

AP/IB Sciences In MCPS

IB Environmental Systems and Societies (IBESS)

May 8th
Wootton High School



Learning Engagements:

- Overview of the IB Program
- Overview of the IBESS course
- Examine the pacing of the content in the course
- Internal Assessments (IA)
- External Assessments (Papers 1 and 2)
- AP Environmental Science

IBESS Ambassador: Mike Willard

- Taught IB Physics since 1998
- Taught IBESS since 2008
- Attended various IB workshops related to both curricula throughout my career.

Diploma Program



- Students enter the DP program in 11th grade.
- DP students are required to take 6 IB courses in addition to a course entitled Theory of Knowledge.
- The student must take at least one course in each of the following subject groups: Group 1 Language and Literature (ELA), Group 2 Language Acquisition (World Language), Group 3 Individuals and Societies (Social Studies), Group 4 Experimental Sciences, Group 5 Mathematics.
- The sixth course can be in Group 6 Arts or may be an additional course in one of the other subject groups.
- At least 3 of those selected courses must be Higher Level (HL)

Standard Level (SL) and Higher Level (HL) Courses

- SL and HL courses consist of the same educational aims, core syllabus and curriculum and assessment models.
- HL courses typically also include a range of additional elements designed to allow students to explore areas of interest within the subject in more depth.
- SL courses are not watered down versions of their HL counterparts.
- The assessment criteria are equally demanding for both levels, and SL exams are marked and standardized with the same rigour as all IB coursework.

Overview of IBESS

- IBESS is an interdisciplinary course and classifies as both a Group 3 and a Group 4 course.
- The interdisciplinary designation provides accessibility for a variety of student backgrounds.
 - Students that are stronger in the humanities will often make this their Group 4 selection
 - Students that are interested in sciences can make this their Group 3 selection, allowing them to take 2 or more sciences.

Overview of IBESS

- IBESS is only offered as an SL course.
 - There has been discussion that IBO will create a HL version of the course in the future.
- Currently, only four MCPS schools (B-CC, Einstein, RM, and Rockville) offer IBESS.
 - Course offerings vary from school to school and are largely driven by the number of students that are in the DP.

Overview of IBESS

- The course mimics a college level introductory environmental science course.
- The curriculum focuses on major environmental issues facing the world today.
- As an interdisciplinary course, the curriculum also stresses how those scientific issues influence economic and political decision making.
- The course emphasizes the systems approach and seeks to understand how various earth systems interact with one another and how they influence our cultural and social systems.

Overview of IBESS

- The course is made up of 8 Topics.
 - Topic 1: Foundations of ESS
 - Topic 2: Ecosystems and Ecology
 - Topic 3: Biodiversity and Conservation
 - Topic 4: Water and Aquatic Food Production Systems and Societies
 - Topic 5: Soil and Terrestrial Food Systems and Societies
 - Topic 6: Atmospheric Systems and Societies
 - Topic 7: Climate Change and Energy Production
 - Topic 8: Human Systems and Resource Use

Topic 1: Foundations of ESS

Significant Ideas

- Students develop their own environmental value system (EVS).
- There is a wide range of EVS, each with its own implications and premises.
 - Students are encouraged to think for themselves and not go along with the herd mentality.

Topic 2: Ecosystems and Ecology

Significant Ideas

- Students will monitor, model and evaluate ecosystems over time to measure both natural change and human impacts to the ecosystem.



Topic 2: Ecosystems and Ecology



IBESS Projects

- MCPS IBESS teachers collaborated and then created quarterly projects that develop the IB Learner Profile while adhering to course content
 - Quarter 1: Environmental Stewardship
 - Quarter 2: New Year's Sustainability Resolution
 - Quarter 3: Food Choices and Ecological Footprints
 - Quarter 4: Collaborative Investigation - Tropospheric Ozone as a Function of Poplar or Willow Tree Density.

