematics of the general pathway of the FB. These demand profiles are presented below in the form of radar diagrams, with superimposed diagrams also being featured to enable immediate visual comparison.

Figure 11: Visual representations of subject demand

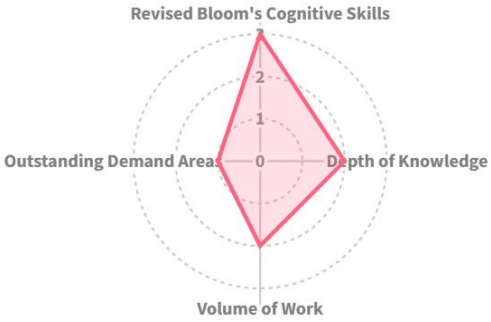
DP mathematics: analysis and approaches SL



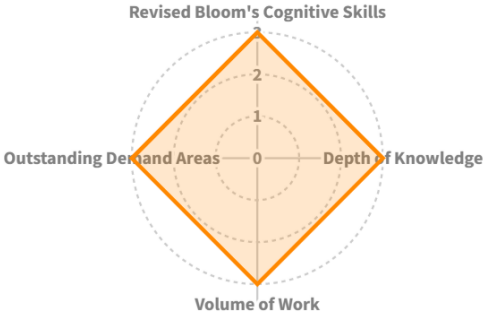
DP mathematics: analysis and approaches HL



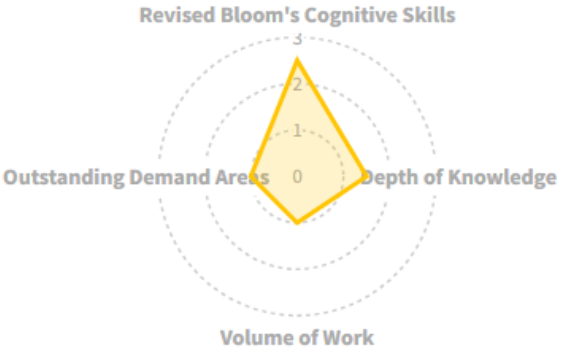
DP mathematics: applications and interpretation SL



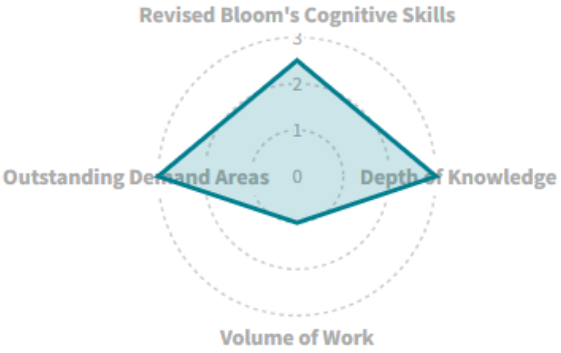
DP mathematics: applications and interpretation HL



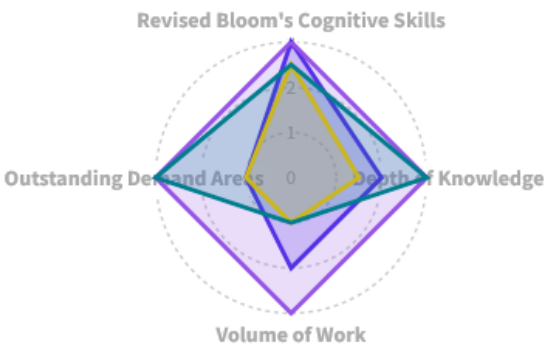
FB mathematicsP



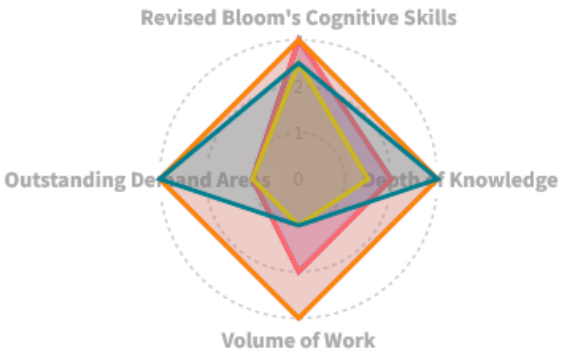
FB mathematicsT



DP AA SL/HL and FB mathematicsP and mathematicsT



DP AA SL/HL and FB mathematicsP and mathematicsT



The panel of experts carried out a detailed analysis of each course and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - The DP mathematics subject group learning outcomes apply to all subjects hence the scores are the same for AA (SL and HL) and AI (SL and HL). These outcomes were given a score of 3 on the basis that they strongly evidence the development of critical and creative thinking skills through their focus on reasoning, inquiry-based approaches, reflection, generalisation, unfamiliar contexts, and consideration of wider implications.
  - The learning outcomes of FB mathematicsP and mathematicsT are the same too, as they share a common list of 'Math Skills'. The panel judged that there was evidence of higher order thinking skills in the documentation, especially with regards to problem solving being the culmination of all these skills. Furthermore, there was reference to investigation and validating or invalidating models. Overall, a score of 2.5 was deemed appropriate for both subjects, as there was not enough evidence to warrant them a 3.

- Regarding the scores for **Depth of Knowledge**:
  - Both DP mathematics subjects at SL were given a score of 2. Both subjects were judged to cover the topics of 'Number and algebra', 'Functions', 'Geometry and trigonometry', 'Statistics and probability', and 'Calculus' in considerable detail, building in complexity and requiring a substantial amount of pre-requisite knowledge. At HL, both DP mathematics subjects were awarded a score of 3 for depth of knowledge. The subjects were judged to cover topics in a high level of detail, with many subtopics having high complexity and requiring a large amount of pre-requisite knowledge.
  - For the FB, FB mathematicsP received a score of 1.5 as some topics are studied in considerable depth – e.g. vectors. However, depth of study was not consistent across all topics; other topics, such as probability and statistics, were studied in considerably lesser detail. FB mathematicsT received a score of 3 for depth of knowledge, as the panellists observed that there was a considerable step up from FB mathematicsP to FB mathematicsT. Each content area in FB mathematicsT

was covered in a high level of detail, with the content providing good preparation for university level mathematics-related courses.

- Regarding the scores for **Volume of Work**:
  - Both DP mathematics subjects at SL were deemed to comprise a moderate-heavy volume of work and were given a score of 2. The panel concluded that the teaching time allotted to cover the different concepts was short (150 hours) but acknowledged that some subtopics contained basic concepts and recapped prior learning, hence 2 was deemed an appropriate score. For HL, both DP mathematics subjects were considered to have a heavy volume of work, due to the short amount of time allocated (240 hours) and the level of complexity of the content, which combined merited a score of 3.
  - For the FB, both FB mathematicsP and mathematicsT were deemed to have a moderate volume of work and thus were given a score of 1. FB mathematicsP is taught for four hours every week, for a total of 128 hours in a year, which was judged to be a standard time allocation for the content to be covered. FB mathematicsT features a higher number of complex topics than FB mathematicsP; however, it also features a higher number of teaching hours per week, going from four hours in FB mathematicsP to six in FB mathematicsT. Overall, over the two years, there is a total of 320 teaching hours for mathematics in the FB *général*, which was deemed to be a standard amount of time for the content covered.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
  - Both DP mathematics subjects at SL contained one area of outstanding demand, which was the 'mathematical exploration'. This element of the SL subjects was considered to apply skills typically needed in higher education, such as extended writing and presentation of mathematical concepts, student-led exploration, and academic writing skills. Therefore, a score of 1 was awarded to both SL subjects for the inclusion of this element. In addition to this, both subjects at HL had further areas of outstanding demand. For mathematics: analysis and approaches, some of the identified outstanding areas of demand were proof by induction, complex numbers (De Moivre's theorem), vectors (cross product, equations of planes and intersections), and Maclaurin series. For mathematics: applications and interpretation, some identified areas of outstanding demand were eigenvalues and eigenvectors, nonlinear regression, Markov chains, second order differential equations, slope fields, Euler's method, and phase portraits. Overall, there was a high number of outstanding areas of demand and a score of 3 was awarded to both HL subjects.
  - For FB subjects, a score of 1 was given to FB mathematicsP for its inclusion of programming with Python and its coverage of vectors. For FB mathematicsT, a score of 3 was given, with proof, sequences, vectors, calculus, and algorithms and programming, all containing subtopics which demonstrated opportunity for challenge and are beyond the usual scope of upper secondary mathematics.

5.2 Physics

Below is the list of subjects used in the physics subject comparison analysis of the DP with the FB.

DP physics[78]
Physics is a subject option from the DP Sciences subject group, offered at both SL and HL. This subject has content that is common to both SL and HL, as well as AHL content that is featured only in the HL. Thus, the HL has greater breadth and depth than SL. This subject is intended to prepare students for university courses such as engineering, physics, and others requiring a strong science background. HL is suitable for those intending to pursue further study in an area requiring a strong background in physics.

FB physics-chemistry
Physics-chemistry is a specialty subject on the FB *général*. It is a combined subject, where physics and chemistry are taught alongside one another, and is designed as a two-year subject – studied at *Première* and *Terminale* years – though students in the FB may choose to drop it in their second year. The subject aims to provide students with the appropriate knowledge and skills to prepare them for higher education in the fields of experimental sciences, medicine, technology, engineering, computer science, or mathematics. When both *Première* and *Terminale* years are studied, the subject places significant emphasis on promoting experimental practice and modelling, requiring students to draw on every day, real-life examples as well as forming links between different themes, and different subjects.

5.2.1 Learning Outcomes – Physics

This section compares and contrasts the learning outcomes of curricula falling within the category of physics.

The learning outcome themes for physics were extracted from the aims and assessment objectives of the DP sciences subject group, hence the themes are the same for biology chemistry and physics.

As, in the FB, physics is studied as part of the FB physics-chemistry combined subject, the learning outcomes of the FB physics-chemistry subject have been mapped against both the DP physics and DP chemistry subjects.

The FB physics-chemistry curriculum outlines specific “Skills developed as part of scientific research”, of which there are five:

- S’approprier – this directly translates as “to appropriate” which means that students will be expected to ‘take ownership’ of their learning
- Analyser/Raisonner – to analyse/reason
- Réaliser – the direct translation of this results in “to realise”, which, in this context, would be where students are expected to create something, or make something happen.
- Valider – to validate

[78] International Baccalaureate. (2023). *Physics guide*.

- Communiquer – to communicate.

These skills characterise the FB's scientific approach and the "aim to structure the learning and assessment of students",[79] is a key focus throughout students' studies. Alongside these, the FB also provides some examples of associated capabilities. Finally, some additional skills are also discussed in the 'Preamble' section of the FB's documentation. As such, the FB's 'skills developed as part of scientific research', the associated capabilities, and the skills extracted from the Preamble have all been considered when mapping against the DP's learning outcome themes.

Once commencing the general pathway, all students will follow a common curriculum, as well as choose three speciality subjects. FB physics-chemistry is one of the speciality subjects that students may choose to pursue, however, after completing the first year (*Première*) of the subject, they have the option of ceasing their studies by dropping one speciality subject. Therefore, it may be the case that not all students will complete the full two-years of study in FB physics-chemistry. However, the skills outlined in the curricula for both the *Première* and *Terminale* years of FB physics-chemistry are the same; as such, these skills will be developed in all students, regardless of whether they choose to continue to study the subject in the *Terminale* year.

The following table demonstrates the learning outcome themes that were extracted from the DP learning outcomes and indicates if and where they were judged to have presence within the learning outcomes of the FB physics curricula.

Table 25: Presence of the DP sciences subject group learning outcome themes in the FB physics-chemistry curricula

Themes extracted from the learning outcomes of the DP sciences subject group	Presence in FB	
1. Conceptual understanding and making connections		Not present in skills, though briefly discussed in the Preamble.
2. Use and application of knowledge, methods, tools, and techniques that characterise science		Present in four out of the five skills.
3. Creativity and critical thinking (problem-solving, analysis, evaluation, synthesis)		Present in the 'appropriate', 'analyse/reason' and 'validate' skills.
4. Apply skills necessary to carry out insightful and ethical investigations (planning, collecting data, organising, following ethical guidelines)		Present in three of the five skills.
5. Development of technological skills		Not present in skills, though discussed in the Preamble of the course.
6. Effective collaboration and communication		Present in the 'communication' skill.
7. Awareness of global and local problems and the environmental, ethical, cultural, and social impact of science		Not present in skills, but some aspects are briefly discussed in the Preamble.

[79] Le Bulletin Officiel De L'Éducation Nationale, 'Programme de physique-chimie première générale (annexe)', p. 2.

Key:

	This theme is well-evidenced in the learning outcomes of the FB.		*This theme is partially evidenced in the learning outcomes of FB.*		*This theme is not evident in the learning outcomes of the FB.*

Presence of the DP's Learning Outcome Themes

As seen in the table above, only four of the seven DP's learning outcome themes are explicitly found within the skills of the FB physics-chemistry subject. The three remaining skills are present to an extent in the Preamble of the physics-chemistry curriculum, but as discussed below, these are not expressed to the same level of detail as that featured in the DP.

1. Conceptual understanding and making connections

This theme is not evident in the skills section of the FB physics-chemistry curriculum; however, the 'making connections' aspect of this theme is discussed in the 'Preamble' section. This outlines how the curriculum is organised into four themes, and then describes how this approach "makes it possible to draw on many situations of daily life and to contribute to a fruitful dialogue with other scientific disciplines".[80] This shows that there will be a focus on students' learning involving real-life scenarios and contexts, therefore students will have to make connections between what they learn in class and how this applies to the real world around them. However, due to there not being any explicit reference to conceptual understanding, the theme is only partially evidenced in the FB physics-chemistry curriculum.

2. Use and application of knowledge, methods, tools, and techniques that characterise science

This theme is clearly emphasised across many of the FB physics-chemistry skills. The 'appropriate' skill describes how students will "state a problem" and then "research and organise information related to that problem".[81] The following three skills (analyse/reason, realise and validate) then cover many aspects of scientific study, including formulating hypotheses, justifying and developing their choice of protocol, performing common procedures, identifying errors and comparing a model to experimental results. The aspects encompass all methods, tools and techniques that characterise science, and show that this theme is strongly prevalent in the FB physics-chemistry curriculum.

3. Creativity and critical thinking (problem-solving, analysis, evaluation, synthesis)

Three out of the five skills in the FB documentation demonstrate the importance of this theme within the FB physics-chemistry curriculum. The 'appropriate' skill outlines that students will state a problem and research information relating to this problem; these are the first steps of problem-solving. Developing, and justifying, a resolution strategy (as stated in the 'analyse/reason' skill) requires creativity and evaluation. The 'validate' skill reflects the 'synthesis' component of this DP theme where it details "propose possible improvements to the approach or model".[82] These aspects fully cover the DP's creativity and critical thinking theme, showing the importance of this theme throughout the FB physics-chemistry curriculum.

4. Apply skills necessary to carry out insightful and ethical investigations

[80] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 2. Available at: www.education.gouv.fr [accessed July 2023]
[81] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 2. Available at: www.education.gouv.fr [accessed July 2023]
[82] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 3. Available at: www.education.gouv.fr [accessed July 2023]

Some aspects of the skills within the FB physics-chemistry curriculum overlap between the third theme above (critical thinking and creativity) and this theme regarding insightful and ethical investigations. For example, the 'analyse/reason' skill outlines the importance of formulating hypotheses, proposing a strategy and developing a protocol. The 'realise' skill includes this theme as it describes "Perform common procedures (collection of data). Implement an experimental protocol".[83] Although this theme is present in so far as there are references to students applying their skills to carry out investigations in a problem-solving capacity, there is no specific reference to the 'ethical and insightful' component of these investigations; an aspect which is emphasised in the DP.

5. Development of technological skills

The skills outlined in the FB physics-chemistry curriculum do not specifically mention technology. However, in the 'Preamble' section of the course, technology is discussed within the 'organisation of the program' section. Here, it is stated that there is the opportunity to bring out cross-cutting notions, for example "experimental and digital devices (sensors, measuring instruments) [and] digital sciences (programming, simulation etc.)".[84] This demonstrates that students will be interacting with technology during their course and will be guided in its use within physics and chemistry; nonetheless, technology is not highlighted as a key skill in the curriculum in the same way as it is presented in the DP.

6. Effective collaboration and communication

Although only one skill within the FB physics-chemistry outlines this theme, the skill is further described within the 'Preamble' section of the curriculum. The skill states that students will "use appropriate vocabulary and choose appropriate modes of representation";[85] it then further states the "exchange between peers" and how these aspects are used both orally and in writing.

The 'Preamble' section provides further detail on this skill, describing how students will develop their skills of argumentation; "explaining one's reasoning in a way as to convince".[86] The FB physics-chemistry subject outlines how this will be important for all students, but particularly those wishing to pursue further study or careers based around teaching. This highlights that, although only one skill within the FB physics-chemistry references communication, it is an important area and therefore it is implied that it would be emphasised throughout the curriculum.

7. Awareness of global and local problems and the environmental, ethical, cultural, and social impact of science

The skills outlined in the FB physics-chemistry curriculum do not specifically mention an awareness of global and local problems, and the impact of science; therefore, this theme is not present within the skills. However, in the 'Preamble' section of the course, some of these aspects are discussed within the accompanying write-up of the skills section. Here, it is described how the FP physics-chemistry subject must be implemented in a way that allows for the opportunity to discuss the "individual and collective responsibility, safety for oneself and others, the environmental education and sustainable development".[87] This demonstrates that students will be coming across aspects of this theme during their course, but it is not

[83] ibid
[84] ibid
[85] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 3. Available at: www.education.gouv.fr [accessed July 2023]
[86] ibid
[87] ibid

highlighted as a key skill in the curriculum in the same way, or to the extent that, it is presented in the DP.

Other Themes in the FB

Whilst it is not described as a 'skill', within the Preamble of the FB physics-chemistry curriculum there is reference to students linking their theoretical understanding to the wider world through the use of models: "the modelling process occupies a central place…to train students to establish a link between objects, experiences, facts and that of models and theories".[88] This is somewhat in line with the DP's use of models throughout its curriculum content in order to enhance students' understanding of concepts, though is more explicitly emphasised in the FB.

Summary

As described above, all DP learning outcome themes are at least partially evidenced within the FB physics-chemistry curriculum. Some themes, such as techniques that characterise science and creativity and critical thinking, are clearly outlined and covered thoroughly. Others, such as the development of technological skills and the awareness of the wider impact of science, are more subtle and nuanced than they are in the DP. Certain aspects of these themes are clearly present, such as environmental impact, whereas others, such as the development of technology skills, can be inferred from other references within the 'Preamble' section of the curriculum.

5.2.2 Content – Physics

This section compares and contrasts the content of the DP and FB curricula falling within the category of physics. In order to support visual comparison at-a-glance, the DP and FB physics curricula are presented below in diagrams which show the key topics and subtopics included in each.

[88] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 1. Available at: www.education.gouv.fr [accessed July 2023]

Figure 12: DP physics content visualiser[89]

A. Space, time and motion	A.1 Kinematics	A.2 Forces and momentum	A.3 Work, energy and power	A.4 Rigid body mechanics (HL only)	A.5 Galilean and special relativity (HL only)
B. The particulate nature of matter	B.1 Thermal energy transfers	B.2 Greenhouse effect	B.3 Gas laws	B.4 Thermodynamics (HL only)	B.5 Current and circuits
C. Wave behaviour	C.1 Simple harmonic motion (SL + AHL)	C.2 Wave model	C.3 Wave phenomena (SL + AHL)	C.4 Standing waves and resonance	C.5 Doppler effect (SL + AHL)
D. Fields	D.1 Gravitational fields	D.2 Electric and magnetic fields	D.3 Motion in electromagnetic fields	D.4 Induction (HL only)	
E. Nuclear and quantum physics	E.1 Structure of the atom (SL + AHL)	E.2 Quantum physics (HL only)	E.3 Radioactive decay (SL + AHL)	E.4 Fission	E.5 Fusion and stars
Experimental programme	Practical work	Collaborative sciences project	Scientific investigation		

[89] '(HL only)' and '(SL + AHL)' are used to flag, respectively, topics only taught at HL and topics taught at both SL and HL, but which also feature additional higher level content.

Figure 83: FB science physics-chemistry content visualiser

Physics-chemistry *Première*	**Constitution and Transformations of Matter**	1. Monitoring the evolution of a system, seat of a transformation	2. From the structure of entities to the physical properties of matter	3. Physico-chemical properties, synthesis and combustion of chemical organic species	
	Movement and Interactions	1. Fundamental interactions and introduction to the notion of field	2. Description of a fluid at rest	3. Movement of a system	
	Energy: conversions and transfers	1. Energetic aspects of electrical phenomena	Energetic aspects of mechanical phenomena		
	Waves and Signals	1. Mechanical Waves	2. Light: images and colours, wave and particle models		
Physics-chemistry *Terminale*	**Constitutions and Transformations of Matter**	1. Determine the composition of a system by physical and chemical methods	2. Modeling the temporal evolution of a system, seat of a transformation	3. Predicting the final state of system, the site of chemical transformation	4. Develop strategies in organic synthesis
	Movement and Interactions	1. Describe a movement	2. Link the actions applied to a system to its movement	3. Model the flow of a fluid	
	Energy: conversions and transfers	1. Describe a thermodynamic system: example of the perfect gas model	2. Carry out energy balances on a system: the first principle of thermodynamics		
	Waves and Signals	1. Characterise wave phenomena	2. Forming images, describing light by a flux of photons	3. Study the dynamics of an electrical system	

Structure

Both DP physics and FB physics-chemistry are designed as two-year subjects, with both offering the opportunity for students to study physics at different levels – i.e. the FB by allowing students to choose whether to continue to study the FB physics-chemistry subject in the *Terminale* year; the DP by offering students the opportunity to study DP physics at either SL or HL.

One notable difference between the structure of the physics subject area in the two DP and FB is that in the latter physics is studied as part of the FB physics-chemistry subject. Although the DP physics covers some aspects of chemistry, such as the structure of the atom, physics and chemistry content are covered in separate subjects in the DP.

The DP physics subject is designed through a concept-based approach and organised into five over-arching, discipline-specific themes: Space, time and motion, The particulate nature of matter, Wave behaviour, Fields and Nuclear and quantum physics. Each of these themes is then organised into at least four subtopics. The FB physics-chemistry content is organised into four themes: 'constitution and transformation of matter', 'movement and interactions', 'energy: conversions and transfers', and 'waves and signals'. All themes draw on daily-life situations and provide links with other sciences. Each theme consists of scientific ideas and content, as well as experimental activities and any coverage of mathematical and numerical abilities. As such, despite FB physics-chemistry being a combined subject, it shares some structural similarities with DP physics, in that it is divided into a similar number of overarching topic areas that also share some similarities in focus.

Finally, the FB physics-chemistry subject builds on the prerequisite scientific understanding obtained in the *Seconde* year of study. In contrast, the two routes through DP physics do not detail specific knowledge prerequisites, allowing students from a variety of backgrounds to access both DP physics SL and HL; however, in the case of the latter, students are recommended to have 'some previous exposure to formal science education', either through having "undertaken the IB Middle Years Programme (MYP) or studied an equivalent national science qualification or a school-based science course".[90]

Content Alignment

The table below represents a simplified summary of the FB's content alignment, at topic-level, with DP physics (SL and HL).

