Environmental Science
International Baccalaureate Middle Years Program

Instructor Information

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Course Description

This course is designed for students enrolled in the International Baccalaureate Middle Years Program and begins with an introduction to the field of environmental science, then is divided into “spheres” of the earth. It provides a comprehensive study of Environmental Science, emphasizing critical thinking, research skills, and a global perspective. Students will engage in a variety of activities, assessments, and projects to deepen their understanding of the subject and develop the skills necessary for success in the IB assessment.

Materials

- Textbook: None
- Supplementary Readings: All additional reading sources will be supplied by the teacher when needed for each unit. Resources can be found under “Tasks and Units” on ManageBac.
- Three ring binder with loose leaf paper (Please have lined and graph paper)
- Dividers for 3 Ring Binders
- Pens and pencils to take notes
- Charged laptop

Assessment

- MYP classes will be graded on the following Criterion
    - Knowing and understanding
    - Inquiring and designing
    - Processing and evaluating
    - Reflecting on the impacts of science
- Formative Assessment: a minimum of one/semester for each criterion listed above
- Summative Assessment: a minimum of one/semester for each criterion listed above

Units of Study, Assessments and/or Activities

Semester 1

Unit 1: Introduction to Environmental Science

- Week 1: Environmental Science Intro
  - Topics:
    - Environmental science vs. ecology vs. environmental activism
    - Renewable and non-renewable resources
  - Activities/Assessments:
    - Tragedy of the Commons (formative assessment)
    - Ecological Footprint (formative assessment)

- Week 2-3 Scientific processes
  - Topics:
    - Scientific Methods
    - Types of data - qualitative vs. quantitative
    - Writing Claim, Evidence, Reasoning (CER) statements
    - Experimental validation - peer review process
    - Scientific theory vs. law
  - Activities/Assessments:
    - Manipulating Variables - mini lab (formative assessment)
    - Reading Scientific papers– All Washed Up and Estuaries articles (formative assessment)

- Week 4 Policies and Laws
  - Topics:
    - Types of environmental policies
      - Regulatory
      - Incentives
      - Voluntary
  - Activities/Assessments:
    - Environmental Policy/Law research
    - Policy presentation (formative assessment)
  - Week 5: Review and Exam day
    - Unit Exam (summative assessment)

Unit 2: Biosphere

- Week 5 (Week 1 of unit) Earth's Spheres - Biosphere
  - Topics:
    - Ecological Organization
    - Biotic and Abiotic Factors
    - Feeding Relationships

- Activities/Assessments
  - Ecology Concept Map
  - Animal Habitat and Niche Activity

- Week 6 (Week 2) Organism Relationships
  - Topics:
    - Symbiosis
    - Adaptations
  - Activities/Assessments:
    - POGIL - Ecological Relationships (formative assessment)

- Week 7 (Week 3) Population Dynamics
  - Topics:
    - Limiting Factors
    - Interspecific competition
    - Intraspecific competition
  - Activities/Assessments:
    - Mung Bean Lab - Intraspecific Competition (formative assessment)
    - Begin Endangered Species Project (summative assessment)

- Week 8-9 (Week 4-5) Population Growth
  - Topics:
    - R vs. K Strategists
    - Carrying Capacity
  - Activities/Assessments:
    - Endangered Species Project Check-in
    - Rabbit - Natural Selection/Carrying Capacity - PhET simulation
    - Strategists Card Sort (formative assessment)

- Week 10-11 (Week 6-8) Community Stabilization
  - Topics:
    - Biomes
    - Keystone Species
    - Biodiversity
    - Succession
  - Activities/Assessments
    - Endangered Species Check-in
    - Ecosystems in Balance - Sea Otters (formative assessment)
    - Succession POGIL (formative assessment)

- Week 12 (Week 9) Invasive Species
  - Topics:
    - Endangered species project check- in

        - Invasive species
        - Impact of on ecosystems
    - Activities/Assessments
        - Coral Reefs 2 - Biotic Factors (Gizmos Simulation)

- Week 13-14 (Week 10-11) Endangered Species Projects
    - Topics:
        - Final project preparation
        - Project presentations
    - Assessments/Activities
        - Enclosure design (summative assessment)
        - Class presentation of project (summative assessment)

Unit 3: Atmosphere - Biogeochemical Cycles

- Week 15 (Week 1 of Unit): Nitrogen Cycle
    - Topics:
        - Movement of nitrogen
        - Nitrogen Fixation
        - Ammonification
        - Nitrification
    - Activities/Assessments:
        - Nitrogen cycle concept map
        - Nitrogen Cycle STEM Case - Gizmos (formative assessment)

- Week 16 (Week 2) Carbon Cycle
    - Topics:
        - Slow carbon cycle
        - Fast carbon cycle
        - Changes in carbon cycle - balance
    - Activities/Assessments:
        - Carbon cycle concept map
        - Dinosaur Breath Lab (formative assessment)