IBESS Projects

Quarter 1 - Environmental Stewardship Project:

As humans, we care for those things with which we have developed some emotional connection. The stronger the emotional connection, the stronger the degree of care and compassion. It is natural to expand this line of reasoning to think about how we, as a society, will care for the environment. If people feel some emotional connection to the environment, they will be more likely to engage in environmental conservation efforts.

For this project, you are encouraged to develop your own emotional connections to the environment in the hopes that you will form some type of long lasting memory.

IBESS Projects

Quarter 2 - Sustainability New Year's Resolution

- Students are asked to increase their sustainability in some way during the month of December or January. It could be through changing diet, carpooling, changing energy or water use, etc.



IBESS Projects

Quarter 3 - Food Choices and Ecological Footprints

- Students create “Costco” style food sampling stations.
- The samples of food prepared by students are chosen for their reduced environmental footprint.

Quarter 4 - Tropospheric Ozone Study

- Students at three MCPS IBESS schools (Einstein, RM, Rockville) will work collaboratively to determine if certain tree species increase the amount of ground level ozone.
- Students will collect and share data amongst the three schools as they attempt to reach a valid scientific conclusion.

Examine the pacing of the content in the course

- The suggested number of hours spent on each topic is provided by the IBESS subject guide.
- Roughly 20% of course time is spent on Topic 2. The other topics each split the remaining time evenly.
- The students are assigned work (text readings, free response prompts) on a regular basis.
- The pace is rigorous as each school attempts to have the course completed by the end of April.

Internal Assessments (IA)

- The Internal Assessment is a student designed and student conducted research investigation.
- The students are assessed on their ability to
 - design a well controlled investigation
 - collect, report and process data
 - draw and defend appropriate conclusions based on their data
 - evaluate the weaknesses and limitations of their procedure.
- The IA counts as 20% of their overall IB course score.
- The IA is started towards the end of first quarter and the final draft is submitted towards the end of third quarter/beginning of fourth.
- Samples are externally moderated to ensure the teacher is scoring the IA properly.

Internal Assessments (IA)

Examining the correlation between the percentage of people asthma within a municipality and the distance of that municipality to the nearest fracking operation.

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Word Count 1510

Fracking and its impacts on Human Health

External Assessments

- The remaining 80% of the course score is determined by the student's performance on external exit exams.
- Paper 1
 - 1 hour in duration
 - Students answer questions that assess their ability to analyze and evaluate data in the context of a case study.

External Assessments - Paper 1

Figure 5(a): Fact file on Madagascan flora and fauna

- Madagascar is home to a diverse range of ecosystems including tropical rainforests, mangroves and coral reefs.
- The island contains 5% of the world's biodiversity.
- There are over 200 000 known species in Madagascar of which more than 80% are endemic to the island (endemic species are those species not found anywhere else).
- Many species are hunted and collected as pets (for example lemurs, chameleons and tortoises).
- Alien species (for example introduced fish Tilapia) threaten native species (for example endemic cichlid fish species).

[Source: Rhett A. Butler / Mongabay.com]

Figure 5(b): Proportion of endemic species in Madagascar

	Total number of species	Endemic species (%)
Plants	12 000	90
Orchids	1 000	85
Palms	194	99
Amphibians	244	100
Reptiles	370	92
Bats	38	75
Lemurs	99	100
Fish	154	72

[Source: Madagascar Environmental Threats and Opportunities Assessment 2014 Update, USAID, <http://www.usaidgems.org/Documents/FAA&Regs/FAA118119/Madagascar2014.pdf>]

7. Explain why Madagascar has a high number of endemic species. [3]

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External Assessments

- Paper 2
 - 2 hours in duration
 - Section A: Students complete short answer and data based questions
 - Section B: Students complete structured essay questions

AP Environmental Science within the IBESS curriculum

- It depends on the exams offered by the school, but IBESS are also relatively well prepared to take the AP Environmental Science exam.
- Students would need to do some additional self study on earth science systems to perform an optimum level on the AP exam

Questions?

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bit.ly/SciNight19



For more information on enrolling your
student in this course, please contact the
Counselor and/or the Science Department
Resource Teacher at your high school.