Table 26: Summary of the content alignment between the DP physics topics and the FB physics

DP physics subtopics	Presence of SL content in FB physics-chemistry	Presence of AHL content in FB physics-chemistry
A. Space, time and motion		
A.1 Kinematics		N/A
A.2 Forces and momentum		N/A
A.3 Work, energy and power		N/A
A.4 Rigid body mechanics	N/A	
A.5 Galilean and special relativity	N/A	

[90] International Baccalaureate (2023) *Physics Guide* p.18-19

B. The particulate nature of matter		
B.1 Thermal energy transfers		N/A
B.2 Greenhouse effect		N/A
B.3 Gas laws		N/A
B.4 Thermodynamics	N/A	
B.5 Current and circuits		N/A
C. Wave behaviour		
C.1 Simple harmonic motion		
C.2 Wave model		N/A
C.3 Wave phenomena		
C.4 Standing waves and resonance		N/A
C.5 Doppler effect		
D. Fields		
D.1 Gravitational fields		
D.2 Electric and magnetic fields		
D.3 Motion in electromagnetic fields		N/A
D.4 Induction	N/A	
E. Nuclear and quantum physics		
E.1 Structure of the atom		
E.2 Quantum physics	N/A	
E.3 Radioactive decay		
E.4 Fission		N/A
E.5 Fusion and stars		N/A
Experimental programme		

Key:

	Strong presence of this topic in the FB.		*Partial presence of this topic in the FB.*		*Little or no presence of this topic in the FB.*	N/A	*This topic does not exist at the respective level.*

NB: Where applicable, content alignments found in pre-requisite subjects are carried forwards and combined with new alignments to represent the cumulative content covered.

As seen in the table above, the FB physics-chemistry and the DP physics subjects are moderately aligned when it comes to their coverage of physics content, with coverage being most strongly aligned in the topic areas of Space, time and motion, and The particulate nature of matter; moderate in the topic area of Wave behaviour, and more limited in topic areas of Fields and Nuclear and quantum physics.

The FB physics-chemistry subject features a strong coverage of some DP SL subtopics, such as ‘Work, energy and power’, ‘Wave model’, ‘Gravitational fields’ and ‘Structure of the atom’, though some subtopics were found to be absent in some cases, such as Sankey diagrams, mechanical power and mechanical efficiency. Other subtopics such as ‘Gas laws’ and ‘Current and circuits’ were partially evidenced, but not fully covered – for example, the FB physics-chemistry does not include ideal gas laws, particle motion or internal energy, nor electromagnetic frequency. All other subtopics were found to either be completely or have negligible presence in the FB.

In addition to the topics mentioned above, there is strong coverage of the DP SL content in ‘Thermal energy transfers’, ‘Greenhouse effect’, ‘Doppler effect’ and ‘Electric and magnetic fields’. Additionally, DP SL content in ‘Forces and momentum’, ‘Wave phenomena’ and ‘Radioactive decay’ are partially covered, as is the AHL content in ‘Radioactive decay’, ‘Quantum physics’, ‘Electric and magnetic fields’, ‘Thermodynamics’, and ‘Galilean and special relativity’. Additionally, FB physics-chemistry features full coverage of the DP physics

AHL's content on 'Wave phenomena' and 'Doppler effect'. That said, the FB physics-chemistry includes no coverage of the AHL content in the 'Induction', 'Simple harmonic motion', 'Rigid body mechanics' and 'Structure of the atom'.

Also notably absent in the FB is coverage of gravitational and electric potential. These topics lend themselves to some of the more challenging problems in the DP and are particularly abstract. The absence of simple harmonic motion, Snell's law and projectile motion removes many opportunities for studying a range of mathematical skills, such as trigonometric calculations. Snell's law and refraction calculations depend heavily on the use of the sine function and a range of other geometric skills involving angles. Similarly, projectile motion requires students to break vectors up into components using the trigonometric functions. These opportunities are absent from the FB physics-chemistry.[91]

Notably, given the combined nature of FB physics-chemistry, the latter also covers a significant amount of content – i.e. chemistry content – that is not covered in DP physics.

*Table 27: FB physics content which is not covered in the DP**

Significant FB physics content which is not included in the DP*
○ Monitoring the evolution of a system, seat of a transformation ○ Modelling the temporal evolution of a system, the seat of transformation ○ From the structure of entities to the physical properties of matter ○ Imaging and lenses (physics)

*FB physics-chemistry also contains chemistry content – see section 5.3.2. Notably, 'significant content' does not include topics which are typically studied *prior* to upper secondary.

In summary, by the end of the two-year FB physics-chemistry course, students will have studied a substantial amount of DP SL content in the topic areas of Space, time and motion, The particulate nature of matter, as well as covered the wave model, gravitational, electric and magnetic fields, and the structure of the atom at SL. Additionally, they will have fully covered the DP AHL content on the 'Wave phenomena' subtopic and the DP's Doppler effect (both at SL and AHL), as well as partially covered Galilean and special relativity, thermodynamics, quantum physics, and radioactive decay. That said, FB physics-chemistry students will not have covered SL content on 'Forces and momentum', 'Gas laws', 'Current and circuits', 'Wave phenomena' and 'Radioactive decay' to the same depth as DP SL, nor will they have covered simple harmonic motion (at either SL or AHL), nor the DP AHL topics of rigid body mechanics or induction. Instead, FB physics-chemistry students will have dedicated a substantial amount of time covering chemistry content (see Chemistry section of this report).

Overall, the physics coverage of the FB physics-chemistry subject is moderately aligned with that of DP physics at SL, and less aligned at HL.

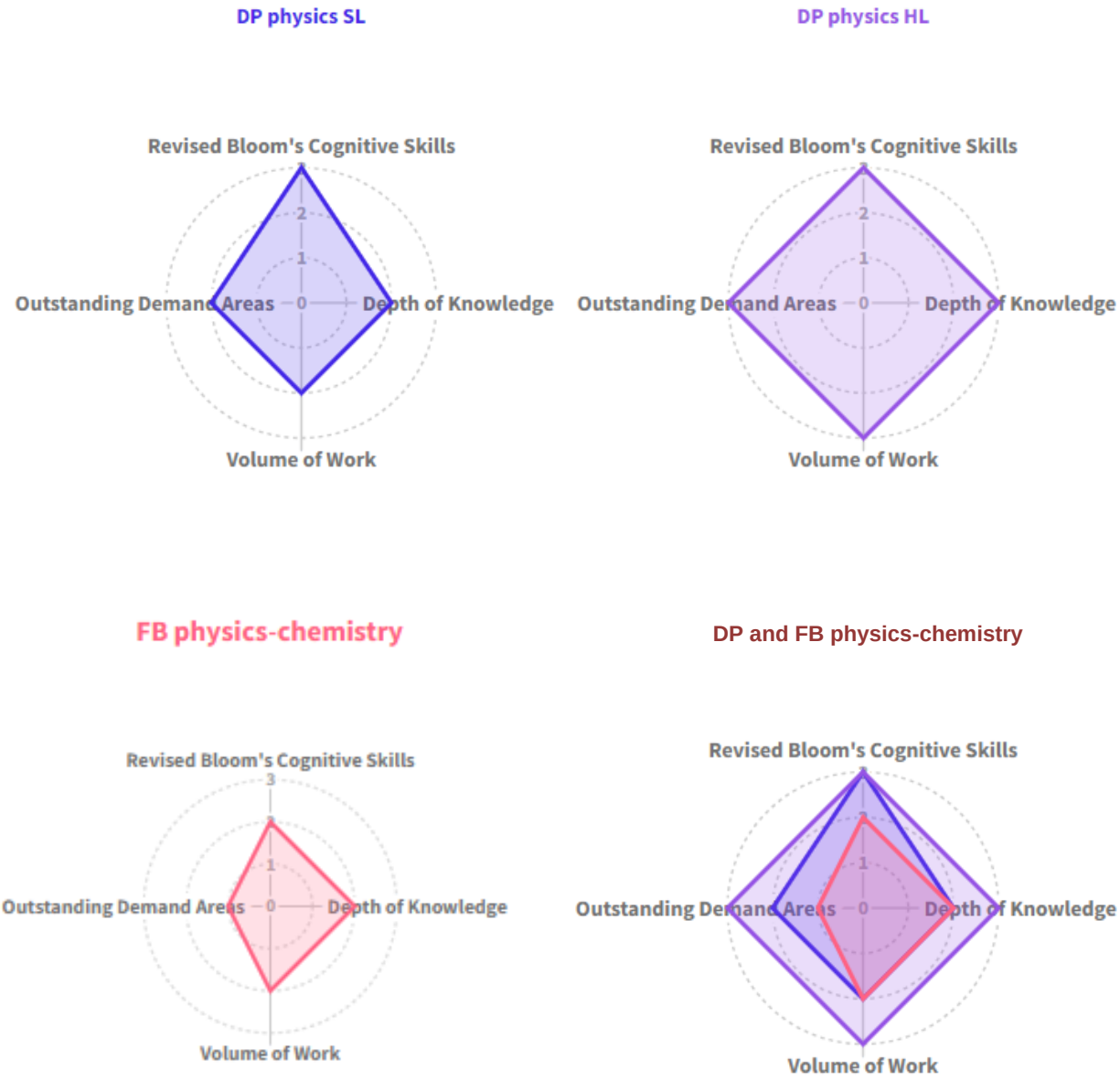
5.2.3 Demand – Physics

The DP and FB curricula were analysed using the same demand tool in order to create a demand profile for DP physics SL, DP physics HL and FB physics-chemistry. These demand

[91] As a combined subject, FB physics-chemistry does include additional chemistry topics which align with the DP chemistry subject instead – see Chemistry section of this report.

profiles are presented below in the form of radar diagrams, with the last diagram showing all profiles superimposed in one place, enabling immediate visual comparison.

Figure 14: Visual representations of subject demand



The panel of experts carried out a detailed analysis of each course and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - DP physics has the same learning outcomes for both SL and HL, meaning that these scores are the same. These were judged to merit a score of 3 due to the high levels of critical thinking, critical awareness and elements of synthesis and creation present in the majority of Aims and Assessment Objective 3.

  - For the FB physics-chemistry, a score of 2 was given. This was due to the presence of critical thinking and a large amount of analysis within the skills of the FB, as well as reference to students making predictions, and revising experimental procedures as necessary. However, there was not enough evidence of a strong presence of evaluation and synthesis to warrant a judgement of 3.

- Regarding the score for **Depth of Knowledge**:
  - DP physics SL was deemed to merit a score of 2 for depth of knowledge due to the mathematical pre-requisite skills and competences required to access the course, as well as the moderate to high level of cognitive complexity of the knowledge that students are expected to acquire. As to the HL course, the greater depth and additional opportunities provided for extended thinking in the additional higher level option topics pushed the score to a 3.
  - The FB physics-chemistry subject was given a score of 2 for the depth of knowledge category. The rationale behind this was that the skills of the FB require students to use some complex reasoning, and some content (electromagnetic and gravitational fields) allows for challenging and abstract thinking. However, evidence of frequent extended thinking and problem-solving was too limited to warrant a score of 3.

- Regarding the scores for **Volume of Work**:
  - The DP physics SL was judged to comprise a moderate-heavy workload (a score of 2) as students are exposed to multiple physics topics, with each topic being allocated a standard to short amount of time. The volume demands of the HL course, on the other hand, were found to be sufficient to meet a score of 3 as, even though the number of topics per hour is smaller, these topics are covered in great depth and with a focus on application.
  - A score of 2 was given for the FB physics-chemistry. There is a relatively high number of themes covered in the subject, and due to the coverage of both physics and chemistry together, this results in a short time allocation per theme. This also means that some level of time is spent on content beyond basic conceptual depth, though evidence that this was a substantial amount was not found, limiting the score to a 2.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
  - For the DP physics SL course (awarded a score of 2), the IA scientific investigation research project that students need to undertake, the linking questions outlined in the syllabus and the collaborative sciences project were considered to be areas of stretch. In addition to the latter, the HL course features additional higher-level topics which were deemed to include additional areas of stretch, meriting a score of 3.
  - The FB physics-chemistry was given a score of 1 for outstanding areas of demand. The transdisciplinary approach to teaching and coverage of thermodynamics were considered to make up 1 or 2 stretch areas, awarding it a score of 1.

5.3 Chemistry

Below is the list of subjects used in the chemistry subject comparison analysis.

DP chemistry[92]
Chemistry is a subject option offered within the DP sciences subject group, at both SL and HL. This subject has content that is common to both SL and HL, as well as AHL content that is featured only in the HL. Thus, the HL has greater breadth and depth than SL. This subject is designed to prepare students for university courses such as medicine, biological science and environmental science. HL is suitable for those intending to pursue further study in an area requiring a strong background in chemistry.

FB physics-chemistry
Physics-chemistry is a specialty subject on the FB *général*. It is a combined subject, where physics and chemistry are taught alongside one another, and is designed as a two-year subject – studied at *Première* and *Terminale* years – though students in the FB may choose to drop it in their second year. The subject aims to provide students with the appropriate knowledge and skills to prepare them for higher education in the fields of experimental sciences, medicine, technology, engineering, computer science, or mathematics. When both *Première* and *Terminale* years are studied, the subject places significant emphasis on promoting experimental practice and modelling, requiring students to draw on every day, real-life examples as well as forming links between different themes, and different subjects.

5.3.1 Learning Outcomes – Chemistry

This section compares and contrasts the learning outcomes of curricula falling within the category of physics.

The learning outcome themes for chemistry were extracted from the aims and assessment objectives of the DP sciences subject group, hence the themes are the same for biology chemistry and physics.

As, in the FB, chemistry is studied as part of the FB physics-chemistry combined subject, the learning outcomes of the FB physics-chemistry subject have been mapped against both the DP chemistry and DP physics subjects.

The FB physics-chemistry curriculum outlines specific “skills developed as part of scientific research”, of which there are five:

- S’approprier – this directly translates as “to appropriate” which means that students will be expected to ‘take ownership’ of something
- Analyser/Raisonner – to analyse/reason
- Réaliser – the direct translation of this results in “to realise”, which, in this context, would be where students are expected to create something, or make something happen.
- Valider – to validate
- Communiquer – to communicate

[92] International Baccalaureate. (2023). *Chemistry guide*.

These skills characterise the FB's scientific approach and "aim to structure the learning and assessment of students,[93] being a key focus throughout students" studies. Alongside these, the FB also provides some examples of associated capabilities. Finally, some additional skills are also discussed in the 'Preamble' section of the FB's documentation. As such, the FB's 'skills developed as part of scientific research', the associated capabilities, and the skills extracted from the Preamble have all been considered when mapping against the DP's learning outcome themes.

Once commencing the general pathway, all students will follow a common curriculum, as well as choose three speciality subjects. FB physics-chemistry is one of the speciality subjects that students may choose to pursue; however, after completing the first year (*Première*) of the subject, they have the option of ceasing their studies by dropping one speciality subject. Therefore, it may be the case that not all students will complete the full two-years of study in FB physics-chemistry. However, the skills outlined in the curricula for both the *Première* and *Terminale* years of FB physics-chemistry are the same; as such, these skills will be developed in all students, regardless of whether they choose to continue to study the subject in the *Terminale* year.

Since the FB physics-chemistry course has been used for comparison to the DP physics and chemistry courses, the 'skills developed' in the FB are the same. This means that the results of the learning outcomes comparison analysis are the same for chemistry as they are for physics. Therefore, this section includes the summary table again, followed by a shortened overview of the findings. Full detail on the comparison analysis of learning outcomes is available in 5.2.1 Learning Outcomes – Physics.

The following table demonstrates the learning outcome themes that were extracted from the DP learning outcomes and indicates if and where they were judged to have presence within the learning outcomes of the FB chemistry curricula.

Table 28: Presence of the DP sciences subject group learning outcome themes in the FB physics-chemistry curricula

Themes extracted from the learning outcomes of the DP sciences subject group	Presence in FB	
1. Conceptual understanding and making connections		Not present in skills, though the fundamental concept is briefly discussed in the Preamble.
2. Use and application of knowledge, methods, tools, and techniques that characterise science		Present in four out of the five skills.
3. Creativity and critical thinking (problem-solving, analysis, evaluation, synthesis)		Present in the 'appropriate', 'analyse/ reason' and 'validate' skills.
4. Apply skills necessary to carry out insightful and ethical investigations (planning, collecting data, organising, following ethical guidelines)		Present in three of the five skills.
5. Development of technological skills		Not present in skills but discussed in the Preamble of the course.
6. Effective collaboration and communication		Present in the 'communication' skill.
7. Awareness of global and local problems and the environmental, ethical, cultural, and social impact of science		Not present in skills, but some aspects are briefly discussed in the Preamble.

Key:

	This theme is well-evidenced in the learning outcomes of the FB.		*This theme is partially evidenced in the learning outcomes of FB.*		*This theme is not evident in the learning outcomes of the FB.*

Summary

As described above, all DP learning outcome themes are at least partially evidenced within the FB physics-chemistry curriculum. Some themes, such as techniques that characterise science and creativity and critical thinking, are clearly outlined and covered thoroughly. Others, such as the development of technological skills and the awareness of the wider impact of science, are more subtle and nuanced than they are in the DP. Certain aspects of these themes are clearly present, such as environmental impact, whereas others, such as the development of technology skills, can be inferred from other references within the 'Preamble' section of the curriculum.

5.3.2 Content – Chemistry

This section compares and contrasts the content of the DP and FB curricula falling within the category of chemistry. In order to support visual comparison at-a-glance, the DP and FB chemistry curricula are presented below in diagrams which show the key topics and subtopics included in each.

Figure 15: DP chemistry content visualiser[94]

Structure	**Structure 1. Models of the particulate nature of matter**	Structure 1.1 – Introduction to the particulate nature of matter	Structure 1.2 – The nuclear atom (SL + AHL)	Structure 1.3 – Electron Configurations (SL + AHL)	Structure 1.4 – Counting particles by mass: The mole	Structure 1.5 – Ideal gases
	Structure 2. Models of bonding and structure	Structure 2.1 – The ionic model	Structure 2.2 – The covalent model (SL + AHL)	Structure 2.3 – The metallic model (SL + AHL)	Structure 2.4 – From models to materials (SL + AHL)	
	Structure 3. Classification of matter	Structure 3.1 – The periodic table: Classification of elements (SL + AHL)	Structure 3.2 – Functional groups: Classification of organic Compounds (SL + AHL)			
Reactivity	**Reactivity 1. What drives chemical reactions?**	Reactivity 1.1 – Measuring enthalpy changes	Reactivity 1.2 – Energy cycles in reactions (SL + AHL)	Reactivity 1.3 – Energy from fuels	Reactivity 1.4 – Entropy and spontaneity (HL only)	
	Reactivity 2. How much, how fast and how far?	Reactivity 2.1 – How much? The amount of chemical change	Reactivity 2.2 – How fast? The rate of chemical change (SL + AHL)	Reactivity 2.3 – How far? The extent of chemical change (SL + AHL)		
	Reactivity 3. What are the mechanisms of chemical change?	Reactivity 3.1 – Proton transfer reactions (includes AHL)	Reactivity 3.2 – Electron transfer reactions (SL + AHL)	Reactivity 3.3 – Electron sharing reactions	Reactivity 3.4 – Electron-pair sharing reactions (SL + AHL)	
Experimental programme	Practical work	Collaborative sciences project	Scientific investigation			

[94] '(HL only)' and '(SL + AHL)' are used to flag, respectively, topics only taught at HL and topics taught at both SL and HL, but which also feature additional higher level content.

Figure 16: FB physics-chemistry content visualiser

Physics-chemistry ***Première***	**Constitution and Transformations of Matter**	1. Monitoring the evolution of a system, seat of a transformation	2. From the structure of entities to the physical properties of matter	3. Physico-chemical properties, synthesis and combustion of chemical organic species	
	Movement and Interactions	1. Fundamental interactions and introduction to the notion of field	2. Description of a fluid at rest	3. Movement of a system	
	Energy: conversions and transfers	1. Energetic aspects of electrical phenomena	2. Energetic aspects of mechanical phenomena		
	Waves and Signals	1. Mechanical Waves	2. Light: images and colours, wave and particle models		
Physics-chemistry ***Terminale***	**Constitutions and Transformations of Matter**	1. Determine the composition of a system by physical and chemical methods	2. Modeling the temporal evolution of a system, seat of a transformation	3. Predicting the final state of system, the site of chemical transformation	4. Develop strategies in organic synthesis
	Movement and Interactions	1. Describe a movement	2. Link the actions applied to a system to its movement	3. Model the flow of a fluid	
	Energy: conversions and transfers	1. Describe a thermodynamic system: example of the perfect gas model	2. Carry out energy balances on a system: the first principle of thermodynamics		
	Waves and Signals	1. Characterise wave phenomena	2. Forming images, describing light by a flux of photons	3. Study the dynamics of an electrical system	

Structure

Both DP chemistry and FB physics-chemistry are designed as two-year subjects, with both offering the opportunity for students to study chemistry at different levels – i.e. the FB by allowing students to choose whether to continue to study the FB physics-chemistry subject in the *Terminale* year; the DP by offering students the opportunity to study DP chemistry at either SL or HL.

One notable difference between the structure of the chemistry subject area in the DP and FB is that in the latter chemistry is taught as part of the FB physics-chemistry subject. In contrast, chemistry and physics content are covered in separate subjects in the DP – i.e. DP chemistry and DP physics, respectively.

Like the DP chemistry subject, FB physics-chemistry is divided into overarching themes of study. In the latter's case, the subject is divided into four themes that cover both chemistry and physics content, namely: Constitution and Transformations of Matter, Movement and Interactions, Energy: Conversions and Transfers, and Waves and Signals. These themes are designed to promote a transdisciplinary approach and encourage real-life application.

In turn, the DP chemistry subject is designed through a concept-based approach and organised into two overarching, discipline-specific topics – Structure and Reactivity. Each of these topics covers various key areas within them and is further divided into subtopics. Overall, DP chemistry SL consists of 22 subtopics, while the DP chemistry HL extends learning in 13 of the 22 subtopics and contains one additional HL-only subtopic.

The FB physics-chemistry subject builds on the prerequisite scientific understanding obtained in the *Seconde* year of study. In contrast, the two routes through DP chemistry do not detail specific knowledge prerequisites, allowing students from a variety of backgrounds to access both DP chemistry SL and HL; however, in the case of the latter, students are recommended to have 'some previous exposure to formal science education', either through having 'undertaken the IB Middle Years Programme (MYP) or studied an equivalent national science qualification or a school-based science course'.[95]

Content alignment

The table below represents a simplified summary of the FB's content alignment, at topic-level, with DP chemistry (SL and HL).