- Week 17 (Week 3) Phosphorus Cycle
    - Topics:
        - Role of phosphorus
        - Phosphorus located?
        - Human impact - eutrophication
    - Activities/Assessments:
        - Phosphorus cycle concept map
        - Human impact - fertilizers - create infographic (formative assessment)

Semester 2

Unit 4: Geosphere

- Week 1: Minerals
  - Topics:
    - What are minerals
    - How to identify minerals
    - Use of minerals
  - Activities/Assessments:
    - Mineral Identification - Gizmos (formative)
    - Mineral Profile (optional formative assessment)

- Week 2 Rocks
  - Topics:
    - Types of Rocks
      - Metamorphic
      - Igneous
      - Sedimentary
    - Rock Cycle
  - Activities/Assessments:
    - Types of Rocks Jigsaw Activity
    - Rock cycle diagram (formative assessment

- Week 3 Mining
  - Topics:
    - Types of mines
    - Mining impact on environment
      - Restoration
      - Reclamation
    - Soil
      - Importance of soil
      - Transportation of soil
  - Activities/Assessments:
    - Soil Analysis (formative assessment)

- Week 4 Soil Erosion
  - Topics:
    - Conservation of Soil
  - Activities/Assessments
    - Soil Erosion Lab (summative assessment)

- Week 5 Energy derived from the geosphere
    - Topics:
        - What is energy
        - Renewable Energy
        - Nonrenewable energy
    - Activities/Assessments
        - Renewable vs. Nonrenewable Energy Debate (formative assessment)
        - Electricity Generation Lab (summative assessment)

Unit 5: Hydrosphere

- Week 6: Properties of Water
    - Topics:
        - Cohesion/Adhesion
        - Polarity
        - Molecular shape
        - Water cycle
    - Activities/Assessments:
        - Water Properties - Gizmos (formative), or
        - Water properties stations lab (formative)

- Week 7: Surface Water
    - Topics:
        - Watersheds
        - Riparian Zones
    - Activities/Assessments:
        - Eutrophication Analysis (formative assessment) or
        - Personal Water Audit (formative assessment)
        - Macroinvertebrate Lab (summative assessment)

- Week 8: Groundwater
    - Topics:
        - Water tables
        - Groundwater storage
        - Irrigation and its impacts
    - Activities/Assessments:
        - Edible Aquifer Lab (formative assessment) or
        - Irrigation Jigsaw (formative assessment)

- Week 9: Marine Biomes
    - Topics:
        - Freshwater and Marine differences

        - Marine biomes zones and biotics
    - Activities/Assessments:
        - Research a Fish (formative assessment)
        - Effects of oil on marine ecosystems (summative assessment)

- Week 10: Wetlands
    - Topics:
        - What are wetlands?
        - Wetlands and carbon
        - Protection of wetlands
    - Activities/Assessments:
        - Sources of pollution (formative assessment)

- Weeks 11 and 12: Water Pollution
    - Topics:
        - Biological Pollution
        - Chemical pollution
        - Persistent organic pollutants (POPs)
    - Activities/Assessments:
        - Clean up an Oil Spill (formative assessment)
        - Water Quality Testing (summative assessment)
        - Microplastics and mismanaged plastic (formative assessment)

Unit 6: Land Use and Sustainability

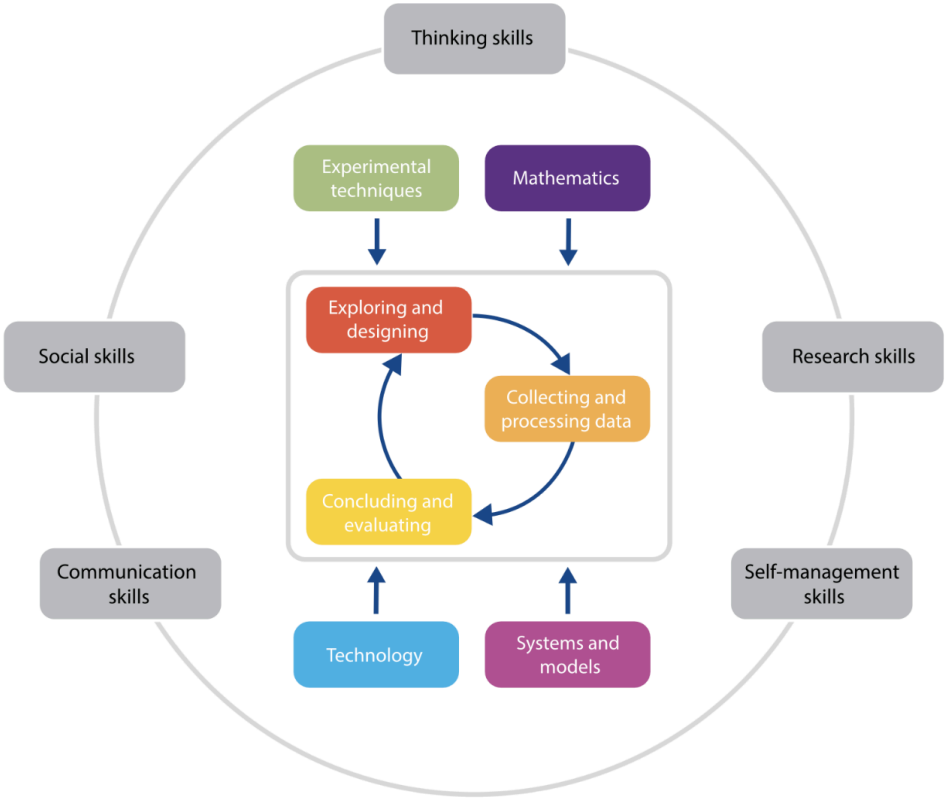
- Week 13 and 14: Urbanization and Urban Growth
    - Topics:
        - What is urbanization
        - How is land used and “zoned”
        - Agriculture and urbanization
        - Cities and environmental impact
    - Activities/Assessments:
        - Google Earth Activity - Heat Islands (formative assessment)
        - Impacts of Urbanization (formative assessment)
        - City Sprawl vs. Smart Growth (formative assessment)
        - City Planning (summative assessment)

