Caring Communicators Reflective
Thinkers Inquirers Principled Open-Minded
Risk-Takers Knowledgeable
Balanced

Building Bridges between Countries & Cultures

MEF
INTERNATIONAL SCHOOLS

MEF IS IZMIR

SECONDARY SCHOOL CURRICULUM GUIDE 2025-26

Grade 11 IBDP1

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MEF IS Motto

Building bridges between countries and cultures

MEF IS Mission

We inspire, nurture and challenge our learners to realise their unique potential.

MEF IS Vision

To be an open-minded community striving for creativity, innovation and excellence

MEF IS Learning Definition

Learning is the ongoing process of constructing new understandings of the world through experiences and interactions. It consists of making connections, reflecting, and expanding on current knowledge through motivation, curiosity, exploration, experimentation, and natural consequences resulting in change in the way we think and perform.

MEF IS Definition for Internationalism / Interculturalism

A dynamic discourse that fosters: knowledge and respect; the search for commonalities and a celebration of differences; international mindedness and a peaceful, ethical and progressive society.

MEF IS Guiding Principles

The MEF International School Community;

- promotes and cultivates global mindedness, developing an appreciation for individuals, groups, cultures and societies
- is empathetic, striving to understand and learn from the perspective of others
- uses reflective practice, striving for continuous improvement

Where learning…

- involves making connections, and extending the learner's understanding that results in action and change
- is experiential, fun, authentic, and collaborative
- engages learners in critical, analytical and creative thinking

Where teaching…

- depends on the positive relationship between teachers and learners
- supports individual learners, providing challenge and rigour
- allows for learner voice, choice and ownership
- fosters curiosity, exploration and experimentation
- integrates technology to enhance learning
- is innovative and creative, informed by research concerning educational practice

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The Roles of Learners and Teachers

These roles reflect the MEFIS learning definition and are based on self-awareness and an understanding of the dynamic, transformative and life-long processes of learning and teaching. Both learners and teachers aim for impacts not just the assessment outcomes. Teachers and learners collaborate in a secure environment in order to develop their thinking, research, self-management, social and communication skills and become responsible and productive members of local, national and global communities.

Learners are	**Teachers are**
Confident in working with information and ideas using a variety of sources by analysing and reflecting on visuals and multimedia.	Confident, knowledgeable and visionary in teaching their subject and engaging each student in learning.
Responsible and principled for their own learning, making informed choices, and being responsive to and respectful of others both in and out of the classroom.	Responsible and principled for themselves being responsive to and respectful of all learners by supporting individual needs and providing challenge and rigour, both in and out of the classroom.
Reflective inquirers who realize that people learn in different ways, discovering how they learn best and developing strategies to be successful throughout the learning process.	Reflective inquirers as learners themselves, developing their practice and fostering curiosity, exploration and experimentation.
Innovative, resourceful and resilient thinkers and risk-takers who take initiative in applying prior knowledge to solve present and future challenges.	Innovative risk-takers equipped for present and future challenges, who integrate 21st century skills to enhance and transform learning and are informed by action research.
Engaged, balanced and open-minded intellectually and socially and ready to make a positive difference in local, national and global communities.	Engaged, balanced thinkers intellectually, professionally and socially, ready to make a positive difference in local, national and global communities.
Communicative and caring in understanding constructive feedback and expressing ideas creatively and collaboratively in more than one language and in many ways.	Communicative and caring allow for student voice, choice and ownership by promoting positive relationships and providing learners with constructive, timely feedback and strategic opportunities for using their mother tongue for developing understandings.

Teaching and Learning

Teachers use a variety of methods to develop student knowledge, skills, understanding and dispositions. It is the responsibility of the student to be engaged, participate and follow instructions. The teacher should be notified if additional support is needed. Technology is used to support and enhance teaching and learning when appropriate. Students should bring fully charged laptops to lessons.

Google Classroom

Each course has a Google Classroom where students can see announcements, homework and deadlines and electronically submit assignments. Students will be invited to join a classroom by their teacher and are expected to check it regularly. Parents can keep track of their child's classroom progress through daily or weekly email summaries. Email summaries include updates on missing work and upcoming work. As a guardian, before you can receive email summaries, you must receive and accept an invitation from your student's teacher or school. If you have any questions, please contact the subject teacher via email.

Assessment

Assessment is used to inform both teachers and students in their teaching and learning. Teachers provide varied opportunities for students to participate in, and reflect on, the assessment of their work**.** Renweb is used to communicate formative and summative assessment outcomes for every student. Each subject is reported on at the end of the two semesters.

To calculate the overall achievement of a student each semester, the grades from different assessments have different weightings:

Summatives: 50%
Performance 1: 40% (essays, lab reports, projects, investigations)
Performance 2: 10% (Formative quizzes, homework, classwork)

Homework:	Homework is assigned regularly to reinforce classroom learning, promote independent practice, and develop self-management skills. Tasks may include problem sets, reflections, readings, research, or preparation for upcoming lessons. Homework is expected to be completed on time and with academic integrity, as it supports readiness for class discussions, formative assessments, and long-term projects. While not graded in the same way as summative assessments, homework provides valuable evidence of learning habits and helps students build the discipline and responsibility required for success in the IB program.
Classwork:	Classwork is an essential component of the learning process and provides opportunities for students to engage actively with concepts through discussions, problem-solving, collaborative tasks, and individual practice. Students are expected to participate meaningfully, remain focused, and contribute to a positive classroom environment. Classwork helps teachers monitor progress, provide feedback, and prepare students for formative and summative assessments, while also fostering ATL skills such as communication, collaboration, and critical thinking.
Formative Assessment	Formative assessments are integrated regularly into teaching and learning to provide students with timely feedback and guide their progress toward mastery of key concepts and skills. These assessments may include quizzes, class discussions, problem-solving tasks, digital tools, reflections, and short written or oral exercises. The purpose is not to assign grades but to identify strengths, address misconceptions, and support differentiated instruction. Formative assessments also help students develop self-management and reflection skills, preparing them for success in summative assessments and ultimately in IB examinations.
Summative Assessment	Summative assessments are communicated to students at least one week in advance to ensure fairness and adequate preparation time. These assessments are criterion-related and may include structured and/or open-ended tasks designed to evaluate student understanding across one or more topics or units. Summative tasks also incorporate IB past paper questions, with the use of past papers gradually increasing as students advance, to build familiarity with IB assessment style and expectations. These assessments provide opportunities for students to demonstrate conceptual understanding, application of knowledge, and critical thinking skills. Summative assessments are typically 30 minutes or longer in duration.

Approaches to Learning (ATLs)
Approaches to Learning (ATLs) are not included in the calculation of academic grades. However, teachers provide feedback on report cards indicating whether each student is meeting the specific ATL skills, offering insight into their development of critical thinking, communication, research, self-management, and social skills.

Balanced Study and Extracurricular Engagement
Grade 11 IB students are expected to dedicate time each week to independent study, homework, and assessment preparation, typically around 10–12 hours outside of school. Equally important is maintaining a healthy balance with extracurricular activities, personal interests, and rest. Engaging in sports, clubs, arts, and community service supports well-rounded development, helps manage stress, and enhances skills such as time management, collaboration, and resilience. Effective learning occurs when study time is purposeful and complemented by activities that foster personal growth and well-being, ensuring students remain motivated, focused, and prepared for the demands of the IB programme.

IB Grades vs MEF Grades
When IB past papers are used for assessment, teachers apply the official IB mark schemes to scale the results. This ensures that student performance is evaluated against the same standards used in formal IB examinations, providing a fair and accurate reflection of progress before grades are recorded in RenWeb.
MEF grades, recorded in RenWeb, reflect this scaled performance while also considering ongoing coursework, class participation, and formative assessments. This approach provides a comprehensive view of student learning, aligning internal tracking with IB standards and helping students understand their progress relative to both classroom expectations and external IB benchmarks.

Student Support
Learning support and counselling is available to all students in need. Students needing support from individual subjects should discuss this with their teachers.

Attendance
Consistent and punctual attendance is important for all students' learning. If students know they plan to miss school, they should complete the student missing worksheet before they leave. Students returning from missing school have the responsibility to catch up on this missed work themselves. Students missing exams are only eligible to take these other dates with the Deputy Principal. This is granted if the student can provide a doctor's note or other official documentation.

Semester Examinations
The academic year is organized into two semesters, each culminating in a semester examination. These examinations form an integral component of the school's summative assessment framework, providing students with an opportunity to demonstrate their knowledge, understanding, and application of key concepts taught over an extended period of learning. Semester examinations are cumulative in nature, typically encompassing multiple chapters or units, thereby encouraging students to develop sustained study habits and deeper conceptual connections across the curriculum. To ensure rigor and alignment with international standards, teachers frequently draw upon International Baccalaureate (IB) past papers when designing assessments. This practice not only familiarizes students with the expectations and format of external examinations but also supports the development of higher-order thinking and exam strategies.

Exam dates:

Semester 1 Exam:	Jan 12 - 16, 2026
Semester 2 Exam:	May 11 - 15, 2026

IB1 OVERVIEW

Course of study

The IB1 Diploma course of study is designed as the first of a two year course of study culminating in the IB (International Baccalaureate) Diploma, an internationally recognised qualification. Students study a first language course in English, or in a self-taught course in their mother tongue; English , French or Spanish as an additional language; Biology, Physics; Chemistry or History; Mathematics; Visual Arts or Economics; and TOK (Theory of Knowledge).

Students study six courses in total: three at **Standard Level (SL)** and three at **Higher Level (HL)**. SL courses require approximately **150 teaching hours**, while HL courses require approximately **240 teaching hours**. These syllabus-based courses outline international learning objectives over a two-year period, culminating in **externally written and graded examinations**, which are typically held at the **end of the second year in May**, and **externally moderated internal assessments** conducted throughout the two years.

Alongside these subjects, students take part in CAS (Creativity, Activity and Service) and write a research-based 'Extended Essay' in one of the core subjects. Further information about the International Baccalaureate can be found on their website http://www.ibo.org/. "Course Aims & Objectives" listed throughout the document have been taken from IB course guides.

DP courses offered at MEFIS:

Group 1 (Studies in Language & Literature)	**Group 2 (Language Acquisition)**
English A (SL , HL) Self-Taught A (SL)	English B (HL), French B (SL , HL) Spanish B (SL , HL) Spanish Ab initio (SL), French Ab Initio (SL)
Group 3 (Individuals and Societies)	**Group 4 (Experimental Sciences)**
History (SL HL) Chemistry (SL , HL)	Biology (SL , HL) Physics (SL , HL)
Group 5 (Mathematics)	**Group 6 (Arts and Electives)**
Mathematics Analysis & Approaches (HL) Mathematics Analysis & Approaches (SL) Mathematical Applications & Interpretation (SL)	Visual Arts (SL , HL) Economics (SL,HL)

Students who do not wish to undertake the full IB Diploma Programme, or who do not meet the entrance requirements, have the option of enrolling in the **IB Course Certificate Programme**.

In this pathway, students take IB courses in English, Mathematics, French or Spanish, Science or Humanities, and a Group 6 elective. They may also choose to sit for externally assessed IB examinations in these subjects and, if successful, will be awarded an official IB certificate for each course.

To be eligible to receive the **Turkish High School Diploma**, IB Course Certificate students must complete at least five courses, including both English and Mathematics.

IB Learner Profile

The IB Diploma Programme is committed to the development of students according to the IB learner profile.

The learner profile aims to develop learners who are:

- Inquirers
- Knowledgeable
- Thinkers
- Communicators
- Principled
- Open-minded
- Caring
- Risk-takers
- Balanced
- Reflective

Figure 1
Diploma Programme model

IB Progress Reports

IB Progress Reports are issued periodically to communicate student progress according to IB standards in individual IB courses during specific time intervals. These grades may be different from what is seen in RenWeb. The grades reflect how students would perform on official IB exams. These reports are unofficial and have no bearing on student transcripts. They do not represent the final predicted grades that teachers submit for the admission applications.

Progress Report grades follow the IB grading system 7-1 for academic subjects and A-E for Extended Essay and TOK. Comments follow the IBDP Grade Descriptors guidance for each group of subjects. Scores of "3" or lower are considered unsatisfactory and may result in a student probation. For students in the full Diploma Programme, an unsatisfactory score on a progress report combined with a failing grade at the end of the first semester may demote a student to the IB Course Certificate Programme.

IB Predicted Grades (March of IB2)

Purpose

The purpose of the IBDP Predicted Grades is to provide an evidence-based projection of each student's anticipated performance in their final International Baccalaureate Diploma Programme (IBDP) examinations. These grades are determined using a range of indicators, including current academic progress, internal assessment results, and teacher evaluation.

Definition

The predicted grade is the teacher's prediction of the grade the candidate is expected to achieve in the subject, based on all available evidence of the candidate's work on components assessed by the IB and the teacher's knowledge of IB standards. Predicted grades may differ from RenWeb grades as they do not include homework or other routine assignments. Predicted grades are also required for Theory of Knowledge (TOK) and the Extended Essay (EE). It is essential that each prediction is made as accurately as possible, without under-predicting or over-predicting the grade. The IB monitors and works with schools that consistently under- or over-predict student grades.

Rationale

Predicted grades serve as an important tool to guide students' academic development and to support university application processes. They reflect the school's professional judgment at a given point in time and are intended to provide a realistic estimate of a student's likely outcome in their final assessments.

Reporting Timeline

Preliminary predicted grades will be shared with students as part of their **April progress report**. These grades are **subject to change** as students continue to demonstrate growth and achievement throughout the program. The **final official predicted grades** will be issued in **March of the second year** of the IBDP.

IB Diploma Requirements

- CAS requirements have been met.
- The candidate's total points are 24 or more.
- There is no "N" awarded for theory of knowledge, the extended essay or for a contributing subject.
- There is no grade E awarded for theory of knowledge and/or the extended essay.
- There is no grade 1 awarded in a subject/level.
- There are no more than two grade 2s awarded (HL or SL).
- There are no more than three grade 3s or below awarded (HL or SL).
- The candidate has gained 12 points or more on HL subjects
- The candidate has gained 9 points or more on SL subjects
- The candidate has not received a penalty for academic misconduct from the Final Award Committee.

		Theory of knowledge					
		Grade **A**	Grade **B**	Grade **C**	Grade **D**	Grade **E**	No grade **N**
Extended essay	Grade **A**	3	3	2	2	Failing condition	Failing condition
	Grade **B**	3	2	2	1	Failing condition	Failing condition
	Grade **C**	2	2	1	0	Failing condition	Failing condition
	Grade **D**	2	1	0	0	Failing condition	Failing condition
	Grade **E**	Failing condition	Failing condition	Failing condition	Failing condition	Failing condition	Failing condition
	No grade **N**	Failing condition	Failing condition	Failing condition	Failing condition	Failing condition	Failing condition

This curriculum guide has been produced in collaboration with all teachers. Please note that there may be changes to the details as students learn at different rates. It may be necessary to take longer on a unit, or go through a unit faster than anticipated.

ENGLISH A: LANGUAGE AND LITERATURE

Teacher(s): James Dittes

Email: dittesj@mefis.k12.tr

Course Description:

This course covers a breadth of topics focused on the uses and abuses of language in our current society. In our study of non-literary texts we look at the ways images and texts are used to convey meaning in web sites and portraits, and in literary texts we learn the analytical tools to look below the surface of timeless tales to learn about the worlds of the authors who crafted them, with a focus on the relationship between context and content. We finish the year with a further language unit which focuses on media and rhetoric. This year is designed to give students a thorough understanding of the multiple assessment types used in the IB course: two practice papers each for the exam's papers 1 and 2, as well as a practice 10-minute speech, known as the individual-oral.

Course Aims & Objectives:

- Develop in students an understanding of how language, culture and context determine the ways in which meaning is constructed in texts.
- Encourage students to think critically about the different interactions between text, audience and purpose.
- Develop in students the ability to engage in close, detailed analysis of individual texts and make relevant connections.
- Develop the students' powers of expression, both in oral and written communication.
- Encourage students to recognize the importance of the contexts in which texts are written and received.
- Encourage, through the study of texts, an appreciation of the different perspectives of people from other cultures, and how these perspectives construct meaning.
- Encourage students to make links between texts and see how literary texts are used and/or manipulated to fit present day situations.

Enduring understandings:

- Students will understand that enduring themes and character studies connect the texts that they read.
- Students will understand that the contexts of production and reception shape a text's content and meaning.
- Students will understand that the study of literature is a cross-curricular discipline.
- Students will understand that knowledge of stylistic techniques enriches our interaction with a text.
- Students will understand that the purpose of a text determines its style and meaning.
- Students will understand that once published, texts are open to multiple interpretations by their audiences.

Transdisciplinary Links:

- **Technology:** effective presentation of web sites

UNIT 1: Language and Dot-commerce: analyzing the messages of websites.	
Timeframe	6 weeks
Learning goals:	● To investigate the effect of national language policies on minority and majority language groups, accents, and dialects and how language is related to culture and power. ● To analyse the way images are used to persuade and/or inform (cartoons, videos, advertisements) ● To understand the format of web sites and how each is conveyed to make the message effective ● To examine the way technology has shaped language usage ● **Area of Exploration**: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● **Concepts**: Communication; Perspective; Representation ● **Global Issues**: Culture, identity & community; Beliefs, values & education; science, technology & the natural world ● **Learner Profile:** Knowledge, Principle, Balance, Inquiry, Reflection
Assessments:	Quizzes over key terms related to web sites & language analysis Practice paper 1: analyze how a web site uses text and images to convey a message
TOK	Knowledge Questions ● Ways of Knowing: To what extent does emotion or intuition guide our interpretation of a website's credibility? Can we know if a source is trustworthy simply by how it makes us feel? ● Knowledge and Language: How does the medium of a website—with its use of hyperlinks, pop-ups, and interactive elements—influence the way we acquire knowledge? Is a non-linear text more or less reliable than a traditional, linear one? ● Perspective and Bias: How do the design choices (e.g., color, layout, imagery) on a political or commercial website reinforce or challenge the user's existing beliefs? To what extent can the medium itself be biased? ● Knowledge and Technology: How has the ability to easily access and create websites changed our understanding of who is an author or a reliable source of information? Does a blog post have the same authority as an encyclopedia entry? Comparative Questions ● Compare a newspaper's physical edition with its website. How do the conventions of the medium affect the knowledge that is communicated? Consider how the use of headlines, advertisements, and article placement differs between the two. ● Examine a fictional character's personal blog or social media account. To what extent can we use this form of digital text to gain knowledge about a character's internal thoughts and motivations? Is this a more or less reliable way to understand them than a traditional narrative? ● Analyze two websites that advocate for opposing viewpoints on a specific topic. How does their use of rhetorical strategies and appeals to emotion differ? How do these strategies influence the knowledge they are trying to impart?

Transdisciplinary Links:

- **History:** Izmir in the Archaic Age, when Homer wrote the epic here.