Table 29: Summary of content alignment between the DP chemistry topics and the FB physics-chemistry

DP chemistry topics	Presence of SL content in FB physics-chemistry	Presence of AHL content in FB physics-chemistry
Structure 1. Models of the particulate nature of matter		
Structure 1.1 – Introduction to the particulate nature of matter		N/A
Structure 1.2 – The nuclear atom		
Structure 1.3 – Electron configurations		
Structure 1.4 – Counting principles by mass: The mole		N/A

[95] International Baccalaureate (2023) *Chemistry Guide* p.18

Structure 1.5 – Ideal gases		N/A
Structure 2. Models of bonding and structure		
Structure 2.1 – The ionic model		N/A
Structure 2.2 – The covalent model		
Structure 2.3 – The metallic model		
Structure 2.4 – From models to materials		
Structure 3. Classification of matter		
Structure 3.1 – The periodic table: Classification of elements		
Structure 3.2 – Functional groups: Classification of organic compounds		
Reactivity 1. What drives chemical reactions?		
Reactivity 1.1 – Measuring enthalpy changes		N/A
Reactivity 1.2 – Energy cycles in reactions		
Reactivity 1.3 – Energy from fuels		N/A
Reactivity 1.4 – Entropy and spontaneity (AHL only)	N/A	
Reactivity 2. How much, how fast and how far?		
Reactivity 2.1 – How much? The amount of chemical change		N/A
Reactivity 2.2 – How fast? The rate of chemical change		
Reactivity 2.3 – How far? The extent of chemical change		
Reactivity 3. What are the mechanisms of chemical change?		
Reactivity 3.1 – Proton transfer reactions		
Reactivity 3.2 – Electron transfer reactions		
Reactivity 3.3 – Electron sharing reactions		N/A
Reactivity 3.4 – Electron-pair sharing reactions		
Experimental programme		

Key:

	Strong presence of this topic in the FB.		*Partial presence of this topic in the FB.*		*Little or no presence of this topic in the FB.*	N/A	*This topic does not exist at the respective level.*

NB: Where applicable, content alignments found in pre-requisite subjects are carried forwards and combined with new alignments to represent the cumulative content covered.

As mentioned above, the DP chemistry SL consists of 22 subtopics. The FB physics-chemistry subject covers the large majority (19) of these subtopics in similar depth and detail, including Models of bonding and structure and Classification of matter.

There are three subtopics that are not covered in the same level of detail as that found in DP chemistry SL, which are: Structure 2.4 – From models to materials, Reactivity 1.2 – Energy cycles in reactions and Reactivity 3.3 – Electron sharing reactions. For 2.4 – From models to materials, the FB physics-chemistry covers polymers, but, unlike the DP, does not include coverage of alloys. For Reactivity 1.2 – Energy cycle in reactions, energy requirements for bond making and breaking are covered, but Hess's law is not covered to the same extent. Finally, for Reactivity 3.3 – Electron sharing reactions, the FB does cover electron sharing reactions, but does not cover free radical substitution, which is present in the DP.

As for comparison to DP chemistry HL, the FB physics-chemistry subject covers four AHL subtopics in similar depth and detail; these are: Structure 2.3 and 2.4, Reactivity 2.3 and 3.1. FB physics-chemistry also partially covers seven HL subtopics – Structure 1.2, 2.2, 3.1, 3.2 and Reactivity 2.2, 3.2 and 3.4 – but features less depth and detail in its coverage of these. For example, the DP chemistry HL covers Rate constants and the Arrhenius equation, which is not present in the FB physics-chemistry curriculum.

There are three DP chemistry AHL topics that are not covered in the FB physics-chemistry subject: Structure 1.3, Reactivity 1.2, Reactivity 1.4. FB physics-chemistry does not cover any additional chemistry content that is not included in the DP chemistry subject.[96]

FB physics-chemistry subject has similar subject breadth to the DP chemistry SL, though it lacks depth in four subtopics. It has notably less subject depth than the DP chemistry HL, with seven AHL topics having only a partial presence in the FB physics-chemistry. There is greater subject breadth in DP chemistry HL, as there are three subtopics that are altogether absent from the FB physics-chemistry subject.

Table 30: FB physics-chemistry content which is not covered in the DP

Significant FB chemistry content which is not included in the DP*
• There is no significant chemistry content in the FB that is not included in the DP.

*The FB physics-chemistry subject also contains physics content – see section 5.2.1. Notably, 'significant content' does not include topics which are typically studied *prior* to upper secondary.

In summary, when comparing the chemistry content covered by FB physics-chemistry in both *Première* and *Terminale*, they align to a similar breadth and depth as that found in DP chemistry SL. The main difference is that the chemistry content in FB physics-chemistry is taught in combination with physics, whereas physics and chemistry are taught as discrete subjects with the DP.

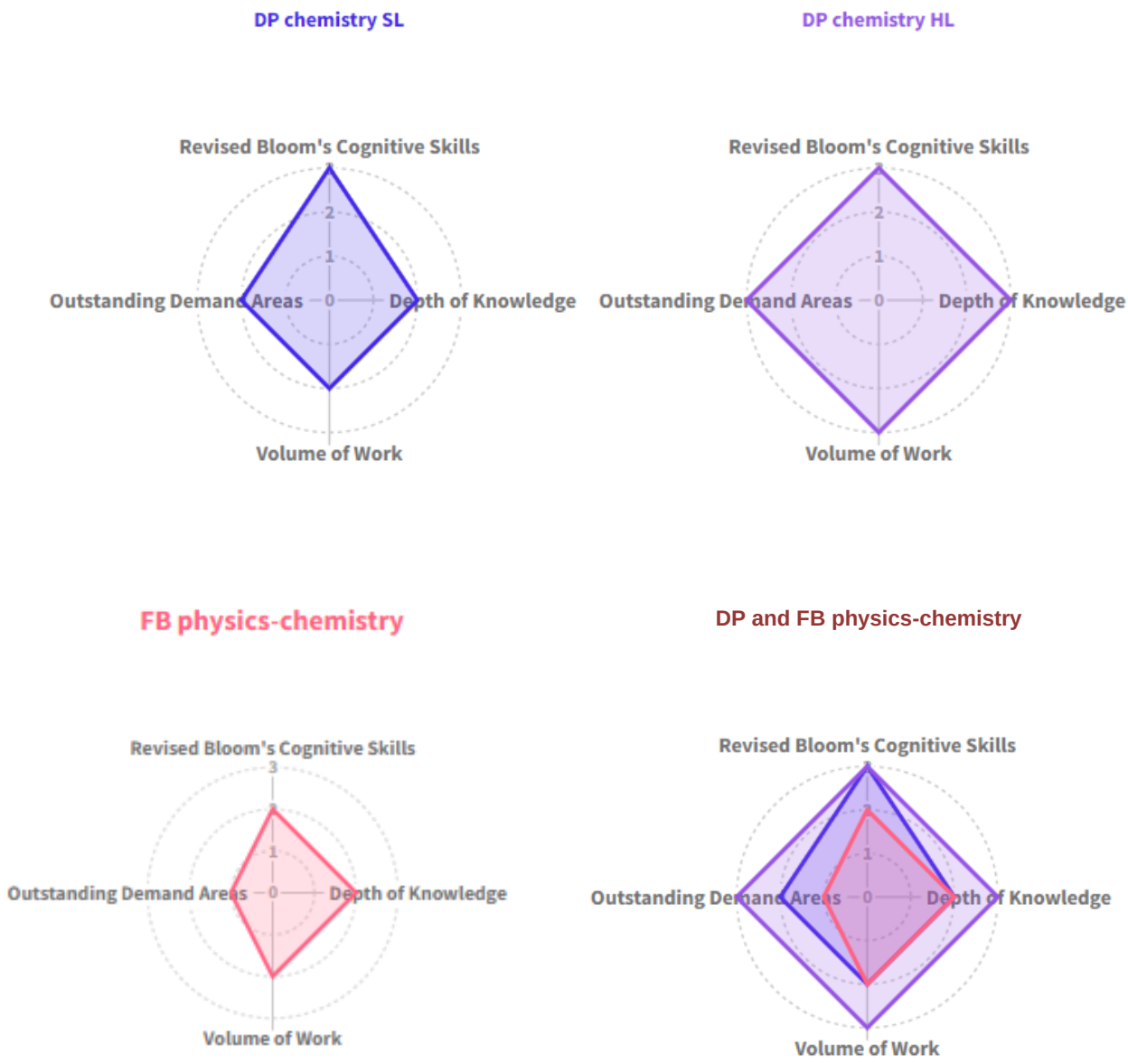
When compared to DP chemistry HL, there is considerably less depth and breadth in the chemistry content of the FB physics-chemistry, with seven AHL subtopics being covered in less depth and detail and three topics being fully absent.

5.3.3 Demand – Chemistry

The DP and FB curricula were analysed using the same demand tool in order to create a demand profile for DP chemistry SL, DP chemistry HL and FB physics-chemistry. These demand profiles are presented below in the form of radar diagrams, with the last diagram showing all profiles superimposed in one place, enabling immediate visual comparison.

[96] As a combined subject, FB physics-chemistry does include additional physics topics which align with the DP physics subject instead – see Physics section of this report.

Figure 17: Visual representations of subject demand



The panel of experts carried out a detailed analysis of each course and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - DP physics has the same learning outcomes for both SL and HL, meaning that these scores are the same. These were judged to merit a score of 3 due to the high levels of critical thinking, critical awareness and elements of synthesis and creation present in the majority of Aims and Assessment Objective 3.
  - For FB physics-chemistry, a score of 2 was given. This was due to the presence of critical thinking and a large amount of analysis within the skills of the FB, as well as the mention of students making predictions, and revising experimental

procedures as necessary. However, there was not enough evidence of a strong presence of evaluation and synthesis to warrant a judgement of 3.

- Regarding the score for **Depth of Knowledge**:
  - DP chemistry SL was deemed to merit a score of 2 for depth of knowledge due to the mathematical pre-requisite skills and competences required to access the course, as well as the moderate to high level of cognitive complexity of the knowledge that students are expected to acquire. As to the HL course, the greater depth and additional opportunities provided for extended thinking in the additional higher level option topics pushed the score to a 3.
  - The FB physics-chemistry course was given a score of 2 for the depth of knowledge category. The reasoning behind this was that FB requires students to use some complex reasoning, and some content (electromagnetic and gravitational fields) allows for challenging and abstract thinking. However, insufficient evidence of extended thinking and problem-solving was found to warrant a score of 3.

- Regarding the scores for **Volume of Work**:
  - The DP chemistry SL was judged to comprise a moderate-heavy workload (a score of 2) as students are exposed to multiple physics topics, with each topic being allocated a standard to short time amount of time. The volume demands of the HL course, on the other hand, were found to be sufficient to meet a score of 3 as, even though the number of topics per hour is smaller, these topics are covered in great depth and with a focus on application.
  - A score of 2 was given to FB physics-chemistry. There is a relatively high number of themes covered in the course, and due to the coverage of both physics and chemistry together, this results in a short time allocation per theme. This also means that some amount of time is dedicated to content beyond basic conceptual depth, warranting a score of 2.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
  - For the DP chemistry SL course (awarded a score of 2), the IA scientific investigation research project that students need to undertake, the linking questions outlined in the syllabus and the collaborative sciences project were considered to be areas of stretch. In addition to the latter, the HL course features additional higher-level topics which were deemed to include additional areas of stretch, meriting a score of 3.
  - The FB physics-chemistry was given a score of 1 for outstanding areas of demand. The transdisciplinary approach to teaching and coverage of thermodynamics were considered to make up 1 or 2 stretch areas, awarding it a score of 1.

5.4 Biology

Below is the list of subjects used in the biology subject comparison analysis.

DP biology[97]
Biology is a subject option within the DP sciences subject group, offered at both SL and HL. This subject has content that is common to both SL and HL, as well as AHL content for HL. Thus, HL has greater breadth and depth than SL. This subject is designed to prepare students for university courses such as biology, medicine, dentistry, and biomedical engineering. HL is suitable for those intending to pursue further study in an area requiring a strong background in biology.

FB life and earth sciences
Life and earth sciences is a specialty subject on the FB *général*. It is a combined subject, bringing together biology, geology and environmental sciences content, and is designed as a two-year subject – studied at *Première* and *Terminale* years – though students in the FB may choose to drop it in their second year. The subject aims to provide students with the appropriate knowledge and skills to prepare them for further study in the disciplines of biology, geology and environmental sciences and scientific careers more broadly. The subject promotes the development of scientific approach skills and associated capabilities in both the *Première* and *Terminale* years.

5.4.1 Learning Outcomes – Biology

This section compares and contrasts the learning outcomes of curricula falling within the category of biology.

The learning outcome themes for biology were extracted from the aims and assessment objectives of the DP sciences subject group, hence the themes are the same for biology chemistry and physics.

The FB life and earth sciences subject outlines specific ‘Skills developed as part of scientific research’, of which there are five:

- Pratiquer des démarches scientifiques - Practice scientific methods
- Concevoir, créer, réaliser - Design, create, realise
- Utiliser des outils et mobiliser des méthodes pour apprendre - Use tools and mobilise methods to learn
- Pratiquer des langages - Practice languages
- Adopter un comportement éthique et responsable - Adopt an ethical and responsible behaviour.

These skills characterise the FB’s scientific approach, being a key focus throughout students’ studies. Alongside these, the FB also provides some examples of associated capabilities. Finally, some additional skills are also discussed in the ‘Preamble’ section of the FB’s documentation. As such, the FB’s ‘skills developed as part of scientific research’, the

[97] International Baccalaureate. (2023). *Biology guide*.

associated capabilities, and the skills extracted from the Preamble have all been considered when mapping against the DP's learning outcome themes.

Once commencing the general pathway, all students will follow a common curriculum, as well as choose three speciality subjects. FB life and earth sciences is one of the speciality subjects that students may choose to pursue; however, after completing the first year (*Première*) of the subject, they have the option of ceasing their studies by dropping one speciality subject. Therefore, it may be the case that not all students will complete the full two-years of study in FB life and earth sciences. However, the skills outlined in the curricula for both *Première* and *Terminale* years of the FB life and earth sciences are the same, therefore these skills will be developed in all students, regardless of whether they choose to continue to study the subject in the *Terminale* year.

The following table demonstrates the learning outcome themes that were extracted from the DP learning outcomes and indicates if and where they were judged to have presence within the learning outcomes of the FB life and earth sciences curriculum.

Table 31: Presence of the DP sciences subject group learning outcome themes in the FB life and earth sciences curricula

Themes extracted from the learning outcomes of the DP sciences subject group	Presence in FB life and earth sciences	
1. Conceptual understanding and making connections		Present in the 'Practice scientific methods' skill.
2. Use and application of knowledge, methods, tools, and techniques that characterise science		Present in the 'Practice scientific methods' and 'Design, create, realise' skill.
3. Creativity and critical thinking (problem-solving, analysis, evaluation, synthesis)		Somewhat present in the 'Practice scientific methods' skill. Reference to problem-solving, but not analysis or evaluation.
4. Apply skills necessary to carry out insightful and ethical investigations (planning, collecting data, organising, following ethical guidelines)		Present in the 'Practice scientific methods' and 'Design, create, realise' skill.
5. Development of technological skills		Present in the 'practice languages' skill
6. Effective collaboration and communication		Present in the 'practice languages' skill
7. Awareness of global and local problems and the environmental, ethical, cultural, and social impact of science		Somewhat present. The environmental aspect found in the 'Adopt an ethical and responsible behaviour' skill. Ethical, cultural and social impact not evident.

Key:

	This theme is well-evidenced in the skills of the FB.		*This theme is partially evidenced in the skills of FB.*		*This theme is not evident in the skills of the FB.*

Presence of the DP's Learning Outcome Themes

As can be seen in the table above, all learning outcome themes extracted from the DP are at least partially evidenced in the FB life and earth sciences curriculum. Some themes are

present across more than one skill, others are reflected in only one. However, overall, the FB life and earth sciences subject focuses on similar skills to those covered in DP biology.

1. Conceptual understanding and making connections

The associated capacities described next to each skill in the FB curriculum show the presence of this theme within the 'practice scientific methods' skill. Here, it is stated that students will "understand that an effect can have several causes" and be able to "distinguish between what is a belief or an opinion and what constitutes scientific knowledge".[98] Whilst there is no specific reference to 'concepts' or 'connections', in order for students to appreciate that one thing can be caused by multiple others, students will have to connect ideas together – possibly from different areas of the curriculum. For example, cancer may be caused by genetic mutations, inherited factors, or environmental factors, and in order to describe and explain this clearly, students would have to link many different ideas to cancer as a singular effect.

To successfully "distinguish between what is a belief or an opinion and what constitutes scientific knowledge", students must have strong conceptual understanding and be confident in their ability to determine whether something is an opinion or a fact. For example, scientific facts are, by definition, verifiable through experimentation and research. To be able to apply this logic, it would be essential that students have thorough understanding of the concepts involved, how to ascertain their validity, and therefore identify them as opinion/belief or scientific fact.

This theme is further highlighted in the 'Preamble' section of the FB life and earth science *Première* curriculum. A paragraph details that students will "integrate into their practices the achievements of other scientific disciplines, in particular physics-chemistry and computer science, and use the concepts of mathematical tools".[99] This is then expanded on to outline the importance of using scientific language consistently across disciplines to support students' understanding.

2. Use and application of knowledge, methods, tools, and techniques that characterise science

Two of the skills in the FB life and earth sciences curriculum show aspects of the use of techniques that characterise science. Within the 'practise scientific methods' skill, there is description of students needing to "Observe, question, formulate a hypothesis [and] experiment", all of which are fundamental components of scientific study. This skill then continues by stating the importance of being able to "interpret results and draw conclusions".[100] Within the 'design, create, realise' skill, students are required to "implement a scientific approach",[101] using tools, concepts, techniques and/or models that they identify as being appropriate for the task. To successfully demonstrate this skill, students would have to apply their knowledge in order to select the most suitable approach for the particular task, as well as the correct use of tools and scientific techniques. This demonstrates similarity between this DP learning outcome theme and the skills outlined in the FB.

[98] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première générale',* p. 4. Available at: www.education.gouv.fr [accessed July 2023]
[99] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première générale',* p. 3. Available at: www.education.gouv.fr [accessed July 2023]
[100] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première générale',* p. 4. Available at: www.education.gouv.fr [accessed July 2023]
[101] ibid

3. Creativity and critical thinking (problem-solving, analysis, evaluation, synthesis)

This theme is present to some extent in the skills within the FB, specifically the 'practise scientific methods' skill. The statement "Formulate and solve a scientific problem. Design and implement resolution strategies"[102] demonstrates that students will be creatively finding solutions to problems. However, there is no explicit reference to analysis, evaluation and synthesis within any of the 'skills developed'.

Although critical thinking is not specifically mentioned within the FB skills, the 'Preamble' of the FB life and earth sciences' curriculum document does describe how "the exercise of critical thinking is particularly necessary".[103] Therefore, although this theme is somewhat present in the FB curriculum, it is not emphasised to the same extent as in the DP.

4. Apply skills necessary to carry out insightful and ethical investigations

Once again, this theme can be seen within the 'practice scientific methods' skill in the FB. In addition to its connection to the second theme, described above, the requirement of students to "observe, question, formulate a hypothesis, deduce its testable consequences, experiment…interpret results and draw conclusions"[104] is the epitome of scientific study.

The inclusion of experiments is also described in the 'Preamble' section of the FB curriculum document Here, it is stated that "experimental activities occupy a central place"[105] in the curriculum, implying that there will be a heavy emphasis on scientific investigations within the teaching of this curriculum.

5. Development of technological skills

This theme is present within the 'practice languages' skill of the FB: "Use digital tools. Use data acquisition, simulation and processing software".[106] The reference to 'digital' aspects shows that not only will technology be used, but it is possible that a range of software and digital components will be utilised. This skill goes further to mention that students will "use data acquisition, simulation and processing software"[107] which suggests that aspects of technology will be used in gathering results and data from scientific experiments.

Reference to this theme is also found within the 'Preamble' of the FB curriculum document. Here, it is stated that the teaching of FB life and earth sciences should be "in touch with the rapid evolution of knowledge and technologies",[108] demonstrating an awareness that technologies change and students must be taught a curriculum that includes this. There is also a section of the 'Preamble' that is devoted to describing the digital tools that will be used within the course, including; the internet, spreadsheets, computer-assisted experimentation, sensors connected to microcontrollers, databases, geoscientific information systems, digital modelling and programming. The extensive list of various technological aspects within the 'Preamble' and the 'skills developed' themselves shows that this DP theme is thoroughly evidenced in the FB life and earth science subject.

[102] ibid
[103] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première Terminale',* p. 2. Available at: www.education.gouv.fr [accessed July 2023]
[104] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première générale',* p. 4. Available at: www.education.gouv.fr [accessed July 2023]
[105] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de de sciences de la vie et de la Terre de Première générale',* p. 3. Available at: www.education.gouv.fr [accessed July 2023]
[106] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de sciences de la vie et de la Terre de Première Terminale',* p. 5. Available at: www.education.gouv.fr [accessed July 2023]
[107] ibid
[108] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 2. Available at: www.education.gouv.fr [accessed July 2023]

6. Effective collaboration and communication

There are two skills in the FB curriculum that demonstrate the presence of this theme. The first is: 'use tools and mobilise methods to learn' states how students will "cooperate and collaborate within the framework of project approaches".[109] This implies that students will be carrying out group or project work and will need to work together and collaborate effectively to ensure the project's successful completion.

The second skill, entitled 'practice languages', describes how students will "communicate in a scientifically appropriate language". Although this does not mention the audience or context, the fundamental aspects of communicating, and the focus of this communication including scientifically appropriate language, reflects the DP's theme of effective communication.

7. Awareness of global and local problems and the environmental, ethical, cultural, and social impact of science

The environmental component of this theme is very clearly outlined in the 'adopt an ethical and responsible behaviour' skill. Students will not only "identify the impacts (benefits and harms) of human activities on environment",[110] but also understand their responsibilities, both "individual and collective", for preserving the planet's resources. These resources are further detailed to be referencing biodiversity, energy resources and mineral resources, which therefore shows that the FB life and earth sciences subject recognises the need for students to respect and play an active role in protecting the world around us.

Within the FB curriculum, there is no specific reference to the other areas within this theme, i.e. the ethical, cultural and social impact of science. Therefore, while the environmental aspect is well covered, there is only partial alignment with this DP theme overall.

Other Themes in the FB

All learning outcome themes within the DP are present in the FB life and earth sciences curriculum. Whilst there are no unique learning outcome themes in the FB, there are slightly some skills have a slightly different weighting from the DP. For example, the communication and collaboration DP theme is demonstrated well, however the FB goes further by emphasising the need for students to 'convince' others. There is particular focus on the ability of students to change someone else's thinking through good oral presentation and argumentation. It is understandable that these aspects are focused on in the FB as students must undertake an oral test as part of the FB, therefore oral presentation skills are essential.

Summary

The DP learning outcome themes are all present in the FB life and earth sciences curriculum within the 'skills developed as part of scientific research' or described in the 'Preamble' sections of the documentation. Some themes are not as emphasised as others; for instance, creativity and critical thinking is less apparent in the FB than in the DP. Moreover, whilst the environmental aspect of theme seven (awareness of the impact of science) is strongly present in the FB, other areas of this theme (ethical, cultural and social) are less evidenced. It may be that these aspects are covered through delivery of the FB subject, however, there is no specific reference to them within the curriculum documentation.

[109] Ministère de l'Éducation nationale et de la Jeunesse (2023). *'Annexe Programme de physique-chimie de Première générale',* p. 4. Available at: www.education.gouv.fr [accessed July 2023]
[110] ibid

5.4.2 Content – Biology

This section compares and contrasts the content of the DP and FB curricula falling within the category of biology. In order to support visual comparison at-a-glance, the DP and FB life and earth sciences curricula are presented below in diagrams which show the key topics and subtopics included in each.