- Week 15 and 16: Sustainability and Forests
    - Topics:
        - What is sustainability
        - “Three E’s” of sustainability
        - Trees and deforestation
    - Activities/Assessments:

- What's the Value of a Tree Lab (formative assessment)

- Week 16 and 17: Sustainability and Agriculture
  - Topics:
    - Agriculture and the environment
    - Organic farming
    - Agriculture in the future
  - Activities/Assessments:
    - Agriculture Infographic (formative assessment)
    - Perplexed by Protein (formative assessment)
    - Agriculture, Development and Boise (summative assessment)

Approaches to Learning for Environmental Science:



Internal Assessment

- Formative assessments will occur within each unit to gauge progress and knowledge of concepts.
- Summative assessments will be a culminating activity within a content arc or at the end of a unit of study

External Assessment

- Final Exam:
    - Semester 1 - Endangered Species Project
    - Semester 2 - Sustainable Living Project

Policies

- Attendance: Students are required to attend class. When students miss class, they are responsible for completing work while they are gone, unless they arrange with Ms. Pohlman **prior to absence**. Please review the schoolwide Attendance Policy.
- Late Work: Late formative work is accepted until the day of the summative assessment. Summative work must be made up within 2 weeks of the missed assessment, **only** under situations of excused absences.
- Any extension requests must be made 24hrs in advance of the due date.
- AI guidance
- Academic Integrity Policy
- Grade Appeal Policy
- Communication: meet with Ms. Pohlman after school or email with questions and concerns anytime. Please expect a 24-48hr response time for emails Monday-Friday.

Grading Scale

MYP grades are awarded on a 1-8 scale. When considering marking a student's work, it is imperative that teachers take the IB recommendations on how to assess a student fully into consideration.

- An emphasis on criterion-related (as opposed to norm-referenced) assessment.
- Valuing the most accurate demonstration of student performance, rather than just averaging attainment grades over a reporting period
- Examining student understanding at the end of the course, based on the whole course and not just aspects of it
- IB grade boundaries published after each examination session. This helps the teacher to measure a student's ability numerically and compare that result to historical results.

Middle Years Programme

MYP Grade Descriptors

IB MYP Grade	Grade Descriptor
7	Consistently completes the most challenging aspects of a task to an exceptional level of complexity and demonstrates synthesis and very high level of familiarity with the required content. *There is a demonstration of ability to move beyond the required content.*
6	Produces *high quality, occasionally innovative work*, communicates extensive understanding of concepts and contexts. Demonstrates critical and creative thinking, frequently with sophistication. Uses knowledge and skills in familiar and unfamiliar situations, often with independence.
5	Usually completes challenging tasks to an appropriate, competent and complex level with very strong transfer of skill to new situations. Work is completely *satisfactory* on every level.
4	Produces good quality work, communicates proficient understanding of most concepts and contexts with few misunderstandings and minor gaps. Often *demonstrates proficient critical and creative thinking*. Uses knowledge and skills with some flexibility in familiar classroom contexts, but requires support in unfamiliar contexts.
3	*Adequate demonstration* of the most basic and many complex elements of the task. Work demonstrates an ability to apply learned content in familiar situations and some ability to achieve in unfamiliar situations with support.
2	*Limited demonstration* of basic elements of the task. Achievement beyond a basic level requires significant support and guidance. Work demonstrates a basic recall and demonstration of some skills and content.

1	Produces work of limited quality. Expresses *misunderstandings or significant gaps in understanding for many concepts and contexts.* Infrequently demonstrates critical or creative thinking. Generally inflexible in the use of knowledge and skills. Infrequently applies knowledge and skills.

Note

This syllabus is a living document. As we progress through the course, it may be updated to include new resources and information that aligns with the content being explored at that time. This approach ensures that learning stays relevant and engaging, providing students with the most up-to-date materials and opportunities to succeed.