UNIT 2: *The Iliad* by Homer	
Timeframe	10 weeks
Learning goals:	● To examine the cultural and historical contexts of the text ● To understand and discuss the merits of the epic as a genre ● To use contextual understanding to inform a deeper analysis of the text ● To be able to analyse and critique the text's themes, characterisation, language and overall narrative (using technical vocabulary appropriate to the epic) ● To consider the reception of this text by different readers, different interest groups and at different times and places ● To be able to write an academic essay based on the text ● To be able to make connections to other texts, news articles, moments in history, and modern epics, such as superhero films or the film, *Ali & Nino* ● **Areas of Exploration:** Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● **Concepts:** Culture, Identity, Perspective ● **Global Issues:** Culture, Identity & Community; Beliefs, Values & Education; Politics, Power, Justice
Assessments:	Practice Paper 2, compare a scene from The Iliad with a scene from a modern epic film Writing an academic essay in response to criticism of the novel Quizzes over terms related to the epic
TOK	Knowledge Questions 🤔 ● Ways of Knowing: To what extent does emotion (such as rage, grief, or honor) act as a reliable guide to knowledge and action in a text like The Iliad? Can we know something to be true based on how a character feels? ● Areas of Knowledge: How does Fagles's translation, an artistic work, shape our historical knowledge of ancient Greece and the Trojan War? Does his translation serve as a document of the past, or a creative interpretation? ● Perspective and Interpretation: How does the translator's perspective (Robert Fagles's in this case) influence the knowledge that is communicated in a work? Consider how Fagles's choices—in language, rhythm, and tone—might alter our understanding of characters like Achilles, Hector, or Helen. ● Knowledge and Language: To what extent is it possible to truly understand the original meaning of a text from a different language and culture? Does a translation merely provide a new version of the truth, or can it genuinely transfer knowledge from one context to another? Comparative Questions 📜 ● Compare Fagles's translation with another version, such as that by Richmond Lattimore or Robert Fitzgerald. How do the different translation choices affect our knowledge of the characters' motivations and the narrative's central themes? For example, how does the tone of the opening lines ("Rage—Goddess, sing the rage of Peleus' son Achilles") differ from other translations, and what knowledge does that tone convey? ● Examine how different media present The Iliad. How does watching a movie adaptation or reading a graphic novel version of the story affect our knowledge and emotional response compared to reading Fagles's translation? What is gained and what is lost? ● How can an understanding of the context of Fagles's translation (e.g., the time it was

	written, his personal approach) affect the way we interpret the meaning of The Iliad?

Transdisciplinary Links:

- **Art: composition of photos & images**

UNIT 3: *The Art and Messaging of Portraiture*	
Timeframe	6 weeks
Learning goals:	● To apply the principles of analysis to a visual element like portraiture ● To use artworks to gain an understanding of a particular culture, place and time ● To use contextual understanding to inform a deeper analysis of the text ● To be able to analyse and critique an image's themes, characterisation, language and overall narrative (using technical vocabulary appropriate to the portrait genre) ● To consider the reception of this text by different readers, different interest groups and at different times and places ● To be able to write an academic essay based on the text ● To be able to make connections to other texts, news articles, moments in history ● Area of Exploration: Readers, Writers, Texts; Time and Space, Intertextuality ● Concepts: Identity; Creativity; Culture; Perspective; Representation ● Global Issues: Culture, Identity & Community; Art, creativity & the imagination; Beliefs, Values, Education; Politics, Power, Justice, Art, Creativity, Imagination
Assessments:	Learner Portfolio, includes a portrait project of student's own Practice Paper 1, Analyze a given portrait Quizzes over terms related to the portrait
TOK	**Knowledge Questions** 🤔 ● **Perception:** How does the viewer's **perception** of a portrait change based on their own cultural background or personal experiences? To what extent does the portrait of a historical figure reveal more about the artist and the time it was painted than the person themselves? ● **Interpretation:** To what extent does the artist's use of **symbolism** and **iconography** in a portrait guide our interpretation of the subject's character? Can we ever truly know the "real" person through a stylized representation? ● **Language and Meaning:** How is the "language" of a portrait—its use of color, light, and composition—similar to or different from the language of a written text in conveying **meaning**? ● **Knowledge Claims:** When a portrait is used to make a **knowledge claim** about a person's identity or status (e.g., a formal portrait of a monarch), how can we evaluate the validity of that claim? **Comparative Questions** 📜 ● Choose a portrait and a written biography of the same person. Compare how each medium constructs a different kind of **knowledge** about the subject. What information is privileged in one medium over the other? ● Analyze two portraits of the same person created in different eras. How do the **conventions and values** of each time period shape the knowledge communicated in the art? ● How does a modern "selfie" function as a form of self-portraiture? How does it communicate **knowledge** about the self in a way that is similar to or different from a traditional, painted portrait?

Transdisciplinary Links:

- **History:** Industrial Revolution (Blake), Post-modernism, feminism, the Holocaust (Plath)

UNIT 4: ***Elements of Poetry: William Blake and Sylvia Plath***	
Timeframe	6 weeks
Learning goals:	● To examine the cultural and historical contexts of the texta ● To use contextual understanding to inform a deeper analysis of the text ● To be able to analyse and critique the text's themes, characterisation, language and overall narrative (using technical vocabulary appropriate to the poetry genre) ● To consider the reception of this text by different readers, different interest groups and at different times and places ● To examine the impact of structure on the meaning of an essay ● To look at gender and its impact on language & perspective ● To be able to write an academic essay based on the text ● To be able to make connections to other texts, news articles, moments in history ● Area of Exploration: Readers, Writers, Texts; Time and Space, Intertextuality ● Concepts: Identity; Creativity; Culture; Transformation; Perspective; Representation ● Global Issues: Art, creativity & the imagination, Culture, identity & community; Beliefs, values & education
Assessments:	Researched essays on the context of the writers lives and its influence on their poetry. Learner Portfolio Practice Paper 2, compare two poems Quizzes on terms related to analyzing poems.
TOK	**Knowledge Questions on Blake** 🤔 ● Blake claimed to receive visions and knowledge from a divine source. To what extent can knowledge gained from **intuition** or **revelation** be considered a valid form of truth? Is the knowledge in Blake's poetry testable or verifiable? ● Blake's **"contraries"** (e.g., Innocence and Experience) present a dualistic view of the world. How does this poetic structure influence our understanding of a complex truth? Is a balance between two opposing ideas more truthful than one singular perspective? **Knowledge Questions on Plath** 🤔 ● Plath's poetry is often deeply rooted in personal suffering and trauma. How does an artist's personal **emotion** act as a **way of knowing** in her poetry? To what extent can the knowledge communicated be considered objective or universal? ● How does Plath's highly metaphorical and symbolic **language** shape our knowledge of her internal world? Does the knowledge gained from reading her poetry rely more on our own emotional experience than on any objective reality? **Comparative Questions** 📜 ● Compare how Blake and Plath each use the **poet's voice** to present a truth. Does Blake's use of a prophetic or divine voice create a more or less trustworthy form of knowledge than Plath's intensely personal and subjective voice? ● Both poets write about the **relationship between the self and the world**. Analyze how their different artistic approaches to this theme result in different kinds of knowledge. Does Blake's social commentary provide a different kind of truth than Plath's psychological introspection? ● Consider how **perspective** is used in both poets' work. How does a change in

	perspective—for example, from a child's view in *Songs of Innocence* to a more adult view in *Ariel*—alter the knowledge being communicated to the reader?

Transdisciplinary Links:

- **History:** The Equal Rights Amendment & Feminism

UNIT 5: *The Handmaid's Tale* by Margaret Atwood	
Timeframe	8 weeks
Learning goals:	● To know some feminist approaches to the use of language ● To be able to rewrite a classic fairy-tale through a feminist lens ● To examine the cultural and historical contexts of the text, including the 1980s and the culture wars in North America over issues of abortion & women's rights ● To use this contextual understanding to inform a deeper analysis of the text ● To be able to analyse and critique the text's themes, characterisation, language and overall narrative ● To consider the reception of this text by different readers, different interest groups and at different times and places ● To be able to write an academic essay based on the text ● To be able to make connections to other texts, news articles, moments in history ● Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality ● Concepts: Identity; Culture; Communication; Perspective; Representation ● Global Issues: Culture, Identity & Community; Beliefs, Values & Education; Politics, Power, Justice
Assessments:	Mock individual-oral exam, connecting a selection of the book with a global issue & a non-literary source Researched essay Quizzes on reading and comprehension
TOK	**Knowledge Questions** 🤔 ● **Memory and Truth:** Offred's narrative is constructed from her memories. To what extent can **memory** be considered a reliable source of **historical knowledge**? What is the role of an author's memory in shaping our understanding of a past event? ● **Language and Power:** How does the Gileadean regime's manipulation of **language** (e.g., "Handmaid," "Un-woman") influence and control what the characters are able to know? Can we ever truly separate our knowledge from the language we use to express it? ● **Perspective:** The novel is told from Offred's limited **first-person perspective**. How does this narrative choice shape the reader's knowledge of Gilead's society? To what extent can a single perspective provide a complete or valid picture of a social truth? ● **Emotion and Knowledge:** The novel is highly emotional. How does the reader's **emotional response** to Offred's story act as a way of knowing? Can our feelings about a character's plight be a valid source of knowledge about human rights? **Specific Questions** 📜 ● The "Historical Notes" at the end of the novel provide a different kind of knowledge about Gilead. Compare and contrast the **type of knowledge** presented in the main narrative versus the epilogue. Is one form of knowledge more valuable or "true" than the other? ● The novel explores themes of gender and identity. To what extent are the identities of the characters—and our knowledge of them—determined by the **social roles** they are forced to play? Is there a "true" self that can exist outside of a society's definitions?

	● Consider the novel as a work of dystopian fiction. How does the genre of a novel, or any work of art, influence the **knowledge** it is able to convey? Does a fictional work have a responsibility to be truthful in a way that non-fiction does not?

UNIT 6: Individual Oral and Higher Level Essay preparation	
Timeframe	4 weeks
Learning goals:	● To develop a link and an outline between two texts studied this year (one literary and one non-literary) for the Individual Oral ● To create and answer an essay question (unrelated to a text that will be used for the IO) that displays the student's understanding of key concepts of the course. ● To recognise the features of effective rhetoric ● To be able to analyse the purpose, audience, tone and effectiveness of a variety of text types ● To develop effective, well targeted and persuasive responses ● Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● Concepts: Identity; Creativity; Culture; Communication; Perspective; Representation ● Global Issues: Culture, Identity & Community; Beliefs, Values & Education; Art, Creativity & Imagination; Politics, Power & Justice; Science, Technology & the Natural World
Assessments:	Individual Oral (IB Internal Assessment) Exam 2

SELF-TAUGHT LANGUAGE A: LITERATURE

Teacher(s): Sandy Safi

Email: safis@mefis.k12.tr

Course Description:

This course covers a breadth of topics focused on the uses of the students' native language in literature. We look at the way language affects our perceptions of characters, communities, setting, stylistic features, and themes. Amidst this, we also work on a detailed study of literary texts with a focus on the relationship between context and content.

This course is classified as self-study; students are responsible for their own learning objectives with the help of outside tutors. The teacher will meet with the students once a week to help them stay on track.

IB Progress Reports are written based on tutor and teacher feedback.

Course Aims & Objectives:

- Develop in students an understanding of how language, culture and context determine the ways in w meaning is constructed in texts.
- Encourage students to think critically about the different interactions between text, audience purpose.
- Develop in students the ability to engage in close, detailed analysis of individual texts and make rele connections.
- Develop the students' powers of expression, both in oral and written communication.
- Encourage students to recognize the importance of the contexts in which texts are written and receiv
- Encourage, through the study of texts, an appreciation of the different perspectives of people from o cultures, and how these perspectives construct meaning.

Enduring Understandings

- Enduring themes and character studies connect the texts that they read.
- The contexts of production and reception shape a text's content and meaning.
- Knowledge of stylistic techniques enriches our interaction with a text.
- The purpose of a text determines its style and meaning.
- Once published, texts are open to multiple interpretations by their audiences.

UNIT 1: *Perfume* - Patrick Suskind	
Timeframe	8 weeks
Learning goals:	• Understand the content of the work and the quality of the work as literature • Respond independently to the work by connecting the individual and cultural experience of the reader with the text • Recognize the role played by cultural and contextual elements in the work • Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) • Concepts: Identity; Culture; Creativity; Transformation; Communication; Perspective; Representation • Global Issues: Culture, Identity, Community; Beliefs, Values, Education; Art, Creativity,

	Imagination; Science, Technology, the Environment, Politics, Power, Justice
Assessments:	NOT APPLICABLE (Self-Study. Progress Reports are written based on both tutor and teacher feedback of the student's self-study practices)

UNIT 2: *A Doll's House* - Henrik Ibsen	
Timeframe	7 weeks
Learning goals:	● Understand the content of the work and the quality of the work as literature ● Respond independently to the work by connecting the individual and cultural experience of the reader with the text ● Recognize the role played by cultural and contextual elements in the work ● Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● Concepts: Identity; Culture; Communication; Perspective; Representation ● Global Issues: Culture, Identity, Community; Beliefs, Values, Education; Art, Creativity, Imagination
Assessments:	NOT APPLICABLE (Self-Study. Progress Reports are written based on both tutor and teacher feedback of the student's self-study practices)

UNIT 3: *Penelopiad* by Margaret Atwood	
Timeframe	7 weeks
Learning goals:	● Understand the content of the work and the quality of the work as literature ● Respond independently to the work by connecting the individual and cultural experience of the reader with the text ● Recognize the role played by cultural and contextual elements in the work ● Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● Concepts: Identity; Culture; Creativity; Communication; Perspective; Representation ● Global Issues: Culture, Identity, Community; Beliefs, Values, Education; Art, Creativity, Imagination, Politics, Power, Justice
Assessments:	NOT APPLICABLE (Self-Study. Progress Reports are written based on both tutor and teacher feedback of the student's self-study practices)

UNIT 4: Literary Analysis	
Timeframe	**15 weeks**
Learning goals:	● Acquire knowledge and understanding of the works studied ● Present an individual, independent response to works studied ● Acquire powers of expression through oral presentation ● Learn how to interest and hold the attention of an audience ● Area of Exploration: Readers, Writers, Texts; Time and Space; Intertextuality (connecting texts) ● Concepts: Identity; Culture; Creativity; Transformation; Communication; Perspective; Representation ● Global Issues: Culture, Identity, Community; Beliefs, Values, Education; Art, Creativity, Imagination; Politics, Power, Justice; Science, Technology, the Environment ● Students will read 2 texts of their own choosing from the Prescribed Reading List
Assessments:	NOT APPLICABLE (Self-Study. Progress Reports are written based on both tutor and teacher feedback of the student's self-study practices)

ENGLISH B

Teacher(s): Chelsea Chen

Contact details: Chenc@mefis.k12.tr

Course Description:

Students will focus on English literary and non-literary texts related to the five themes of Experiences, Identities, Social Organisation, Human Ingenuity and Sharing the Planet. Students will develop conceptual understandings of Audience, Context, Purpose, Meaning and Variation through exposure to a variety of different text types.

For Higher Level, students will study two literary texts chosen from the following list:

- *Born a Crime* by Trevor Noah
- *Run, Rebel* by Manjeet Mann
- *The Giver* by Lois Lowry

During this first year of the two year course, students will practise the various parts of the IB internal and external exams.

Course Aims & Objectives:

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

Enduring understandings:

- Students will understand that the context we are in determines the language and register which will be most effective.
- Students will understand that other cultural perspectives enrich our experience of the world.
- Students will understand that cultures are lively, multifaceted and interact with one another to enrich our world.
- kearStudents will understand the ability of language to guide or manipulate thought
- Students will understand that their culture and languages share many similarities with others
- Students will understand that knowing another language holds many personal and professional advantages.

UNIT 1: Experiences (Migration, Life Stories, Customs and Traditions, Rites of Passage, Leisure Activities, Holidays and Travel)	
Timeframe	12 weeks
Learning goals:	Students will be able to: ● Explore and tell the stories of the events, experiences and journeys that shape our lives. ● Understand the conventions of different text-types and cultivate skills to create a range of pieces of writing. ● Develop receptive skills of comprehension, analysis and evaluation. ● Debate, present, and speak about personal experiences and those of others. ● Develop an understanding of the IB Programme and English B assessments in order to engage with the course materials.
Assessments:	Homework and classroom written assignments Performance Task / Project Exam 1 In-class Presentations
TOK	Students will consider the following questions: ● How does travel broaden our horizons? ● How does our past shape our present and our future? ● How and why do different cultures mark important moments in life? ● How would living in another culture affect our worldview? ● How has immigration affected English?

UNIT 2: Identities (Lifestyles, Beliefs and Values, Subcultures)	
Timeframe	13 weeks
Learning goals:	Students will be able to: ● Practice listening, reading, and oral skills in class activities for IB2 assessment goals. ● Consider culture's influence on identity across borders, history, and individual experiences. ● Identify themes, character traits, and main events in the texts.
Assessments	Homework and classroom written assignments Performance Task / Project Exam 2 In-class Presentations
TOK	Students will consider the following questions: ● What constitutes an identity? ● How do we express our identity? ● What ideas and images do we associate with a healthy lifestyle? ● How do language and culture contribute to form our identity?

UNIT 3: Social Organisation (Social Relationships, Community, The Working World)	
Timeframe	12 weeks
Learning goals:	Students will be able to: ● Prepare for Paper 2 in and out of class with considerable focus on listening and reading comprehension ● Analyse textual traits in broadcast media works, oral texts, images, non-literary and literary written texts and extracts
Assessments	Homework and classroom written assignments Performance Task / Project Exam 3 In-class Presentations
TOK	Students will consider the following questions: ● What is the individual's role in the community? ● What role do rules and regulations play in the formation of a society? ● What role does language play in a society? ● What opportunities and challenges does the 21st-century workplace bring?

FRENCH B

Teacher(s): Sandy Safi

Contact details: safis@mefis.k12.tr

Course Description:

French B is a two-year course in the IB Diploma Programme. The primary goal for the learner is to develop speaking, listening, reading and writing skills in French. Both written and oral communication are focal points in this course. Attention is paid to the IB curriculum, as students take written and oral examinations in the second year of the program. Students will cover topics in the themes of identities, experiences, human ingenuity, social organization and sharing the planet during this 2 years program. Students at Higher level also study one literature work in the target language in the first year of the course. Grammar topics will include a thorough review of verb tenses in the indicative and subjunctive moods, and students will focus on developing writing and speaking skills in an academic context. To this end, fluency will be encouraged by the utilization of various teaching methodologies in class. Students will work individually as well as in groups. Classes will be active and varied in order to use French as much as possible by both the teacher and students.

Course Aims & Objectives:

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

Enduring understandings:

- Students will understand the ability of language to guide or manipulate
- Students will develop international-mindedness through the study of languages, cultures, and ideas and issues of global significance.
- Students will learn to communicate in a range of contexts and for a variety of purposes
- Students will understand that the study of texts and social interaction can develop an awareness and appreciation of a variety of perspectives of people from diverse cultures.
- Students will develop an awareness of the importance of language in relation to other areas of knowledge.
- Students will foster curiosity, creativity and a lifelong enjoyment of language learning

UNIT 1: identities	
Timeframe	14 weeks
Learning goals:	● To discuss different types of lifestyles ● To talk about health and wellbeing ● To analyse the convictions and values of people from the francophone nations ● To understand what is meant by a subculture
TOK	How does our culture affect our perception of what is good or bad for us? How is the value of an advice or recommendation determined? Why are we sensitive to the way others look at us? Language is the mode of communication of our knowledge, but some say that language is also the source of our knowledge : knowledge is not the same depending on the language we use. How does language influence our thinking and behaviors? Can language limit our knowledge? **Activity** : Topics will be answered through short videos, presentations by groups and discussion in class.
Assessments:	Homework, Quizzes, Interactive Oral activities, Written Productions (Blog, article, diary) Exam/ Performance Task/ Project.

