

Course Proposal
The Earth's Biosphere
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The biosphere of the earth is the zone in which life forms of any kind exist. Extending a few kilometers below and above the surface of the planet, it is thinner than an eggshell in proportion to the size of the earth. This course is a descriptive scientific survey of the history of life on earth, how it has evolved, and its interactions with rock and soil formation, the oceans, the atmosphere, and climate over many millions of years. The course is based on *The Earth's Biosphere* by Vaclav Smil, MIT Press, which is required reading. This book is of the highest scientific and scholarly quality, presenting what is known, what is theorized, and what is controversial in our present state of knowledge. At the same time, it is so beautifully written and accessible that it leaves one in awe when contemplating the remarkable planet we live on.

Topics to be Covered:

- History of Biospheric Studies from its Origin in 19th Century Russia to Today
- Characterizing Life
Metabolism, Reproduction, Adaptation, Diversity, Evolution
- Energizing the Biosphere – Solar Radiation and the Earth's Heat
- Water and Material Flows – Cycles Ranging from Days to Millions of Years
Water, Carbon Dioxide, Nitrogen, Sulfur, Phosphorus, Calcium, Silicon, Iron
Effects of Life on Land Formation and Mineral Deposits, Oceans,
Atmosphere and Climate
- The Biosphere's Extent
Individual Size and Total Biomass of Species
Presence of Life from the Stratosphere to Deep Below the Earth's Surface
The Range of Biological Services Provided by Bacteria
- The Biosphere's Dynamics and Organization
A Systems Theory Overview of the Biosphere
- Civilization and the Biosphere
The Earth Transformed By Human Action

If ours were a rational society we would be paying much more anxious attention to nature's services than to the Dow Jones or NASDAQ indices. Above all, we would not be destroying and damaging with such abandon the stocks of natural capital— intricate assemblages of living organisms in forests, grasslands, wetlands, fertile soils, coastal waters, or coral reefs— that produce the astounding array of environmental services.

-Vaslav Smil-

This course does not have any scientific or mathematical prerequisite. Curiosity and a mind open to new ways of seeing the world are the most important things to bring to the class.