GRANDE PRAIRIE REGIONAL COLLEGE

DEPARTMENT OF SCIENCE

Winter SEMESTER 2007 - 2008

COURSE OUTLINE

ES 1000 – Planet Earth

Lecture	Section A3	M W	10:00 - 11:20	Room J203
Lab	L1	M	14:30 - 17:20	Room J107

INSTRUCTOR: **Dr. Desh Mittra** **Office: J215** **Ph. 539 2981**
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TRANSFER CREDIT:	U. of Alberta	EAS 100	3 credits
	U. of Calgary	GLGY 201	3 credits
	U. of Lethbridge	GEOL 2060	3 credits
	Athabasca Univ.	GEOL 200	6 credits

OBJECTVE The course has been designed to generate competence in the fundamental Concepts of Earth and Atmospheric Sciences through the media of lecture, visual aids, and integrated laboratory exercises. ES 1000 serves both as the introductory course for specialists in Geology or Geography and as a course for non-specialists desirous of obtaining knowledge of the Earth and Atmosphere.

COURSE OUTLINE: Introduction to the origin and evolution of the Earth and the solar system. Introduction to plate tectonics and the rock cycle. Simple energy balances and interactions between radiation and the atmosphere, oceans, ice masses, and the global hydrological cycle. Evolution of life, biogeography, and global climate in the context of geologic time. The carbon cycle. Human interaction with the Earth. Mineral and energy resources.
This course is not available to students with credit in ES 1010 or 1020.

TEXTBOOKS The Blue Planet: 2nd Ed. by John Wiley & Sons.
LAB BOOK ES 1000 Laboratory Manual: U of A publication
Understanding Weather and Climate, 3rd Ed., Prentice Hall (Recommended)

OTHER ITEMS
1. Simon and Schuster's Guide to Rock's and Minerals or any equivalent book.
2. Dictionary of Geological Terms

Approximate schedule of lecture topics:

Week One	Introduction & Course Outline. **The Earth System**: Geologic concepts, Energy cycle, Hydrologic cycle, Rock cycle and Uniformitarianism, The Human impact. (Ch. 1)
Week Two	**Earth's Nearest Neighbours**: The Solar system and Global Energy System; origin and evolution of the Planets, The terrestrial Planets. **The Sun, Giver of Life**: Structure and source of energy of Sun, Radiation and Solar spectrum, the active Sun, Other Suns. (Ch. 2, 3)
Week Three	**Plate Tectonics**: Moving continents, Earth's internal energy, Magnetic reversals, External structure of the Earth, Causes of Plate Tectonics, Rock cycle and Plate Tectonics. (Ch.4)
Week Four	**Earthquakes and Earth's Interior**: Origin of earthquakes, Locating the Epicentre, Risks involved, Prediction of earthquakes. **Minerals and Rocks**: Elements and atoms, Crystal structure, Common minerals, Features of rocks, Chemical and Physical Weathering, Soils and Soil profiles, Soil types. (Ch. 5, 6)
Week Five	**Volcanoes, The Heat Within**: Properties and Composition of Magma, Viscosity, Volcanic eruptions, Types of eruptions, Types of Volcanoes, Volcanic Hazards. **The Earth's Evolving Crust:** Sedimentary Strata, Missing strata and correlation, Sedimentary Rocks, Clastic and Chemical, Metamorphism and metamorphic Rocks, Plate tectonics and mountain Building. (Ch. 7, 8)
Week Six	**Water and Ice on the Land:** Hydrologic cycle, Moisture in the atmosphere and climatic changes, Streams and different types of channels, Stream loads, Floods, Ground Water, Water Table and Groundwater movement, Porosity, Recharge and Discharge, Springs, Aquifers, Geologic work of Groundwater, Lakes. Glaciers form and distribution, Glacier budget, How glaciers move, Calving and glacier Surges. (Ch.9, 10)
Week Seven	**(Mid Terms Exams this week)** **Evolution of Life:** Life and its characters, Prokaryotes and Eukaryotes, The Ecosystem and Food Chains, Life Energy, production and growth, Population Dynamics, Life and Global Environment. (Ch. 15,)
Week Eight	**The World Ocean:** Ocean geography, Origin depth volume and Age of ocean, Salinity, Temperature and Heat Capacity of the Ocean, Ocean Circulations, Current Systems, Beaches, Reefs, Changing sea. **Winds, Weather and Deserts:** factors affecting wind speed and direction, Hadley Cell, Polar fronts, Jet streams. Dust storms, Mountain

and valley winds, weather systems and Chinooks. (Ch. 11, 13)