UNIT 2: Experiences	
Timeframe	14 weeks
Learning goals:	● To talk about holidays, travel and leisure activities ● To discuss the life stories of significant historical figures ● To develop our understanding of customs and traditions in the francophone world ● To discuss the importance and significance of rights of passage ● To consider migration and why it occurs
TOK	Is free time the time of freedom? In a society that pushes for performance, to what extent is leisure a waste of time? To what extent does reason influence the choice of our activities? Where is the line between passion and obsession? In the field of holiday and travel, our perception of things can be influenced by different factors. To what extent do our expectations influence our feelings? To what extent does our ability to communicate in a foreign country influence the evaluation of our experiences? To what extent does visiting a country allow us to perceive the reality of what its inhabitants are experiencing? **Activity** : Topics will be answered through speaking presentations, role plays and discussion in class.
Assessments:	Homework, Quizzes, Role Plays, Written Productions: (informal letter), Performance Task/ Project

UNIT 3: Human ingenuity	
Timeframe	9 weeks
Learning goals:	● To discuss technology and scientific innovation and how it affects us. ● To talk about entertainment ● To analyse the term 'artistic expression' and discuss what it means in the various cultures of the francophone world ● To talk about how the media is involved in our daily lives ● To discuss how communication is changing
TOK	How do the activities we do in our free time define us? How do they influence the way others perceive us? What does "understanding" mean when it comes to art? What knowledge is needed to understand the art? Is art still the language of emotions? How important is beauty in art? How has the emergency of new mass media influence our production of knowledge? How does the

	emergence of new media shape your perspectives as a knower? What is the difference between scientific discoveries, inventions and innovations? **Activity** : Topics will be answered through research and presentation on powerpoints, role plays and discussion in class.
Assessments:	Homework, Quizzes, Interactive Oral activities / Performance Task/ Project / Exam

FRENCH AB INITIO

Teacher(s): Sandy Safi

Contact details: safis@mefis.k12.tr

Course Description:

The French ab Initio course for beginners is followed over two years. The main focus of the course is on the acquisition of language required for purposes and situations usual in everyday social interactions. The French ab initio course provides a solid grammar and vocabulary framework and is organised into five themes made up of a series of twenty topics. The five themes are

- **Identities**
- **Experiences**
- **Human ingenuity**
- **Social organisation**
- **Sharing the planet**

Course Aims & Objectives:

There are four assessment objectives for the ab initio course;

At the end of the ab initio course, students will be expected to demonstrate an ability to:

- communicate information and some basic ideas clearly and effectively in a limited range of situations,
- understand and use accurately the essential spoken and written forms of the language in a limited range of situations,
- understand and use a limited range of vocabulary in common usage,
- use a register that is generally appropriate to the situation,
- show an awareness of some elements of the culture of the target language.

Enduring understandings:

- Students will understand the ability of language to guide or manipulate.
- Students will develop international-mindedness through the study of languages, cultures, and ideas and issues of global significance.
- Students will learn to communicate in a range of contexts and for a variety of purposes.
- Students will understand that the study of texts and social interaction can develop an awareness and appreciation of a variety of perspectives of people from diverse cultures.
- Students will develop an awareness of the importance of language in relation to other areas of knowledge.
- Students will foster curiosity, creativity and a lifelong enjoyment of language learning.

UNIT 1:Identities (Personal attributes /Personal relationships / Eating and drinking /Physical well- being)	
Timeframe	10 weeks
Learning goals:	● Talking about yourself and others (age, birthday) and using *être* and *avoir*, numbers up to 100, and question words ● Saying where you are from and where you live and using prepositions with towns and countries (*à, en, aux etc.*) ● Describing someone's physical appearance and personality using adjectives (physical description, character etc.) ● Discussing family life using the present tense ● Talking about relationships with family ● Discovering french speaking countries (*la Francophonie*) ● Talking about food and drinks ● Discuss weekend activities and routine ● Talk about hobbies and interests ● Discuss health and sport using the imperative and negatives ● Talking about healthy lifestyle ● Practising listening comprehension
TOK	● Research and brochure: Discover a typical Parisian shopping centre, "*Les Galeries Lafayette*": how can you link it to your own culture? ● Research and Powerpoint presentation: French-speaking countries: discover places, symbols, dishes and famous celebrities from French-speaking countries: how can you link them to your own culture ? ● Discussion and roundtable: French food and drinks: are there any similarities with your own cuisine ? Which one do you prefer ? Are the meals organised in the same way?
Assessments:	Homework and quizzes End-of-unit test Project Performance task Listening comprehension quiz

UNIT 2: Experiences (Daily routine/ Leisure / Holidays / Weather /Festivals and celebrations)	
Timeframe	11 weeks
Learning goals:	● Talking and asking for daily activities expressing frequency and reviewing habits ● Talking about daily routine outside of school using irregular and reflexive verb ● Discuss preferences for different types of holidays ● Talk about holiday activities and interests using the future tense + *Si* structures ● Describing cities, neighbourhoods and parts of the house ● Formulating questions related with the weather ● Expressing ability and knowledge about geographical places and type of transportation ● Expressing reasons, purposes, opinions related to a vacational trip ● Asking and giving directions as a tourist or to a tourist ● Talking about travelling experiences ● Describing and expressing opinions about visited places ● Knowledge blog of travel, reportage ● Knowledge of map, plane, article, informative brochure, forum, entry from blog, email, schedule, questionnaire ● Talking about french festivals and celebrations (ex: *14 juillet*) ● Practising listening comprehension

TOK	● Research and poster: Routine in the French-speaking countries: why is the type of housing changing according to the country? ● Discussion and roundtable: Comparing food habits in French-speaking countries: how is it in your culture? ● Discussion and roundtable: Cities: Why and how create links between your hometown and French-speaking cities? ● Research and video: Celebrations: Does the climate impact on the way of living ?
Assessments:	Homework Project Listening comprehension quiz Exam

UNIT 3: Human Ingenuity (Transport / Entertainment /Media / Technology)	
Timeframe	8 weeks
Learning goals:	● Talking about how technology influences young people's lives . ● Describe the weather (past, present, and future tense) ● Talk about means of transport/types of holiday accommodations ● Describe a past holiday using the past tense ● Talk about places in town using the pronoun *y* ● Understand and ask for directions using the imperative ● Discuss what you can do in your city using *on peut/on pourrait* ● Discuss the advantages and disadvantages of urban life using impersonal verbs ● Knowledge of message from Facebook, review, song, part weather, conversation, interview ● Learning about different media types (radio / news article / tv /internet ● Discuss TV and cinema using articles and object pronouns ● Talk about new technologies using *pour* + infinitive ● Expressing opinion in an invitation showing acceptance or rejection ● Talking about the weather ● Exchanging ideas about preferences of climate and favourite places ● Using of impersonal verbs ● Indicating equality / Making comparisons ● Practising listening comprehension
TOK	● Research-reading activity :Transportation: travel through French-speaking countries, how can I like it to my culture? ● Discussion and roundtable: Entertainment: what are the popular activities in the French-speaking countries, how can you link and compare them to the ones in your own country? ● Research and project-reading activity and Powerpoint presentation: New technologies: which apps are popular in French-speaking countries, how can you compare it to your own country?
Assessments:	Homework and quizzes Exam Performance task Listening comprehension quiz

UNIT 4: Social Organization (Education / Work / Celebrations)	
Timeframe	8 weeks

Learning goals:	● Understand the French education system ● Discuss school routine and giving opinions about school rules ● To explore the topic of career prospects and work conditions ● Practising listening comprehension
TOK	● Discussion and poster: Education and work: discovering the French-speaking school system and working environment, what are the similarities and differences with my own culture?
Assessments:	Homework and quizzes End-of-unit test Project Listening comprehension quiz

SPANISH B

Teacher(s): Terry Baudilio Anzueto

Contact details: anzuetot@mefis.k12.tr

Course Description:

Spanish B is a two-year course in the IB Diploma Programme. The primary goal for the learner is to speak, read, write, and understand Spanish in written and oral form. Attention is paid to the IB curriculum, as students take written and oral examinations in the second year of the program. The units will center on areas related to identities, experiences, human ingenuity, social organization and sharing the planet. The class will focus on different forms of writing and text features by investigating pieces of writing from the media, books, magazines and the internet. Students will also complete activities and coursework in preparation for the official IB examinations.

Grammar topics will include a thorough review of verb tenses in the indicative and subjunctive moods, and students will focus on developing writing and speaking skills in an academic context. To this end, fluency will be encouraged through various teaching strategies in class. Students will work individually as well as in groups. Classes will be active and varied in order to use Spanish as much as possible by both the teacher and students.

Course Aims & Objectives:

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

Enduring understandings:

- Students will understand the ability of language to guide or manipulate
- Students will develop international-mindedness through the study of languages, cultures, and ideas and issues of global significance.
- Students will learn to communicate in a range of contexts and for a variety of purposes
- Students will understand that the study of texts and social interaction can develop an awareness and appreciation of a variety of perspectives of people from diverse cultures.
- Students will develop an awareness of the importance of language in relation to other areas of knowledge.
- Students will foster curiosity, creativity and a lifelong enjoyment of language learning

UNIT 1: IDENTITIES - Mente sana y cuerpo sano	
Timeframe	7 weeks
Learning goals:	**Healthy mind and healthy body** ● Comment on different lifestyles. ● Reflect on aspects related to health and well-being. Text types: ● Expository text, questionnaire, article, interview
Theory of Knowledge TOK	● How is well-being represented in the media? ● How does what surround us influence us when it comes to changing our eating or health habits? ● Can the culture in which we grow up influence when determining our diet, taste in music, sports, etc.? Why (not)? Activity: Improve Well-Being This unit will present different aspects of improving well-being through food, sports, or artistic and interactive activities. Find some wellness-related phrases, quotes, or opinions that you can glean from blogs or articles (also from citation dictionaries). Then share them with the rest of your classmates; Analyze them and express your opinions. Ex. "Music is for the soul what gymnastics is for the body" (Plato, philosopher).
Assessments:	On-going assessment through class work. Homework assignments. Quizzes. Performance task.

UNIT 2: EXPERIENCES - En busca de nuevas experiencias	
Timeframe	7 weeks
Learning goals:	**Looking for new experiences** ● Analyze the reasons why human beings seek new experiences. ● Analyze how new experiences change us. ● Explore the advantages and disadvantages of living new experiences. Text types: ● Interview, social network comments, forum, blog, news, brochure, synopsis, poem
Theory of Knowledge TOK	● Why is it essential to have new experiences in life? ● What do they bring you in your personal, social, and work life to experience new acts? ● How can experiences change you? ● How do you think technology is changing the way we travel? Activity: The benefits of traveling After listening to the song “Mediterranean” by Los Rebeldes, a Spanish rock band from the 80s, carry out the following activities: Start a debate about the different objectives that a vacation can have and compare the benefits of simply traveling to the beach with the help of a trip that includes beach and cultural elements. Also, discuss how travel and the expectations of tourists and travelers have changed in recent years.
Assessments:	Oral activities, written production, reading passages, listening activities. Quizzes. Project. Exam 1.

UNIT 3: HUMAN INGENUITY - El arte, una forma de vivir	
Timeframe	8 weeks
Learning goals:	**Art, a way of life** ● Talk about different artistic manifestations. ● Meet various artists from the Spanish-speaking world. ● Talk about painting, literature, traditional art and illustration. ● Learn about different cultures through art. Text types: ● Ads- Instructions - survey - posters - tweets - song - blog
Theory of Knowledge TOK	● What characterizes a creative person? ● Have you ever wondered why some titles or expressions are not literally translated into other languages? ● How art, in its different expressions can, influence people's lives? Activity: The following art through an artist Your city will have a retrospective exhibition of the Spanish painter Lita Cabellut. In pairs, distribute and do one of the following activities. Group 1: stage Lita's press conference. Group 2: Create a poster announcing the Lita Cabellut exhibition and present it to the rest of the class. Group 3: write a speech to present Lita in a public act of tribute. Group 4: write the press release that tells what is going to happen (the exhibition and the tribute to the artist).
Assessments:	On-going assessment through class work. Homework assignments. Quizzes. Project

UNIT 4: SOCIAL ORGANIZATION - Vivir en comunidad	
Timeframe	8 weeks
Learning goals:	**Living in Community** ● Explore the role of the individual in the community. ● Investigate what role language and language play in society. Text types: ● Report, historical review, biography, poem *HL, rules, cartoons - blog entry,
Theory of Knowledge TOK	● How can we be an active part of the community? ● Is solidarity an acquired habit? ● How important is language as a determinant of our social identity? Activity: Discovering Solidarity (Our Wikipedia) Look at the images that present the unit. What ideas do they convey to you about these people as members of the community? With the help of a classmate, choose one of the photos and think about the context in which this situation could occur. Comment on what you see in the photo, what those people are doing, where the action can take place, etc. To carry out the activity, we are going to expand our thematic vocabulary related to aspects such as solidarity, community activities, etc. We are going to compile a small glossary related to the topic of Solidarity. Try to include as much vocabulary as possible. The class can create a virtual document to share it among all and collaborate in the construction of this dictionary. Then, we will work on word family contextualization exercises with this list.
Assessments:	On-going assessment through class work. Homework assignments. Quizzes. Performance task.

UNIT 5: SHARING THE PLANET - Vivir en armonía con nuestro planeta	
Timeframe	7 weeks
Learning goals:	**Living in harmony with our planet** ● Reflect on the environmental and social aspects that present challenges for the planet. ● Explore different initiatives to overcome these challenges. ● Reflecting on the problems and opportunities that change in rural and urban environments implies. Text types: ● articles , interview - blog - infographic - report - biography
Theory of Knowledge TOK	● We have seen how cities can be built with less negative environmental impact. What sectors of the population have to intervene to achieve this change? ● What characteristics do you think a responsible traveler or tourist should have? ● How do solidarity trips help promote a country or a region? ● Is it possible to live without generating garbage? ● How can we ensure that all our actions positively impact the environment? Activity: Man and the environment In this unit, we have studied humans' negative impact on nature and seen possible solutions or initiatives to reduce it. Do you know someone who has fought for the environment or an initiative to protect nature? If you have yet to hear or speak, it's time to seek information and find out. Find on the internet and share your character and his environmental actions in class.
Assessments:	On-going assessment through class work. Homework assignments. Quizzes. Project.. Exam 2

SPANISH AB INITIO

Teacher(s): Terry Baudilio Anzueto

Email: anzuetot@mefis.k12.tr

Course Description:

The Spanish ab Initio course for beginners is followed over two years. The main focus of the course is on the acquisition of language required for purposes and situations usual in everyday social interactions. The ab initio French course provides a solid grammar and vocabulary framework and is organized into five themes made up of a series of twenty topics. The five themes are:

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

Course Aims & Objectives:

There are four assessment objectives for the ab initio course. Students will be assessed on their ability to:

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

Enduring understandings:

- Students will understand that learning a language can enhance their life.
- Students will identify that they can use their existing language learning skills to learn another language.
- Students will understand that some mistakes are worth making in order to communicate when learning another language.
- Students will identify that there are cultural similarities and differences between their own culture and the target language.
- Students will learn to use pronunciation to sound more like a native speaker of another language.
- Students will learn that we don't have to translate everything in order to comprehend a new language.

UNIT 1: Identities: My identity / Relationships /Social Organization: Habitat	
Timeframe	13 weeks
Learning goals:	● Talking about yourself and others (age, birthday) and using *tú* and *usted*, numbers up to 100, and ask questions. ● Describing someone's physical appearance and personality using adjectives (physical description, character etc.). ● Discussing family life using the present tense. ● Getting information from ID, profiles on social media, news, websites, family trees, blogs, advertisements, messages on social media and/or brochure. ● Describing cities, neighbourhoods and parts of the house. ● Asking for the existence of public services (sports centres, gyms, clubs,etc). ● Formulating questions related with the weather. ● Discovering South American countries - Cultural approach-Chile, Ecuador. ● Go over the topics as a study guide to revise for the exam.
Assessments:	Homework and quizzes End-of-unit test Project (To do a Poster / Design a family tree) Performance task EXAM 1
TOK	● To create a visual or audio (a letter, a song, a collage, a picture, a poster, etc) to represent their own identity and present it in class. The stimulus should convey some info such as name, age, likes/dislikes, nationality, family member, habitat. ● To fill in on a Venn Diagram comparing and contrasting Spanish and the students' own language(s).

UNIT 2: Identities: Habits - Nutrition / Human ingenuity: Competitions	
Timeframe	13 weeks
Learning goals:	● Talking and asking for daily activities expressing frequency and reviewing habits ● Using of quantifiers (*muy, mucho, poco*) and prepositions of place ● Talking about daily routine outside of school using irregular and reflexive verbs ● Knowledge of map, plane, article, informative brochure, forum, entry from blog, Email, schedule, questionnaire ● Discovering south american countries - Cultural approach- Guatemala, Peru ● Talking about sports activities expressing preference. ● Expressing and comparing tastes in food and drink. ● Talking about habit food and asking in and establishment of food. ● Discuss health and sport using the imperative and negatives. ● Giving and asking about meals and its preparation using impersonal mode *se* ● Understanding and using pronouns in object direct. ● Knowledge of computer graphics, article magazine, website, summary of competition, tourist brochure, software radio, informational text, recipe, menu, fragment of news ● Discovering south american countries - Cultural approach Costa Rica, Spain
Assessments:	Homework and quizzes Project (design a project of a new neighbourhood / write a entry of Blog about your everyday life) Project (Prepare a Spanish competition / Writing recipes of their favorite hispanic meals) Performance Task
TOK	● Round table: How might my habits shape my future?

	● Thinking Routine (CSI): What is competition? collaboration? teamwork? triumph? failure? learning? rules? ● Thinking Routine (The imagination game): Bring a product from home unique from their culture and allow the others to describe it and find their uses.

UNIT 3: Human Ingenuity: Entertainment / Sharing the planet: Climate / Experiences: Travels	
Timeframe	11 weeks
Learning goals:	● Talking about plans and intentions ● Expressing opinion in an invitation showing acceptance or rejection ● Talking about the weather ● Exchanging ideas about preferences of climate and favourite places ● Analysing climate and personality ● Using of impersonal verbs (*llueve, nieva, está nublado, hace frío…*) ● Indicating equality / Making comparisons ● Knowledge of vignette, message from Facebook, review, song, part weather, conversation, interview ● Discovering south american countries - Cultural approach- Cuba, Dominican Republic, Argentina - Mexico ● Expressing ability and knowledge about geographical places and type of transportation ● Expressing reasons, purposes, opinions related to a vacational trip ● Asking and giving directions as a tourist or to a tourist ● Describing and expressing opinions about visited places
Assessments:	Homework and quizzes End-of-unit test Project (Write a-mail / Write an informative article) Performance task Final Exam
TOK	● Writing a letter to a friend to express their opinion about reality shows and/or beauty contests/ sport championships. ● Question for discussions: What is the most beautiful natural place in your country? What is a natural wonder? What are the requirements for a site to be considered a natural wonder? ● Video about natural wonders in Latin America: Describe the places. In your opinion, is this a real natural wonder? Why or why not?

ECONOMICS

Teacher(s): Kevin Sheehan

Contact details: sheehank@mefis.k12.tr

Course Description:

Economics is an exciting, dynamic subject that allows students to develop an understanding of the complexities and interdependence of economic activities in a rapidly changing world. At the heart of economic theory is the problem of scarcity. While the world's population has unlimited needs and wants, there are limited resources to satisfy these needs and wants. As a result of this scarcity, choices have to be made. The economics course, at both SL and HL, uses economic theories to examine the ways in which these choices are made.

The choices made by economic agents (consumers, producers and governments) generate positive and negative outcomes and these outcomes affect the relative well-being of individuals and societies. As a social science, economics examines these choices through the use of models and theories. The Diploma Programme (DP) economics course allows students to explore these models and theories, and apply them, using empirical data, through the examination of the following six real-world issues which are posed as economic questions.

Economic theory suggests that the material well-being of societies is related to the quantity of goods and services that are available to that society. As a result, economic growth and increased efficiency have become prominent goals. However, there are two important global economic issues related to these goals and the choices made by economic agents. These are the ways in which economic activity impacts the environment, and the challenges facing the world in terms of fair access to resources, goods and services. When exploring these significant global issues, **sustainability and equity** become key concepts for DP economics students to understand. In all areas of economic activity, the economic agents can be divided up into the private sector (consumers and producers) and the public sector (governments). To different extents and with different outcomes, the public sector in any economy assumes some responsibility for monitoring and regulating the behaviour of the private sector. This government intervention is a significant concept that appears throughout the course and students are expected to critically evaluate the balance between the market forces of the private sector and intervention by governments.

