Grande Prairie Regional College
Department of Science
ES 1050- **The Dynamic Earth through Time**
Course Outline
Winter 2010- 2011

Lecture	Section A3	T, R	10:00 - 11:20	Room J204
Labs	L1	T	14:30 - 17:20	Room J107

INSTRUCTOR: **Dr. Desh Mittra**
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TRANSFER CREDIT:			
	U. of Alberta	EAS 105	3 credits
	U. of Calgary	GLGY 201	3 credits
	U. of Lethbridge	GEOL 2060	3 credits
	Athabasca Univ.	GEOL 200	6 credits

OBJECTVE The objective of this course is to discuss the geological nature of Earth, including its origins, composition, and the history of life. Geological themes introduced in ES 1000 will be addressed in greater details in ES 1050. We will strive to achieve an appreciation of how the Earth has changed since its origin.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 1050 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

The plate tectonic framework of a dynamic Earth as it relates to the origin of major groups of minerals and rocks. Earthquakes, Structural geology and the origin of mountain belts. Surface processes and their sedimentary products. History of life and extinctions.
Not available to students with credit in ES 1010. Prerequisite: ES 1000 or ES1020.

RECOMMENDED TEXTBOOKS:

1. Monroe and Wicander: The Changing Earth, Thompson (Will be used as Textbook)
2. Skinner Porter and Botkin: The Blue Planet, John Wiley and Sons (your ES1000 textbook is a good auxiliary reference)
3. Press and Siever: Understanding Earth, W.H.Freeman and Co (on reserve in Library)

LAB BOOK:

LABORATORY MANUAL for PLANET EARTH ES 1050

Approximate schedule of lecture topics:

Week of Jan.4 Introduction

- Introduction to the course; study of the Earth as a heat engine.
- Review rock cycle.

Week of Jan.11 Tectonic Framework and the formation of Lithosphere

- Plate boundaries and their characteristic processes
- Examples of the products of plate tectonics
- Plate tectonics and the Geology of Canada

Week of Jan.18 Minerals

- Main groups and classification of minerals
- Chemical composition and structures of major mineral groups
- Physical and chemical properties of rock-forming minerals

Week of Jan.25 Igneous processes including intrusive activity and volcanism

- Igneous processes and rocks
- Magmatic processes and their relationship to tectonic setting
- Classification and identification of igneous rocks

Week of Feb.1 Structural Geology

- Deformation processes
- Identification and characteristics of major structures: folds, faults, etc.
- Tectonic interpretation of structures; orogens and orogenic belts

Week of Feb.8 Metamorphism and metamorphic rocks

- Causes and types of metamorphism
- Plate tectonic context of metamorphism
- Major types of metamorphic rocks and their characteristics

Week of Feb.15 Processes at the Earth's surface

- Weathering and soil
- Flow and transport of sediment by air, water, and ice
- Main types of sediment and sedimentary rock

Week of Mar.1 Processes at the Earth's surface

- Sedimentary environments and their tectonic setting
- Unconformities

Week of Mar.8 The geological timescale

- Introduce the geological timescale and the main subdivisions of geologic time
- Review methods of stratigraphic correlation and measuring of geologic time
- Introduction to the concepts of evolution.

Week of Mar.15 Precambrian Earth and life, Canadian Shield

- Characteristics of the Precambrian Earth
- Paleontological database of Precambrian life
- Major elements of the Canadian Shield

Week of Mar.22 Paleozoic Earth and life

- Continental margins of North America in the Paleozoic
- Major groups of fossils from the Paleozoic

Week of Mar.29 Mesozoic Earth and life

- History of North America in the Mesozoic and Cenozoic; Rocky Mountains
- Major groups of Mesozoic fossils: dinosaurs, invertebrates

Week of Apr.5 Cenozoic Earth and life

- Major Cenozoic fossils: mammals
- History of Glaciation

Week of Apr.12 Review

LABORATORY WORK:

Laboratory work will be conducted weekly starting the first week of classes. The lab will run 3 hours per week. Attendance is mandatory. During this time you will receive the lab assignment. Students shall hand in completed assignments before or at the end of **that** lab session.

NOTE: **There is NO Lab Final Exam**. Weekly labs and quizzes carry full weight.

MARK DISTRIBUTION:

Weekly Labs	20%
Laboratory Quizzes	10%
Assignments	15%
Mid Term Exam	20%
Final Term Exam	35%

LABORATORY CLASSES

Week of:	Lab number and general topic
Jan. 4	No lab held during this weeks
Jan. 11	Lab 1: Minerals and their atomic structure: Develop basic skills in mineral description by investigating and reporting the physical characteristics of the main rock-forming minerals.
Jan. 18	Lab 2: Igneous processes and rocks: Learn the scale and morphology of igneous processes through geological map interpretation exercises and air-photo interpretation; also develop basic skills in rock description by investigating and reporting the main igneous rock types.
Jan. 25	Lab 3: Structural Geology: build structural block diagrams and interpret maps.
Feb. 1	Lab 4: Metamorphism and metamorphic rocks: Mapping metamorphic zones (e.g. Barrovian sequence); develop basic skills in rock description by investigating and reporting the main metamorphic rock types.
Feb. 8	Lab 5: Sedimentary Rocks: Learn the scale and morphology of sedimentary processes through geological map interpretation exercises and air-photo interpretation; also develop basic skills in rock description by investigating and reporting the main sedimentary rock types.
Feb. 15	Lab 6: Plate tectonics: Use maps and examples to show geomorphology of tectonic zones and then calculate spreading / subduction rates.
Feb. 22	**NO LABS DURING THESE WEEKS**
Mar. 1, 8	Lab 7: Precambrian Earth and life, Canadian Shield: Precambrian fossils, configuration of cratons, examples of shield rocks.
Mar. 15	Lab 8: Paleozoic Earth and life; the Paleozoic of North America: Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the periods.
Mar. 22	Lab 9: Mesozoic and Earth and life; the Mesozoic of North America: Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the periods.
Mar. 29	Lab 10: Cenozoic Earth and life; the Cenozoic of North America: Develop basic skills in fossil description by describing and sketching the typical fauna (from fossil examples) of the periods.
Apr. 5	**Review**