Figure 18: DP biology content visualiser[111]

A: Unity and diversity	**1. Molecules**	A1.1 Water (SL + AHL)	A1.2 Nucleic acids (SL + AHL)	
	2. Cells	A2.1 Origins of cells (HL only)	A2.2 Cell structure (SL + AHL)	A2.3 Viruses (HL only)
	3. Organisms	A3.1 Diversity of Organisms (SL + AHL)	A3.2 Classification and cladistics (HL only)	
	4. Ecosystems	A4.1 Evolution and speciation (SL + AHL)	A4.2 Conservation and biodiversity	
B: Form and function	**1. Molecules**	B1.1 Carbohydrates and lipids	B1.2 Proteins (SL + AHL)	
	2. Cells	B2.1 Membranes and membrane transport (SL + AHL)	B2.2 Organelles and compartmentalization (SL + AHL)	B2.3 Cell specialization (SL + AHL)
	3. Organisms	B3.1 Gas exchange (SL + AHL)	B3.2 Transport (SL + AHL)	B3.3 Muscle and mobility (HL only)
	4. Ecosystems	B4.1 Adaptation to environment	B4.2 Ecological niches	
C: Interaction and independence	**1. Molecules**	C1.1 Enzymes and metabolism (SL + AHL)	C1.2 Cell respiration (SL + AHL)	C1.3 Photosynthesis (SL + AHL)
	2. Cells	C2.1 Chemical signalling (HL only)	C2.2 Neural signalling (SL + AHL)	
	3. Organisms	C3.1 Integration of body systems (SL + AHL)	C3.2 Defence against disease	
	4. Ecosystems	C4.1 Populations and communities	C4.2 Transfers of energy and matter	
D: Continuity and change	**1. Molecules**	D1.1 DNA replication (SL + AHL)	D1.2 Protein synthesis (SL + AHL)	D1.3 Mutations and gene editing (SL + AHL)
	2. Cells	D2.1 Cell and nuclear division (SL + AHL)	D2.2 Gene expression (HL only)	D2.3 Water potential (SL + AHL)
	3. Organisms	D3.1 Reproduction (SL + AHL)	D3.2 Inheritance (SL + AHL)	D3.3 Homeostasis (SL + AHL)
	4. Ecosystems	D4.1 Natural selection (SL + AHL)	D4.2 Sustainability and change (SL + AHL)	D4.3 Climate change (SL + AHL)
Experimental programme	Practical work	Collaborative sciences project	Scientific investigation	

[111] '(HL only)' and '(SL + AHL)' are used to flag, respectively, topics only taught at HL and topics taught at both SL and HL, but which also feature additional higher level content.

Figure 19: FB life and earth sciences content visualiser

Life and earth sciences ***Première***	**Life and the organisation of living things**	Eukaryotic cells, cell division, DNA replication	DNA mutations and the genome	Inheritance	Enzymes and catalysts
	The Internal Dynamics of the Earth	The structure of the Earth	Seismological and thermal studies	The lithosphere	The dynamics of convergence and divergence zones
	Contemporary Issues of the Planet	Ecosystems and environments	The management of ecosystems		
	Human Body and Health	Mutations and inherited diseases	Mutations and cancer	Bacterial genetics and antibiotic resistance	The Immune System
Life and earth sciences ***Terminale***	**Life and the organization of living things**	Genetics and evolution, the origin of genotypes	Horizontal gene transfers and endosymbioses	Population genetics	The diversity of living organisms
	The geological past of our planet	Time and rocks	Traces of Earth's turbulent past		
	Contemporary planet issues	From the wild to the domesticated plant	The organization of flowering plants	The plant, producer of organic matter	Reproduction and domestication of plants
	The Earth's climate	Understanding the past	The consequences of global warming		
	Human Body and Health	Behaviour, movement and the nervous system	Muscle contraction	The organism and responses to stress	

Structure

Both DP biology and FB life and earth sciences are designed as two-year subjects, with both offering the opportunity for students to study biology at different levels – i.e. the FB by allowing students to choose whether to continue to study the FB life and earth sciences subject in the *Terminale* year; the DP by offering students the opportunity to study DP biology at either SL or HL.

One notable difference between the structure of the study of biology in the DP and FB is that in the latter biology is taught as part of the FB life and earth sciences subject. Although DP biology covers some environmental sciences content, such as D4.3 Climate, biology is studied primarily as a single-subject course in the DP.

The DP biology subject is designed through a concept-based approach and organised into four over-arching, discipline-specific themes – Unity and Diversity, Form and Function, Interaction and interdependence and Continuity and Change. Each of these themes is divided into four levels of organisation; Molecules, Cells, Organisms and Ecosystems. These four themes are subdivided into four levels of organisation, which provides 16 topics which are further divided into subtopics. Overall, DP biology SL consists of 16 topics which are divided into 34 subtopics, while the DP HL biology extends learning in 14 of the 16 topics, and more specifically in 27 of the 34 subtopics and it also contains six additional HL-only subtopics.

In turn, the FB life and earth sciences content is organised into three main themes: 'Earth, life and evolution', 'contemporary issues of the planet' and 'the human body and health'. All themes draw on daily-life situations and require the use of critical thinking to explore potential solutions to large-scale, real-world problems.

Content Alignment

The table below represents a simplified summary of the FB's content alignment, at topic-level, with DP biology (SL and HL).

Table 32: Summary of content alignment between the DP biology topics and the FB

DP biology topics	Presence of SL content in FB life and earth sciences	Presence of AHL content in FB life and earth sciences
A1 Unity and diversity – Molecules		
A2 Unity and diversity – Cells		
A3 Unity and diversity – Organisms		
A4 Unity and diversity – Ecosystems		
B1 Form and function – Molecules		
B2 Form and function – Cells		
B3 Form and function – Organisms		
B4 Form and function – Ecosystems		N/A
C1 Interaction and independence – Molecules		
C2 Interaction and independence – Cells		
C3 Interaction and independence – Organisms		
C4 Interaction and independence – Ecosystems		N/A
D1 Continuity and change – Molecules		
D2 Continuity and change – Cells		
D3 Continuity and change – Organisms		
D4 Continuity and change – Climate Change		

Experimental programme	

Key:

	Strong presence of this topic in the FB.		*Partial presence of this topic in the FB.*		*Little or no presence of this topic in the FB.*	N/A	*This topic does not exist at the respective level.*

NB: Where applicable, content alignments found in pre-requisite subjects are carried forwards and combined with new alignments to represent the cumulative content covered.

FB life and earth sciences covers the vast majority of DP biology SL content to a similar depth, with exception of three topics: B3 Form and function – Organisms, B4 Form and function – Ecosystems and D2 Continuity and change – Cells. Within the 'Organisms' section of B3 Form and function, the FB earth and life sciences covers the structure of arteries and veins but does not include the adaptations of xylem vessels, which is present in the DP. Of the D2 Continuity and Change – Cells topics, the FB earth and life sciences does not cover medical applications of isotonic solutions.

As to comparison with DP biology HL, the FB earth and life sciences covers only the Climate change topic of D4 Continuity and change to a similar depth and level of detail. The FB earth and life sciences also partially covers ten HL topics: A1 and A2 from Unity and Diversity, B1 and B3 from Form and Function, C1, C2, C3 and C4 from Interaction and Independence, and D1, D3 and D4 from Continuity and change. However, the FB's coverage of these DP topics is partial, as the latter includes less depth and level of detail than the DP – for example, DP biology HL covers the molecular mechanisms of photosynthesis, which is not found in the FB curriculum. There are also three DP biology HL topics that are not covered in the FB earth and life science, namely: A3 and A4 from Unity and diversity, and B2 from Form and Function. Moreover, the FB earth and life science does not cover any additional biology content that is not included in the DP; nonetheless, as a combined course, it does include additional earth science topics that are not included in DP biology.

The FB life and earth science has similar breadth and depth in the biology topics as the DP biology SL. It has considerably less subject depth that the DP biology HL, with most AHL topics having only partial presence in the FB. There is also greater subject breadth in the DP biology HL, as there are three AHL topics that are entirely absent from the FB life and earth science subject.

Table 33: FB biology content which is not covered in the DP

Significant FB biology content which is not included in the DP*
○ Earth Science topics only

*Significant content mostly does not include topics which are typically studied *prior* to upper secondary.

In summary, the biology content studied in the FB life and earth sciences subject has similar breadth to that of DP biology SL subject, and a similar depth too. In turn, compared to the DP biology HL, the biology content covered in FB earth and life science has somewhat less breadth and significantly less depth.

5.4.3 Demand – Biology

The DP and FB curricula were analysed using the same demand tool in order to create a demand profile for DP biology SL, DP biology HL and the FB life and earth sciences. These demand profiles are presented below in the form of radar diagrams, with the last diagram showing all profiles superimposed in one place, enabling immediate visual comparison.

Figure 20: Visual representations of subject demand

The panel of experts carried out a detailed analysis of each course and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - DP biology has the same learning outcomes for both SL and HL, meaning that these scores are the same. These were judged to merit a score of 3 due to the high

levels of critical thinking, critical awareness and elements of synthesis and creation present in the majority of Aims and Assessment Objective 3.
    - A score of 2 was awarded to FB life and earth sciences. This is due to there being a strong presence of analysis in the 'skills developed', and some reference to synthesis and design. However, creativity and evaluation were not found to be predominant, therefore a score of 3 could not be awarded.

- Regarding the score for **Depth of Knowledge**:
    - DP biology SL was deemed to merit a score of 2 for depth of knowledge due to the pre-requisite skills and competences (e.g. interpretation of graphs data, mathematics skills, some chemistry and geography links) required to access the course, as well as the moderate to high level of cognitive complexity of the knowledge that students are expected to acquire. As to the HL course, the greater depth and additional opportunities provided for extended thinking in the additional HL topics pushed the score to a 3.
    - The FB life and earth sciences was given a score of 2 for depth of knowledge. The presence of analysis within the FB 'skills developed' and some content areas suggest that some time is spent beyond foundational knowledge and understanding. However, the cognitive demands of the FB are often not complex and abstract, preventing a score of 3.

- Regarding the scores for **Volume of Work**:
    - The DP biology SL was judged to comprise a moderate-heavy workload (a score of 2) as students are exposed to multiple biology topics, with each topic being allocated a standard to short amount of time. The volume demands of the HL course, on the other hand, were found to be sufficient to meet a score of 3 – even though the proportion of topics per allocated teaching hour is smaller, these topics are covered in great depth and with a focus on application.
    - A score of 2 was given to the FB life and earth sciences for the volume of work category. The relatively high number of themes within the subject, coupled with the teaching of physics and chemistry together, results in a standard to short time allocation per theme. Although some time is spent on issues beyond basic conceptual depth, this is not the majority of the course; therefore, a judgement of 2 was reached.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
    - For the DP biology SL course (awarded a score of 2), the IA scientific investigation research project that students need to undertake, the linking questions outlined in the syllabus and the collaborative sciences project were considered to be areas of stretch. In addition to the latter, the HL course features additional higher-level topics which were deemed to include additional areas of stretch, meriting a score of 3.
    - The FB life and earth sciences was awarded a score of 1 for outstanding areas of subject demand. The transdisciplinary approach to teaching the subject allows for potential stretch, as does the 'project-focused' and collaborative approach which is outlined in the FB 'skills developed'. Together, these aspects were deemed to warrant a score of 1 area of subject demand.

5.5 Philosophy

Below is the list of subjects used in the philosophy subject comparison analysis.

DP philosophy[112]
The overarching emphasis of the DP philosophy course is to actively engage students in philosophical activity. A key focus of the course is on encouraging students to explore complex philosophical concepts and questions in a curious and critical way. The course develops transferrable skills such as how to formulate clear arguments, make reasoned judgements and evaluate highly complex issues. Students can study philosophy at SL or HL and the course consists of the core theme, one optional theme and one prescribed text. HL students must study one additional optional theme and the extension topic "Philosophy and contemporary issues". Throughout the course students are encouraged to apply their knowledge and skills to real-world situations and issues.

FB philosophy
Philosophy is a one-year compulsory common subject taught on the final (*Terminale*) year of the FB. It aims to establish multiple links with other disciplines, as well as develop in students a concern for questioning and truth, and an aptitude for analysis and autonomy of thought. The subject is designed to be accessible to all students, whatever their background and the studies they choose to pursue.

5.5.1 Learning Outcomes – Philosophy

This section compares and contrasts the learning outcomes of curricula falling within the category of philosophy.

For its philosophy learning outcomes, the DP sets out aims and assessment objectives for all subjects within the relevant subject guide. In FB, the philosophy learning outcomes take the form of overarching objectives, and 'Perspectives' which are related to human existence and culture, morality and politics, and knowledge.

The following summary table demonstrates the learning outcome themes that were extracted from the DP philosophy and indicates if and where they were judged to have presence within the learning outcomes of the FB philosophy.

[112] International Baccalaureate. (2023). *Philosophy Guide*.

Table 34: Presence of the DP philosophy learning outcome themes in the FB philosophy

Themes extracted from DP philosophy learning outcomes	Presence in the FB philosophy	
1. Develop knowledge and understanding of philosophical concepts and arguments.		Present in the overarching aims and objectives outlined in the 'preamble' of the FB.
2. Apply knowledge of philosophical concepts and arguments to individuals and society.		Present in the overarching aims and objectives outlined in the 'Preamble' referencing knowledge mobilisation and examining knowledge to test its validity.
3. Analyse and evaluate philosophical concepts, arguments and philosophical activity.		Present in the overarching aims and objectives outlined in the 'Preamble' referencing analysis of concepts and examining ideas and knowledge to test their validity.
4. Develop an understanding of ethics and diversity and apply this knowledge in real-life situations.		Whilst reference is made in the overarching aims and objectives to developing a concern for questioning and truth, it is not clear whether this relates to 'truth' in an ethical context or truth in the pursuit of knowledge related to philosophy.
5. Understand the similarities and differences between forms of reasoning used in different philosophical content areas.		Present in the overarching aims and objectives outlined in the 'Preamble' referencing distinguishing concepts from each other and addressing different points of view on a problem.
6. Generate responses using appropriate philosophical formats, to a range of philosophical questions.		Present in a range of the overarching aims and objectives outlined in the 'preamble' referencing the use of philosophical culture to deal with questions, implement reasoning, explain ideas clearly and formulate constructed propositions and educated arguments.
7. Select, apply and evaluate material to generate views and ideas.		Whilst direct reference to selecting, applying and evaluating material is not made in the FB, the overarching aims and objectives outlined in the 'preamble' suggest that this is present in the FB, with reference to formulating objections, reasoned justifications, propositions and education arguments, and developing autonomy of thought.

Key:

	This theme is well-evidenced in the learning outcomes of the FB.		*This theme is partially evidenced in the learning outcomes of the FB.*		*This theme is not evident in the learning outcomes of the FB.*

Presence of the DP's Learning Outcome Themes

As demonstrated in the above table, most of the learning outcome themes from the DP are present in the FB philosophy; with some being more emphasised than others and being present in both the 'Preamble' and the overarching aims. Only one theme (an understanding of ethics and diversity) was not explicitly highlighted in the FB.

1. Develop knowledge and understanding of philosophical concepts and arguments

Similar to the DP, the FB philosophy is designed to develop students' knowledge of philosophical concepts and arguments. This is evidenced in the FB's requirements that students "Orient themselves in the major problems of existence and thought", or "Mobilize knowledge by reading and studying philosophical texts and work".

2. Apply knowledge of philosophical concepts and arguments to individuals and society

Following on from the development of knowledge, students in the DP are expected to apply knowledge of key philosophical questions and arguments to individuals and society. Whilst specific reference to the interrelation between philosophy and society is not made in the FB, application of philosophical knowledge is reflected in outcomes where students are expected to "make use of the philosophical culture acquired to deal with questions" and test the validity of the knowledge they acquire to address questions and different points of view.

3. Analyse and evaluate philosophical concepts, arguments and philosophical activity

When considering philosophical concepts and arguments, students in the DP are expected to demonstrate higher order thinking skills, such as analysis and evaluation. These skills are also present in the FB philosophy curriculum, where students are expected to "Develop…an aptitude for analysis…", analyse concepts and question them, and "examine ideas and knowledge to test their validity".

4. Develop an understanding of ethics and diversity and apply this knowledge in real-life situations

The DP requires students to develop an understanding of the diversity and ethics of individuals and society and to apply this knowledge to real-life situations. Whilst reference is made in the FB to developing a concern for questioning and truth, it is not clear whether this relates to 'truth' in an ethical context or truth in the pursuit of knowledge related to philosophy. Moreover, the FB does not make explicit reference to ethics or diversity in its objectives or concepts. Therefore, this theme was not well evidenced in the FB learning outcomes.

5. Understand the similarities and differences between forms of reasoning used in different philosophical content areas.

The theme of understanding variations in the reasoning of philosophical areas is present in a number of FB outcomes, including the expectation for students to distinguish philosophical concepts from each other and address different points of view on a problem. In both subjects, students are expected to engage with multiple perspectives and ways of thinking.

6. Generate responses using appropriate philosophical formats, to a range of philosophical questions

FB philosophy also shares similarities with the DP's requirement for students to respond to philosophical questions through the use of appropriate philosophical formats. Whilst the document reviewed for the FB does not go into detail on the philosophical formats used, it does make clear that students are expected to analyse works of selected philosophers to a "sufficient breadth, unity and continuity" to inform their wider knowledge of philosophical questions. This is reflected in the FB outcomes which require students to "make use of the philosophical culture acquired to deal with questions…implement reasoning and formulate objections and reasoned justifications", and "…formulate constructed propositions and educated arguments".

7. Select, apply and evaluate material to generate views and ideas

A further key theme that the DP and FB share is the development and application of views and ideas. In FB philosophy, students are required to explain ideas clearly, formulate propositions, objections, educated arguments and reasoned justifications, in addition to finding solutions to problems. This is in line with the DP requirements for the philosophy subject.

Other Themes in the FB

No themes were found within FB philosophy that were not present in the DP philosophy subject. That said, there is a greater emphasis in the FB philosophy outcomes on developing judgements and reasoning around philosophical concepts and questions linked to philosophical concepts than in the DP. This is reflected in outcomes such as “Address different points of view on a problem before finding an appropriate solution…Justify affirmations and denials by formulating constructed propositions and educated arguments” and “Implement reasoning and formulate objections and reasoned justifications”.[113]

Summary

Overall, there is strong alignment between the learning outcomes of the DP’s philosophy and the FB philosophy, with the exception of developing an understanding of ethics and diversity which was not well evidenced in FB philosophy. Both subjects expect students to develop knowledge of philosophical concepts and arguments and apply this knowledge to solve philosophical problems. Furthermore, both subjects emphasise critical thinking through the analysis and evaluation of philosophical concepts and demonstrate critical judgement in the formulation of educated arguments.

However, it is noted that there is a greater emphasis in the FB philosophy outcomes on developing judgements and reasoning around philosophical concepts and questions linked to philosophical concepts than in the DP.

5.5.2 Content – Philosophy

This section compares and contrasts the content of the DP and FB curricula falling within the category of philosophy. In order to support visual comparison at-a-glance, the DP and FB philosophy curricula are presented below in diagrams which show the key topics/concepts and subtopics (where available) included in each.

[113] Le Bulletin Officiel de L’Éducation, ‘Programme de philosophie de terminale générale (annexe)’.

Figure 21: DP philosophy content visualiser[114]

	Key concepts	Suggested topics of study		
Core Theme – Being Human	**Identity**	Personal identity	Identity over time	Cultural identity
	The self and the other	Self and non-self	Solipsism and intersubjectivity	Relations to others
	Consciousness	Consciousness, the self and the world	The mind–body problem	The problem of other minds
	Personhood	Self-consciousness	Agency	Moral responsibility
	Human nature	Individuality and universality	The nature versus nurture debate	Emotion and reason
	Freedom	Freedom and determinism	Social conditioning	Existential angst and authenticity
	Themes	**Required content**		
Optional Themes	**Aesthetics**	The nature of art	The artist and the artistic process	Aesthetic experience and judgement
	Epistemology	Nature of knowledge	Problems of knowledge	Application of knowledge
	Ethics	Normative ethics	Meta-ethics	Applied ethics
	Philosophy of religion	Nature and existence of God	Religious language	Religious experience and behaviour
	Philosophy of science	Nature and methodologies of science	Science and the self	Science and society
	Political philosophy	The state	Justice	Liberty and rights
	Social philosophy	Social structures and institutions	Equality and discrimination	Gender
	Topics	**Required content**		
HL extension: Philosophy and contemporary issues	**Philosophy and technology**	Nature and role of technology; relationship between technology and nature	Impact of technology on individuals and societies	Philosophical challenges arising from developments in biotechnology, robotics, and information and communication technology
	Philosophy and the environment	Environmental challenges and degradation	Environmental conservation and activism	Intrinsic and extrinsic value; deep ecology, social ecology and anthropocentrism
	The nature, function, meaning and methodology of philosophy	Nature of philosophy	Function and meaning of philosophy	Philosophical methodology

[114] Content for the core and optional themes of the DP SL and HL is identical, however SL students study one optional theme, by contrast HL students study two optional themes. It should also be noted that the subtopics for the core themes are suggested areas of study and not designed to be prescriptive.

Figure 22: FB philosophy content visualiser

Perspectives	Human existence and culture	Morality and Politics	Knowledge	Cultural identity
Concepts	Time	Religion	The technique	Language
	Freedom	Truth	Reason	Work
	Consciousness	The State	Science	Art
	The unconscious	Justice	Nature	
	Happiness	Duty		

NB: the French programme documentation does not link Perspectives to the Concepts in the table above.

Structure

There are both similarities and differences in the philosophy curriculum of the FB and DP philosophy SL and HL. The DP philosophy has two levels, SL and HL; the main difference between these levels being the requirement to study an additional theme from the seven options available. The FB has a single curriculum which each education provider is guided by when delivering the subject.

Both subjects are organised around overarching topics – six core themes in the DP and 17 'topics' in the FB. Within each of the core themes of the DP, there are three subtopics. Furthermore, the DP includes seven optional themes, and within each of these three subtopics.

By contrast, the FB philosophy curriculum does not specify any particular subtopics of study. Furthermore, the order in which the concepts are studied and the depth to which they are covered is decided by each education provider. Therefore, education providers delivering the FB philosophy have freedom to deliver the content in a format that fits their pedagogical aims. This is somewhat in line with the DP which provides suggested topics of study under the optional themes. However, for the optional themes of the DP, the subtopics are more prescriptive, with a list of required content for each optional theme, together with suggested examples/discussed questions (which are non-exhaustive).

Content Alignment

The table below shows a simplified summary of the extent to which the FB aligns with the main topics of the DP philosophy.

Table 35: Summary of the content alignment between the DP and FB philosophy

DP philosophy topics		Presence in FB philosophy
Core Theme – Being Human	1. Identity	
	2. The Self and the other	
	3. Consciousness	
	4. Personhood	
	5. Human nature	
	6. Freedom	
Optional Themes	1. Aesthetics	
	2. Epistemology	
	3. Ethics	
	4. Philosophy of religion	
	5. Philosophy of science	
	6. Political philosophy	
	7. Social philosophy	
HL extension	Philosophy and contemporary issues	

Key:

	Strong presence of this topic in the FB		*Partial presence of this topic in the FB*		*Little or no presence of this topic in the FB*

NB: Where applicable, content alignments found in pre-requisite subjects are carried forwards and combined with new alignments to represent the cumulative content covered.