By focusing on the **six real-world issues** through the **nine key concepts** (scarcity, choice, efficiency, equity, economic well-being, sustainability, change, interdependence and intervention), students of the economics course will develop the knowledge, skills, values and attitudes that will encourage them to act responsibly as global citizens.

Course Aims & Objectives:

- Encourage the systematic and critical study of: human experience and behaviour; physical, economic and social environments; the history and development of social and cultural institutions
- Develop in the student the capacity to identify, analyse critically and evaluate theories, concepts and arguments about the nature and activities of the individual and society
- Enable the student to collect, describe and analyse data used in studies of society, and to test hypotheses and interpret complex data and source material
- Promote the appreciation of the way in which learning is relevant to both the culture in which the student lives and the culture of other societies
- Develop an awareness in the student that human attitudes and opinions are widely diverse and that a study of society requires an appreciation of such diversity
- Enable the student to recognize that the content and methodologies of the individuals and societies group are contestable and that their study requires the tolerance of uncertainty.
- Develop a critical understanding of a range of economic theories, models, ideas and tools in the areas of microeconomics, macroeconomics and the global economy..

Enduring understandings:

- Students will understand key economic theories, concepts and skills and their real-world application.
- Students will understand and appreciate the impact on individuals and societies of economic interactions between nations.

- Students will understand basic economic numeracy and literacy and how to illustrate and explain simple data including graphs and diagrams.
- Students will understand how to identify and discriminate between differing sources of information and how to distinguish between facts and value judgments in economic issues.
- Students will understand the development issues facing nations as they undergo the process of change.
- Students will understand how to use tools of economic analysis and skills of economic investigation in particular situations.

Key Concepts:

Scarcity	**Equity**	**Change**
Choice	**Economic well-being**	**Interdependence**
Efficiency	**Sustainability**	**Intervention**

Transdisciplinary Links:

- There are connections to math in the form of measuring utility by setting arbitrary numbers and trying to figure out benefits and cost of ideas.
- Mathematics thinking at margins which is the idea of the next number.
- Biology idea of scarcity and human desires.
- English writing argumentative and persuasive essays based around government actions.
- Philosophy and idea of logical thinking and humans being rational thinkers.
- Psychology and the idea of how to adjust human behavior using economic policies.

Theory of Knowledge:

In the realm of economics, the Theory of Knowledge (TOK) can be utilized as an effective strategy to both introduce and conclude a chapter, fostering students' evaluation and critical thinking skills while captivating their interest. By commencing the chapter with a compelling TOK question pertaining to economics, such as "To what extent does self-interest influence economic decision-making?", students are immediately prompted to explore various perspectives, critically assess underlying assumptions, and discern biases within economic theories. This initiates a sense of curiosity and primes them for a deeper investigation. Furthermore, concluding the chapter by revisiting the TOK question and challenging students to reflect on their evolving understanding of the subject matter encourages metacognition and the development of analytical abilities, enabling them to construct more nuanced arguments and make informed judgments about economic phenomena. By adopting this approach, instructors can leverage the power of TOK to captivate students, enhance their engagement, and cultivate their skills in evaluation and critical thinking within the realm of economics.

<table>
<tr>
<td>Unit 1: Introduction to Economics
1. To what extent does our cultural background influence our understanding of economic concepts and principles?
2. How do ethical considerations shape economic decision-making and policies?</td>
<td>Unit 2: Microeconomics
1. What role does perception play in determining the value of a good or service in a market?
2. To what extent can the assumptions of rationality and self-interest in microeconomic models accurately represent human behavior?</td>
</tr>
<tr>
<td colspan="2">Unit 3: Macroeconomics
1. How does the media influence public opinion and government policies regarding economic indicators, such as unemployment and inflation?
2. To what extent can economic models effectively predict the impact of government fiscal and monetary policies on national economies?</td>
</tr>
</table>

UNIT 1 : Intro to Economics and Microeconomics	
Timeframe	2 Weeks Intro and 20 weeks Microeconomics
Learning goals:	Students will understand that… ● Decisions are best on utility. ● Markets are usually a good way to organize economic activity. ● People respond to incentives. ● Rational humans think at the margin. ● People face trade-offs. ● Efficient use of resources may not lead to social optimal levels. ● Knowledge of market forces may change people's economic decisions. ● Governments may improve market outcomes. ● Efficient use of resources may not lead to social optimal levels. ● Government intervention has consequences on stakeholders.
Assessments:	Written exam (Paper 1), Written exam (Paper 2), Written exam (Paper 3),Performance task 1, **IA #1** AND Simulations,Small Group Work, Presentations,Written CommentariesGroup Discussions, ,Debates,Real World Application,Applying Maths,Connection to TOK/ CAS/ EE

UNIT 2: Macroeconomics (Introduction)	
Timeframe	3 weeks
Learning goals:	Students will understand that… ● Society face a short-run tradeoff between inflation and unemployment ● Prices rise when the government prints too much money. ● Governments may improve markets ● Governments may improve market outcomes. ● Government intervention has consequences on stakeholders.
Assessments:	Performance Task 2, Simulations,Small Group Work, Presentations,Written CommentariesGroup Discussions, ,Debates,Real World Application,Applying Maths,Connection to TOK/ CAS/ EE

UNIT 3: Macroeconomics	
Timeframe	12 weeks
Learning goals:	Students will understand that… ● Society face a short-run tradeoff between inflation and unemployment ● Prices rise when the government prints too much money. ● Governments may improve markets ● Governments may improve market outcomes. ● Government intervention has consequences on stakeholders.
Assessments:	Simulations,Small Group Work, Presentations,Written Commentaries, Group Discussions, ,Debates,Real World Application,Applying Maths,Connection to TOK/ CAS/ EE , **IA #2** Written exam (Paper 1), Written exam (Paper 2), Written exam (Paper 3)

HISTORY

Teacher(s): Ms. Clare Natschowny
Contact details: natschownyc@mefis.k12.tr

Course Description:

The DP History course is a world history course based on a comparative and multi-perspective approach to history. It involves the study of a variety of types of history, including political, economic, social and cultural, and provides a balance of structure and flexibility.

The course emphasizes the importance of encouraging students to think historically and to develop historical skills, as well as gaining factual knowledge. It puts a premium on developing the skills of critical thinking and on developing an understanding of multiple interpretations of history. In this way, the course involves a challenging and demanding critical exploration of the past. Students will be explicitly taught all of the necessary skills to succeed in the course, including thinking and research skills such as comprehension, text analysis, transfer and use of primary and secondary sources.

In the modern world, which is saturated with information from the internet and obsessed with commercial aims, the study of history might seem to have become anachronistic and unnecessary. However, considering these challenges, the subject is arguably more important than ever, providing students with all of the critical analysis, reading and comprehension skills needed to navigate an information-rich world. More so though, by understanding our collective world history, the subject can provide much needed balance, perspective, meaning and above all empathy to our students.

Course Aims & Objectives:

- To enable students to develop an understanding of, and continuing interest in, the past.
- Encourage students to engage with multiple perspectives and to appreciate the complex nature of historical concepts, issues, events and developments.
- Promote international-mindedness through the study of history from more than one region of the world.
- Develop an understanding of history as a discipline and to develop historical consciousness, including a sense of chronology and context and an understanding of different historical perspectives.
- Develop key historical skills, including engaging effectively with sources.
- Increase students' understanding of themselves and of contemporary society by encouraging reflection on the past.

Enduring understandings:

- History is an interpretive discipline, shaped by the perspectives, contexts, and biases of those who record and study it.
- Power and ideology influence the development, structure, and decline of societies.
- Historical events and developments are interconnected, often influenced by complex causes and leading to far-reaching consequences.
- Continuity and change are constant themes in history, occurring simultaneously across different regions and periods.
- The construction of national, regional, and cultural identities is shaped through historical narratives and collective memory.
- Conflict and cooperation are recurring dynamics in human societies and can drive significant political, economic, and social change.
- Historians use evidence selectively and interpretively, and the past can be understood in multiple valid ways.
- The legacy of colonialism, imperialism, and resistance continues to shape the modern world.
- Global events often reflect and impact local histories, and vice versa.
- Historical inquiry fosters empathy, critical thinking, and a deeper understanding of present-day issues.

Key Concepts:

- Change
- Continuity
- Causation
- Consequence
- Significance
- Perspectives

Transdisciplinary Links:

- **Theory of Knowledge (TOK)**: With shared concepts and skills like the interpretation of evidence, perspective, bias and reliability, there is scope for TOK-style debates, source analysis activities or reflective writing exercises focused on the past.
- **English:** With shared concepts and skills such as critical analysis of texts, propaganda, rhetoric or the construction of narrative and argumentative accounts, there is scope for the analysis of speeches and sources from the past. Potential for a joint essay on a topic such as: "How does fiction shape our understanding of historical reality?"
- **Global Politics:** With shared concepts and skills such as power, legitimacy, sovereignty, nationalism or human rights, there is scope for collaboration with simulated debates, linking activities particularly in the field of international relations.

UNIT 1 : Introduction to DP History	
Timeframe	Approx 1 week. (1st Sept. - 5th Sept.)
Learning goals:	Students will understand: ● Class and study expectations. ● The structure and assessment criteria for the course.
Assessments:	Formative: Prior knowledge/skills checks

UNIT 2: The Interwar Years / Versailles to Berlin **Case Study: Hitler's Germany**	
Timeframe	Approx. 18 weeks (8th Sept. - 30th Jan.)
Learning goals:	Students will understand: ● Describe and understand the factors which pushed Germany into authoritarianism. ● Describe the features of Nazi ideology and explain how they influenced the aims of Hitler and Nazi policies. ● Understand the methods used to consolidate and maintain authoritarian power in Germany. ● Have a thorough knowledge of events leading from the impact of the first world war through the period in question; 1914-1945. ● Be able to draw causal links between the various events of the 20th century. ● Be able to critically analyse primary, secondary and tertiary source materials from the time period. ● Describe and understand the repercussions of the First World War as well as the efforts by states and the League of Nations to use international diplomacy in the time period.

	● Weimar Germany: the initial crises of the years 1918 - 23, the Golden era of Stresemann and then the rise of Hitler after 1929 ● Hitler's Germany: his consolidation of power 1933 - 34, his economic, social and policies, the nature and organisation of the Nazi state and the extent of resistance to the Nazis ● Italy: reasons for the rise of Mussolini, his consolidation of power, social, political and economic policies. The nature of the fascist state ● Spain: political developments from 1918 leading to the outbreak of civil war in 1936. Foreign involvement in the war and the reasons for Franco's victory ● Describe and understand the factors which pushed Germany into authoritarianism. ● Describe the features of Nazi ideology and explain how they influenced the aims of Hitler and Nazi policies. ● Understand the methods used to consolidate and maintain authoritarian power in Germany.
Assessments:	**Formative:** Written assessment in various styles, such as causal or persuasive. Comprehension/Primary, Secondary and Tertiary source analysis. Debate, classroom discussion, presentation and research tasks. **Summative:** Testing point 1: Students will complete two formal assessments; one in the style of a Paper 1 (Source analysis and comprehension) and the second in the style of Paper 2 (Essay writing)
UNIT 3: The move to Global War **Case Studies: World War 2, Spanish Civil War**	
Timeframe	Approx. 18 weeks (2nd Feb. - 19th June)
Learning goals:	Students will understand: ● Understand how the actions of three countries in two different regions contributed to the 'move to global war' in the 1930s; Italy, Japan and Germany. ● Explain the causes of international tensions during the time period and provide factorial explanations and arguments surrounding the topic. ● Understand how states failed to deal with the repercussions of the First World War. ● Be able to describe the foreign policies of France, Britain, Germany, Italy and Russia, including their aims and objectives. ● The contributing factors which led to the Second World War from a variety of perspectives. ● Understand and evaluate the reasons for the failure of the Fascist nations in World War 2. ● Be able to use historiography, primary and secondary sources to effectively support academic writing on the subject. ● To understand the causes, practices, innovations and consequences of the Second World War across a range of global or cross-regional perspectives. ● To understand the causes, practices, innovations and consequences of the Spanish Civil War across a range of global or cross-regional perspectives.
Assessments:	**Formative:** Written assessment in various styles, such as causal or persuasive. Comprehension/Primary, Secondary and Tertiary source analysis. Debate, classroom discussion, presentation and research tasks. **Summative:** Testing point 1: Students will complete two formal assessments; one in the style of a Paper 1 (Source analysis and comprehension) and the second in the style of Paper 2 (Essay writing)

BIOLOGY

Teacher(s): Corinne Estrada

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Course Description:

Biology is the study of life. The first organisms appeared on the planet over 3 billion years ago and, through reproduction and natural selection, have given rise to the 8 million or so different species alive today. Estimates vary, but over the course of evolution 4 billion species could have been produced. Most of these flourished for a period of time and then became extinct as new, better adapted species took their place. There have been at least five periods when very large numbers of species became extinct and biologists are concerned that another mass extinction is underway, caused this time by human activity. Nonetheless, there are more species alive on Earth today than ever before. This diversity makes biology both an endless source of fascination and a considerable challenge.

An interest in life is natural for humans; not only are we living organisms ourselves, but we depend on many species for our survival, we are threatened by some and co-exist with many more. From the earliest cave paintings to the modern wildlife documentary, this interest is as obvious as it is ubiquitous, as biology continues to fascinate young and old all over the world.

The word 'biology' was coined by German naturalist Gottfried Reinhold in 1802, but our understanding of living organisms only started to grow rapidly with the advent of techniques and technologies developed in the 18th and 19th centuries, especially with the invention of the microscope and the realization that natural selection is the process that has driven the evolution of life.

Biologists attempt to understand the living world at all levels using many different approaches and techniques. At one end of the scale is the cell, its molecular construction and complex metabolic reactions. At the other end of the scale biologists investigate the interactions that make whole ecosystems function.

Many areas of research in biology are extremely challenging and many discoveries remain to be made. Biology is still a young science and great progress is expected in the 21st century. This progress is sorely needed at a time when the growing human population is placing ever greater pressure on food supplies and on the habitats of other species as well as threatening the very planet we occupy.

The unit outline is from page 25 of the new syllabus.

Course Aims & Objectives:

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

The aims enable students to

1. appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
2. acquire a body of knowledge, methods and techniques that characterize science and technology
3. apply and use a body of knowledge, methods and techniques that characterize science and technology
4. develop an ability to analyse, evaluate and synthesize scientific information
5. develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
6. develop experimental and investigative scientific skills including the use of current technologies
7. develop and apply 21st century communication skills in the study of science

8. become critically aware, as global citizens, of the ethical implications of using science and technology
9. develop an appreciation of the possibilities and limitations of science and technology
10. develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge.

Enduring understandings:

- Students will understand scientific study and creativity within a global context through stimulating and challenging opportunities.
- Students will understand a body of knowledge, methods and techniques that characterize science and technology.
- Students will understand how to analyse, evaluate and synthesize scientific information.
- Students will understand the need for, and the value of, effective collaboration and communication during scientific activities.
- Students will understand experimental and investigative scientific methods whilst using current technologies.
- Students will understand 21st century communication methods in the study of science.
- Students will understand that science and technology have ethical implications.
- Students will understand the possibilities and limitations of science and technology.
- Students will understand the relationships between scientific disciplines and their influence in other areas of knowledge.

Transdisciplinary Links

- ICT; chemistry;technology; mathematics; ethics; TOK.

First Topic: Unity and Diversity Cells A2.2.102.2.11 (SL &HL) and HL ONLY A2.1, A2.2.12-A2.2.14, A2.3	
Timeframe	6 Weeks
Learning goals:	**SL & HL** ● Compare and contrast the features common to all cells and the features that differ. ● Describe how microscopy is used to investigate cell structure. ● Outline the process of visualizing specific proteins in cells using immunofluorescence technology. ● Outline the process of producing images of cell surfaces using freeze-fracture electron microscopy. ● Outline the process of visualizing specific proteins using cryogenic electron microscopy. ● Explain some features of a compelling theory. ● Describe how the structure of specialized cells relate to their function.. **HL ONLY** ● Explain a plausible hypothesis could account for the origin of life ● Describe the intermediate stages could there have been between non-living matter and the first living cells? ● Outline the conditions that are thought to have existed on prebiotic Earth, including atmosphere, temperature, UV radiation, volcanic activity and asteroid bombardment. ● State that the conditions of prebiotic Earth may have caused a variety of carbon compounds to form spontaneously. ● Discuss the challenges of defining matter as living or nonliving. ● Discuss the reasons why cells are considered to be living. ● Discuss the reasons why viruses are considered to be non-living. ● Outline the intermediate stages needed for the evolution of the first cells on prebiotic Earth. ● Discuss limitations in testing hypotheses about the evolution of the first cells.

	● Outline the methodology, results and conclusion that can be drawn from Miller and Urey's experiments into the origin of biologically relevant carbon compounds. ● Discuss the benefits and limitations of the Miller-Urey apparatus as a model for a natural phenomena. ● Outline the cause and consequence of the spontaneous formation of membranes and vesicles by amphipathic molecules such as fatty acids and phospholipids on prebiotic Earth. ● State that modern cells use DNA as the genetic material and enzyme proteins as catalysts of metabolism. ● List properties of RNA that suggest it was the first genetic material. ● Compare the genetic stability of RNA and DNA. ● Outline the ribosomal ribozyme as a type of RNA that is still used as a catalyst. ● Discuss why the LUCA is not thought to be the first cell, but rather is thought to be the last common ancestor to all living cells. ● Compare the estimated dates for the evolution of the first cells and of the LUCA cells to the age of Earth. ● Describe stromatolites as the earliest direct evidence of fossilized life. ● Outline the use of isotopes and the molecular clock for estimating dates of the first cells and of the LUCA cells. ● Explain the use of deductive reasoning to predict what genes were present in LUCA cells. ● Describe the conditions present at a white-smoker hydrothermal vent. ● Explain how knowledge of the genes present in the LUCA cells can provide evidence that the cells lived in the vicinity of hydrothermal vents. ● Explain the origin of mitochondria and chloroplast with reference to the endosymbiosis. ● Describe the genetic, structural and behavioral evidence for the endosymbiotic theory. ● Outline the benefits of cell specialization in a multicellular organism. ● Describe the relationship between cell differentiation and gene expression. ● State that multicellularity has evolved repeatedly. ● List groups of organisms that are multicellular. ● Outline the steps in the evolution of multicellularity. ● Explain how viruses exist with so few genes. ● Describe the ways viruses vary.
Assessments:	Quizzes Lab report (Analysis)

Second Topic: Form and Function (Cells) B2.1- B2.3 (SL &HL) HL ONLY B2.1.11-B2.1.17, B2.2.4-B2.2.9, B2.3.7-B2.3.10	
Timeframe	6 Weeks
Learning goals:	**SL & HL** ● Explain how molecules of lipid and protein assemble into biological membranes. ● Describe what determines whether a substance can pass through a biological membrane. ● Compare and contrast how organelles in cells adapted to their functions.

