**BI 124 Topic List and Suggested Activities**

Aligns well with the [AP Environmental Science Handbook](https://apcentral.collegeboard.org/pdf/ap-environmental-science-course-and-exam-description.pdf). BMCC uses: **Kaufmann & Cleveland (2018), Environmental Science, Trunity.** Purchased through Trunity directly for $75.

Ecosystems

* Ecosystems
* Biomes
	+ Resource: [Free Biome Interactive](https://www.biointeractive.org/classroom-resources/biomeviewer)
* Nutrient Cycles (Carbon, Nitrogen, Phosphorous, Water)
* Trophic Levels and energy transfer
	+ Possible lab: Efficacy of energy transfer between levels
* Food Chain (Primary Producers, Primary Consumers, Secondary Consumers)
	+ Possible lab: Owl pellet dissections
	+ Possible lab: Aquatic primary productivity
* Homeostasis

Biodiversity

* Island biogeography
* Keystone Species
	+ Possible Lab: Calculate biodiversity indices
	+ Possible Lab: Loss of biodiversity (carolina Kit)
* Resistance vs Resilience
* Ecological Tolerance
	+ Possible Lab: Creating species maps
	+ Possible lab: Biodiversity survey
* Disturbances, habitat fragmentation, invasive species, and edge effects
* Background Extinction vs Mass Extinctions
* Natural Selection
* Adaptations
* Succession

Populations

* Generalist vs specialist species
* R vs K selected species
* Survivorship curves
* Carrying capacity
* Population Growth and Resource Availability
	+ Possible lab: Estimating population size
	+ Possible lab: Population growth with lemna major
* Age Structure Diagrams
* Total Fertility Rate
* Human Population Dynamics and Demographic Transition
	+ Possible activity: [Worldometers](https://www.worldometers.info/) use statistics to propose solutions for increased stability
* Environmental benefits and challenges faced by cities

Earths Systems & Resources

* Plate Tectonics and Continental Drift
	+ Possible Lab: PHeT Simulation on Plate Tectonics
	+ Possible Lab: PHeT Simulation on Glaciers
* Soil formation and Erosion
* Soil Composition and Properties
	+ Possible lab: Soil Analysis
* Earth’s Atmosphere
* Global Wind Patterns and the Coriolis Effect
* Thermohaline Circulation and the Global Conveyor Belt
* Watersheds
* Solar Radiation, albedo, and Earth’s Seasons
* Earth’s Geography and Climate
* El Niño and La Niña

Land and Water Use

* Clearcutting and Slash and Burn Agriculture
* Irrigation methods
* Pest control methods
* Meat production methods and the impacts of overfishing, urbanization, and mining
* Ecological footprints
	+ Possible activity: Ecological site assessment (Web Survey Data)
	+ Possible activity: [Calculate YOUR ecological footprint](https://www.footprintcalculator.org/home/en)
* Agroecosystems
* Green Revolution Agriculture
* Genetically Modified Organisms
* Nomadic Herding
* Sustainable agriculture, aquaculture and forestry
	+ Possible Lab: Smarter farming using aerial photo analysis
* Economic growth and affluence
	+ Possible activity: Sustainable consumables

Energy Resources and Consumption

* Renewable and Non renewable energies
* Global energy consumption
* Fuel types and uses (fossil fuels, nuclear power, solar, wind, hydro, geothermal, fuel cells)
	+ Possible Lab: Microbial fuel cells
* Limiting Resource
	+ Possible lab: Liebig’s barrel
* Energy conservation
* Universal Soil Loss Equation
* Sheet Erosion, Rill Erosion and Gully Erosion
* Wind Driven Soil Erosion
* Soil Conservation Techniques
	+ Possible Lab: Can plants stop soil erosion
* Human threat to biodiversity

Atmospheric Pollution

* The Atmosphere
* Stratospheric Ozone
* Stratospheric Ozone Depletion
* The Cause of Stratospheric Ozone Depletion
* The Effects of Less Stratospheric Ozone
* Photochhemical SMOG
* Thermal inversion
* CO2, SO2, Acid Rain
* Vertical and Horizontal Mixing
* Atmospheric Stability

Aquatic and terrestrial Pollution

* Eutrophication
	+ Possible lab: Effect of fertilizers on algal growth
* Coral bleaching
	+ Possible activity: [Satellite Image Analysis](https://kcvs.ca/details.html?key=coralBleaching) Visualization
	+ Possible activity: [Acidification data review](https://kcvs.ca/details.html?key=graphingOceanAcidification)
* Solid Waste Disposal
* Waste Reduction Methods
* Sewage Treatment
	+ Possible Lab: Recycling grey water, can plants tolerate it
* Lethal Dose 50% (LD50) and half lifes
	+ Possible Lab: PHeT Simulation on Radioactive Dating
* Persistent Organic Pollutants
* Biomagnification
	+ Possible lab: Daphnia and water toxicity

Global Change

* Greenhouse Gases
	+ Possible Lab: [Climate contributions](https://kcvs.ca/details.html?key=climateContributions) visualization
* Greenhouse Effect
	+ Possible Lab: PHeT Simulation on the Greenhouse Effect
* Climate Change Mitigation
	+ Possible Lab: [Climate Model Hindcasting](https://kcvs.ca/details.html?key=climateModelHindcasting)
	+ Possible Lab: [Design our climate](https://kcvs.ca/details.html?key=designOurClimate) simulation
* Carbon Tax
* Cap & Trade System
	+ Suggested Activity: Case Study - Kyoto Protocol
* Carbon Sequestration
* Geoengineering
* Ocean warming
* Ocean acidification
	+ Possible activity: Ocean [Carbonate](https://kcvs.ca/details.html?key=oceanAcidification) visualization
* Bioremediation