The mapping of content demonstrates that FB philosophy has alignment with nearly all areas of the DP philosophy subject, although the degree of alignment varies per topic. It should be noted that, due to the relatively less prescriptive nature of the FB philosophy curriculum, a number of inferences were made from the FB philosophy concepts outlined to carry out the content mapping, as the latter did not provide any further information on areas studied within these concepts.

Within the prescribed text component[115] of the DP students are required to study a text in its entirety[116] from a list of 12 philosophical texts. This is an in-depth study of one text, although teachers are encouraged to use extracts from other philosophical texts to support their teaching. In terms of alignment with content of the FB, four of the 12 authors of the prescribed texts listed in the DP are also present in the FB. This suggests there may be some overlap in the themes covered in the DP and FB. However, the FB documentation does not provide any detail beyond the names of the authors to be studied, and therefore the depth and breadth of content alignment based on the prescribed text component is unclear.

Within the concepts of the FB philosophy curriculum, there was no specific reference to identity, which is a concept covered in the core theme of the DP (Being Human). As a key concept in philosophy, it would be expected that identity would be covered in the FB, and there is reference to ‘human existence’ and ‘cultural identity’ in the overarching perspectives of the programme. In addition, concepts such as ‘the state’, ‘freedom’, and ‘reason’ may also cover identity as a topic. Identity is also listed in the ‘landmarks’ of the FB, suggesting that this concept plays a part in how students reflect on and address philosophical problems.[117]

Similar to identity, another concept covered in the DP’s core theme, titled ‘the self and other’, is not explicitly referenced in the FB. However, as with identity, it is expected that this topic area would be covered in the FB, and this is reflected in the overarching perspectives of the FB subject, titled ‘human existence and culture’. Furthermore, the concept of ‘the self’ references our relations to others and this may be covered in the subtopics of other FB concepts, such as ’religion’, ‘work’ and ‘freedom’.

In terms of the concept of ‘consciousness’ in the DP core theme, there is a strong presence indicated in the FB’s ‘consciousness’ and ‘the unconscious’ concepts. Following this, the concept of ‘personhood’ in the DP is linked to self-consciousness, agency and moral responsibility, all of which have broad links with the FB concepts, such as ‘consciousness’, ‘freedom’ and ‘duty’. This suggests that there is some presence of this topic within the French programme, but this does not appear to be a significant focus based on the information reviewed.

Whilst a concept in the DP’s core theme, ‘human nature’ is not directly referenced in the FB. However, this would be expected to be covered in a number of the FB concepts, such as ‘happiness’, ‘nature’ (of things) and ‘reason’. In addition, authors such as Hume, Locke and Descartes are all referenced in relation to this topic in the DP documentation and in the list of

[115] As a guide, 40 hours should be dedicated to the study of the prescribed text. Students are tested on this component in a one hour open-book examination (Paper 2 of the external assessment).
[116] Due to their length, particular sections of texts by Plato and De Beauvoir are specified for study.
[117] Landmarks are lexical and conceptual distinctions which support the reflection that the student constructs to deal with a philosophical problem.

authors suggested in the FB documentation. This further suggests that philosophical concepts related to human nature are present in FB philosophy, although it is unclear to what degree.

With regards to the 'freedom' concept of the DP's core theme, this is clearly present in the FB, and is listed as one of the 17 concepts. Further coverage of freedom may be present in other FB concepts, such as 'reason', 'work' and 'happiness', indicating that freedom is a topic with a strong presence in FB philosophy.

In terms of the optional themes of the DP and how these are reflected in the FB, the information reviewed suggests that some themes have a strong presence, whilst others have partial or little presence in the FB. For example, the optional theme 'aesthetics' in the DP would be expected to be covered to some degree in the 'art' concept of the FB. As with other concepts of FB philosophy, there is no further information on what is studied, therefore a judgement cannot be made on whether there is a strong presence of aesthetics – as such, a partial presence has been recorded.

Likewise, other DP optional themes, such as epistemology and ethics, are not referenced explicitly in the FB, but it can be inferred from the list of concepts and programme outlook that there is at least a partial presence of these themes in the FB. For example, the overarching perspective 'knowledge' of FB philosophy would cover epistemology (the theory of knowledge). Furthermore, ethics is a broad topic which would be expected to be covered in the FB concepts of 'justice', 'truth' and 'duty'. Authors listed in the DP document in relation to ethics and in the FB, such as Anscombe, Aristotle and Kant, provide further evidence of this topic being present in the FB.

Some optional themes of the DP, such as 'religion' and 'science', are also listed in the concepts of the FB, suggesting that the study of philosophy of religion and philosophy of science have a strong presence in the FB. Within the optional theme of political philosophy in the DP, topics include 'the state', 'justice', 'liberty and rights'. These align well with the concepts of the FB, including 'the state', 'justice' and 'freedom', suggesting that there is a strong presence of political philosophy in the FB subject.

Social philosophy, as outlined in the DP, covers social structures and institutions, equality and discrimination and gender, and does not have clear alignment with the concepts of the FB. It should be noted that this does not preclude social philosophy from being part of the FB philosophy; rather, a reasoned conclusion from the documentation reviewed cannot be drawn due to a lack of evidence.

Finally, the FB demonstrates partial alignment with the content in the DP's HL extension topic of 'philosophy and contemporary issues', which is compulsory for all students who take the DP philosophy at HL. In particular, FB lists some concepts and authors also covered in the HL extension's 'the nature, function, meaning and methodology of philosophy' and 'philosophy and technology' subtopics. For example, FB philosophy covers the concepts of conceptual analysis and critical evaluation of beliefs and attitudes, and includes authors such as Heidegger and Marx, which are also recommended in the DP. Coverage of the DP HL extension's subtopic of 'philosophy and the environment' is less obvious from the FB's documentation, but may occur under the FB's concept of 'The technique'.

There was no specific content present in the FB curriculum documentation that was not covered in the DP philosophy syllabus.

Table 36: FB philosophy content which is not covered in the DP

Significant FB philosophy content which is not included in the DP*
○ There are no content areas in the FB that are not included in the DP

*Significant content mostly does not include topics which are typically studied *prior* to upper secondary.

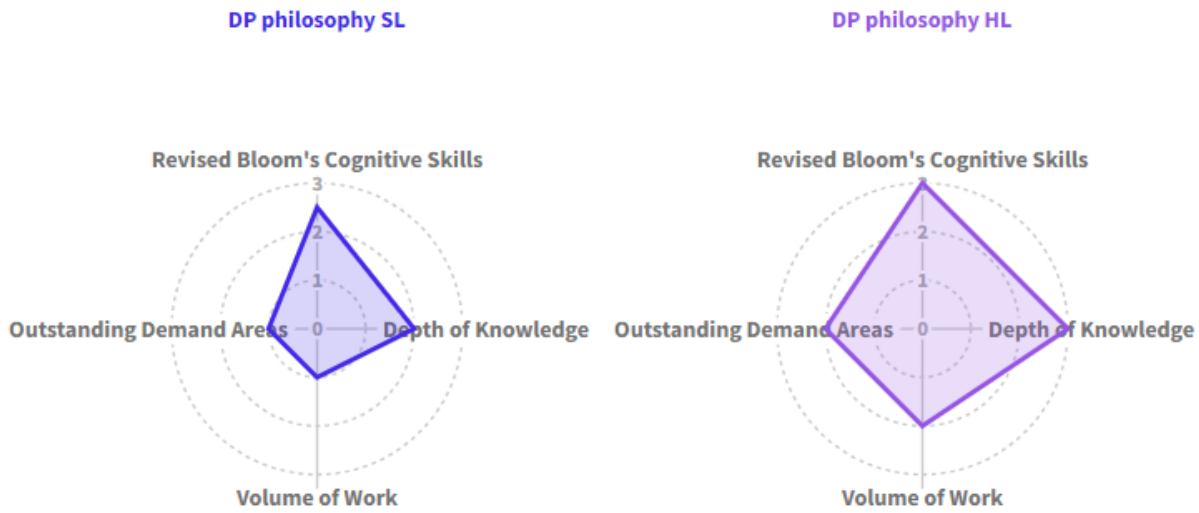
Summary

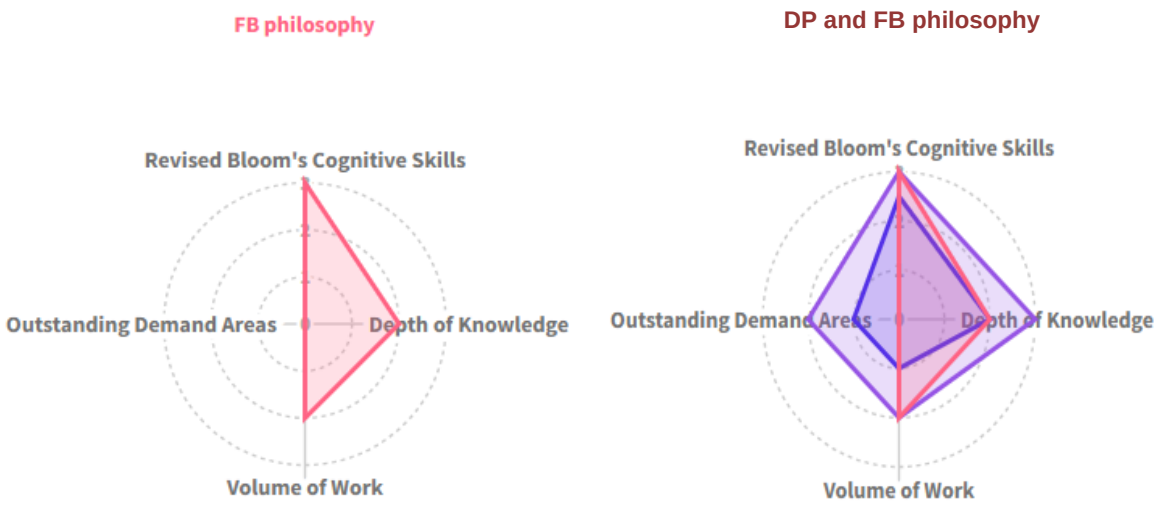
Overall, there are similarities in some of the overarching concepts studied in DP and FB philosophy. The table above indicates that there is slightly greater alignment between the FB and the DP's optional themes than between the FB and the DP's core themes. However, it should be recognised that, due to the less prescriptive and less detailed nature of the FB curriculum documentation, it is not possible to fully compare the depth of the two subjects. For example, there is no information on subtopics for the FB concepts, as it is left to each education provider to decide what content should be delivered.

5.5.3 Demand – Philosophy

The DP and FB curricula were analysed using the same demand tool in order to create demand profiles for DP and FB philosophy. These demand profiles are presented below in the form of radar diagrams, with the last diagram showing all profiles superimposed in one place, enabling immediate visual comparison.

Figure 23: Visual representations of subject demand





The panel of experts carried out a detailed analysis of each course and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - Evidence from the Assessment Objectives of the DP SL demonstrated that a score of 2.5 best reflects the demand level in this area. For example, there is an emphasis on Level 2 skills, as reflected in assessment objectives such as explain and analyse philosophical concepts, construct and develop balanced and focused arguments, make use of relevant supporting evidence, and discuss different points of view. Whilst there was some reference to evaluation of philosophical concepts, issues and arguments, there was not a broad enough focus on skills around creating and/or synthesising to rank this at Level 3. Therefore, a score of 2.5 was given.
  - With regards to the DP HL, the main difference in the cognitive skills between SL and HL is the addition of assessment objectives which refer to understanding, analysing and evaluating the nature, function, meaning and methodology of philosophical activity. This indicates that the cognitive skills required of the HL are, in general, more advanced than the SL with a broader range of analysis and evaluation skills required. This greater focus on analysis and evaluation led to a score of 3 being awarded.
  - For the FB, there is broad evidence that higher cognitive skills are expected, as described in the majority of the subject's aims/LOs. For example: developing a concern for questioning and truth, an aptitude for analysis and autonomy of thought; Develop critical judgment, and formulate constructed propositions and educated arguments, and develop critical judgment. This demonstrates how students are expected to go beyond a simple analysis of philosophical concepts by synthesising information to justify reasoning and affirmations, developing critical judgements and finding solutions to complex problems. Given the strong emphasis on higher level cognitive skills, a score of 3 was awarded.

- Regarding the scores for **Depth of Knowledge**:
  - The DP SL assessment objectives suggest students are required to undertake strategic thinking, evidenced in AOs such as explain and analyse philosophical

concepts, issues and arguments, construct and develop balanced and focused arguments, discuss different points of view and come to reasoned conclusions. These are all cognitive skills related to Level 2, and there is insufficient evidence to demonstrate that the reasoning / planning / synthesis of philosophical issues/ideas is complex enough for Level 3. Strategic thinking, some complex reasoning, and the use of evidence is required as part of the assessments, but it is not clear to what extent extended thinking (augmentation), synthesis of information and problem solving are present. Therefore, a score of 2 was awarded

- As with the DP SL, the HL assessment objectives suggest there is an overarching requirement for strategic thinking, as shown in a number of assessment objectives and the HL-specific assessment objectives, such as demonstrate, analyse and evaluate the nature, function, meaning and methodology of philosophical activity. This indicates there is a greater emphasis in the HL on higher order thinking skills such as analysis and evaluation. This, combined with the HL's coverage of an additional theme, led to the conclusion that a greater depth of knowledge will be required at HL through further engagement with critical thinking skills. Therefore, a score of 3 was given.
- For the FB, the depth of knowledge required of students is broad and complex. The aims/LOs go beyond a score of 1, in that a level of autonomy is required as demonstrated by the requirement to develop a concern for questioning and truth, and an aptitude for analysis and autonomy of thought. There is a mix of Level 2 and Level 3 aims/LOs, with in-depth knowledge skills and evidence of approaching complex situations, gaining comprehension of the situation and then deriving and proposing solutions to problems. However, evidence of Level 3 depth of knowledge and extended thinking was not sufficiently predominant to warrant a score of 3, and therefore a score of 2 was given.

- Regarding the scores for **Volume of Work**:
  - For DP SL, six themes are present within the 'Being Human' concept. Within the six themes are a range of suggested subtopics. The six themes are typical of philosophy subjects at this level and signify a moderate portion of time is spent going beyond basic concepts. The total teaching hours are 150 and the assessment comprises two examination papers and a philosophical analysis of non-philosophical stimulus. This demonstrates that the assessment demand is moderate and programme hours are typical (again moderate) of a programme at this level and therefore a score of 1 was given.
  - The DP HL also comprises six themes and a broad range of sub-themes. However, at HL level there is a requirement for students to study a further optional theme and an 'extension topic', which demonstrates a larger range of themes is covered at HL than at SL. Furthermore, there is greater assessment demand in the HL, with an additional exam paper on an unseen text. The increased assessment scope, together with a broader range of concepts covered suggests the overall volume of work, is greater than the SL and is at a moderate-heavy level. Therefore, a score of 2 was given.
  - In terms of subject content, the FB covers 17 'concepts'. There is no further information on what is studied within each overarching concept. Taking into account the high number of concepts studied, the cognitive load is comparable with or higher than other similarly focused subjects at the same level, with the number

of themes covered in a short space of time being quite high, and, thus, the time available to spend on concepts quite short. Therefore, whilst acknowledging that the number of hours allocated to each concept area is unclear, the volume of work was judged to be moderate-heavy and a score of 2 was awarded.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
  - For the DP SL, some optional themes – such as political philosophy or aesthetics – were judged to provide an opportunity for stretch. Students are required to choose one optional theme, which suggests that there may be a stretch area in the subject. Therefore, a score of 1 was deemed appropriate.
  - In the DP HL, students are required to choose two optional themes, suggesting that there is the potential for two stretch areas to be present at HL level in the optional themes. Additionally, students may be stretched further by the HL extension topic, which requires them to "engage with some of the most urgent issues facing humanity in the 21st century and to consider how philosophy can help us to engage with and navigate them". As such, there is potential for three stretch areas, and a score of 2 was deemed appropriate.
  - The 17 concepts which comprise the FB curricula represent overarching areas with no further detail on what is studied within each concept. There is a comprehensive list of authors in the programme overview, but this does not indicate how and to what degree certain philosophical concepts from authors are studied. There was insufficient evidence to come to a reasoned conclusion on whether the overarching areas are studied in such a way that stretches students. Therefore, the subject scored a 0 for this category. That said, it should be noted that this does not mean there are no stretch areas in the French programme; rather that stretch areas have not been evidenced in the documentation reviewed.

5.6 Theory of Knowledge

Below is the list of subjects used in the theory of knowledge subject comparison analysis.

DP theory of knowledge[118]
The theory of knowledge (TOK) course is a core component of the DP which provides students with the opportunity to explore and reflect on the nature of knowledge and the process of knowing. Schools are required to devote at least 100 hours of class time to it as it is a core element of the DP. The course centres on exploration of knowledge questions and is made up of three interconnected parts: the core theme, optional themes (of which teachers select two from a choice of five) and five compulsory areas of knowledge. This subject is designed to promote discussions that will encourage students to appreciate the positive value of different kinds of knowledge.

FB philosophy
Philosophy is a one-year compulsory common subject taught on the final (*Terminale*) year of the FB. It aims to establish multiple links with other disciplines, as well as develop in students a concern for questioning and truth, and an aptitude for analysis and autonomy of thought.

[118] International Baccalaureate. (2023). *Theory of knowledge guide*.

The subject is designed to be accessible to all students, whatever their background and the studies for which they are destined.[119]

5.6.1 Learning Outcomes – Theory of Knowledge

This section compares and contrasts the learning outcomes of the DP TOK course and the FB philosophy subject.

The DP sets out clear aims and assessment objectives for DP TOK, which, combined, form the subject's learning outcomes. In FB, the learning outcomes take the form of overarching objectives, and 'Perspectives' which are related to human existence and culture, morality and politics, and knowledge.

The following summary table outlines the learning outcome themes that were extracted from the DP TOK and indicates if and where they were judged to have presence within the learning outcomes of the FB curricula.

Table 37: Presence of the DP TOK learning outcome themes in the FB philosophy.

Themes extracted from the learning outcomes in the DP TOK	Presence in the FB philosophy curricula	
1. Demonstrate knowledge and understanding of TOK and TOK concepts in a range of contexts.		Present in the overarching aims and objectives outlined in the 'preamble' of the programme.
2. Understand and appreciate the perspectives and world views of others.		Present in an overarching aim and objective outlined in the 'preamble' referencing addressing different points of a view.
3. Engage in reflective practice.		Present in some sections of the programme outline including the 'outlook' and 'exercises and learning of philosophical reflection'.
4. Evaluate concepts and points of view.		Present in the overarching aims and objectives outlined in the 'preamble' of the programme.
5. Select, apply and evaluate sources to develop views and opinions.		Present in a range of overarching aims and objectives outlined in the 'preamble' of the programme.

Key:

	This theme is well-evidenced in the learning outcomes of the FB.		*This theme is partially evidenced in the learning outcomes of the FB.*		*This theme is not evident in the learning outcomes of the FB.*

Presence of the DP's Learning Outcome Themes

As demonstrated in the table above, the DP's learning outcome themes are present in all areas of the FB philosophy objectives, with this presence varying from partially evidenced to well-evidenced.

[119] Notably, the choice DP TOK as the comparison for FB philosophy was made by the IB. Due to the special nature of DP TOK as a subject, it can be challenging to find a similarly-focused subject in national secondary curricula, with philosophy subjects – due to their focus on epistemology (philosophy of knowledge) – often serving as the best possible comparison.

1. Demonstrate knowledge and understanding of TOK and TOK concepts in a range of contexts.

Whilst acknowledging that DP TOK and FB philosophy constitute somewhat different subject areas, there is evidence that demonstration of knowledge and understanding (of the subject) and of (subject) concepts in a range of contexts is present in both the DP and FB. For example, students in FB philosophy demonstrate knowledge of concepts through the mobilisation of 'knowledge by reading and studying philosophical texts and works' and through the ability to 'explain ideas clearly […] with precision and accuracy'. Furthermore, demonstration of understanding of concepts in a range of contexts is reflected in the FB objective where students are expected to 'Orient themselves in the major problems of existence and thought'.

2. Understand and appreciate the perspectives and world views of others.

Additionally, there is partial evidence of understanding and appreciating the perspectives of others through the requirement in the FB to 'address different points of view on a problem.' However, it is unclear whether, in the FB, this understanding and appreciation extends to the 'world views' of others, like it does in the DP.

3. Engage in reflective practice.

Whilst there is no explicit reference in the FB objectives or 'perspectives' to the DP learning outcome regarding engagement in reflective practice, there is some reference in the FB to reflection in a broader sense. For example, students are expected to reflect on knowledge, and undertake 'philosophical reflection' in relation to assessment.

4. Evaluate concepts and points of view.

The DP's theme of evaluating concepts and points of view is well evidenced in the FB. For example, at an overarching level, students are expected to 'examine ideas and knowledge …'. Furthermore, students are required to 'analyse concepts […] and articulate them in a relevant way'.

5. Select, apply and evaluate sources to develop views and opinions.

Using analysis and evaluation to develop ideas is a wide-ranging theme in the FB and this is shown in strong alignment with the DP learning outcome theme concerning selecting, applying and evaluating sources to develop views and opinions. For example, in the FB students are expected to develop critical judgment and 'an aptitude for analysis and autonomy of thought.'

With reference to developing views and opinions, students in the FB are also expected to 'implement reasoning and formulate objections and reasoned justifications' and explain their ideas clearly. Furthermore, students in the FB are expected to 'Justify affirmations and denials by formulating constructed propositions and educated arguments'.

Other Themes in the FB

In general, there are no significant themes covered in the FB philosophy subject that are not present in the DP. However, it was noted from the information reviewed that the FB made more extensive reference in the overarching aims and perspectives to formulating and justifying arguments, judgements and justifications than the DP TOK subject.

Summary
Overall, there is strong alignment between the learning outcomes of the DP TOK and the FB philosophy aims and perspectives. Both subjects expect students to develop knowledge and understanding of key concepts in a range of contexts and understand different points of view. Furthermore, both emphasise evaluating concepts and points of view and applying that evaluation to the development of views and opinions.

5.6.2 Content – Theory of Knowledge

This section compares and contrasts the content of the DP TOK and FB philosophy curricula. In order to support visual comparison at-a-glance, the DP TOK and FB philosophy curricula are presented below in tables which show the key topics and subtopics (where available) included in each.

Figure 24: DP theory of knowledge content visualiser

Core themes	Knowledge and the knower				
Optional themes	Knowledge and technology	Knowledge and language	Knowledge and politics	Knowledge and religion	Knowledge and indigenous societies
Areas of knowledge	History	The human sciences	The natural sciences	The arts	Mathematics

Figure 25: FB philosophy content visualiser

Perspectives	Human existence and culture	Morality and Politics	Knowledge	Cultural identity
Concepts	Time	Religion	The technique	Language
	Freedom	Truth	Reason	Work
	Consciousness	The State	Science	Art
	The unconscious	Justice	Nature	
	Happiness	Duty		

Structure

DP TOK is one of three core elements of the DP, together with Creativity, activity, service (CAS) and The extended essay (EE). There are four overarching elements of the DP TOK subject which are present in every part of the DP TOK curricula. Furthermore, DP TOK elements are split between an overarching core theme, optional themes, and compulsory areas of knowledge. Students study two optional themes from five options and are required to study five areas of knowledge.