	• Describe the advantages of compartmentalization in cells. • Explain the roles of stem cells in multicellular organisms. • Understand how differentiated cells adapted to their specialized functions. **HL ONLY** • Diagram and describe how biological processes depend on active transport in biological systems. • Explain the roles of cell membranes in the interaction of a cell with its environment. • Define examples of structure–function correlations at each level of biological organization. • Explain the separation techniques are used by biologists. • Explain the advantages of small size and large size in biological systems. • Discuss how cells become differentiated.
Assessments:	Quizzes Performance task Lab report (Analysis) Unit Test

Third Topic: Interaction and Interdependence (Cells) C2.2 (SL &HL) and HL ONLY C2.1, C2.2.8-C2.216	
Timeframe	5 Weeks
Learning goals:	**SL & HL** • Explain how electrical signals are generated and moved within neurons. • Describe how neurons interact with other cells. **HL ONLY** • Describe the ways in which biological systems are regulated. • Explain how the structure of specialized cells are related to their function. • Describe how cells distinguish between the many different signals that they receive. • Explain the interactions that occur inside animal cells in response to chemical signals. • Analyze the patterns that exist in communication in biological systems. • Explain how negative feedback is evident at all levels of biological organization.
Assessments:	Key-word and structure quizzes Lab report (Exploration section) Performance task Unit Test

	Exam 1

Forth Topic: Continuity and Change (Cells) D2.1, D2.3 (SL &HL) and HL ONLY D2.1.12-D2.1.17, D2.2, D2.3.8-D2.3.11	
Time frame	6 Weeks
Learning goals:	**SL & HL** ● Understand how can large numbers of genetically identical cells be produced ● Explain how eukaryotes can produce genetically varied cells that can develop into gametes ● Understand how gene expression changes in a cell ● Describe how patterns of gene expression can be conserved through inheritance ● Demonstrate the factors that affect the movement of water into or out of cell ● Explain how plant and animal cells differ in their regulation of water movement **HL ONLY** ● Understand the processes that support the growth of organisms ● Explain how the variation produced by sexual reproduction contribute to evolution ● Define the mechanisms that are there for inhibition in biological systems ● Demonstrate in what ways does the environment stimulate diversification ● Explain the implications of solubility differences between chemical substances for living organisms ● Explain how variables influence the direction of movement of materials in tissues
Assessments	Unit Test Laboratory Report Quiz

Fifth Topic: Unity and diversity & Form and Function (Molecular Biology) A1.1, A1.2, B1.1, B1.2 (SL &HL) and HL ONLY A1.1.7-A1.1.8, A1.2.11-A1.2.15, B1.2.6-B1.2.12	
Time frame	7 Weeks
Learning goals:	**SL & HL** ● Understand the physical and chemical properties of water make it essential for life ● Describe the challenges and opportunities of water as a habitat ● Explain how the structure of nucleic acids allow hereditary information to be stored

	● Demonstrate how the structure of DNA facilitate accurate replication ● Understand the ways variations in form allow diversity of function in carbohydrates and lipids ● Compare and contrast carbohydrates and lipids as energy storage compounds ● Explain the relationship between amino acid sequence and the diversity in form and function of proteins ● Demonstrate how protein molecules are affected by their chemical and physical environments **HL ONLY** ● Define the various intermolecular forces of attraction affect biological systems ● Describe biological processes only happen at or near surfaces ● Understand the implications of solubility differences between chemical substances for living organisms ● Understand the use of certain molecular building blocks in all living cells ● Discuss what makes RNA more likely to have been the first genetic material, rather than DNA ● Describe how can polymerization result in emergent properties ● Demonstrate how compounds synthesized by living organisms accumulate and become carbon sinks ● Explain the roles of oxidation and reduction in biological systems ● Describe how abiotic factors influence the form of molecules ● Explain the relationship between the genome and the proteome of an organism
Assessments	Unit Test Laboratory Report Quiz

Sixth Topic: Interaction and Interdependence (Molecular Biology) C1.1, C1.2, C1.3 (SL &HL) and HL ONLY C1.1.11-C1.1.17, C1.2.7-C1.2.17, C1.3.9-C1.3.19	
Time frame	4 Weeks
Learning goals:	**SL & HL** ● Explain in what ways do variations in form allow diversity of function in carbohydrates and lipids ● Compare and contrast how carbohydrates and lipids as energy storage compounds ● Understand the roles of hydrogen and oxygen in the release of energy in cells ● Demonstrate how energy distributed and used inside cells ● Describe how energy from sunlight absorbed and used in photosynthesis ● Understand how abiotic factors interact with photosynthesis **HL ONLY** ● Describe how compounds synthesized by living organisms accumulate and become carbon sinks ● Understand the roles of oxidation and reduction in biological systems ● Explain what forms is energy stored in living organisms ● Discuss the consequences of respiration for ecosystems ● Discuss the consequences of photosynthesis for ecosystems

	• Describe the functions of pigments in living organisms
Assessments	Unit Test Laboratory Report Quiz

Seventh Topic: Continuity and Change (Molecular Biology) D1.1, D1.2, D1.3 (SL & HL), and HL ONLY D1.1.6-D1.1.9, D1.2.12-D1.2.19, D1.3.8-D1.3.10	
Time frame	3 Weeks
Learning goals:	**SL & HL** • Explain how new DNA is produced • Discuss how knowledge of DNA replication enabled applications in biotechnology • Describe how does a cell produce a sequence of amino acids from a sequence of DNA bases • Understand how the reliability of protein synthesis ensured • Describe how gene mutations occur • Discuss the consequences of gene mutation **HL ONLY** • Understand how igenetic continuity is ensured between generations • Explain what biological mechanisms rely on directionality • Explain what biological processes depend on hydrogen bonding • Discuss how the diversity of proteins produced contribute to the functioning of the cell • Describe how does variation in subunit composition of polymers contribute to function • Demonstrate how natural selection leads to both a reduction in variation and an increase in biological diversity
Assessments	Unit Test Laboratory Report Quiz 2nd Exam

CHEMISTRY

Teacher(s): Elias Abou Naccoul

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Course Description

This course will cover a breadth of topics that cover all the fundamental aspects of IB Chemistry, which is an excellent prerequisite for studying at university level. The course will teach abstract chemical concepts, problem solving and experimental work to develop a high level of logical and critical thinking.

Course Aims & Objectives:

Chemistry is an experimental science that combines academic study with the acquisition of practical and investigational skills. It is called the central science, as chemical principles underpin both the physical environment in which we live and all biological systems. Apart from being a subject worthy of study in its own right, chemistry is a prerequisite for many other courses in higher education, such as medicine, biological science and environmental science, and serves as useful preparation for employment. The Diploma Programme chemistry course includes the essential principles of the subject but also, through selection of options, allows teachers some flexibility to tailor the course to meet the needs of their students. The course is available at both Standard Level (SL) and Higher Level (HL), and therefore accommodates students who wish to study science in higher education and those who do not.

The aims enable students, through the Enduring theme of the Nature of science, to:

- Appreciate scientific study and creativity within a global context through stimulating and challenging opportunities
- Acquire a body of knowledge, methods and techniques that characterize science and technology
- Apply and use a body of knowledge, methods and techniques that characterize science and technology
- Develop an ability to analyse, evaluate and synthesize scientific information
- Develop a critical awareness of the need for, and the value of, effective collaboration and communication during scientific activities
- Develop experimental and investigative scientific skills including the use of current technologies
- Develop and apply 21st century communication skills in the study of science
- Become critically aware, as global citizens, of the ethical implications of using science and technology
- Develop an appreciation of the possibilities and limitations of science and technology
- Develop an understanding of the relationships between scientific disciplines and their influence on other areas of knowledge

Enduring understandings:

- Students will understand scientific study and creativity within a global context through stimulating and challenging opportunities.
- Students will understand a body of knowledge, methods and techniques that characterize science and technology.
- Students will understand how to analyse, evaluate and synthesize scientific information.

- Students will understand the need for, and the value of, effective collaboration and communication during scientific activities.
- Students will understand experimental and investigative scientific methods whilst using current technologies.
- Students will understand 21st century communication methods in the study of science.
- Students will understand that science and technology have ethical implications.
- Students will understand the possibilities and limitations of science and technology.
- Students will understand the relationships between scientific disciplines and their influence in other areas of knowledge.

TOOLS FOR CHEMISTRY: Measurement and data processing	
Timeframe	2 weeks
Learning goals:	● Uncertainties and errors in measurement and results ● Graphical techniques
ToK	To what extent does the interpretation of graphs also rely on the other WOKs, such as reason?
Assessments:	Laboratory activities and reports, Class participation

STRUCTURE 1 Introduction to the Particulate Nature of Matter	
Timeframe	6 weeks
Learning goals:	● The particulate nature of matter and chemical change ● The mole concept ● Reacting masses and volumes ● The Nuclear Atom ● Electron Configurations ● Ideal Gases
ToK	If chemical equations are the language of chemistry, to what extent do they function as a 'universal' language? As chemistry develops a systematic 'universal' language, what is gained and lost in the process? How does the use of 'universal' language(s) help or hinder the pursuit and acquisition of knowledge? Why might it be important to have a single universal scientific language? To what extent does our vocabulary simply communicate our knowledge, or to what extent does it shape what we can know?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

STRUCTURE 2.1, 2.2, 2.3. Models of Bonding and Structure	
Timeframe	5 weeks
Learning goals:	● Ionic bonding and structure ● Covalent bonding ● Covalent structures ● Hybridization ● Intermolecular forces ● Metallic bonding
ToK	How many exceptions do there need to be before a scientific rule stops being useful?

	What criteria do we use in assessing the validity of a scientific theory? What are the challenges and limitations of applying general laws and principles to specific examples and instances?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Reactivity 1.1, 1.2. What Drives Chemical Reactions.	
Timeframe	5 weeks
Learning goals:	● Measuring energy changes ● Hess's Law and bond cycles ● Bond enthalpies ● Energy cycles
ToK	What criteria do we use when judging discrepancies between experimental and theoretical values? What ways of knowing (WOKs) do we use when assessing experimental limitations and theoretical assumptions?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Reactivity 2.1, 2.2 How Much? How Fast?	
Timeframe	4 weeks
Learning goals:	● Collision theory and rates of reaction ● Activation energy ● Rate expression and reaction mechanisms
ToK	Are physical properties such as temperature invented or discovered?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Reactivity 2.3 How Far? The extent of Chemical Change	
Timeframe	4 weeks
Learning goals:	● Equilibrium ● The equilibrium Law
ToK	Scientists investigate the world at different scales; the macroscopic and microscopic. Which ways of knowing allow us to move from the macroscopic to the microscopic? • Chemistry uses a specialized vocabulary: a closed system is one in which no matter is exchanged with the surroundings. Does our vocabulary simply communicate our knowledge; or does it shape what we can know? • The career of Fritz Haber coincided with the political upheavals of two world wars. He supervised the release of chlorine on the battlefield in World War I and worked on the production of explosives. How does the social context of scientific work affect the methods and findings of science? Should scientists be held morally responsible for the applications of their discoveries? • The equilibrium law can be deduced by assuming that the order of the forward and backward reaction matches the coefficients in the chemical equation. What is the role of deductive reasoning in science? • We can use mathematics successfully to model equilibrium systems. Is this because we create mathematics to mirror reality or because the reality is intrinsically mathematical?

	• Many problems in science can only be solved when assumptions are made which simplify the mathematics. What is the role of intuition in problem solving?
Assessments	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Reactivity 3.1. Proton Transfer Reactions	
Timeframe	4 weeks
Learning goals:	● Theories of acids and bases ● Properties of acids and bases ● The pH scale ● Strong and weak acids and bases ● Calculations involving acids and bases ● pH curves
ToK	Chemistry makes use of the universal language of mathematics as a means of communication. Why is it important to have just one "scientific" language? Acid and base behaviour can be explained using different theories. How are the explanations in chemistry different from explanations in other subjects such as history?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Reactivity 3.2. Electron Transfer Reactions	
Timeframe	4 weeks
Learning goals:	• Oxidation and reduction ● Electrochemical cells
ToK	Is energy simply an abstract concept used to explain various things? Are concepts such as energy actually real?
Assessments:	Quiz, Test, Laboratory activities, Completeness of homework assignments, Class participation

Internal Assessment in Chemistry	
Timeframe	3 weeks
Learning goals:	• Requirements of internal assessment in chemistry ● Samples of good IAs done in chemistry ● Finalizing the IA research question in chemistry
Assessments:	Quiz, Laboratory activities, Completeness of homework assignments, Class participation

PHYSICS

Teacher(s): Brian Burleigh

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Course Description:

Students in IB1 Physics will investigate a range of topics including kinematics, dynamics, gravitational fields, thermal physics, wave behaviour and (motion in) electric and magnetic fields. The skills and techniques students will experience through the course are encompassed within the following tools: experimental techniques, technology and mathematics. These tools support the application and development of the inquiry process (exploring and designing, collecting and processing data, concluding and evaluating). The practical tasks will be assessed against the IB internal assessment criteria. Other assessment of student performance will be conducted through end-of-unit review and examination questions, which target recall of important facts and problem solving capability.

Course Aims & Objectives:

Physics is the most fundamental science, seeking to explain the universe from the very small to the very large. Theory and experiments go hand in hand in the scientific community, and this is reflected in the classroom. Students will develop knowledge and understanding, along with practical expertise, including in the use of technology. There is also a human dimension to the sciences, so students will need to develop their critical thinking, problem solving and teamwork skills.

Enduring understandings:

- Students will understand scientific study and creativity within a global context through stimulating and challenging opportunities.
- Students will understand a body of knowledge, methods and techniques that characterize science and technology.
- Students will understand how to analyse, evaluate and synthesize scientific information.
- Students will understand the need for, and the value of, effective collaboration and communication during scientific activities.
- Students will understand experimental and investigative scientific methods whilst using current technologies.
- Students will understand 21st century communication methods in the study of science.
- Students will understand that science and technology have ethical implications.
- Students will understand the possibilities and limitations of science and technology.
- Students will understand the relationships between scientific disciplines and their influence in other areas of knowledge.

UNIT 1: Introduction and skills in IB Physics	
Timeframe	2 weeks

Learning goals:	**SL and HL** ● Addressing safety of self, others and the environment ● Measuring variables ● Applying technology to collect data ● Applying technology to process data ● Applying general mathematics ● Using units, symbols and numerical values ● Processing uncertainties ● Graphing
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes)
TOK	What has influenced the common language used in science? To what extent does having a common standard approach to measurement facilitate the sharing of knowledge in physics?

UNIT 2: Mechanics	
Timeframe	9 weeks
Learning goals:	**SL and HL** ● Understand that the motion of bodies through space and time can be described and analysed in terms of position, velocity, and acceleration ● Understand that velocity is the rate of change of position, and acceleration is the rate of change of velocity ● Understand that the change in position is the displacement ● Understand the difference between distance and displacement ● Understand the difference between instantaneous and average values of velocity, speed and acceleration, and how to determine them ● Know how to use the equations of motion for solving problems with uniformly accelerated motion as given by $s = \frac{v+u}{2}t, v = u + at, s = ut + \frac{1}{2}at^2$ and $v^2 = u^2 + 2as$ ● Understand motion with uniform and non-uniform acceleration ● Understand the behaviour of projectiles in the absence of fluid resistance, and the application of the equations of motion resolved into vertical and horizontal components ● the qualitative effect of fluid resistance on projectiles, including time of flight, trajectory, velocity, acceleration, range and terminal speed. ● Understand Newton's three laws of motion ● Understand forces as interactions between bodies ● Understand that forces acting on a body can be represented in a free-body diagram ● Understand that free-body diagrams can be analysed to find the resultant force on a system ● Understand the nature and use of the following contact forces: ○ normal force F_N is the component of the contact force acting perpendicular to the surface that counteracts the body ○ surface frictional force F_f acting in a direction parallel to the plane of contact between a body and a surface, on a stationary body as given by $F_f \leq \mu_s F_N$ or a body in motion as given by $F_f = \mu_d F_N$ where μ_s and μ_d are the coefficients of static and dynamic friction respectively ○ tension ○ elastic restoring force F_H following Hooke's law as given by $F_H = -kx$ where k is the spring constant ○ viscous drag force F_d acting on a small sphere opposing its motion through a fluid as given by $F_d = 6\pi\eta rv$ where η is the fluid viscosity, r is the radius of the sphere and v is the velocity of the sphere through the fluid ○ buoyancy F_b acting on a body due to the displacement of the fluid as given by $F_b = \rho Vg$ where V is the volume of fluid displaced

	● Understand the nature and use of the following field forces: ○ gravitational force F_g is the weight of the body and calculated is given by F_g = mg ○ electric force F_e ○ magnetic force F_m ● Understand that linear momentum as given by p = mv remains constant unless the system is acted upon by a resultant external force ● Understand that a resultant external force applied to a system constitutes an impulse J as given by J = FΔt where F is the average resultant force and Δt is the time of contact ● Understand that the applied external impulse equals the change in momentum of the system ● Understand that Newton's second law in the form F = ma assumes mass is constant whereas F = Δp/Δt allows for situations where mass is changing ● Understand the elastic and inelastic collisions of two bodies ● Understand explosions ● Understand energy considerations in elastic collisions, inelastic collisions, and explosions ● Understand that bodies moving along a circular trajectory at a constant speed experience an acceleration that is directed radially towards the centre of the circle—known as a centripetal acceleration as given by $a = \frac{v^2}{r} = \omega^2 r = \frac{4\pi^2 r}{T^2}$ ● Understand that circular motion is caused by a centripetal force acting perpendicular to the velocity ● Understand that a centripetal force causes the body to change direction even if its magnitude of velocity may remain constant ● that the motion along a circular trajectory can be described in terms of the angular velocity ω which is related to the linear speed v by the equation as given by $v = \frac{2\pi r}{T} = \omega r$ ● Understand the principle of the conservation of energy ● Understand that work done by a force is equivalent to a transfer of energy ● Understand that energy transfers can be represented on a Sankey diagram ● that work W done on a body by a constant force depends on the component of the force along the line of displacement as given by W = Fs cos θ ● Understand that work done by the resultant force on a system is equal to the change in the energy of the system ● Understand that mechanical energy is the sum of kinetic energy, gravitational potential energy and elastic potential energy ● Understand that in the absence of frictional, resistive forces, the total mechanical energy of a system is conserved ● Understand that if mechanical energy is conserved, work is the amount of energy transformed between different forms of mechanical energy in a system, such as: ○ the kinetic energy of translational motion as given by $E_k = \frac{1}{2}mv^2 = \frac{p^2}{2m}$ ○ the gravitational potential energy, when close to the surface of the Earth as given by $\Delta E_p = mg\Delta h$ ○ the elastic potential energy as given by $E_H = \frac{1}{2}k(\Delta x)^2$ ● Understand that power developed P is the rate of work done, or the rate of energy transfer, as given by $P = \frac{\Delta W}{\Delta t} = Fv$ ● Understand efficiency η in terms of energy transfer or power as given by $\eta = \frac{E_{output}}{E_{input}} = \frac{P_{output}}{P_{input}}$ ● Understand energy density of the fuel sources.
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes), exam
TOK	The independence of horizontal and vertical motion in projectile motion seems to be counter-intuitive. How do scientists work around their intuitions? How do scientists make use of their intuitions?

	Classical physics believed that the whole of the future of the universe could be predicted from knowledge of the present state. To what extent can knowledge of the present give us knowledge of the future?

UNIT 3: Gravitational fields	
Timeframe	5 weeks
Learning goals:	**SL and HL** ● Understand Kepler's three laws of orbital motion ● Understand Newton's universal law of gravitation as given by $F = G\frac{m_1 m_2}{r^2}$ for bodies treated as point masses ● Understand the conditions under which extended bodies can be treated as point masses ● Understand that the gravitational field strength g at a point is the force per unit mass experienced by a small point ● mass at that point as given by $g = \frac{F}{m} = G\frac{M}{r^2}$ ● Understand gravitational field lines **HL only** ● Understand that the gravitational potential energy Ep of a system is the work done to assemble the system from infinite separation of the components of the system ● Understand the gravitational potential energy for a two-body system as given by $E_p - G\frac{m_1 m_2}{r}$ where r is the separation between the centre of mass of the two bodies ● Understand that the gravitational potential V_g at a point is the work done per unit mass in bringing a mass from infinity to that point as given by $V_g - G\frac{M}{r}$ ● Understand the gravitational field strength g as the gravitational potential gradient as given by $g = -\frac{\Delta V_g}{\Delta r}$ ● Understand the work done in moving a mass m in a gravitational field as given by $W = m\Delta V_g$ ● Understand equipotential surfaces for gravitational fields ● Understand the relationship between equipotential surfaces and gravitational field lines ● Understand the escape speed v_{esc} at any point in a gravitational field as given by $v_{esc} = \sqrt{\frac{2GM}{r}}$ ● Understand the orbital speed $v_{orbital}$ of a body orbiting a large mass as given by $v_{orbital} = \sqrt{\frac{GM}{r}}$ ● Understand the qualitative effect of a small viscous drag force due to the atmosphere on the height and speed of an orbiting body.
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes), exam
TOK	Foucault's pendulum gives a simple observable proof of the rotation of the earth, which is largely unobservable. How can we have knowledge of things that are unobservable? The laws of mechanics along with the law of gravitation create the deterministic nature of classical physics. Are classical physics and modern physics compatible? Do other areas of knowledge also have a similar division between classical and modern in their historical development?

