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Harvard Undergraduate Science Olympiad India 2024
Open Round
Earth Science Syllabus: 9th-10th Grade

Potential Topics Covered on the Exam:
Please note that not necessarily every topic on this list will be on the exam, don't get overwhelmed! The syllabus is meant to be exhaustive of all *potential* topics that could be on the exam. A great place to start is with making sure you're comfortable with the ICSE curriculum for 9th-10th grade. It will be a difficult exam, but remember you don't need to (nor do we expect you) get a 100%! Just do your best and show us all that you've learned! Good luck and happy studying!

Please note that some topics have been edited to better reflect the distribution of content on the final round. New topics will be written in red, as well as topics that may be more heavily emphasized on the final round.

The final round will also likely be more calculation-heavy: calculators will be allowed!

Atmosphere:
Layers of atmosphere and composition
Fronts

- Air masses and fronts, pressure systems
- Cyclone formation

Humidity and precipitation
Circulation Cells
Atmospheric structure, inversions, and adiabats

Air pollutants
Geostrophic balance
Specific phenomena:

- Cloud types and cloud formation, Local winds, Thunderstorms and other severe weather, El Niño and La Niña, Monsoons, Hurricanes, Greenhouse effect

Hydrosphere:
Freshwater:

- Surface water: Rivers, Lakes and ponds, swamps, marshes, bogs, etc.
- Groundwater: Aquifers, water table, porosity and permeability

Saltwater::

- Ocean currents and other cells
- Ocean circulation (more heavily stressed on final round)
- Waves and tides
- Coastal geology and erosional features

Other hydrologic features

- Glaciers, karsts, tsunamis

Geosphere:
Geologic time periods
Geochemistry

- Phase diagrams (more heavily stressed on final round)
- Bowen's Reaction Series
- Minerals
    - Properties: crystal structure, hardness, opacity, fracture and cleavage, mineral habit, etc.
    - Identification: not heavily stressed but may be tested

Sedimentary Rocks, Sedimentary structures, Depositional environments

- Sedimentary rock classification/basic identification

Metamorphic Rocks, Metamorphic facies and zones, Types of metamorphism

- Metamorphic rock classification/basic identification

Igneous Rocks, Igneous rocks/processes, Igneous intrusions and extrusive bodies

- Igneous rock classification/basic identification
- Magma types and magma differentiation
- Volcanism

Interior

- Layers of the earth, Earthquakes, Plate movement and boundaries, Faults, Tectonic movement

Dating/Mapping

- Strike/dip calculations
- Interpreting geologic maps (more heavily stressed on final round)
- Relative dating and unconformities
- Radiometric dating (more heavily stressed on final round)

Basic Solar System Astronomy

- Application of geology, atmospheric science, hydrology to the solar system

Preparation for Exam: The following resources may be helpful: ***Foundations of Earth Science by Tarbuck***. This is a great introduction to earth science for anyone who is interested! If you read this book carefully, you will have the necessary knowledge to complete most or even all of the questions.

Practice questions: Past open exams from **USESO** will be good practice, though they may be a little more difficult than the questions on the open round of HUSO-India.

HUSO's flagship competition follows the rules of the US-based "Science Olympiad", which has competitors compete in teams in a variety of events. You may find Science Olympiad tests in the following events helpful: **Dynamic Planet** (freshwater, glaciers, oceanography, tectonics), **Rocks and Minerals,** and **Geologic Mapping.** Tests should be easily findable online.