Week Nine **The Earth's Changing Climate**: Climate systems, Geologic records of climate change, Greenhouse effect, Reasons for climatic variations, Glacial and interglacial stages, Last Ice Age, Changes in Oceanic Circulation, Solar energy variations and volcanic activity. (Ch. 14)

Week Ten **Composition and Structure of the Atmosphere:** Temperature, Air pressure, Humidity, Condensation and Clouds, Understanding of Micro and Macro Climates. (Ch. 12)

Week Eleven **Resources from the Earth:** Mineral resources, Hydrothermal-magmatic-sedimentary and residual mineral deposits, Energy Resources, Fossil fuel, coal, Other sources of Earth. (Ch. 18)

Week Twelve **Geochemistry and Life:** Biogeochemical cycle and evolution, Biological conservation of elements, Carbon cycle, Nitrogen cycle and Phosphorous cycle, Atmosphere, Hydrosphere and Geosphere, Types of erosions. (Ch. 16)

Week Thirteen **Evolution and History of Biosphere:** Competitions, Exclusions and Ecological Niche, New species from Old, Mutation, Migration, Life's evolution on Earth, Life on Land, Extinctions and links with human activity. (Ch. 17)

Last day of classes – April 11, 2008

ASSIGNMENTS You will be given weekly assignments consisting of multiple choice, true/false or fill in the blanks type questions. These assignments are open book and are available on Black Board. You will be given two choices and marks will be recorded out of the best. The test will be available for two weeks before the due date. If you do not complete your test within given time, a **20%** deduction per day will be applied to your score.

Minitest Every second week, you may be given a mini-test at the start of class which will be approximately 15 minutes long. Labs will also have quizzes.

MARKS DISTRIBUTION

Mini tests	5%
Assignments	15%
Lab quiz	10%
Weekly labs	10%
Midterm exam	15%
Lab final	15% (Two finals 7.5% each)
Final exam	30%
	100%

Assignment Due Dates

Ass#	Due date	Special Info
1.	Jan. 17	
2.	Jan. 24	mini-test Jan.29
3.	Jan. 31	
4.	Feb. 7	mini-test Feb.11
Mid-Term Exam	**Feb. 14 – Thursday**	
5.	Feb. 29	
6.	Mar. 6	
7.	Mar. 13	mini-test Mar.18
8.	Mar. 20	
9.	Mar. 27	mini-test Apr.1
10.	**Fill in the blanks** Apr. 8	

LAB SCHEDULE

Week of:

January 7	**NO LABS**	
January 14	Lab 1.	Maps and topographic profiles
January 21	Lab 2	Mapping Geological History
January 28	Lab 3.	The Tectonic System
February 4	Lab 4	Identification and properties of Minerals and Rocks
February 11	Lab 5	Water at and Beneath the Earth's Surface
February 18	**NO LABS**	
February 25	**FINAL LAB EXAM (PART 1)**	
March 3	Lab 6.	Glaciers and Glaciation
March 10	Lab 7.	Solar Radiations, Climate and Weather
March 17	Lab 8.	The Life and Times of Planet Earth
March 24	Lab 9.	Mineral Resources and the Human Footprints
March 31	Lab 10.	Environmental Studies
April 7	**FINAL LAB EXAM (PART 2)**	

Note **- All books and materials are available at the Bookstore**
- labs could be used for studying rocks, minerals or maps other than scheduled lab hours by pre-arranging with Medha Karnik, our lab technologist.