	Although gravitational and electrostatic forces decrease with the square of distance and will only become zero at infinite separation, from a practical standpoint they become negligible at much smaller distances. How do scientists decide when an effect is so small that it can be ignored?

UNIT 4: Thermal Physics	
Timeframe	6 weeks
Learning goals:	**SL and HL** ● Understand molecular theory in solids, liquids and gases ● Understand density ρ as $\rho = \frac{m}{V}$ ● Understand that Kelvin and Celsius scales are used to express temperature ● Understand that the change in temperature of a system is the same when expressed with the Kelvin or Celsius scales ● Understand that Kelvin temperature is a measure of the average kinetic energy of particles as given by $\overline{E_K} = \frac{3}{2}k_B T$ ● Understand that the internal energy of a system is the total intermolecular potential energy arising from the forces between the molecules plus the total random kinetic energy of the molecules arising from their random motion ● Understand that temperature difference determines the direction of the resultant thermal energy transfer between bodies ● Understand that a phase change represents a change in particle behaviour arising from a change in energy at constant temperature ● Understand the quantitative analysis of thermal energy transfers Q with the use of specific heat capacity c and specific latent heat of fusion and vaporization of substances L as given by Q = mcΔT and Q = mL ● Understand that conduction, convection and thermal radiation are the primary mechanisms for thermal energy transfer ● Understand conduction in terms of the difference in the kinetic energy of particles ● Understand quantitative analysis of rate of thermal energy transfer by conduction in terms of the type of material and cross-sectional area of the material and the temperature gradient as given by $\frac{\Delta Q}{\Delta t} = kA\frac{\Delta T}{\Delta x}$ ● Understand the qualitative description of thermal energy transferred by convection due to fluid density differences ● Understand a quantitative analysis of energy transferred by radiation as a result of the emission of electromagnetic waves from the surface of a body, which in the case of a black body can be modelled by the Stefan-Boltzmann law as given by $L = \sigma A T^4$ where L is the luminosity, A is the surface area and T is the absolute temperature of the body ● Understand the concept of apparent brightness b ● Understand luminosity L of a body as given by $b = \frac{L}{4\pi d^2}$ ● Understand the emission spectrum of a black body and the determination of the temperature of the body using Wien's displacement law as given b $\lambda_{max} T = 2.9 \times 10^{-3}$mK where λ_{max} is the peak wavelength emitted ● Understand pressure as given by $P = \frac{F}{A}$ where F is the force exerted perpendicular to the surface ● Understand the amount of substance n as given by $n = \frac{N}{N_A}$ where N is the number of molecules and N_A is the Avogadro constant ● Understand that ideal gases are described in terms of the kinetic theory and constitute a modelled system used to approximate the behaviour of real gases ● Understand that the ideal gas law equation can be derived from the empirical gas laws for constant pressure, constant volume and constant temperature as given by $\frac{PV}{T} = constant$ ● Understand the equations governing the behaviour of ideal gases as given by $PV = Nk_B T$ and $PV = nRT$

	• Understand that the change in momentum of particles due to collisions with a given surface gives rise to pressure in gases and, from that analysis, pressure is related to the average translational speed of molecules as given by $P = \frac{1}{3}\rho v^2$ • Understand the relationship between the internal energy U of an ideal monatomic gas and the number of molecules or amount of substance as given by $U = \frac{3}{2}Nk_BT$ or $U = \frac{3}{2}nRT$ • Understand the temperature, pressure and density conditions under which an ideal gas is a good approximation of a real gas. **HL only** • Understand that the first law of thermodynamics as given by Q = ΔU + W results from the application of conservation of energy to a closed system and relates the internal energy of a system to the transfer of energy as heat and as work • Understand that the work done by or on a closed system as given by W = PΔV when its boundaries are changed can be described in terms of pressure and changes of volume of the system • Understand that the change in internal energy as given by $\Delta U = \frac{3}{2}Nk_B\Delta T = \frac{3}{2}nR\Delta T$ of a system is related to the change of its temperature • Understand that entropy S is a thermodynamic quantity that relates to the degree of disorder of the particles in a system • Understand that entropy can be determined in terms of macroscopic quantities such as thermal energy and temperature as given by $\Delta S = \frac{\Delta Q}{T}$ and also in terms of the properties of individual particles of the system as given by S = k_B ln Ω where k_B is the Boltzmann constant and Ω is the number of possible microstates of the system • Understand that the second law of thermodynamics refers to the change in entropy of an isolated system and sets constraints on possible physical processes and on the overall evolution of the system • Understand that processes in real isolated systems are almost always irreversible and consequently the entropy of a real isolated system always increases • Understand that the entropy of a non-isolated system can decrease locally, but this is compensated by an equal or greater increase of the entropy of the surroundings • Understand that isovolumetric, isobaric, isothermal and adiabatic processes are obtained by keeping one variable fixed • Understand that adiabatic processes in monatomic ideal gases can be modelled by the equation as given by $PV^{\frac{5}{3}} = constant$ • Understand that cyclic gas processes are used to run heat engines • Understand that a heat engine can respond to different cycles and is characterized by its efficiency as given by $\eta = \frac{useful\ work}{input\ energy}$ • that the Carnot cycle sets a limit for the efficiency of a heat engine at the temperatures of its heat reservoirs as given by $\eta_{Carnot} = 1 - \frac{T_c}{T_h}$
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes)
TOK	Observation through sense perception plays a key role in making measurements. Does sense perception play different roles in different areas of knowledge? When does modelling of "ideal" situations become "good enough" to count as knowledge?

UNIT 5: Wave behaviour	
Timeframe	7 weeks
Learning goals:	**SL and HL** • Understand the conditions that lead to simple harmonic motion • Understand the defining equation of simple harmonic motion as given by $a = -\omega^2 x$

	• Understand that a particle undergoing simple harmonic motion can be described using time period T, frequency f, angular frequency ω, amplitude, equilibrium position, and displacement • Understand the time period in terms of frequency of oscillation and angular frequency as given by $T = \frac{1}{f} = \frac{2\pi}{\omega}$ • Understand the time period of a mass–spring system as given by $T = 2\pi\sqrt{\frac{m}{k}}$ • Understand the time period of a simple pendulum as given by $T = 2\pi\sqrt{\frac{l}{g}}$ • Understand a qualitative approach to energy changes during one cycle of an oscillation • Understand transverse and longitudinal travelling waves • Understand wavelength λ, frequency f, time period T, and wave speed v applied to wave motion as given by $v = \lambda f = \frac{\lambda}{T}$ • Understand the nature of sound waves • Understand the nature of electromagnetic waves • Understand the differences between mechanical waves and electromagnetic waves • Understand that waves travelling in two and three dimensions can be described through the concepts of wavefronts and rays • Understand wave behaviour at boundaries in terms of reflection, refraction and transmission • Understand wave diffraction around a body and through an aperture • Understand wavefront-ray diagrams showing refraction and diffraction • Understand Snell's law, critical angle and total internal reflection • Understand Snell's law as given by $\frac{n_1}{n_2} = \frac{sin\theta_2}{sin\theta_1} = \frac{v_2}{v_2}$ where n is the refractive index and θ is the angle between the normal and the ray • Understand superposition of waves and wave pulses • Understand that double-source interference requires coherent sources • Understand the condition for constructive interference as given by path difference $= n\lambda$ • Understand the condition for destructive interference as given by path difference $= \left(n + \frac{1}{2}\right)\lambda$ • Understand Young's double-slit interference as given by $s = \frac{\lambda D}{d}$ λD where s is the separation of fringes, d is the separation of the slits, and D is the distance from the slits to the screen. • Understand the nature and formation of standing waves in terms of superposition of two identical waves travelling in opposite directions • Understand nodes and antinodes, relative amplitude and phase difference of points along a standing wave • Understand standing waves patterns in strings and pipes • Understand the nature of resonance including natural frequency and amplitude of oscillation based on driving frequency • Understand the effect of damping on the maximum amplitude and resonant frequency of oscillation • Understand the effects of light, critical and heavy damping on the system • Understand the nature of the Doppler effect for sound waves and electromagnetic waves • Understand the representation of the Doppler effect in terms of wavefront diagrams when either the source or the observer is moving • Understand the relative change in frequency or wavelength observed for a light wave due to the Doppler effect where the speed of light is much larger than the relative speed between the source and the observer as given by $\frac{\Delta\lambda}{\lambda} = \frac{\Delta f}{f} \approx \frac{v}{c}$ • Understand that shifts in spectral lines provide information about the motion of bodies like stars and galaxies in space. **HL only** • Understand that a particle undergoing simple harmonic motion can be described using phase angle

	• Understand that problems can be solved using the equations for simple harmonic motion as given by $x = x_0 sin(\omega t + \phi)$, $v = \omega x_0 cos(\omega t + \phi)$, $v = \pm\ \omega\sqrt{x_0^2 - x^2}$, $E_T = \frac{1}{2} m\omega^2 x_0^2$ and $E_P = \frac{1}{2} m\omega^2 x^2$ • Understand single-slit diffraction including intensity patterns as given by $\theta = \frac{\lambda}{b}$ where b is the slit width • Understand that the single-slit pattern modulates the double slit interference pattern • Understand interference patterns from multiple slits and diffraction gratings as given by $n\lambda = d\ sin\theta$ • Understand the observed frequency for sound waves and mechanical waves due to the Doppler effect as given by: ○ moving source $f' = f\left(\frac{v}{v \pm u_s}\right)$ where u_s is the velocity of the source ○ moving observer $f' = f\left(\frac{v \pm u_o}{v}\right)$ where u_o is the velocity of the observer
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes), exam
TOK	1. The harmonic oscillator is a paradigm for modelling where a simple equation is used to describe a complex phenomenon. How do scientists know when a simple model is not detailed enough for their requirements? 2. Huygens and Newton proposed two competing theories of the behaviour of light. How does the scientific community decide between competing theories? 3. There are close links between standing waves in strings and Schrodinger's theory for the probability amplitude of electrons in the atom. Application to superstring theory requires standing wave patterns in 11 dimensions. What is the role of reason and imagination in enabling scientists to visualize scenarios that are beyond our physical capabilities? 4. Are explanations in science different from explanations in other areas of knowledge such as history? 5. Most two-slit interference descriptions can be made without reference to the one-slit modulation effect. To what level can scientists ignore parts of a model for simplicity and clarity? 6. The resolution limits set by Dawes and Rayleigh are capable of being surpassed by the construction of high quality telescopes. Are we capable of breaking other limits of scientific knowledge with our advancing technology?

UNIT 6: Rigid body mechanics	
Timeframe	3 weeks
Learning goals:	**HL only** • Understand the torque τ of a force about an axis as given by $\tau = Fr\ sin\theta$ • Understand that bodies in rotational equilibrium have a resultant torque of zero • Understand that an unbalanced torque applied to an extended, rigid body will cause angular acceleration • Understand that the rotation of a body can be described in terms of angular displacement, angular velocity and angular acceleration • that equations of motion for uniform angular acceleration can be used to predict the body's angular position θ, angular displacement $\Delta\theta$, angular speed ω and angular acceleration α, as given by $\Delta\theta = \frac{\omega_f + \omega_i}{2} t$, $\omega_f = \omega_i + \alpha t$, $\Delta\theta = \omega_i t + \frac{1}{2}\alpha t^2$ and $\omega_f^2 = \omega_i^2 + 2\alpha\Delta\theta$ • Understand that the moment of inertia I depends on the distribution of mass of an extended body about an axis of rotation • Understand the moment of inertia for a system of point masses as given by $I = \sum mr^2$

	• Understand Newton's second law for rotation as given by $\tau = I\alpha$ where τ is the average torque • Understand that an extended body rotating with an angular speed has an angular momentum L as given by $L = I\omega$ • Understand that angular momentum remains constant unless the body is acted upon by a resultant torque • Understand that the action of a resultant torque constitutes an angular impulse ΔL as given by $\Delta L = \tau\Delta t = \Delta(I\omega)$ • Understand the kinetic energy of rotational motion as given by $E_k = \frac{1}{2}I\omega^2 = \frac{L^2}{2I}$
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes), exam
TOK	What is the difference between engineering and physics? Should we be surprised that the mathematics of rotating things has exactly the same form as things moving in a straight line? Is analogical reasoning a good way to reason? Does Newton's rotating bucket experiment prove absolute space exists?

UNIT 7: Electric and magnetic fields	
Timeframe	5 weeks
Learning goals:	**SL and HL** • Understand the direction of forces between the two types of electric charge • Understand Coulomb's law as given by $F = k\frac{q_1q_2}{r^2}$ for charged bodies treated as point charges where $k = \frac{1}{4\pi\varepsilon_0}$ • Understand the conservation of electric charge • Understand Millikan's experiment as evidence for quantization of electric charge • Understand that the electric charge can be transferred between bodies using friction, electrostatic induction and by contact, including the role of grounding (earthing) • Understand the electric field strength as given by $E = \frac{F}{q}$ • Understand electric field lines • Understand the relationship between field line density and field strength • Understand the uniform electric field strength between parallel plates as given by $E = \frac{V}{d}$ • Understand magnetic field lines **HL only** • Understand the electric potential energy E_p in terms of work done to assemble the system from infinite separation • Understand the electric potential energy for a system of two charged bodies as given by $E_p = k\frac{q_1q_2}{r}$ • Understand that the electric potential is a scalar quantity with zero defined at infinity • Understand that the electric potential V_e at a point is the work done per unit charge to bring a test charge from infinity to that point as given by $V_e = k\frac{Q}{r}$ • Understand the electric field strength E as the electric potential gradient as given by $E = -\frac{\Delta V_e}{\Delta r}$ • Understand the work done in moving a charge q in an electric field as given by $W = q\Delta V_e$ • Understand equipotential surfaces for electric fields • Understand the relationship between equipotential surfaces and electric field lines
Assessments:	Informal and formative assessments, cooperative and individual problem solving, lab reports, group and individual projects, homework, classwork, and summative assessments (written quizzes), exam

TOK	Isn't it convenient that matter is made of positive and negative charges that add and cancel just like numbers? If there had been a third type (*) and you had to have +, - and * to produce a neutral body then we couldn't use numbers to represent them. Is our number system the same as the charges by chance or is there something more deep-rooted? Did we come up with the model of charge because our number system works like that or does our number system work like it does because our brains are made of two charges? Could there be two masses in the same way as there are two charges? Why was the electric field defined in terms of positive charge? Electric and gravitational forces are very similar. Why is the universe so symmetric? How much do we know about the inside of the Earth and how do we know it? The Chinese are said to have discovered magnetism. Did they discover it or were they the first to write about it?

MATHEMATICS APPLICATIONS & INTERPRETATION (SL)

Teacher(s): Wissam Malaeb

Contact details: malaebw@mefis.k12.tr

Course Description:

Applications and Interpretation (AI) course is a two-year program designed for students who enjoy applying mathematics to real-world contexts. It emphasizes modeling, data analysis, and the use of technology to solve practical problems, while developing critical thinking and statistical reasoning. The course prepares students for further studies in fields such as social sciences, business, life sciences, and other disciplines where applied mathematics plays a key role.

Course Aims & Objectives:

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems. Student will be expected to demonstrate the following:

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

- Inquiry approaches: investigate unfamiliar situations, both abstract and real-world, involving organizing and analyzing information, making conjectures, drawing conclusions and testing their validity.

Enduring understandings:

- Relationships and functions can be represented numerically, graphically, and algebraically
- The way data is collected, organized, and displayed influences interpretation.
- Mathematics can be utilized to model real world scenarios and make informed decisions.
- Mathematical models can be used to describe and represent various physical relationships numerically, algebraically, and graphically.
- There are a variety of methods to solve and analyze polynomial equations and graphs and one method may be better than another given the polynomial.
- Trigonometry helps us model non-linear scenarios, such as period phenomena.
- Algebra is necessary to create robust geometric models and solve otherwise unsolvable geometric problems.
- Although circles are a geometric topic, their importance lies in the study of Trigonometry.
- Using probability helps us to make inferences and predictions.
- Randomization has an effect on the conclusions formed from surveys, experiments, and observational studies.

UNIT 1: NUMBER & ALGEBRA	
Timeframe	8 weeks
Learning goals:	● Identify the different numbers sets (N, Z, Q, R) and classify given numbers as N, Z, Q or R. ● Approximate answers to the required number of decimal places. ● Write numbers to the required number of significant figures. ● Calculate percentage error. ● Estimate answers. ● Express numbers in standard (scientific) notation. ● Laws of exponents with integer exponents. ● Use of GDC to solve linear equations & polynomial equations. ● Use the formula for the nth term and the sum of the first n terms of an arithmetic sequence. ● Use the formula for the nth term and the sum of the first n terms of a geometric sequence. ● Use of sigma notation in arithmetic & geometric sequences. ● Financial applications : Compound interest & annual depreciation ● Amortization and annuities using technology. TOK: - Do the names that we give things impact how we understand them? For instance, what is the impact of the fact that some large numbers are named, such as the googol and the googolplex, while others are represented in this form? - Is all knowledge concerned with identification and use of patterns? Consider Fibonacci numbers and connections with the golden ratio. - How do mathematicians reconcile the fact that some conclusions seem to conflict with our intuitions? - Consider for instance that a finite area can be bounded by an infinite perimeter.

	- How have technological advances affected the nature and practice of mathematics? Consider the use of financial packages for instance. - Is mathematics invented or discovered? For instance, consider the number e or logarithms–did they already exist before man defined them? (This topic is an opportunity for teachers to generate reflection on "the nature of mathematics"). - Is mathematical reasoning different from scientific reasoning, or reasoning in other areas of - knowledge? - What role does language play in the accumulation and sharing of knowledge in mathematics? Consider for example that when mathematicians talk about "imaginary" or "real" solutions they are using precise technical terms that do not have the same meaning as the everyday terms.
Assessments:	Daily homework, quizzes, worksheets, IB past paper questions, Performance Task

UNIT 2: MODELLING RELATIONSHIPS WITH FUNCTIONS	
Timeframe	14 weeks
Learning goals:	● Concept of a function, domain, range and graph. ● Function notation, eg f(x), v(t), C(n). ● Concept of a function as a mathematical model. ● Linear models. ● Linear functions and their graphs, $f(x) = mx + c$. ● Parallel & perpendicular lines ● Inverse functions as a reflection in the line y=x. ● Quadratic models. ● Quadratic functions and their graphs, $f(x) = ax^2 + bx + c; a \neq 0$ ● Properties of a parabola: symmetry; vertex; intercepts on the x-axis and y-axis. ● Equation of the axis of symmetry, $x = (-b/2a)$ ● Exponential models. ● Exponential functions and their graphs. ● Concept and equation of a horizontal asymptote. ● Models using functions of the form $f(x) = ax^m + bx^n + \ldots$ ● Cubic models ● Sinusoidal models. ● Drawing accurate graphs. ● Creating a sketch from information given. ● Transferring a graph from GDC to paper. ● Reading, interpreting and making predictions using graphs. ● Included all the functions above and additions and subtractions. ● Use of a GDC to solve equations involving combinations of the functions above. ● Trigonometry of right-angled triangles and indirect measurements ● Angles of elevation and depression ● Trigonometry of non-right triangles ● Area of a triangle formula: applications of right and non-right angled trigonometry ● 3D geometry: solids, surface area and volume TOK - Descartes showed that geometric problems could be solved algebraically and vice versa. What does this tell us about mathematical representation and mathematical knowledge?