The FB has a single curriculum comprising 17 'concepts' from which each education provider designs and delivers their own courses. It is expected that all the concepts are studied during the course. However, the order in which the concepts are studied and the depth to which they are covered is decided by the education provider, who has freedom to deliver the content in a format that fits their individual pedagogical aims. This approach is also somewhat reflected in the DP TOK, which provides suggested 'knowledge questions' for the core theme, optional themes and areas of knowledge. It should be noted that these questions are not prescriptive, and teachers are free to explore the themes and areas of knowledge using examples and knowledge questions of their choice.

Content Alignment

The table below shows a simplified summary of the extent to which the FB philosophy aligns with the main topics of the DP TOK.

Table 38: Summary of the content alignment between the FB philosophy and the main topics in the DP TOK

DP TOK topics		Presence in FB philosophy
Core Theme	Knowledge and the knower	
Optional Theme	Knowledge and technology	
	Knowledge and language	
	Knowledge and politics	
	Knowledge and religion	
	Knowledge and indigenous societies	
Areas of Knowledge	History	
	The Human Sciences	
	The Natural Sciences	
	The arts	
	Mathematics	

Key:

	Strong presence of this topic in the FB.		*Partial presence of this topic in the FB.*		*Little or no presence of this topic in the FB.*

The mapping of content shows that FB philosophy partially covers a number of DP TOK topics. That said, it should be noted that, in order to carry out the content alignment, a number of inferences were made from the FB concepts, as there was no further information on areas studied within these concepts. Furthermore, whilst the DP curriculum is designed to cover the nature, scope and limits of knowledge, a detailed technical philosophical investigation into the nature of knowledge is not part of TOK, and students are not expected to be familiar with specific philosophers or philosophical texts. By contrast, the FB philosophy contains a list of philosophers from which the teachers choose the object of study in a particular class.

At an overarching level, theory of knowledge, also known as epistemology, is a key branch of philosophy and this area is reflected in the FB philosophy subject through the overarching 'knowledge' perspective. However, it should be acknowledged that there is no further explicit reference to knowledge in the 17 concepts outlined in the FB philosophy curriculum. With regards to the core theme of the DP TOK, 'knowledge and the knower', it is expected that this overarching topic area will be covered to some degree in the FB, by reference to the previously stated 'knowledge' perspective and the fact that epistemology (theory of knowledge) is a key branch of philosophy.

In terms of the optional themes of the DP, in the FB documentation reviewed, there was no evidence of coverage of knowledge when related to technology or indigenous societies. Whilst technology may be covered as a topic area in the 'science' concept, with reference to the application of scientific knowledge for practical purposes, there is insufficient information in the FB documentation to make a firm conclusion. Likewise, the study of knowledge as it relates to a particular group, culture or society may be covered to some degree in the FB under the perspective 'cultural identity'; though again, without more information, the extent of the possible coverage is unclear.

Evidence suggests that there is partial coverage of some of the DP TOK's optional themes, including: knowledge and language, knowledge and politics, and knowledge and religion. Language and religion are both concepts within the FB and it is expected that the knowledge of these areas would be touched upon within the content of these concepts. However, the breadth and depth of coverage in these subject areas in the FB is unclear. With regards to coverage of the DP's knowledge and politics topic, morality and politics is an overarching perspective of the FB philosophy and the subject area of politics would be expected to be covered in concepts of the FB, such as 'the state' and concepts linked more broadly to politics such as 'freedom' and 'justice'.[120]

In terms of the specific areas of knowledge of the DP, there is no evidence within the documentation reviewed that mathematics is covered in the FB philosophy subject. Furthermore, history is not explicitly referenced in the FB, and whilst there is a concept titled 'time', the FB documentation provides no further information on what this concept covers in practice.

The FB philosophy documentation suggests a partial coverage of the DP's human and natural sciences areas of knowledge. For example, the DP TOK human sciences comprises a range of disciplines, including psychology, social and cultural anthropology, economics, political science and geography.[121] At an overarching level, human sciences is covered in the FB, with reference in the overarching perspectives of the FB to human existence and culture and cultural identity, in addition to concepts such as science and nature. With regards to natural sciences, coverage of this area would be expected in the FB concepts of science and nature. Again, however, it is unclear to what breadth or depth these areas of knowledge are covered.

[120] A key focus of the 'Knowledge and politics' theme is "politics of knowledge" and issues around knowledge, power and oppression, which may include discussion of the concept of "epistemic injustice".
[121] Theory of knowledge guide – First assessment 2022 - p.29.

Finally, the DP TOK 'arts' area of knowledge and the examples outlined in the DP TOK subject guide of discussion points and questions around the subject, such as perspectives on art, and the relationship between art and culture, suggest that there is partial alignment through the 'art' concept of the FB.

The table below summarises the FB philosophy content topics that are not present in the DP TOK.

*Table 39: French philosophy programme content which is not covered in the DP**

Significant FB content which is not included in DP philosophy*
• Consciousness • The unconscious • Work • Happiness • Time • The technique

*Significant content does not include topics that are typically studied *prior* to upper secondary

Summary

Overall, there are similarities between some of the themes of the DP TOK and concepts of FB philosophy. The table above indicates that there is some level of alignment between the optional themes and the core themes of the DP and the FB. However, the FB philosophy also has little or no presence of two optional themes and two core themes, whilst the remaining DP topics have only a partial presence.

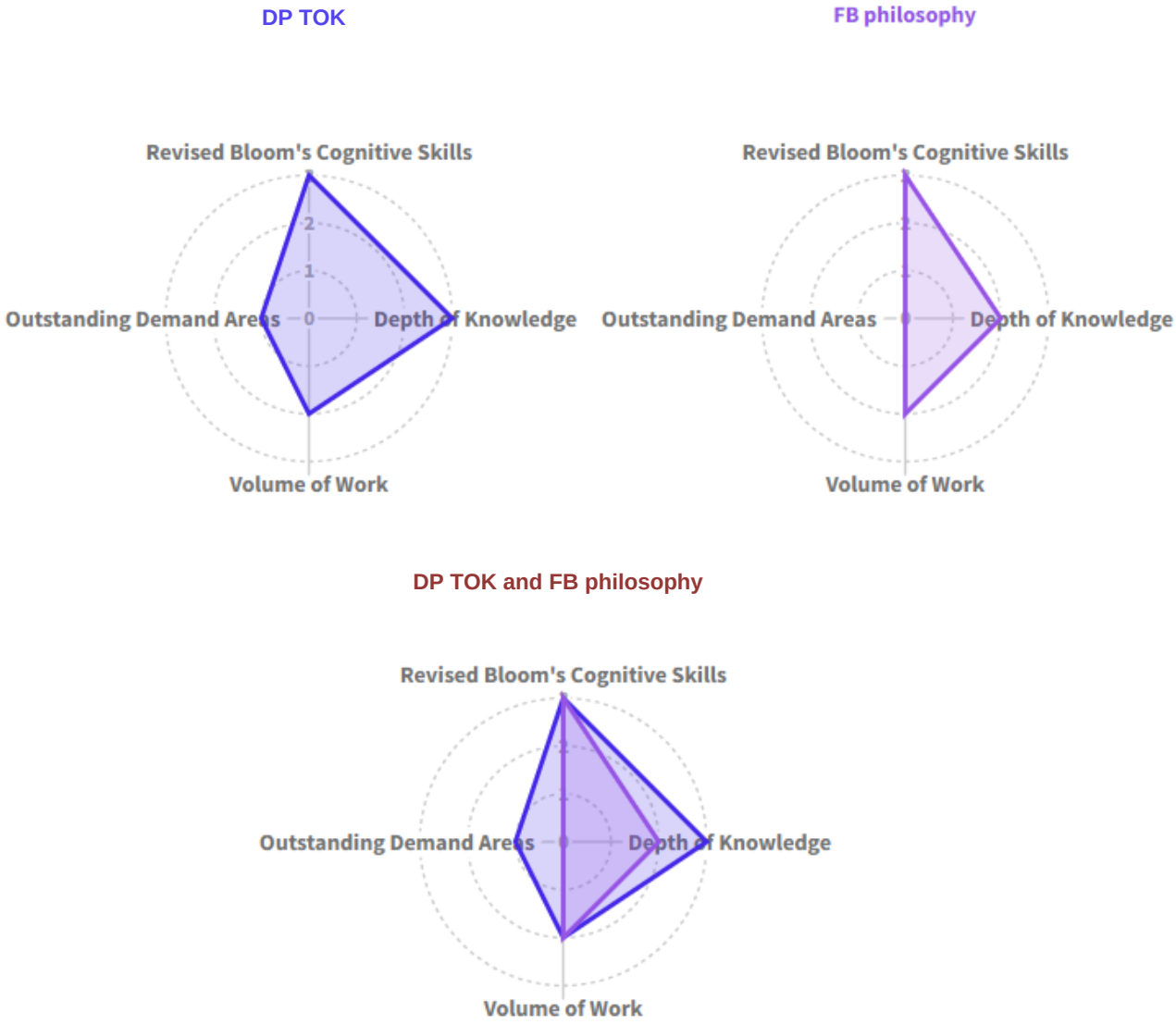
As mentioned above, it should be recognised that it is not possible to compare the level of breadth and depth the subjects go into in selected areas as there is insufficient information included in the FB philosophy documentation. For example, there is no information on subtopics studied within each FB philosophy concept, as this is left to each education provider to decide.

5.6.3 Demand – Theory of Knowledge

This section considers the alignment between the DP TOK and the FB philosophy curricula in terms of demand.

The DP and FB curricula were analysed using the same demand tool in order to create a demand profile for DP TOK and the FB philosophy. These demand profiles are presented below in the form of radar diagrams, including diagrams showing multiple profiles superimposed in one place, enabling immediate visual comparison.

Figure 26: Visual representations of subject demand



The panel of experts carried out a detailed analysis of each subject and reached a consensus on the scores shown in the profiles above. The following points were particularly important within the panel discussion:

- Regarding the scores for **Bloom's Cognitive Skills**:
  - A review of the DP TOK aims and assessment objectives demonstrates an emphasis on critical thinking skills, reflective of higher level cognitive skills in Blooms taxonomy. The subject is designed to expose students to ambiguity, uncertainty and questions with multiple plausible answers, help prepare them to encounter novel and complex situations, encourage them to reflect critically on their own beliefs and assumptions, and engage with multiple perspectives. This highlights how the subject's outcomes go beyond analysis to evaluation and synthesising information from multiple perspectives to support arguments and discussions around the theory of knowledge. Therefore, a score of 3 was awarded.
  - For FB philosophy, there is broad evidence that higher cognitive skills are expected, as described in the majority of the subject's aims/LOs. For example:

developing a concern for questioning and truth, an aptitude for analysis and autonomy of thought; Develop critical judgment, and formulate constructed propositions and educated arguments, and develop critical judgment. This demonstrates how students are expected to go beyond a simple analysis of philosophical concepts by synthesising information to justify reasoning and affirmations, developing critical judgements and finding solutions to complex problems. Given the strong emphasis on higher level cognitive skills, a score of 3 was awarded.

- Regarding the scores for **Depth of Knowledge**:
  - The DP TOK aims and assessment objectives demonstrate a requirement for both strategic and extended thinking, such as: demonstrate TOK thinking through the critical examination of knowledge questions; use example and evidence effectively to support a discussion; and demonstrate awareness and evaluation of different points of view. Furthermore, the assessment provides students with the opportunity to apply extended thinking skills in the creation of an exhibition. The TOK exhibition, which comprises three objects or images of objects, and a written commentary of each object, is connected to one of the 35 Internal Assessment (IA) prompts – high-level knowledge questions. Here students are expected to engage critically with how TOK connects with the real world and the objects chosen for the exhibition. Complex reasoning would be applied to justify the contribution each object makes to the exhibition. Students are posed questions based on a 'knowledge framework' consisting of four elements: scope, perspectives, methods and tools, and ethics. Through the perspectives element students reflect on historical as well as their own perspectives and what informs them. Methods and tools ask students to consider the cognitive and material tools that are available in the pursuit of knowledge and the assumptions that underlie methods of inquiry. Students also explore how ethical and epistemic values are built into the quest for knowledge. To engage in these areas, students require critical thinking skills and the overall evidence suggests that a significant portion of TOK is focused on higher order thinking skills. Therefore, a score of 3 was given
  - For the FB, the depth of knowledge required of students is broad and complex. The aims/learning objectives go beyond a score of 1, in that a level of autonomy is required as demonstrated by the requirement to develop a concern for questioning and truth, and an aptitude for analysis and autonomy of thought. There is a mix of Level 2 and Level 3 aims/LOs, with in-depth knowledge skills and evidence of approaching complex situations, gaining comprehension of the situation and then deriving and proposing solutions to problems. However, evidence of Level 3 depth of knowledge and extended thinking was not sufficiently predominant to warrant a score of 3, and therefore a score of 2 was given.

- Regarding the scores for **Volume of Work**:
  - The DP TOK requires at least 100 teaching hours. This is significantly less than other DP subjects, which have a suggested number of 150h at SL and 240h at HL. The hours for TOK are split as follows: Core Theme: Knowledge and the knower + optional themes (two required from five options) = 32 hours. Areas of knowledge (five areas) = 50 hours. Assessment = 18 hours. The limited number of hours dedicated to each theme suggests that there is a short time allocation per theme.

Acknowledging the scope and depth of TOK concepts covered, together with the assessment tasks involved, the volume of work was judged to be 'moderate-heavy' considering the lower-than-average number of teaching hours the programme is taught over. Therefore, a score of 2 has been awarded.

- In terms of subject content, the FB covers 17 'concepts'. There is no further information on what is studied within each overarching concept. Taking into account the high number of concepts studied, the cognitive load is comparable with or higher than other similarly focused subjects at the same level, with the number of themes covered in a short space of time being quite high, and, thus, the time available to spend on concepts quite short. Therefore, whilst acknowledging that the number of hours allocated to each concept area is unclear, the volume of work was judged to be moderate-heavy and a score of 2 was awarded.

- Regarding the scores for **Outstanding Areas of Subject Demand**:
  - As stated previously, DP TOK students are posed questions based on a 'knowledge framework' consisting of four elements: scope, perspectives, methods and tools, and ethics. Through the perspectives element, students reflect on historical as well as their own perspectives and what informs them. Methods and tools ask students to consider the cognitive and material tools that are available in the pursuit of knowledge and the assumptions that underlie methods of inquiry. Students also explore how ethical and epistemic values are built into the quest for knowledge. Within the 'knowledge framework', there is room for stretch areas, depending on how the subject content is delivered. In terms of subject content, the optional themes that students are required to study could also be regarded as 'stretch areas'. For example, knowledge and indigenous societies and/or knowledge and technology. Whilst stretch areas in TOK are challenging to identify as there is no obvious comparator subject at a similar level, there are several areas with the TOK programme that could be challenging for students. However, the exact number of stretch areas is difficult to quantify and therefore a score of 1 has been awarded.
  - The 17 concepts which comprise the FB philosophy curricula represent overarching areas with no further detail on what is studied within each concept. There is a comprehensive list of authors in the programme overview, but this does not indicate how and to what degree certain philosophical concepts from authors are studied. There was insufficient evidence to come to a reasoned conclusion on whether the overarching areas are studied in such a way that stretches students. Therefore, the subject scored a 0 for this category. That said, it should be noted that this does not mean there are no stretch areas in the FB subject; rather that stretch areas have not been evidenced in the documentation reviewed.

6. Key Findings

This section summarises the alignment and main similarities and differences found between the DP and France's upper secondary programme (FB), both at programme level and subject level.

6.1 Programme Level

Philosophical Underpinnings

Some of the key themes within the IB's learner profile, ATL, and philosophy of international-mindedness have stronger presence in the French context than others. The themes of 'International outlook, diversity, and intercultural understanding', 'principled and community-oriented' and 'Grounded in real world contexts' are well evidenced in the legislation associated with the FB, while the theme of 'Communicative and collaborative competence' is also presence to some extent. Conversely, the themes of 'independence/self-management, critical inquiry and reasoning' and 'conceptual thought and understanding' are not well evidenced in the French Code of Education, though there is evidence that these may be incorporated throughout the study of specific subjects.

There are also some themes that are more evidenced in the French general principles of education than in the IB's philosophical underpinning themes. Sustainable development, for example, receives explicit attention in the French Code of Education's General Disposition section. Secularism (laïcité), too, is more strongly emphasised by the French system, constituting one of its key values.

Programme Structure

There are various similarities between the two programmes' structures; for example, both take a baccalaureate-style approach to encourage breadth of study, and both require students to study subjects from broadly similar subject areas. Additionally, both programmes allow students to specialise in particular subject areas – the DP by allowing students to study up to four subjects at HL, and the FB allowing students to take a number of specialty subjects from a particular subject area (e.g. science).

One notable difference between the two programmes is their overall duration – while the DP is delivered over two years, the FB spans over three years, with the *Seconde* year (Grade 10) acting as a preparatory, foundational year. Additionally, students in the FB take a higher number of subjects – per year and overall – than students in the DP. In the DP, students take six subjects; in the FB, they study up to 12 subjects in their *Seconde* year – 10 common subjects and two optional subjects; 10 subjects in their *Première* year – six common subjects, three specialty subjects and one optional subject; and 10 subjects in their *Terminale* year – six common subjects, two specialty subjects and up to two optional subjects. Finally, the FB does not require the completion of additional components to pass the qualification, while students in the DP must complete the TOK, CAS and the extended essay in order to obtain their diplomas.

Entry Requirements

Both the DP and the FB present a flexible approach to entry requirements at the start of their programmes. The IB encourages students and teachers to consult subject guides around expected prior learning but does not provide fixed entry requirements. For the FB, there are no formal entry requirements beyond the successful completion of lower secondary education. One difference between the two programmes is that, contrary to the DP, some FB optional courses in Grades 11 and 12 have prerequisites for enrolment which are outlined in the programme curriculum and policy documentation. For example, in *Terminale* (Grade 12), only students who have taken the mathematics specialty can select the optional subject of expert mathematics.[122] The DP does not stipulate a similar type of entry requirement for its subjects; instead, it simply states that, to study *some* subjects at HL, some prior study in the specific subject area is advisable.

Student Learning Pathways

Both programmes provide some level of optionality in relation to subjects studied and both require students to study subjects from a wide range of subject groupings. The approach to combining subject-specialisation with breadth is, therefore, very similar.

The main difference between the student learning pathways of both programmes is the number of subjects students can choose to specialise in. While DP students take a minimum of three and a maximum of four subjects at HL, FB students may only take three specialist subjects in their *Première* year, dropping to two specialist subjects in their *Terminale* year. That said, the FB requires students to dedicate more hours than the DP to the study of each of their subjects of specialisation. Nonetheless, this difference is somewhat offset by the fact that some FB specialty subjects combine two different subject areas (e.g. physics-chemistry combines physics and chemistry); whereas each DP subject focuses on one single subject area.

Assessment Methods

Both the DP and the FB make use of both internal and external assessments, but award greater weighting to the latter, with external examinations typically making up 70-80% of the overall grades for DP students and 90% for FB students. The FB features a higher focus on oral examinations, although oral work is part of some DP subjects.

In terms of assessment objectives, while the FB curriculum does not describe clear assessment objectives for each subject, there similarities between the assessment objectives of the DP subjects and the skills targeted by the FB *général* subjects' syllabi, with both programmes recognising the importance of developing foundational knowledge and understanding but also seeking to develop and assess how students can use, explore, and articulate that understanding. In this sense, the skills-based criteria for assessment show broad alignment.

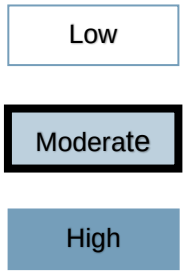
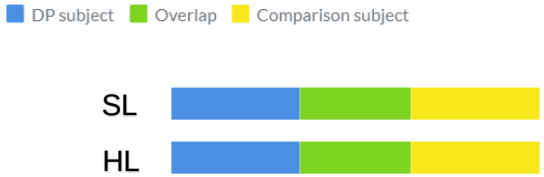
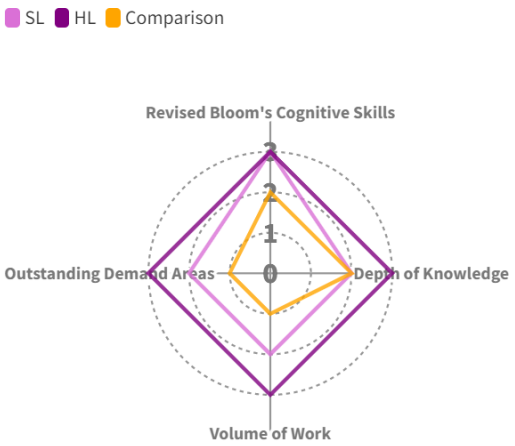
[122] Eurydice (2022) France: Teaching and learning in general up[per secondary education https://eurydice.eacea.ec.europa.eu/national-education-systems/france/teaching-and-learning-general-upper-secondary-education

Summary
The student learning pathways constitute the most significant point of similarity between the two programmes, while the philosophical underpinnings constitute the most significant point of difference. In all other respects, there are some notable differences, though with points of clear alignment with regard to how students would be likely to experience the programmes in practice.

6.2 Subject Level

This section provides visual summaries of the subject-level alignment between specific subjects within the DP and the respective comparison points in the FB. The summaries include key findings on learning outcomes alignment, content alignment and demand alignment, as per the key below:

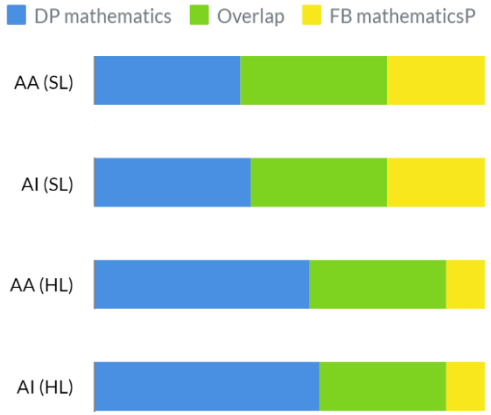
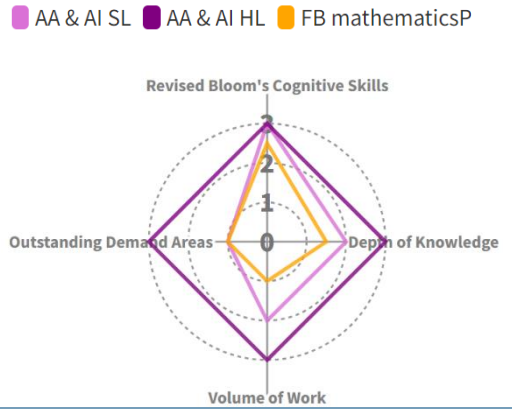
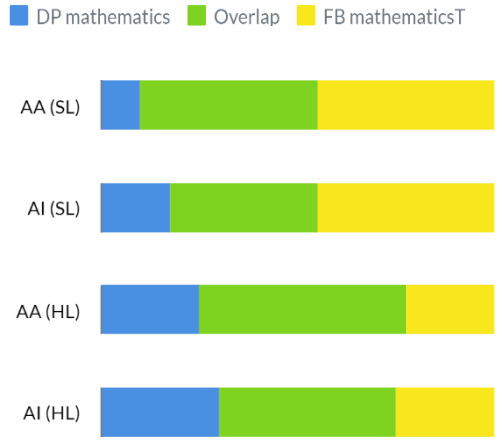
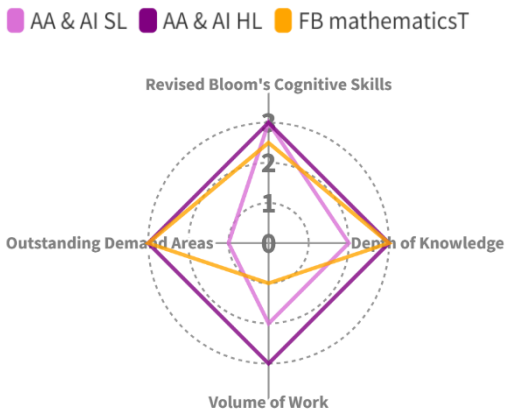
Key:

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
Displays the name of the comparison subject	 This represents the learning outcome alignment between the DP subject and the comparison subject. A black border is placed around the selected judgement – 'Moderate' in this example.	 These bars represent the content alignment between the DP subject and the comparison. There is one bar showing alignment with SL content and another for HL content (inclusive of SL content). The **green** section of the bar represents the overlap of content between the subjects. The **blue** section represents content which was in the DP subject only. The **yellow** section represents content which was in the comparison subject only. Therefore, if, say, the blue section was longer than the yellow, this can be interpreted as DP subject having more content unique to itself than the comparison did. A large green bar would indicate that a substantial proportion of content overlaps between the DP and the comparison subject.	 This radar diagram displays the demand judgement scores for the comparison subject(s) and the DP subject – both SL and HL.

