

**UNIVERSITY OF NEW YORK
TIRANA-ALBANIA**

**The Scientific World
Course 2006-2007
(Summer Semester)**

**Instructor: Prof. Dr. R. Meidani
Member of Academy of Sciences.**

Email: rmeidani@rmeidani.info; rmeidani@gmail.com; rmeidani@hotmail.com

TEXT: The Sciences: An Integrated Approach, by J. Trefil and R. M. Hazen

ADDITIONAL READING:

Physics, A World View, by L. D. Kirkpatrick and G. F. Wheeler; Physics, A World View (Physics, a numerical world view to accompany), (second edition), by L. D. Kirkpatrick and G. F. Wheeler; The world as I see it, by A. Einstein; The structure of scientific revolutions (third edition), by Th. S. Kuhn; What do you care what other people think?, by R. P. Feynman; The Universe in a Nutshell, by S. Hawking, etc.

Supplementary texts (in Albanian): Determinizmi dhe mekanika kuantike, by R. Meidani; Mbi lëvizjen fizike, by R. Meidani; Mbi strukturën e materies në fizikë, by R. Meidani; Entropia, by R. Meidani; Hyrje në fizikën moderne, by R. Meidani; Të vërtetat dhe të fshehtat e entropisë, by R. Meidani. A është deterministe teoria kuantike. Debat filozofiko-shkencor, by R. Meidani

Course Description

Why does the non-scientist need to know science? He/she does not need to know science itself as much as the methods, the concepts and the philosophy of science, to comprehend the course of events in the whole world-to create a world view. Different of philosophy, in science, the world view is a shared set of ideas that represents the current explanations of how the material world operates. These include some rather concepts and constructs, like gravity and mass, as well as strange sounding ones, like quarks and black holes; some relationships and laws for different kinds of changes or motions in space and time, different interactions in the universe as a transfer of motion, etc. But of the specific importance are also some practical and technological applications.

The scientific world view is a dynamic one. Hypothesis, ideas are constantly being proposed, debated, formulated theoretically and tested against the material world. Some survive, some don't. The inclusion of new ideas often forces the rejection of previously accepted ones. Some firmly accepted ideas in the world view are very difficult to discard, but in the long run experimentation wins out over personal biases. A powerful idea or axiom has a large number of consequences. If there is no more match between the predicted consequences and the real world, the idea is, scientifically worthless. If there is a match, there is hope that the idea has a merit. Although the most basic criteria for accepting an idea are that it agrees with the results of past experiments and successfully predicts the outcome of future experiments. Experimental results can never prove an idea; they can only disprove it. Thus, acceptance is a human activity, it has subjective aspects, implying, also, opinions. If an idea is very general (having many consequences), it can

replace many separate ideas. It is regarded as more fundamental. If the predictions are borne out, the best that can be claimed is: “so far, so good”.

This is the way of discussing, through concrete knowledge and examples, the general need for science in the process of building the scientific world view, a kind of natural and practical philosophy.

Grading

There will be one in-class exam during the semester and one final exam. They will carry weights of 40% and 60% respectively. The final exam will be comprehensive. Besides the exams, students will be expected to participate in in-class discussions, in a question-answer “technology”. They will be graded on the degree and quality of their **participation** (at maximum **8 points** per the first exam and **10 points** per final one) and **homework**, at maximum 3-4 points per each chapter, (composed, *at least, from four answers: two from section: **Problems**, one from section: **Review Questions** and one from section: **Discussion Questions**) and **5 points** for any **supplementary homework**, handed in the next lecture.*

Exam Schedule

First exam	in the 7-or 8-th week
Final exam	in the 15-th week

P.S.: Each exam has 100 points. Coefficient for first exam is 0.4 and for the final one 0.6.

Topics to be covered.

- Science: a way of knowing. The scientific method-myths and reality. (Ch.1). (*One homework*)
- The ordered Universe. A predictive system-Newton’s laws. (Ch.2). (*One homework*)
- Energy. (Ch.3). (*One homework*)
- Heat and the Second Law of Thermodynamics. (Ch.4). (*One homework*)
- Electricity and magnetism. (Ch.5). (*One homework*)
- Waves and Electromagnetic radiation. (Ch.6). (*One homework*)
- Albert Einstein and the theory of relativity (Ch.7). (*One homework*)
- The atom. (Ch.8). (*One homework*)
- Quantum mechanics. (Ch.9). (*One homework*)
- Atoms in Combination. The chemical bond. Properties of materials. (Ch.10-11). (*Only reading and one homework*)
- The nucleus of the atom (Chap.12). (*One homework*)
- The ultimate structure of matter (Ch.13). (*One homework*)
- The stars, the Earth and other planets. Plate Tectonics. Cycles of the Earth... (Ch.14, 16-18). (*Only reading and one homework*)
- Cosmology (Ch.15). (*One homework*)
- Ecology, Ecosystems and the Environment (Ch.19). (*Only reading*)
- Strategies of Molecules of Life. The Living Cell. etc... (Ch. 20-25) (*Only reading*).