	- Do you think mathematics or logic should be classified as a language? - Does studying the graph of a function contain the same level of mathematical rigour as studying the function algebraically? What are the advantages and disadvantages of having different forms and symbolic language in mathematics? - What role do models play in mathematics? Do they play a different role in mathematics compared to their role in other areas of knowledge? - What is it about models in mathematics that makes them effective? Is simplicity a desirable - characteristic in models?
Assessments	Performance task, daily homework, quizzes, IB past paper questions, Exam 1

UNIT 3: STATISTICS & PROBABILITY	
Timeframe	14 weeks
Learning goals:	● Concepts of population, sample, discrete and continuous data. ● Construct frequency tables and draw frequency polygons (and histograms). ● Find mid-interval values and upper and lower boundaries. ● Draw statistical diagrams (stem and leaf plots, box and whisker plots). ● Interpretation of outliers. ● Find percentiles and quartiles. ● Find the measures of central tendency for simple and grouped discrete data and continuous data. ● Measures of central tendency (mean, median, and mode) ● Model class. ● Find measures of dispersion: range, interquartile range, standard deviation. ● Understand the concept of correlation. ● Calculate Pearson's product-moment correlation coefficient. ● Interpret positive, zero and negative correlation. ● Calculate the equation of the regression line for y on x. ● Use the regression line for prediction purposes. ● Use the χ^2 test for independence. ● Formulate the null and alternative hypotheses; significance levels; contingency tables; expected frequencies; degrees of freedom; use of tables for critical values; p-values. ● T-test ● The normal distribution. ● The concept of a random variable; of the parameters μ and σ ; of the bell shape; the symmetry about $x = \mu$. ● Diagrammatic representation. ● Normal probability calculations. ● Inverse normal calculations. ● Basic concepts of set theory: elements $x \in A$; subsets $A \subset B$; intersection $A \cap B$; and union ● $A \cup B$; complement A'. ● Venn diagrams and simple applications. ● Sample space; event A; complementary event, A' . ● Probability of an event. ● Probability of a complementary event. ● Expected value. ● Probability of combined events, mutually exclusive events, independent events. ● Probability using "with replacement" and "without replacement". ● Conditional probability. ● Binomial distribution. TOK

	- Why have mathematics and statistics sometimes been treated as separate subjects? How easy is it to be misled by statistics? Is it ever justifiable to purposely use statistics to mislead others? - What is the difference between information and data? Does "data" mean the same thing in different areas of knowledge? - Could mathematics make alternative, equally true, formulae? What does this tell us about mathematical truths? Does the use of statistics lead to an over-emphasis on attributes that can be easily measured over those that cannot? - Correlation and causation–can we have knowledge of cause and effect relationships given that we can only observe correlation? What factors affect the reliability and validity of mathematical models in describing real-life phenomena? - To what extent are theoretical and experimental probabilities linked? What is the role of emotion in our perception of risk, for example in business, medicine and travel safety? - Can calculation of gambling probabilities be considered an ethical application of mathematics? Should mathematicians be held responsible for unethical applications of their work?
Assessments:	Daily homework, quizzes, worksheets, IB past paper questions, Performance Task Exam 2.

REVISION	
Timeframe	1 week
Learning goals:	● Students will review the objectives of Number and Algebra, Functions, Statistics and Probability units.

MATHEMATICS ANALYSIS & APPROACHES (SL)

Teacher: Cansu Coban

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Course Description:

This course caters to students who already possess knowledge of basic mathematical concepts and who are equipped with the skills needed to apply simple mathematical techniques correctly. The majority of these students will expect to need a sound mathematical background as they prepare for future studies in a wide-range of subjects.

The course focuses on introducing important mathematical concepts through the development of mathematical techniques. The intention is to introduce students to these concepts in a comprehensible and coherent way, rather than insisting on the mathematical rigour required at Higher Level Mathematics. Students should, wherever possible, apply the mathematical knowledge they have acquired to solve realistic problems set in an appropriate context. The internally assessed component of the course known as the mathematical exploration offers students the opportunity for developing independence in their mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas.

Course Aims & Objectives:

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems. Students will be expected to demonstrate the following:

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

Enduring understandings:

- Patterns, relations and functions are mathematical ways to describe connectedness and dependen
- Coordinate geometry can be used to describe spatial relationships and location.
- The study of transformations and symmetry provides a deeper understanding of physical change.
- All functions are not expressible as a finite combination of algebraic operations of additi subtraction, multiplication, division, raising to a power, and extracting a root.Examples include t functions log x, sin x, cos x, e^x and any functions containing them. Such functions are expressible algebraic terms only as infinite series. In general, the term transcendental means non-algebraic.
- A study of probability helps illuminate the randomness of our everyday world.
- Data collection and its organization helps formulate relevant questions that can be answered usi mathematical tools.
- Selection of the appropriate statistical method to analyze data will progress toward solutions a subsequent inferences.
- Moral, social and ethical implications arise from the work of mathematicians and the applications mathematics.
- Visualization, spatial reasoning, and geometric modeling are strategies to enhance problem solvin

Transdisciplinary Links

- TOK : Were numbers created or discovered?
- PHYSICS : Trajectories of a ball, rocket etc. follow the graph of a quadratic function.
- HUMANITIES and CHEM: Application of Expo. fns. for population growth, radioactive growth and decay.
- ART : The Fibonacci Sequence is a classic example of patterns in numbers, this led mathematicians and artists the discovery of the Golden Ratio. Renaissance Artists and architects used the golden ratio in their paintir and sculptures. The use of point and line perspective is another example of the use of mathematics in art.
- ECONOMICS; Calculation of Compound Interest.

UNIT 1 : NUMBER AND ALGEBRA **Generalization, representation, modeling, equivalence, patterns, quantity.**	
Timeframe	5 weeks
Learning goals:	1.1 Operations with numbers in the form $a \times 10^k$ where $1 \leq a < 10$ and k is an integer 1.2 Arithmetic sequences and series. Use of the formulae for the n^{th} term and the sum of the first n terms of the sequence. Use of Sigma notation for sums of arithmetic sequences. Applications. Analysis, interpretation and prediction where a model is not perfectly arithmetic in real life. 1.3 Geometric sequences and series. Use of the formulae for the n^{th} term and the sum of the first n terms of the sequence. Use of sigma notation for the sums of geometric sequences. Applications. 1.4 Financial applications of geometric sequences and series. Compound Interest. Annual depreciation. 1.8 Sum of infinite convergent geometric sequences. 1.5 Laws of Exponents with integer exponents.

	Introduction to logarithms with base 10 and e. Numerical evaluation of logarithms using technology. 1.6 Simple deductive proof, numerical and algebraic; how to lay out a left-hand side to right-hand side (LHS to RHS) proof. The symbols and notation for equality and identity. 1.7 Laws of exponents with rational exponents. Laws of logarithms. $\log_a xy = \log_a x + \log_a y$ $\log_a (x/y) = \log_a x - \log_a y$ $\log_a xm = m\log_a x$ for a, x, y > 0. Change of base of a logarithm $\log_a x = (\log_a x) / (\log_a y)$ for a, b, x > 0. Solving exponential equations, including using logarithms. 1.9 The binomial theorem. Expansion of $(a+b)^n$, . Use of Pascal's triangle and ${}^{n}C_{r}$.
Assessments:	Daily homework, Exams/Quizzes, Class participation and behavior.
TOK:	Where did numbers come from? Is mathematics a language? Is all knowledge concerned with identification and use of patterns? How is intuition used in mathematics? Do all societies view investment and interest in the same way? How many different tickets are possible in a lottery?

UNIT 2: FUNCTIONS **Representation, relationships, space, quantity, equivalence.**	
Timeframe	Linear functions and Introduction to functions - 3 weeks Quadratic functions and equations - 2 weeks Exponential and Logarithmic functions - 5 weeks Reciprocal functions and transformations of graphs - 4 weeks Total:14 weeks
Learning goals:	2.1 Linear equations. Different forms of the equation of a straight line. Gradient; intercepts. Lines with gradients m_1 and m_2. Parallel lines $m_1 = m_2$. Perpendicular lines $m_1 \times m_2 = -1$. 2.2 Concept of a function, domain, range and graph. Function notation e.g. f(x) v(t), C(n). The concept of a function as a mathematical model. Informal concept that an inverse function reverses or undoes the effect of a function. Inverse function as a reflection in the line y = x and the notation $f^{-1}(x)$. 2.3 The graph of a function; its equation y = f(x). Creating a sketch from information given or a context, including transferring a graph from screen to paper. Using technology to graph functions including their sums and differences. 2.4 Determine key features of graphs.

	Finding the point of intersection of two curves or lines using technology. 2.5 Composite functions. Identity function. Finding the inverse function $f^{-1}(x)$. 2.6 The quadratic function $f(x) = ax^2 + bx + c$; its graph, y-intercept (0, c). Axis of symmetry. The form $f(x) = a(x - p)(x - q)$, x-intercepts (p,0) and (q, 0). The vertex- axis form $f(x) = a(x - h)^2 + k$, vertex (h, k). 2.7 Solution of quadratic equations and inequalities. The quadratic formula. The discriminant $\Delta = b^2 - 4ac$ and the nature of the roots, that is, two distinct real roots, two equal real roots, no real roots. 2.8 The reciprocal function $f(x) = 1/x$, $x \neq 0$; its graph and self-inverse nature. Rational functions of the form $f(x) = (ax + b) / (cx + d)$ and their graphs. Equations of vertical and horizontal asymptotes. 2.9 Exponential functions and their graphs: $f(x) = a^x$, $a > 0$, $f(x) = e^x$ Logarithmic functions and their graphs: $f(x) = \log_a x$, $x > 0$, $f(x) = \ln x$, $x > 0$. 2.10 Solving equations, both graphically and analytically. Use of technology to solve a variety of equations, including those where there is no appropriate analytic approach. Applications of graphing skills and solving equations that relate to real-life situations. 2.11 Transformations of graphs. Translations : $y = f(x) + b$ $y = f(x - a)$. Reflections in both axes: $y = - f(x)$; $y = f(- x)$. Vertical stretch with scale factor p: $y = pf(x)$. Horizontal stretch with scale factor 1/q: $y = f(qx)$. Composite transformations.
Assessments:	Daily homework, Quizzes, Class participation, Performance Task, Exam1
TOK:	What is the relationship between real-life problems and mathematical models? Why is proof important in mathematics? Is mathematics independent of culture? Do you think that mathematics is just the manipulation of symbols under a set of rules? How accurate is a visual representation of a mathematical concept? How can a mathematical model give us knowledge even if it does not yield accurate predictions? Do you think that using mathematical language can distort understanding?

UNIT 3: GEOMETRY AND TRIGONOMETRY **Generalization, space, relationships, equivalence, representation.**	
Timeframe	6 weeks
Learning goals:	3.1 The distance between two points in three dimensional space, and their midpoint. Volume and surface area of three-dimensional solids including right pyramid, right cone, sphere, hemisphere and combinations of these solids. The size of an angle between two intersecting lines or between a line and a plane. 3.2

	Use of sine, cosine and tangent ratios to find the sides and angles of right angled triangles. The sine rule. The cosine rule. Area of a triangle as (1/2)absinC 3.3 Applications of right and non-right angled trigonometry, including Pythagoras's theorem. Angles of elevation and depression. Construction of labeled diagrams from written statements. 3.4 The circle: radian measure of angles; length of an arc; area of a sector. 3.5 Definition of $\cos\theta$, $\sin\theta$ in terms of the unit circle. Definition of $\tan\theta$ as $\sin\theta / \cos\theta$. Exact values of trigonometric ratios of 0, $\pi/6$, $\pi/4$, $\pi/3$, $\pi/2$ and their multiples. Extension of the sine rule to the ambiguous case. 3.6 The Pythagorean identity $\cos^2\theta + \sin^2\theta = 1$. Double angle identities for sine and cosine. The relationship between trigonometric ratios. 3.7 The circular functions sinx, cosx, and tanx; amplitude, their periodic nature, and their graphs. Composite functions of the form $f(x) = a\sin(b(x + c)) + d$. Transformations. Real-life contexts. 3.8 Solving trigonometric equations in a finite interval, both graphically and analyically. Equations leading to quadratic equations in sinx, cosx or tanx.
Assessments:	Daily homework, Quizzes, Class participation, Performance Task.
TOK:	When was the word ''sine'' first used and why?

UNIT 4: STATISTICS **Quantity, validity, approximation, generalization.**	
Timeframe	6 weeks
Learning goals:	4.1 Concepts of population, sample, random sample, discrete and continuous data. Reliability of data sources and bias in sampling. Interpretation of outliers. Sampling techniques and their effectiveness. 4.2 Presentation of data (discrete and continuous). frequency distribution (tables). Histograms. Cumulative frequency; cumulative frequency graphs; use to find median, quartiles, percentiles, range and interquartile range (IQR). Production and understanding of box and whisker diagrams. 4.3 Measures of central tendency (mean, median and mode). Estimation of mean from grouped data. Modal class. Measures of dispersion (interquartile range, standard deviation and variance).

	Effect of constant changes on the original data. Quartiles of discrete data. 4.4 Linear correlation of bivariate data. Pearson's product-moment correlation coefficient, r. Scatter diagrams; lines of best fit, by eye, passing through the mean point. Equation of the regression line of y on x. Use of the equation of the regression line for prediction purposes. Interpret the meaning of the parameters, a and b, in a linear regression y = ax + b. 4.10 Equation of the regression line of x on y. Use of the equation for prediction purposes.
Assessments:	Daily homework, Quizzes, Class participation, Performance Task.
TOK:	How easy is it to be misled by statistics? Is there a difference between information and data? How reliable are mathematical measures? What is the difference between correlation and causation? Can all data be modelled by a known mathematical function? To what extent can you reliably use the equation of the regression line to make predictions?

UNIT 5: PROBABILITY AND PROBABILITY DISTRIBUTIONS **Quantity, validity, approximation, generalization.**	
Timeframe	6 weeks
Learning goals:	Formal definition and use of the formulae: P(A\B) =P(A B)/ P(B) for conditional probabilities, and P(A\B) = P(A) = P(A\B') for independent events. 4.5 Concepts of trial, outcome, equally likely outcomes, relative frequency, sample space (U) and event. The probability of an event A is P(A) = n(A)/n(U). The complementary events A and A' (not A). Expected number of occurrences. 4.6 Use of Venn diagrams, tree diagrams, sample space diagrams and tables of outcomes to calculate probabilities. Combined events: P (A U B) = P(A) + P(B) – P(A B). Mutually exclusive events: P(A B) = 0. Conditional probability P(A\B) = P(A B)/ P(B). Independent events P(A B) = P(A)P(B). 4.7 Concept of discrete random variables and their probability distributions. Expected value (mean), for discrete data. Applications. 4.8 Binomial distribution. Mean and Variance of the binomial distribution. 4.9 The normal distribution curve. Properties of the normal distribution.

	Diagrammatic representation. Normal probability calculations. Inverse normal calculations. 4.12. Standardization of normal variables (z-values). Inverse normal calculations where mean and standard deviation are unknown.
Assessments:	Daily homework, Quizzes, Class participation, Performance Task, Exam2
TOK:	Is mathematics a useful way to measure risks? What do we mean by a ''fair'' game? Is it possible to reduce all human behaviour to a set of statistical data? How can we trust the data collected from humans?

MATHEMATICS ANALYSIS & APPROACHES (HL)

Teacher: Cansu Coban

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Course Description:

The course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way. This is achieved by means of a carefully balanced approach. Students are encouraged to apply their mathematical knowledge to solve problems set in a variety of meaningful contexts. Development of each topic should feature justification and proof of results. Students embarking on this course should expect to develop insight into mathematical form and structure, and should be intellectually equipped to appreciate the links between concepts in different topic areas. They should also be encouraged to develop the skills needed to continue their mathematical growth in other learning environments. The internally assessed component, the exploration, offers students the opportunity for developing independence in their mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas. This course is a demanding one, requiring students to study a broad range of mathematical topics through a number of different approaches and to varying degrees of depth.

Course Aims & Objectives:

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems. Students will be expected to demonstrate the following:

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

Enduring understandings:

- Being able to explore mathematics will lead to a richer understanding of mathematics and a better appreciation of the content.
- Writing mathematical analyses will improve communication skills and will therefore lead to a higher level of mathematical competence.
- Sample data will vary depending on many factors including sample method, sample size, and bias.
- Making a prediction is a multi-step process that requires the continual analysis and summary of data in order to find the patterns within the distribution. Some data distributions will yield predictions that will be more accurate than others.
- Probability leads to a better understanding of distributions, which can be used to make predictions and inferential decisions about populations.
- Explaining why certain statistical measures are more appropriate than others for a variety of distributions and interpret these values .

- Solving real-world problems and producing results that are meaningful in a real-world context.

UNIT 1 : SEQUENCES & SERIES & PROOF TECHNIQUES	
Timeframe	7 weeks
Learning goals:	1.1 Operations with numbers in the form $a \times 10^k$ where $1 \leq a < 10$ and k is an integer 1.2 Sequences Arithmetic sequences and series. Use of the formulae for the n^{th} term and the sum of the first n terms of the sequence. Use of Sigma notation for sums of arithmetic sequences. Applications. Analysis, interpretation and prediction where a model is not perfectly arithmetic in real life. 1.3 Geometric sequences and series. Use of the formulae for the n^{th} term and the sum of the first n terms of the sequence. Use of sigma notation for the sums of geometric sequences. Applications. 1.4 Financial applications of geometric sequences and series. Compound Interest. Annual depreciation. 1.8 Sum of infinite convergent geometric sequences 1.9 The binomial theorem expansion of $(a + b)^n$ 1.10 Counting principles, including permutations and combinations. 1.11 Extension of the binomial theorem to fractional and negative indices, ie $(a + b)^n$, 1.15 Proof by mathematical induction Proof by contradiction Direct proof 1.16 Solutions of systems of linear equations (a maximum of three equations in three unknowns),including cases where there is a unique solution, an infinite number of solutions or no solution
Assessments:	Daily homework, Quizzes, Class participation, Performance Task
TOK	*What counts as understanding in mathematics? Is it more than just getting the right answer? *What is the role of the mathematical community in determining the validity of a mathematical proof? Do proofs provide us with completely certain knowledge? What is the difference between the inductive method in science and proof by induction in mathematics?

UNIT 2: FUNCTIONS & TRANSFORMATION OF FUNCTIONS & EXPONENTIAL AND LOGARITHMIC FUNCTIONS	
Timeframe	6 weeks
Learning goals:	2.1 Linear equations. Different forms of the equation of a straight line. Gradient; intercepts. Lines with gradients m_1 and m_2.

	Parallel lines $m_1 = m_2$. Perpendicular lines $m_1 \times m_2 = -1$. 2.2 Concept of a function, domain, range and graph. Function notation e.g. f(x) v(t), C(n). The concept of a function as a mathematical model. Informal concept that an inverse function reverses or undoes the effect of a function. Inverse function as a reflection in the line y = x and the notation $f^{-1}(x)$. 2.3 The graph of a function; its equation y = f(x). Creating a sketch from information given or a context, including transferring a graph from screen to paper. Using technology to graph functions including their sums and differences. 2.4 Determine key features of graphs. Finding the point of intersection of two curves or lines using technology. 2.5 Composite functions. Identity function. Finding the inverse function $f^{-1}(x)$. 2.6 The quadratic function $f(x) = ax^2 + bx + c$; its graph, y-intercept (0, c). Axis of symmetry. The form f(x) = a(x – p)(x – q), x-intercepts (p,0) and (q, 0). The form form $f(x) = a(x - h)^2 + k$, vertex (h, k). 2.7 Solution of quadratic equations and inequalities. The quadratic formula. The discriminant $\Delta = b^2 - 4ac$ and the nature of the roots, that is, two distinct real roots, two equal real roots, no real roots. 2.8 The reciprocal function $f(x) = 1/x$, $x \neq 0$; its graph and self-inverse nature. Rational functions of the form f(x) = (ax + b) / (cx + d) and their graphs. Equations of vertical and horizontal asymptotes. *Laws of Exponents with integer exponents. *Introduction to logarithms with base 10 and e. *Numerical evaluation of logarithms using technology. *Simple deductive proof, numerical and algebraic; how to lay out a left-hand side to right-hand side (LHS to RHS) proof. *The symbols and notation for equality and identity. *Laws of exponents with rational exponents. *Laws of logarithms. $\log_a xy = \log_a x + \log_a y$ $\log_a (x/y) = \log_a x - \log_a y$ $\log_a xm = m\log_a x$ for a, x, y > 0. 2.9 Exponential functions and their graphs: $f(x) = a^x$, a > 0, $f(x) = e^x$ Logarithmic functions and their graphs: $f(x) = \log_a x$, x > 0, f(x) = ln x, x > 0. 2.10 Solving equations, both graphically and analytically. Use of technology to solve a variety of equations, including those where there is no appropriate analytic approach. Applications of graphing skills and solving equations that relate to real-life situations. 2.11 Transformations of graphs. Translations : y = f(x) + b y = f(x - a). Reflections in both axes: y = - f(x) ; y = f(- x).