6.2.1 Mathematics Alignment

The subject level alignment between the DP and FB mathematics subjects is represented below:

Figure 27: Visual representations of subject-level alignment (mathematics subjects)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
mathematicsP	Low **Moderate** High		
mathematicsT	Low **Moderate** High		

- **Learning outcomes alignment:** the level of alignment between the learning outcomes of both DP mathematics subjects, both at SL and HL, and those of the FB subjects is moderate, as most, though not all, DP themes are present in the FB curricula.

- **Content alignment:** the level of content alignment between DP mathematics subjects and FB subjects is generally moderate. Indeed, although FB subjects may have similar breadth and depth to the DP subjects, the topics and subtopics covered in each curricula vary, resulting in a moderate amount of shared content. The breadth and depth of FB mathematicsP is aligned with DP SL subjects and FB mathematicsT is aligned with DP HL subjects. FB mathematics overall has slightly more alignment with DP AA content than DP AI.

- **Demand alignment:** FB mathematics is well aligned with the DP SL and HL subjects with regards to demand, scoring similarly in most categories. FB mathematicsP is most aligned with DP SL subjects and FB mathematicsT is most aligned with DP HL subjects. However, a key difference is that FB mathematics scores lower for volume of work than DP subjects, at both SL and HL.

The **key similarities** identified were the following:

- **Similarities in learning outcomes**: both the DP and FB set out general learning outcomes that are applicable to all mathematics courses within their programmes. Six of the eight themes extracted from the DP are evidenced in the FB mathematics curricula, hence there is reasonable overlap in mathematics learning outcome themes between the DP and FB. Like the DP, FB promotes critical thinking skills, communication in different contexts, the use of technology in investigation and problem-solving, using generalisation and abstraction, understanding concepts and application, and the use of inquiry approaches.

- **Similarities in content**: similar to SL and HL in the DP, FB mathematics offers two levels of study, mathematicsP and mathematicsT, with the latter building on the content of the former. The level of overall content alignment between DP and FB mathematics subjects is moderate. Indeed, FB mathematicsP has similar breadth and depth to DP SL subjects and includes some SL content from each of the DP's five main topics. As such, FB mathematicsP has partial alignment with SL content across all topics, except the DP AI's Statistics and Probability topic. FB mathematicsP also covers some AHL vectors content that is present in the DP Geometry and Trigonometry topic. FB mathematicsT (including mathematicsP) has similar breadth and depth as DP HL subjects and includes most SL content across all topics as well as some AHL content, particularly from the DP's Geometry and Trigonometry, and Calculus topics.

- **Similarities in demand**: FB mathematicsP scores the same as DP SL subjects for outstanding demand areas and scores similarly, though slightly lower, for Bloom's cognitive skills and depth of knowledge. Therefore, FB mathematicsP aligns reasonably well with the demand of DP SL. Moreover, FB mathematicsT scores the same as DP HL for depth of knowledge and outstanding areas of demand, and scores

similarly, though slightly lower, for Bloom's cognitive skills. Thus FB mathematicsT aligns reasonably well with the demand of DP HL.

The **key differences** identified were the following:

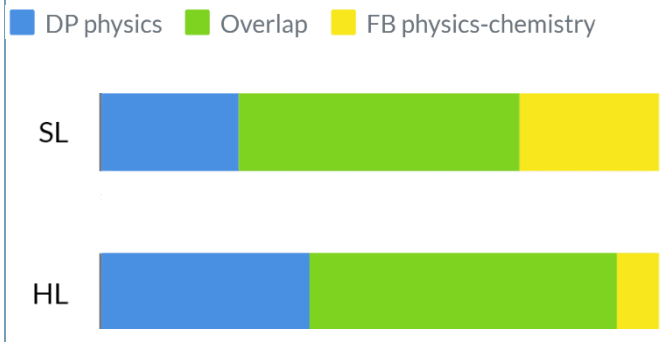
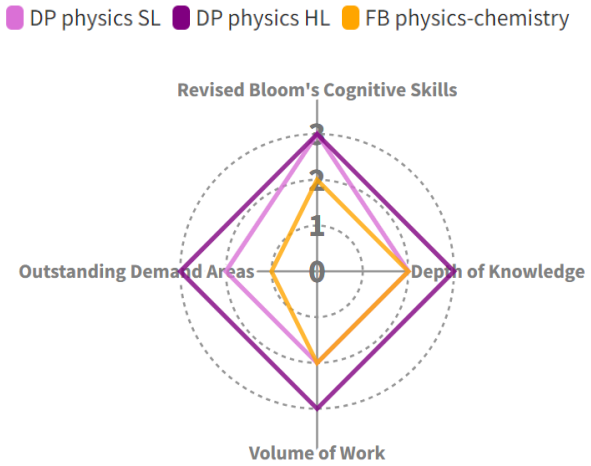
- **Differences in learning outcomes:** though there is overlap in learning outcomes, the FB does not evidence a similar emphasis on DP themes of engaging with mathematics in wider contexts and developing transferable learning skills. There is also no explicit reference to students making links to other subjects. Conversely, the FB curricula places a higher emphasis than the DP on oral communication of mathematics, as well as the use of representations.

- **Differences in content:** FB mathematicsP only partially aligns with DP SL content, due to often not including some key subtopics. Instead, FB mathematicsP covers a topic named Algorithms and Programming, which consists of content that is not present in the DP, such as the use of Python. FB mathematicsT has moderate alignment with DP HL, due to not having any alignment with AHL content in some topics, and only partial in others. Indeed, for both AA and AI, FB mathematicsP has no alignment with AHL Functions or Statistics and Probability content. In addition, FB mathematicsP has no alignment with DP AI AHL content in Number and Algebra. Again, FB mathematicsT instead covers different content to the DP, such as the Algorithms and Programming topic, limits of sequences, and other vectors and statistics subtopics. Finally, it can be noted that FB subjects are slightly more aligned with DP AA than DP AI.

- **Differences in demand:** the most significant difference in demand between FB and DP mathematics relates to volume of work. DP mathematics covers a similar breadth and depth of content in a short amount of allocated teaching hours, whereas the FB allocates a generous amount of teaching hours to content coverage, increasing the time per week in the second year to cover the more complex content. The difference is most notable when comparing the FB courses to DP HL, which has a heavy volume of work, as opposed to a standard volume observed in the FB courses.

6.2.2 Physics Alignment

Figure 28: Visual representations of subject-level alignment (physics)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
physics-chemistry	Low Moderate High		

*the yellow bar for FB physics-chemistry represents physics-only additional content, it does not represent the chemistry content covered on the course

- **Learning outcomes alignment**: the level of alignment between the learning outcomes of DP physics and FB physics-chemistry is significant, with all themes extracted from the DP learning outcomes being present, to some extent, in the FB's 'skills developed' or 'preamble'. While there are some small differences in focus – e.g. the FB featuring a more subtle reference to the development of technology skills – the level of overlap is, nevertheless, substantial.

- **Content alignment**: for both SL and HL content, there is a reasonable amount of DP physics content that is not covered by the FB physics-chemistry, and an equal amount of content that overlaps across the DP and FB physics-chemistry. There is also a small amount of content covered uniquely by the FB, being absent from the DP at both SL and HL.

- **Demand alignment**: FB physics-chemistry has stronger alignment with the DP physics SL course, although it features fewer stretch areas than the latter. The DP SL and HL significantly surpass the FB physics-chemistry in demand, with the HL also featuring more stretch areas, greater depth of knowledge, and a higher volume of work.

The **key similarities** identified were the following:

- **Similarities in learning outcomes:** all the seven learning outcome themes extracted from DP physics are present to some extent in FB physics-chemistry. In terms of emphasis on those themes, the FB shows particularly strong alignment with four of them: the use of knowledge, tools and techniques that categorise science, creativity and critical thinking, the skills to carry out investigations, and collaboration and communication.

- **Similarities in content:** FB physics-chemistry covers a substantial amount of the topics in the DP SL, including 'space, time and motion', gravitational, electric and magnetic fields and the 'particulate nature of matter'. In addition to this, the FB physics-chemistry includes some AHL subtopics, such as 'wave phenomena' and 'doppler effect'. SL topics with which FB physics-chemistry has the strongest alignment are space, time and motion, and fields. Regarding AHL content, alignment between FB physics-chemistry and the DP was strongest with regard to content on wave behaviour.

- **Similarities in demand:** FB physics-chemistry received the same depth of knowledge and volume of work scores as the DP physics SL course, as the FB course overall was found to go into a similar depth as the DP SL, and the amount of content students are expected to cover over the course of each subject amounting to a similar volume of work.

The **key differences** identified were the following:

- **Differences in learning outcomes:** FB physics-chemistry, whilst not highlighting this as a 'skill' per se, does emphasise the importance of students understanding and using models. Modelling plays a pivotal role in students' education through the FB, with students being expected to be able to link models and theories with observations, facts,

data and explanations. Whilst modelling is referenced in DP physics, it is not as prominent a feature as in the FB physics-chemistry.

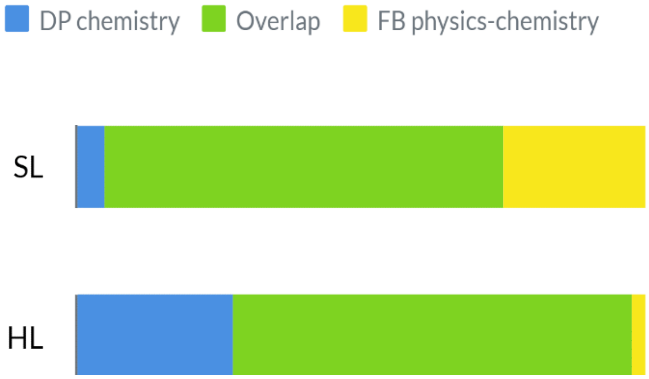
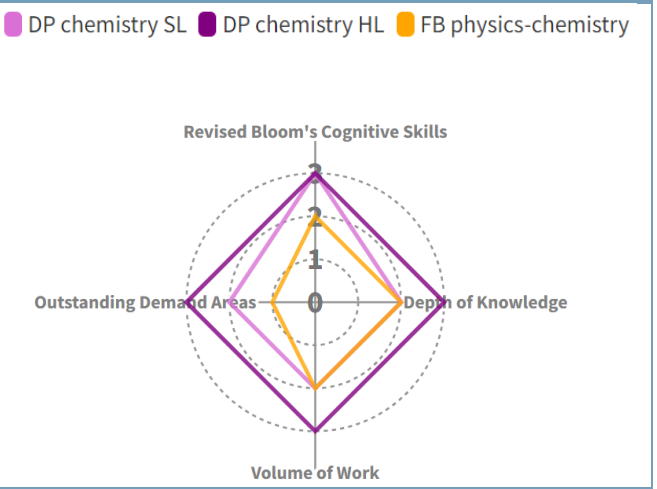
- **Differences in content:** the most notable difference between the DP and FB regarding physics content is that physics in the FB is taught as part of the FB physics-chemistry combined course, whereas physics and chemistry are taught as separate subjects in the DP. The FB's combination of physics and chemistry results in the DP physics covering more physics content than FB physics-chemistry, with the latter failing to cover, for example, gravitational and electric potential, simple harmonic motion, Snell's law and projectile motion. As such, FB physics-chemistry presents more limited opportunities than DP physics for students to develop a range of mathematical skills through the study of physics.

- **Differences in demand:** the demand of FB physics-chemistry is lower in most categories than that of DP physics, both at SL and HL. DP SL exceeds the FB in Bloom's cognitive skills and the areas of outstanding demand, while the DP HL exceeds the FB in all demand categories.

6.2.3 Chemistry Alignment

The subject level alignment between the DP chemistry and FB chemistry is represented below:

Figure 29: Visual representations of subject-level alignment (chemistry)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
physics-chemistry	Low Moderate High		

*The yellow bar for FB physics-chemistry represents chemistry-only additional content, it does not represent the physics content

- **Learning outcomes alignment**: the level of alignment between the learning outcomes of DP chemistry and FB physics-chemistry is significant, with all themes extracted from the DP learning outcomes being present, to some extent, in the FB's 'skills developed' or 'preamble'. While there are some small differences in focus – e.g. the FB making a more subtle reference to the development of technology skills – the level of overlap is, nevertheless, substantial.

- **Content alignment**: there is a large amount of topic and subtopic overlap between FB physics-chemistry and DP chemistry, both at SL and, to a lesser extent, HL. DP SL covers some topics that are not covered by the FB, though the majority of content is shared with FB physics-chemistry. Compared to SL, the DP HL features additional content that is not present in FB, though there is still a substantial amount of content overlap with FB physics-chemistry. Notably, there are no significant content areas covered by FB physics-chemistry which cannot be found in DP chemistry.

- **Demand alignment**: FB physics-chemistry has stronger alignment with the DP chemistry SL course, although it features fewer stretch areas than the latter. The DP SL and HL both surpass the FB physics-chemistry in demand level, with DP HL also featuring more stretch areas, greater depth of knowledge, and a higher volume of work than the latter.

The key similarities identified were the following:

- **Similarities in learning outcomes:** all the seven general learning outcome themes extracted from DP chemistry are present to some extent in all FB physics-chemistry documentation. In terms of emphasis on those themes, the FB is particularly well aligned with the DP on four of them: the use of knowledge, tools and techniques that categorise science, creativity and critical thinking, the skills to carry out investigations and collaboration and communication.

- **Similarities in content:** FB physics-chemistry contains some subtopics from each of the overarching topics covered by DP chemistry at SL. At topic level, the greatest level of alignment was seen in the DP's Structure 1, Structure 3 and Reactivity 2 topics, with the FB observing strong alignment with all subtopics within these. In regard to DP HL content, the FB showed at least partial alignment with all subtopics of the DP's Structure 2, Reactivity 2 and Reactivity 3 topics. FB physics-chemistry also shows a similar breadth of content as the DP SL chemistry.

- **Similarities in demand:** FB physics-chemistry curriculum received the same score as DP chemistry SL for depth of knowledge and volume of work, as both go into similar levels of depth and the amount of content students are expected to cover over the course of each subject amounting to a similar volume of work.

The **key differences** identified were the following:

- **Differences in learning outcomes:** FB physics-chemistry, whilst not highlighting this as a 'skill' per se, does emphasise the importance of students understanding and using

models. Modelling plays a pivotal role in students' education through the FB, with students being expected to be able to link models and theories with observations, facts, data and explanations. Whilst modelling is referenced in the DP chemistry course, it is not as prominent a feature as in FB physics-chemistry.

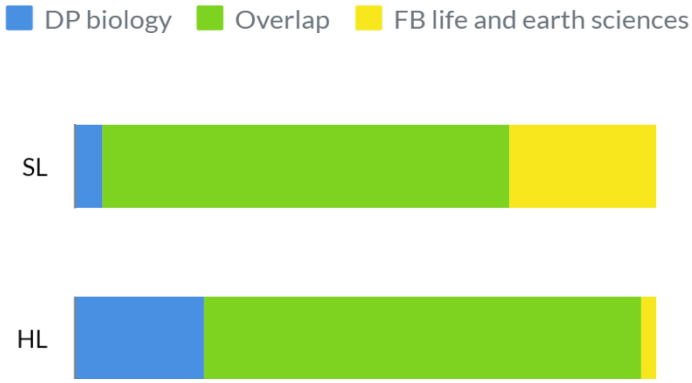
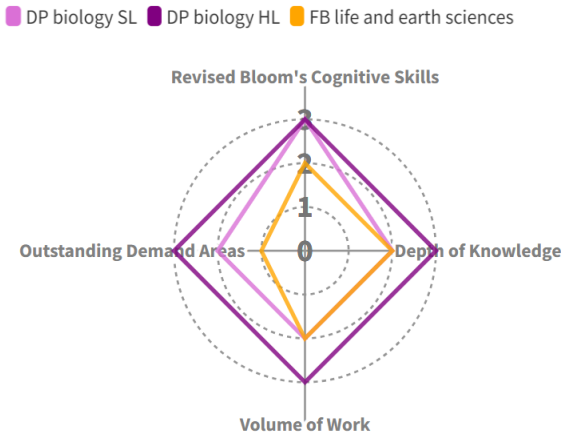
- **Differences in content:** the most notable difference between the DP and FB regarding their coverage of chemistry content is that chemistry in the FB is taught as part of the FB physics-chemistry combined course, whereas chemistry and physics are taught as separate subjects in the DP. The FB's combination of chemistry and physics results in the DP chemistry covering more chemistry content than FB physics-chemistry, with the latter failing to cover, for instance, alloys, Hess's law and free radical substitution. Additionally, DP AHL content not found in the FB includes: Structure 1.3, Reactivity 1.2 and Reactivity 1.4.

- **Differences in demand:** the demand of FB physics-chemistry is lower in most categories than that of DP chemistry, both at SL and HL. DP SL exceeds the FB in Bloom's cognitive skills and the areas of outstanding demand, while the DP HL exceeds the FB in all demand categories.

6.2.4 Biology Alignment

The subject level alignment between the DP biology and FB biology is represented below:

Figure 30: Visual representations of subject-level alignment (biology)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
life and earth sciences	Low Moderate High		

*the yellow bar for FB life and earth science represents biology-only additional content, it does not represent earth science topics.

- **Learning outcomes alignment**: the level of alignment between the learning outcomes of the DP and FB life and earth sciences is high, with all themes extracted from the DP learning outcomes being present to some extent in the FB's skills. While there are some small differences in emphasis – e.g. the FB exploring the theme of communication and collaboration more extensively than the DP – the level of overlap is, nevertheless, substantial.

- **Content alignment**: there is a large amount of topic and subtopic overlap between DP and FB life and earth sciences. There is substantial alignment between the DP SL and FB life and earth sciences, though alignment is only partial for almost all subtopics at HL. DP SL covers a small number of topics which are not covered by FB, though the majority of topics is shared with FB. With the exception of Earth Science topics, the FB life and earth sciences does not contain content which is not also present in the DP biology syllabus.

- **Demand alignment**: the FB and DP SL share the same scores in the categories of depth of knowledge and volume of work, though the FB falls short of SL scores in the remaining categories. DP HL surpasses FB in terms of demand in all categories.

The **key similarities** identified were the following:

- **Similarities in learning outcomes:** all seven learning outcome themes extracted from the DP biology are present to some extent in FB life and earth sciences. In terms of emphasis on the themes, the FB is especially similar in its focus on conceptual understanding, the use of techniques that categorise science and the awareness of the impact of science. The FB also features clear references to problem-solving and the development of technology skills.

- **Similarities in content:** the FB has some level of alignment with all DP SL subtopics, with 13 of these showing strong alignment and only 3 showing partial alignment. At HL, there is particularly strong alignment between the FB and the DP topic of Continuity and Change – Climate Change, while FB also demonstrates partial alignment with ten DP HL subtopics. The FB life and earth sciences' practical skills also partially aligns with the DP's experimental programme.

- **Similarities in demand:** the demand of the FB life and earth sciences curriculum is more similar to that of the DP biology at SL than at HL. The depth of knowledge and volume of work for the DP SL and FB life and earth sciences both received scores of 2.

The **key differences** identified were the following:

- **Differences in learning outcomes:** some of the skills within the DP are given slightly different emphasis in the FB earth and life sciences course. For example, the DP theme of communication and collaboration is demonstrated well in the FB, but the latter features greater emphasis on the need for students to 'convince' others than the former. This particular mention of students learning to change someone else's thinking

through good oral presentation and argumentation is more specific in the FB than the DP. Some aspects of the DP's theme focused on awareness of the impact of science are also less apparent in the FB than others. For example, the ethical, cultural and social implications of actions are less evidenced in the FB curriculum than in the DP's.

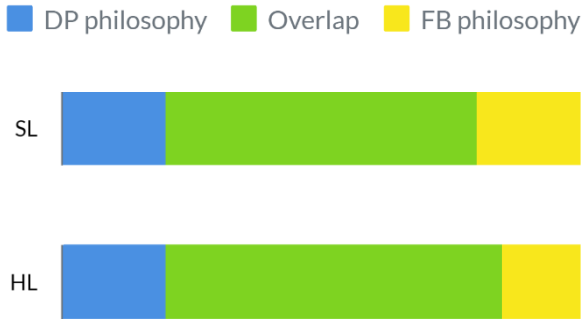
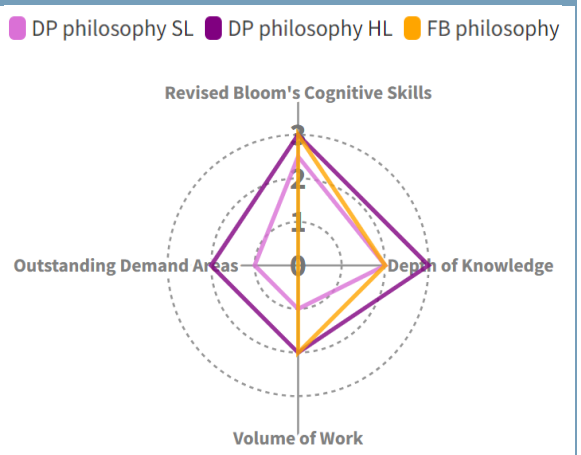
- **Differences in content:** despite there being a great deal of content similarity and overlap between the DP and the FB life and earth sciences, there are some subtle differences between the two. Three DP topics (B2 – Organisms, B4 – Ecosystems and D2 – Cells) at SL are covered in less depth in the FB than they are in the DP – e.g. xylem vessels and medical applications of isotonic solutions are present in the DP but not found in the FB. There are greater differences between the DP HL and FB life and earth sciences, with the FB only demonstrating partial alignment with most topics. Three DP HL topics (A3 – Organisms, A4 – Ecosystems and B2 – Cells) have little to no presence in the FB course. Due to the combined nature of the FB course, there is Earth Science content covered which is not present in the DP. However, regarding biology content, there are no significant content areas in the FB that are not also found in the DP.