	Vertical stretch with scale factor p: y = pf(x). Horizontal stretch with scale factor 1/q: y = f(qx). Composite transformations
Assessments:	Daily homework, Quizzes, Class participation, Performance Task , Exam 1
TOK	*What are the key concepts that provide the building blocks for mathematical knowledge? *What assumptions do mathematicians make when they apply mathematics to real-life situations? *Is it an oversimplification to say that some areas of knowledge give us facts whereas other areas of knowledge give us interpretations?

UNIT 3: TRIGONOMETRY	
Timeframe	10 weeks
Learning goals:	3.1 The distance between two points in three dimensional space, and their midpoint. Volume and surface area of three-dimensional solids including right pyramid, right cone, sphere, hemisphere and combinations of these solids. The size of an angle between two intersecting lines or between a line and a plane. 3.2 Use of sine, cosine and tangent ratios to find the sides and angles of right angled triangles. The sine rule. The cosine rule. Area of a triangle as $(1/2)ab\sin C$ 3.3 Applications of right and non-right angled trigonometry, including Pythagoras's theorem. Angles of elevation and depression. Construction of labeled diagrams from written statements. 3.4 The circle: radian measure of angles; length of an arc; area of a sector. 3.5 Definition of $\cos\theta$, $\sin\theta$ in terms of the unit circle. Definition of $\tan\theta$ as $\sin\theta / \cos\theta$. Exact values of trigonometric ratios of $0, \pi/6, \pi/4, \pi/3, \pi/2$ and their multiples. Extension of the sine rule to the ambiguous case. 3.6 The Pythagorean identity $\cos^2\theta + \sin^2\theta = 1$. Double angle identities for sine and cosine. The relationship between trigonometric ratios. 3.7 The circular functions sinx, cosx, and tanx; amplitude, their periodic nature, and their graphs. Composite functions of the form 3.8 Solving trigonometric equations in a finite interval, both graphically and analytically. Equations leading to quadratic equations in sinx, cosx or tanx. 3.9 Definition of the reciprocal trigonometric ratios $\sec\theta$, $\text{cosec}\theta$ and $\cot\theta$. Pythagorean identities: $1 + \tan^2\theta = \sec^2\theta$ $1 + \cot^2\theta = \text{cosec}^2\theta$ The inverse functions $f(x) = \arcsin x$, $f(x) = \arccos x$, $f(x) = \arctan x$; their domains and ranges; their graphs. 3.10 Compound angle identities. Double angle identity for tan. 3.11

	Relationships between trigonometric functions and the symmetry properties of their graphs.
Assessments:	Daily homework, Exams/Quizzes, Class participation, Performance Task
TOK	*If the angles of a triangle can add up to less than 180°, 180° or more than 180°, what does this tell us about the nature of mathematical knowledge? *Trigonometry was developed by successive civilizations and cultures. To what extent is mathematical knowledge embedded in particular traditions or bound to particular cultures? How have key events in the history of mathematics shaped its current form and methods? *What is the relationship between concepts and facts? To what extent do the concepts that we use shape the conclusions that we reach?

UNIT 4 : COMPLEX NUMBERS	
Timeframe	5 weeks
Learning goals:	*Complex numbers: the number i, where $i^{\text{squared}} = -1$. *Cartesian form $z = a + bi$; the terms real part, imaginary part, conjugate, modulus and argument. *The complex plane. * Definition of Modulus–argument (polar) form: $z = r(\cos\theta + i\sin\theta) = r\text{cis}\theta$. *Euler form $z = re^{i\theta}$ *Sums, products and quotients in Cartesian, polar or Euler forms and their geometric interpretation. *Complex conjugate roots of quadratic and polynomial equations with real coefficients. *Finding the powers and roots of complex numbers.
Assessments:	Daily homework, Quizzes, Class participation, Performance Task, Exam 2
TOK	Music can be expressed using mathematics. What does this tell us about the relationship between music and mathematics?

UNIT 5 : VECTORS	
Timeframe	9 weeks
Learning goals:	3.12 Concept of a vector; position vectors; displacement vectors. Representation of vectors using directed line segments. Base vectors i, j, k. Components of a vector: $v = v_1 i + v_2 j + v_3 k$. 3.13 The definition of the scalar product of two vectors. The angle between two vectors.

	Perpendicular vectors,parallel vectors 3.14 Vector equation of a line in two and three dimensions The angle between two lines Application of kinematics 3.15 Coincident, parallel, intersecting and skew lines, distinguishing between these cases. Points of intersection of two lines. The definition of the vector product of two vectors Properties of the vector product. Geometric interpretation of $\lvert v \times w \rvert$
Assessments:	Daily homework, Quizzes, Class participation, Performance Task, Exam-2.
TOK	*Vectors are used to solve many problems in position location. This can be used to save a lost sailor or destroy a building with a laser-guided bomb. To what extent does possession of knowledge carry with it an ethical obligation?

VISUAL ARTS

Teacher(s): Zeynep Usta

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Course Description:

The IB visual arts course is a creative, practice-based art course. Students work in the classroom as they would in an art studio. Art-making as inquiry is at the centre of the new syllabus for 2027 graduates, and students learn through three core areas—create, connect and communicate. There are 3 final sections for assessment (Artist Study HL/Connections study SL, Art making inquiries 'Process Portfolio', Resolved Artworks). Learning art-making as inquiry will mostly integrate these areas of creating, connecting and communicating. This is to allow students to embrace the holistic nature of visual arts practice. Students gain a deeper understanding of the visual arts through working with a variety of art-making forms and creative strategies, and develop a personal visual language as well as critical and curatorial skills and methods. During the two years of the course, students are supported and guided by their teachers to become increasingly more independent visual artists. Assessment components and objectives, clearly defined and embedded in the creative process, guide teachers and students from the beginning to the cumulative end of the course. Students learn to nurture their artistic practice and to develop their ideas, work and reflections through observation, experimentation and investigation. The course is designed to deepen students' understanding of the interactive and generative nature of the work of visual artists, and to promote flexible and iterative creative processes. Visual arts journals—which might take a variety of formats—are used by students to generate, progress and develop their art-making as inquiry and their learning across the three core areas. Students realize and resolve artworks to communicate with audiences through synthesis of concept and form. Understanding of context(s) and cultural significance are also part of the curriculum, and students learn to consider the complex and dynamic relationships between artist, artwork, audience and context.

Course Aims & Objectives:

- Students examine and compare the work of artists from different cultural contexts. Students consider the contexts influencing their own work and the work of others.
- Students look at different techniques for making art. Students investigate and compare how and why different techniques have evolved and the processes involved.
- Students explore ways of communicating through visual and written means. Students make artistic choices about how to most effectively communicate knowledge and understanding.
- Students make art through a process of investigation, thinking critically and experimenting with techniques. Students apply identified techniques to their own developing work.
- Students experiment with diverse media and explore techniques for making art. Students develop concepts through processes that are informed by skills, techniques and media.
- Students produce a body of artwork through a process of reflection and evaluation, showing a synthesis of skill, media and concept.
- Students develop an informed response to work and exhibitions they have seen and experienced. Students begin to formulate personal intentions for creating and displaying their own artworks.
- Students evaluate how their ongoing work communicates meaning and purpose. Students consider the nature of "exhibition" and think about the process of selection and the potential impact of their work on different audiences.
- Students select and present resolved works for exhibition. Students explain the ways in which the works are connected. Students discuss how artistic judgments impact the overall presentation.

Enduring Understandings:

CREATING

Students are introduced to a variety of art-making forms and creative strategies and are encouraged to experiment and investigate independently. Students learn how to generate ideas from investigation and observation, and engage with experimentation or in resolving artworks. They learn how to follow lines of inquiry from conception to realization and to develop a visual language. Students examine how artists and designers shape artistic investigations, following or breaking with traditions in pursuit of creative art-making goals. Students learn that creativity and innovative thinking are essential life skills that can be developed. Students understand that artists and designers experiment with forms, structures, materials, concepts, media, and art-making approaches. Artists and designers balance experimentation and safety, freedom and responsibility while developing and creating artworks. Artists and designers develop excellence through practice and constructive critique, reflecting on, revising, and refining work over time.

COMMUNICATING

Teachers introduce methods of visual and written presentation, and create opportunities for dialogue and critique. Students learn how to curate, share and situate their artwork. Teachers introduce methods to digitally document and curate artwork Artists, curators and others consider a variety of factors and methods including evolving technologies when preparing and refining artwork for display and or when deciding if and how to preserve and protect it. Objects, artifacts, and artworks collected, preserved, or presented either by artists, museums, or other venues communicate meaning and a record of social, cultural, and political experiences resulting in the cultivating of appreciation and understanding Visual imagery influences understanding of and responses to the world. People gain insights into meanings of artworks by engaging in the process of art criticism. Individual aesthetic and empathetic awareness developed through engagement with art can lead to understanding and appreciation of self, others, the natural world, and constructed environments. Recognize and describe personal aesthetic and empathetic responses to the natural world and constructed environments.

CONNECTING :

Teachers introduce ways to investigate artworks from different times and contexts, and pursue lines of inquiry that relate to their own interests. Students consider the relationships between artwork, artist and audience. They learn how to situate their art-making in relation to context and to consider cultural significance. Students learn that through art-making, people make meaning by investigating and developing awareness 96 of perceptions, knowledge, and experiences. Students understand that people evaluate art based on various criteria, and people develop ideas and understandings of society, culture, and history through their interactions with and analysis of art.

The 3 ASSESSED components of the UPDATED IB Visual Arts program for 2027 Graduates:

Artist Project HL/Connection study SL: Grade weight HL 30%/SL 20%
Art making inquiries 'Process Portfolio': Grade weight HL 30%/ SL 40%
Resolved Artworks 'Exhibition': 40% (Internally assessed)
Throughout the course students at both SL and HL are required to maintain a **visual arts journal**. This is their own record of the two years of study and should be used to document individual inquiry, including:

1. the development of art-making skills and techniques
2. experiments with media and technologies
3. personal reflections
4. their responses to first-hand observations
5. creative ideas for exploration and development
6. their evaluations of art practices and art-making experiences
7. their responses to diverse stimuli and to artists and their works
8. detailed evaluations and critical analysis
9. records of valued feedback received

10. challenges they have faced and their achievements.

[Note: These pages are used to digitally assemble their Art making inquiries process portfolio, digital google slides.]

Research

When carrying out research, students should be encouraged to consult a suitable range of primary and secondary sources. As well as the more obvious sources (books, websites, videos, DVDs, articles) research may also include art-making experiences and encounters such as workshops, lectures, correspondence with experts and visits to exhibitions. All sources consulted during the course must be cited following the protocol of the referencing style chosen by the school and be presented in a bibliography or as footnotes.

Studio artwork

Students are given the opportunity to experiment with art-making practices they have identified in their research and their analysis of art-making practices from a variety of cultural contexts. They should engage with artists and artworks that particularly inspire them and experiment with the skills, media, materials, techniques and processes involved.

These can take the form of simple transcriptions, through which the students seek to find out how particular elements of artworks have been created or how specific effects have been achieved, or more 97 in-depth studies through which students follow a process through to creating a larger body of work inspired by the artist, artwork or artifact. To enable students to develop proficiency in their own preferred areas of expertise as they progress through the course it is expected that they will have been exposed to a breadth of contrasting skills, techniques, media, production processes, materials and practices and incorporate these into their own repertoire of art-making strategies. (i.e. during years 9 and 10 foundation art classes). Year one will include special media skills development workshops, and provided conceptual frameworks, interspersed with independently driven projects.

Art-making forms

Throughout the course students are expected to experience working with a variety of different art-making and conceptual forms. All students should, as a minimum, experience working with at least two art-making forms, each selected from separate columns of the table below.. The examples given are for guidance only and are not intended to represent a definitive list.

Two-dimensional forms	**Three-dimensional forms**	**Lens-based, electronic and screen-based forms**
Drawing: such as charcoal, pencil, ink Painting: such as acrylic, oil, watercolour Printmaking: such as relief, intaglio, planographic, chine collé Graphics: such as illustration and design	Sculpture: such as ceramics, found objects, wood, assemblage Designed objects: such as fashion, architectural, vessels Site specific/ephemeral: such as land art, installation, mural Textiles: such as fibre, weaving, printed fabric	Time-based and sequential art: such as animation, graphic novel, storyboard Lens media: such as still, moving, montage Digital/screen-based: such as vector graphics, software generated

Unit 1: Inquirers: Introduction to IB Visual Arts and The Visual Art Journal	
Timeframe	6 weeks
Learning goals:	• IGenerate and conceptualize artistic ideas and work, and brainstorm possible lines of inquiry. Enduring Understanding: Creativity and innovative thinking are essential life skills that can be developed. • Artists and designers shape artistic investigations, follow lines of inquiry, following or breaking with traditions in pursuit of creative artmaking goals. • Artists and designers experiment with forms, structures, materials, concepts, media, and art-making approaches. A diversity of media and techniques will be explored in class and students will refine their areas of interest as they begin to make studio works for the exhibition and content for their process portfolios
Assessments	Visual Art Journal Assignments, mindmaps, Object studies and various inclass tasks

Unit 2: Art making inquiries portfolio (skills techniques and processes)	
Time frame	8 weeks
Learning goals:	• Students will build on the prior units' understanding of why the Visual arts journal is an integral part of the IB programme. • They will curate their visual arts journals and various studio experimentation into the process portfolio in order to gain a strong understanding of IBs expectations. • They will continue to document and experiment heavily with the creative process with a variety of in class tasks and assignments
Assessments	Visual art journal pages, Process portfolio, Studio works, Performance task ("The Attic Project")

Unit 3: Intro to the Exhibition (Resolved Artworks)	
Time frame	10 weeks
Learning goals	• To what extent does the submitted artwork communicate: A coherent collection of works which fulfill stated artistic intentions and communicate clear thematic or stylistic relationships across individual pieces? • effective application and manipulation of media and materials; • effective application and manipulation of the formal qualities? *elements of art, Principles of design)
Assessments	At least 2 Exhibition works (according to the IB rubric) for the February IB Exhibition, with a curatorial statement draft and artist tags

Unit 4: Intro to the Artist project/connection study	
Time frame	10 weeks
Learning goals	• **Connections Study** (SL 20%, External Assessment) will ask students to select a chosen resolved artwork and connect it to their context. In addition, they will be asked to research at least two artworks by different artists, demonstrating connections to these works through an informed analysis of their cultural significance • **Artist Project** (HL 30%, External Assessment) will ask students to create and contextualize an artwork for a choice-based project. Within their project development, students will connect their ideas to at least two artworks by different artists The goal of the artist project/connection study is to connect and situate the students artwork within a broader context. Research into art history is a crucial component for this experimental project. Artwork is assessed on how well it connects, not on technical ability.
Assessments	The artist project/connection study (1st draft)

THEORY OF KNOWLEDGE (TOK)

Teacher(s): Clare Natschowny and Kevin Sheehan

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Course Description:

TOK is a course about critical thinking and inquiring into the process of knowing, rather than about learning a specific body of knowledge. The TOK course examines how we know what we claim to know. It does this by encouraging students to analyse knowledge claims and explore knowledge questions. A knowledge claim is the assertion that "I/we know X" or "I/we know how to Y", or a statement about knowledge; a knowledge question is an open question about knowledge.

Course Aims & Objectives:

- Encourage students to reflect on the central question, "How do we know that?", and to recognize the value of asking that question
- Expose students to ambiguity, uncertainty and questions with multiple plausible answers
- Equip students to effectively navigate and make sense of the world, and help prepare them to encounter novel and complex situations
- Encourage students to be more aware of their own perspectives and to reflect critically on their own beliefs and assumptions
- Engage students with multiple perspectives, foster open-mindedness and develop intercultural understanding
- Encourage students to make connections between academic disciplines by exploring underlying concepts and by identifying similarities and differences in the methods of inquiry used in different areas of knowledge
- Prompt students to consider the importance of values, responsibilities and ethical concerns relating to the production, acquisition, application and communication of knowledge.

Enduring Understandings:

Students will understand that:

- Our senses and memory are highly subjective and often fallible
- Arguments and conclusions can be dressed as logical but still be incorrect
- Logical fallacies are everywhere and often go unnoticed
- Emotions can be a powerful source of knowledge
- No area of knowledge is without its uncertainties, contradictions and internal debates
- Human bias and manipulation is often a root cause of unreliable data / knowledge
- Methodologies should be questioned closely

Transdisciplinary Links:

- Mathematics, Natural Sciences, The Arts

UNIT 1: Core Theme > Knowledge and the Knower	
Timeframe	9 weeks
Learning Goals:	● The Diploma Programme Core ● The TOK course ● The nature of knowledge ● Knowledge vs Beliefs ● The Knowledge Framework ● First Order vs Second Order claims ● Knowledge Questions ● TOK Concepts ● Me as a knower and a thinker ● What shapes my perspective as a knower ● The origin of my values ● Resources I have as a knower to help me navigate the world ● How the different communities of knowers I belong to influence me ● Contestable vs Incontestable claims ● Ways I perceive and construct my understanding of the world
Assessments:	Weekly journal entries Quiz Essay

UNIT 2: Values	
Timeframe	8 weeks
Learning Goals:	● Methods for producing knowledge ● Connections to the Core Theme ● Interrogate the scope, the perspectives, the methods and tools and the ethics in regards to the first Optional Theme selected. ● Deconstruct arguments based on their logic and assumptions ● Extract practical and philosophical questions about the nature of knowing from practical examples ● Understand epistemological debates within the selected Optional Theme
Assessments:	Weekly journal entries Quiz Essay Exam 1

UNIT 3: Spin	
Timeframe	8 weeks
Learning Goals:	● Methods for producing knowledge ● Connections to the Core Theme ● Interrogate the scope, the perspectives, the methods and tools and the ethics in regards to the second Optional Theme selected. ● Deconstruct arguments based on their logic and assumptions ● Extract practical and philosophical questions about the nature of knowing from practical examples ● Understand epistemological debates within the selected Optional Theme
Assessments:	Weekly journal entries Quiz Essay Performance Task 1

UNIT 4: Perspectives	
Timeframe	6 weeks
Learning Goals:	● Understand some of the basic methodologies of each AOK ● Understand some of the epistemological debates within each AOK field ● Understand some of the key language and underpinning theories utilised in each AOK
Assessments:	Weekly journal entries Quiz Performance Task 2

UNIT 5: Creativity / TOK Exhibition	
Timeframe	6 weeks
Learning Goals:	● TOK assessment outline ● TOK assessment instruments ● Global Impression Marking ● The Exhibition Process ● IA prompts ● 3 Objects ● The Commentary
Assessments:	Weekly journal entries TOK Exhibition / Exam 2