- **Differences in demand:** FB life and earth sciences scored lower than the DP SL and HL in all areas, with the exception of those listed in 'similarities' above. The DP, at both SL and HL, exceeds the FB life and earth sciences when it comes to Bloom's cognitive skills and outstanding demand areas. The DP HL further exceeds the FB in the depth of knowledge and volume of work categories.

6.2.5 Philosophy Alignment

The subject level alignment between the DP and FB philosophy subjects is represented below:

Figure 31: Visual representations of subject-level alignment (philosophy subjects)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
philosophy	Low Moderate High		

- **Learning outcomes alignment**: the level of alignment between the DP and FB philosophy learning outcomes is high. This is due to a high number of DP themes being present in the FB, with no significant additional themes identified in the latter.

- **Content alignment**: there is moderate content alignment between DP and FB philosophy. The concepts and authors listed in FB philosophy indicate some alignment with the concepts of the DP's core theme, as well as the optional themes. However, the FB philosophy curriculum is less prescriptive and does not detail specific texts or subtopics to be studied. Therefore, inferences had to be made when assessing alignment, and comparisons of content depth could not be fully drawn.

- **Demand alignment**: FB philosophy aligns with DP SL for depth of knowledge and with DP HL for Bloom's cognitive skills and volume of work. Both DP subjects score higher than FB philosophy for outstanding demand areas, though it should be noted that the FB curriculum is less detailed and, as such, it is possible that additional areas of challenge are present when the subject is taught. Overall, FB philosophy is slightly more aligned with the demand of DP philosophy SL, though does demonstrate similarity with DP HL in some categories.

The **key similarities** identified were the following:

- **Similarities in learning outcomes**: of the seven DP philosophy learning outcome themes, four of these are well-evidenced in FB philosophy and two are partially evidenced. Indeed, both subjects expect students to develop knowledge of philosophical concepts and arguments and apply this knowledge to solve philosophical problems. Furthermore, both subjects emphasise critical thinking through the analysis and evaluation of philosophical concepts and demonstrate critical judgement in the formulation of educated arguments.

- **Similarities in content**: FB philosophy has similarities in content with the DP's core theme 'Being human', the optional themes, and the prescribed texts. Whilst not explicitly referencing all the six concepts within the DP's core theme, the 17 concepts listed in FB philosophy indicated at least some alignment with all of these, with 'Consciousness' and 'Freedom' being particularly present in the concepts. Similarly, from the DP's optional themes, the FB philosophy concepts indicate a presence of philosophy of science, religion, and political philosophy, and some presence of aesthetics, epistemology, and ethics. Furthermore, four of the 12 authors of the DP's prescribed texts are present in the FB. That said, it should be noted that some inferences had to be made in the analysis due to the FB philosophy curriculum being less prescriptive and not detailing specific texts or subtopics to be studied, only authors. As such, comparisons of content depth could not be fully drawn.

- **Similarities in demand**: like DP philosophy, the learning outcomes of FB philosophy demonstrate higher cognitive skills of analysis and evaluation, earning it the same high score as DP HL for Bloom's cognitive skills. FB philosophy also scored the same as DP HL for volume of work, as its high number of concepts covered in a short space of time suggested a moderate-heavy workload. For depth of knowledge, FB philosophy

scores the same as DP SL, with some evidence of approaching and comprehending complex situations, and proposing solutions to problems.

The **key differences** identified were the following:

- **Differences in learning outcomes:** although FB philosophy outcomes evidence most of the DP's themes and demonstrate an overall high degree of alignment with the latter, the theme of developing an understanding of ethics and diversity is not well evidenced in FB philosophy. Moreover, it can be noted that the FB philosophy outcomes have a greater emphasis on developing judgements and reasoning around philosophical concepts and questions linked to philosophical concepts than that given in the DP.

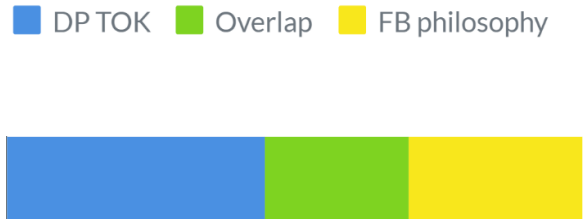
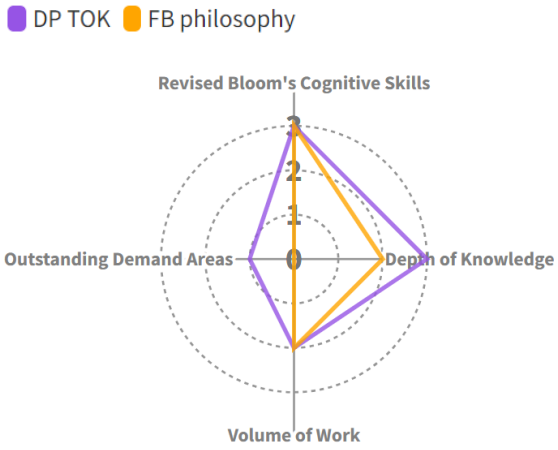
- **Differences in content:** unlike DP philosophy, FB philosophy is not offered at two levels, having a single syllabus to be covered in one year. The curriculum is relatively less prescriptive compared to the DP in some places, as it does not suggest subtopics for themes or provide suggested examples/discussed questions. In terms of alignment, a significant number of the DP's core theme concepts and the optional themes could only be recorded as being partially present due to the FB philosophy's concepts not indicating a strong enough presence of these. For example, the optional theme of 'aesthetics' would be expected to be covered in some degree in the 'art' concept of the FB, but the absence of further information on this concept prevents the ability to confirm a strong level of alignment. Finally, it can be noted that none of the FB's philosophy concepts indicated a presence of the DP's social philosophy optional theme.

- **Differences in demand:** the most significant difference in demand between FB and DP philosophy is with regard to the number of outstanding demand areas. Indeed, no areas could be identified in the FB's curriculum, with the latter scoring lower in this category than both DP SL and DP HL as a result. However, it should be noted that the FB curriculum does not indicate how and to what degree certain philosophical concepts are studied; thus, it is possible that stretch areas are present, there was just insufficient evidence from the documentation to warrant a higher score.

6.2.6 Theory of knowledge Alignment

The subject level alignment between the DP Theory of knowledge course and FB philosophy is represented below:

Figure 32: Visual representations of subject-level alignment (Theory of knowledge and philosophy subjects)

Subject name	Learning outcomes alignment	Content alignment	Demand alignment
philosophy	Low Moderate High		

- **Learning outcomes alignment**: the level of alignment between the DP's TOK and FB philosophy's learning outcomes is high. This is due to all the DP TOK themes being either strongly or partially evidenced in the learning outcomes of FB philosophy, with no additional themes being present in the latter.

- **Content alignment**: there is some content alignment between DP TOK and FB philosophy; however, this is fairly limited. Overlapping content tends to be partially, rather than strongly, aligned. Furthermore, each subject has different themes/concepts which are not present in the other. Moreover, the FB philosophy curriculum is notably non-prescriptive and does not detail specific texts or subtopics to be studied#, only authors. Therefore, inferences had to be made when assessing alignment and comparisons of content depth could not be fully drawn.

- **Demand alignment**: FB philosophy is closely aligned with the demand of DP TOK in some categories, scoring equally highly for Bloom's cognitive skills and volume of work. However, DP TOK exceeds FB philosophy in demand for depth of knowledge and outstanding areas of demand. It should be noted that the FB philosophy curriculum is particularly non-prescriptive; thus, not being able to identify areas of demand does not preclude their existence.

The **key similarities** identified were the following:

- **Similarities in learning outcomes**: of the five DP TOK learning outcome themes, two are well-evidenced in FB philosophy and three are partially evidenced. Indeed, both courses expect students to develop knowledge and understanding of key concepts in a range of contexts and understand different points of view. Furthermore, both emphasise evaluating concepts and points of view and applying that evaluation to the development of views and opinions.

- **Similarities in content**: there is some (though limited) alignment in content, as FB philosophy partially covers some DP TOK topics. Theory of knowledge is a key branch of philosophy and this area is reflected in the FB subject through the overarching 'knowledge' perspective; thus, it is expected that the DP TOK's core theme 'knowledge and knower' will be covered to some degree. There is also evidence of partial alignment with some of the DP's optional themes of knowledge and language, knowledge and politics, and knowledge and religion, as well as the DP's human and natural sciences and the arts areas of knowledge.

- **Similarities in demand**: DP TOK and FB philosophy both score high for Bloom's cognitive skills, as each demonstrate a predominant focus on higher order thinking skills, such as evaluation and synthesis. Furthermore, both score the same for volume of work, as each was judged to have a moderate-heavy workload, given the number of themes/concepts to be covered within the allocated time.

The **key differences** identified were the following:

- **Differences in learning outcomes:** there are not many significant differences in the learning outcomes of the two courses. However, it can be noted that FB philosophy includes reflection in a broader sense than the DP, the latter emphasising reflective practice. Furthermore, whilst FB philosophy somewhat evidences the understanding and appreciation of the perspectives of others, it is not clear that this extends to the 'world views' of others, as it does in the DP.

- **Differences in content:** largely, there is not a high level of content alignment between DP TOK and FB philosophy. With the DP TOK topics that the FB philosophy curriculum indicates some alignment with, it is unclear whether the latter covers these in similar breadth and depth to the DP. Furthermore, not all DP TOK optional themes and areas of knowledge can be identified in FB philosophy. Indeed, there is no evidence of coverage of knowledge when related to technology or indigenous societies, or that history and mathematics are areas of knowledge in the FB philosophy curriculum. Conversely, whilst the DP TOK is designed to cover the nature, scope and limits of knowledge, a detailed technical philosophical investigation into the nature of knowledge is not part of DP TOK, and students are not expected to be familiar with specific philosophers or philosophical texts as they are in FB philosophy.

- **Differences in demand:** DP TOK scores higher than FB philosophy for depth of knowledge, as the former course more strongly demonstrates a requirement for strategic and extended thinking. DP TOK also scores higher for outstanding areas of demand, as its 'knowledge framework' and optional themes of study were deemed to provide potential opportunities for challenge. No areas of challenge were identified in the FB philosophy curriculum; however, it should be noted that there is generally less information provided about the course, hence it cannot be concluded for certain than no challenging areas are present.

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Appendix A

This Appendix provides further detail on the criteria utilised by Ecctis' experts and external panel members with subject expertise to measure demand for each of the subjects analysed in this study.

Demand Profile – Subject-level Judgement

- **Revised Bloom's Cognitive Skills** score (0-3): this is an overall score of course demand, based entirely on a review of learning outcomes. Levels have been defined based on increasing emphasis on Bloom's Higher Order Thinking Skills.

    - Level 0 – remembering and understanding: learning outcomes (as well as assessment and content) are primarily focused on recall and understanding, with limited or no evidence of higher order thinking skills.
    - Level 1 – applying: learning outcomes (as well as assessment and content) comprise a mix of recall-, understanding- and application-focused objectives, with only limited presence of higher order thinking skills.
    - Level 2 – analysing: learning outcomes (as well as assessment and content) comprise a mix of recall-, understanding and application-focused goals but also feature a substantial focus on analysis. Learning outcomes can also potentially feature some (though limited) evidence of evaluation and creation-focused goals.
    - Level 3 – evaluating and creating (or synthesising): learning outcomes (as well as assessment and content) feature a predominant focus on analysis-, evaluation- and creation/synthesis.

- **Depth of Knowledge** (adapted from Webb's) score (0-3): this is an overall score evaluating the depth of knowledge or complexity of knowledge required by curriculum standards and expectations. The score is focused on subject content and learning outcomes, complemented by assessment where relevant/possible. Levels have been defined based on the level of detail studied per topic, as well as the levels of thinking described in Webb's depth of knowledge framework.

    - Level 0 – All or most topics are studied in limited detail (pre-upper secondary level). Only basic pre-requisite knowledge is required in order to grasp ideas. The level of cognitive complexity of the information students are expected to know is low (e.g. many tasks may require recall and reproduction of information such as facts, definitions, terms, or simpler procedures – acquired knowledge).
    - Level 1 – Some topics are studied in considerable detail. Moderate levels of pre-requisite knowledge are required in order to grasp ideas in some topics. The level of cognitive complexity of the information students are expected to know is low to moderate (e.g. many tasks may require engagement of some mental processing beyond habitual responses, including comparison and basic reasoning – knowledge application).

  - Level 2 – Most topics are studied in considerable detail. Considerable pre-requisite knowledge is required in order to grasp ideas in some topics. The level of cognitive complexity of the information students are expected to know is average to high (e.g. some tasks require complex reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands are often complex and abstract – analysis).
  - Level 3 – All or most topics are studied in very high detail. Considerable pre-requisite knowledge is required in order to grasp ideas in most topics. The level of cognitive complexity of information students are expected to know is mostly high (e.g. many tasks may require complex reasoning, planning, developing, information synthesis, interpretation of data for problem solving, and thinking most likely over an extended period – extended thinking).

- **Volume of Work** score (0-3): this is a trifactor score, considering breadth of content and depth of content, evaluated against the programme's specified timeframe. The three factors – breadth, depth, and time – were all considered in defining the levels.

  - Level 0 – light: small number of themes and sub-themes covered; a significant majority of time is spent on straightforward or basic themes; generous time allocation per theme.
  - Level 1 – moderate: typical number of themes and sub-themes covered; more time spent on conceptually complex themes compared to Level 1 (though majority of time still spent on themes of basic depth); standard time allocation per theme.
  - Level 2 – moderate heavy: typical to high number of themes and sub-themes covered; a significant proportion of time spent on issues beyond basic conceptual depth; standard to short time allocation per theme.
  - Level 3 – heavy: high number of themes and sub-themes covered; a large proportion of time spent on issues beyond basic conceptual depth; short time allocation per theme.

- **Outstanding Areas of Subject Demand** score (0-3): this score reflects the number of content areas typically viewed as more challenging and/or conducive to intellectual stretching of learners. Levels have been defined on a scale of increasing presence of 'stretch areas'.

  - Level 0 – no stretch areas (0)
  - Level 1 – few stretch areas (1-2)
  - Level 2 – a significant number of stretch areas (3-4)
  - Level 3 – a high number of stretch areas (>4)

Appendix B

Learner profile	Approaches to learning	Approaches to teaching	International-mindedness
Inquirers: We nurture our curiosity, developing skills for inquiry and research. We know how to learn independently and with others. We learn with enthusiasm and sustain our love of learning throughout life. **Knowledgeable**: We develop and use conceptual understanding, exploring knowledge across a range of disciplines. We engage with issues and ideas that have local and global significance. **Thinkers**: We use critical and creative thinking skills to analyse and take responsible action on complex problems. We exercise initiative in making reasoned, ethical decisions. **Communicators**: We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups. **Principled**: We act with integrity and honesty, with a strong sense of fairness and justice, and with respect for the dignity and rights of people everywhere. We take responsibility for our actions and their consequences. **Open Minded**: We critically appreciate our own cultures and personal histories, as well as the values and traditions of others. We seek and evaluate a range of points of view, and we are willing to grow from the experience.	In all IB programmes, there are five categories of skills including: **Thinking skills:** including areas such as critical thinking, creative thinking, and ethical thinking **Research skills:** including skills such as comparing, contrasting, validating, and prioritizing information **Communication skills:** including skills such as written and oral communication, effective listening, and formulating arguments **Social skills:** including areas such as forming and maintaining positive relationships, listening	In all IB programmes, teaching is: **Based on inquiry:** A strong emphasis is placed on students finding their own information and constructing their own understandings. **Focused on conceptual understanding:** Concepts are explored in order to both deepen disciplinary understanding and to help students make connections and transfer learning to new contexts. **Developed in local and global contexts:** Teaching uses real-life contexts and examples, and students are encouraged to process new information by connecting it to their own experiences and to the world around them. **Focused on effective teamwork and collaboration:** This includes promoting teamwork and collaboration between students, but also refers to the collaborative relationship between teachers and students.	The aim of all IB programmes is to develop internationally minded people who recognize their common humanity and shared guardianship of the planet. Central to this aim is international-mindedness. International-mindedness is a multifaceted concept that captures a way of thinking, being and acting characterised by an openness to the world and a recognition of our deep interconnectedness to others. To be open to the world, we need to understand it. IB programmes therefore provide students with opportunities for sustained inquiry into a range of local and global issues and ideas. This willingness to see beyond immediate situations and boundaries is essential as globalization and emerging technologies continue to blur traditional distinctions between the local, national and international. An IB education fosters international-mindedness by helping students reflect on their own perspective, culture and identities, as well as those of others. By engaging with diverse beliefs, values and experiences, and by learning to think and collaborate across cultures and disciplines, IB learners gain the understanding necessary to make progress towards a more peaceful world.

Caring: We show empathy, compassion, and respect. We have a commitment to service, and we act to make a positive difference in the lives of others and in the world around us. **Risk-Takers**: We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change. **Balanced**: We understand the importance of balancing different aspects of our lives – intellectual, physical, and emotional – to achieve well-being for ourselves and others. We recognize our interdependence with other people and with the world in which we live. **Reflective**: We thoughtfully consider the world and our own ideas and experience. We work to understand our strengths and weaknesses in order to support our learning and personal development.	skills, and conflict resolution **Self-management skills:** including both organizational skills, such as managing time and tasks, and affective skills, such as managing state of mind and motivation.	**Designed to remove barriers to learning:** Teaching is inclusive and values diversity. It affirms students' identities, and aims to create learning opportunities that enable every student to develop and pursue appropriate personal goals. **Informed by assessment:** Assessment plays a crucial role in supporting, as well as measuring, learning. This approach also recognizes the crucial role of providing students with effective feedback.	An IB education further enhances the development of international-mindedness through multilingualism. All IB programmes require students to study, or study in, more than one language. This is because we believe that communicating in more than one language helps students to appreciate that his or her own language, culture and world view are just one of many. In this way, it provides excellent opportunities to develop intercultural understanding and respect. International-mindedness is also encouraged through a focus on global engagement and meaningful service with the community. These elements challenge students to critically consider power and privilege, and to recognize that they hold this planet and its resources in trust for future generations. They also highlight the focus on action in all IB programmes: a focus on moving beyond awareness and understanding to engagement, action and bringing about meaningful change to make a more peaceful and sustainable world for everyone.

Appendix C

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Task brief – Expert Demand Panel – [Subject]

For each subject, highlight in yellow the descriptor(s) deemed to best fit each demand category, using the following criteria (please refer to the demand tables for descriptors of the levels):

- **Revised Bloom's Cognitive Skills** score (0-3): this is an overall score of course demand, based entirely on a review of learning outcomes. Levels have been defined based on increasing emphasis on Bloom's Higher Order Thinking Skills.

- **Depth of Knowledge** (adapted from Webb's) score (0-3): this is an overall score evaluating the depth of knowledge or complexity of knowledge required by curriculum standards and expectations. The score is focused on subject content and learning outcomes, complemented by assessment where relevant/possible. Levels have been defined based on the level of detail studied per topic, as well as the levels of thinking described in Webb's depth of knowledge framework.

- **Volume of Work** score (0-3): this is a trifactor score, considering breadth of content and depth of content, evaluated against the programme's specified timeframe. The three factors – breadth, depth and time – were all taken into account in defining the levels.

- **Outstanding Areas of Subject Demand** score (0-3): this score reflects the number of content areas typically viewed as more challenging and/or conducive to intellectual stretching of learners. Levels have been defined on a scale of increasing presence of 'stretch areas'.

Demand Judgements – [Subject]

Table 40: [Subject]

Demand Judgement	Score Descriptors (highlight the best-fit descriptor)	Judgement and Key Evidence
Revised Bloom's Cognitive Skills[123]	Level 0 – remembering and understanding: learning outcomes are primarily focused on recall and understanding, with limited or no evidence of higher order thinking skills.	
	Level 1 – applying: learning outcomes (as well as assessment and content) comprise a mix of recall-, understanding- and application-focused objectives, with only limited presence of higher order thinking skills.	
	Level 2 – analysing: learning outcomes (as well as assessment and content) comprise a mix of recall-, understanding and application-focused goals but also feature a substantial focus on analysis. Learning outcomes can also potentially feature some (though limited) evidence of evaluation and creation-focused goals.	
	Level 3 – evaluating and creating (or synthesising): learning outcomes feature a predominant focus on analysis-, evaluation- and creation/synthesis.	
Depth of Knowledge[124]	Level 0 – All or most topics are studied in limited detail (pre-upper secondary level). Only basic pre-requisite knowledge is required in order to grasp ideas. The level of cognitive complexity of the information students are expected to know is low (e.g. many tasks may require recall and reproduction of information such as facts, definitions, terms, or simpler procedures – acquired knowledge).	
	Level 1 – Some topics are studied in considerable detail. Moderate levels of pre-requisite knowledge are required in order to grasp ideas in some topics. The level of cognitive complexity of the information students are expected to know is low to moderate (e.g. many tasks may require engagement of some mental processing beyond habitual responses, including comparison and basic reasoning – knowledge application).	

[123] Evidence pool: Learning outcomes
[124] Evidence pool: Learning outcomes, subject content, assessment types

Demand Judgement	Score Descriptors (highlight the best-fit descriptor)	Judgement and Key Evidence
	Level 2 – Most topics are studied in considerable detail. Considerable pre-requisite knowledge is required in order to grasp ideas in some topics. The level of cognitive complexity of the information students are expected to know is average to high (e.g. some tasks require complex reasoning, planning, using evidence, and a higher level of thinking than the previous two levels. The cognitive demands are often complex and abstract – analysis).	
	Level 3 – All or most topics are studied in very high detail. Considerable pre-requisite knowledge is required in order to grasp ideas in most topics. The level of cognitive complexity of information students are expected to know is mostly high (e.g. many tasks may require complex reasoning, planning, developing, information synthesis, interpretation of data for problem solving, and thinking most likely over an extended period of time – extended thinking).	
Volume of Work[125]	Level 0 – light: small number of themes and sub-themes covered; a significant majority of time is spent on straightforward or basic themes; generous time allocation per theme.	
	Level 1 – moderate: typical number of themes and sub-themes covered; more time spent on conceptually complex themes compared to Level 1 (though majority of time still spent on themes of basic depth); standard time allocation per theme.	
	Level 2 – moderate heavy: typical to high number of themes and sub-themes covered; a significant proportion of time spent on issues beyond basic conceptual depth; standard to short time allocation per theme.	
	Level 3 – heavy: high number of themes and sub-themes covered; a large proportion of time spent on issues beyond basic conceptual depth; short time allocation per theme.	
Outstanding Areas of Subject Demand[126]	Level 0 – no stretch areas (0)	
	Level 1 – few stretch areas (1-2)	
	Level 2 – a significant number of stretch areas (3-4)	

[125] Evidence pool: Subject content; assessment types and number; course duration; time allocated per topic/subtopic (where available).
[126] Evidence pool: Subject content.

Demand Judgement	Score Descriptors (highlight the best-fit descriptor)	Judgement and Key Evidence
	Level 3 – a high number of stretch areas (>4)	