Grande Prairie Regional College

ES 1020
Introduction to Environmental Earth Science
Fall Semester 2003

Lecture: Wed and Fri 1:00 – 2:20

Lecture Room: J227

Lab: Mon and Tues 2:30 – 5:20

Lab Room: J107

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Course Objectives

This introductory course in physical geography is designed to guide the student toward a clearer understanding of planet Earth through lectures, personal study and laboratory exercises. The focus is on atmospheric processes, ecological processes and on the resulting global patterns of energy flow, weather, climate, vegetation, soils and ecosystems. It is hoped that the student will gain a deeper understanding and appreciation of the relationships between the processes and patterns in the environment. Laboratory exercises and exams will be designed to see if the student can select and apply the relevant knowledge given in the lectures and during the laboratory sessions.

Textbook

Briggs, D., Smithson, P., Ball, T., Johnson, P., Kershaw, P. and Lewkowicz, A. 1993. *Fundamentals of Physical Geography*. 2nd Canadian edition, Copp Clark Pitman Ltd. Toronto, 692 pp.

Course Requirements

1. Development and study of lecture notes complemented with the study of the text book
2. Students must read relevant sections in the text and lab manual prior to each lecture and lab session. These are given in the course outline and serve to be the minimum requirement for each section.
3. **Attendance of all laboratory exercises** in the lab that you have signed up for during registration. Labs are meant to complement and enhance material presented in lectures and should not be taken lightly. Materials learned on the labs will be tested in two lab exams. To be prepared you should bring the following materials to each lab session: (a) the text book and lab manual; (b) a drawing pencil and eraser; (c) a ruler calibrated in centimeters, millimeters and inches; (d) protractor and right triangle; (e) at least 4 coloured pencils; (f) a calculator would be useful for most labs
4. Completion of the mid-term, final and 2 lab exams

Mark Distribution

Assignments:	15%
Labs:	20%
Lab Exams:	15% (7.5% each)
Mid-term Exam :	25%
Final Exam:	25%

Lecture Outline

Week of Sept 1	Introduction and discussion of course outline, objectives and student responsibilities. Discussion of scientific principles: hypothesis, theories, scientific laws and models. Global energy system: concepts of energy, radiation, energy and mass transfers *Readings: Chapter 2: Pages 11-24*
Week of Sept 8	Energy balance of the atmosphere: composition of the atmosphere, short and long wave radiation, radiation and energy balances and solar radiation. *Readings: Chapter 3: Pages 29-45*
Week of Sept 15	Heat and moisture in the atmosphere: daily and annual cycles in the atmosphere and humidity. Vertical changes in temperature: stability, cloud formation and precipitation *Readings: Chapter 4: Pages 57-59, 74-76, 109-111*
Week of Sept 22	Atmospheric motion: air pressure, winds, global circulation, Coriolis effect Weather forming systems: air masses, fronts *Readings: Chapters 5 and 6: Pages 71-112*
Week of Sept 29	Climates of the world: nature and elements of climate, climate classification, regional climates. *Readings: Chapters 7: Pages 113-138, Appendix II: 640-641*
Week of Oct 6	Climactic change: past climates, future climates, effects of human activity Microclimates *Readings: Chapter 9: Pages 161-193 and Chapter 8: Pages 139-159*
Week of Oct 13	**Midterm exam**
Week of Oct 20	The hydrological cycle: global water balance, precipitation, evapotranspiration *Readings: Chapters 10, 11 and 12: Pages 195-242*
Week of Oct 27	Soils: soil forming systems, soil profile development, soil properties, soil types *Readings: Chapter 27: Pages 529-551*
Week of Nov 3	Ecosystems: structure and functions, energy cycling, world ecosystems *Readings: Chapter 26: Pages 515-528*

Week of Nov 10	Vegetation: structure, changes in the biosphere, environmental relationships, competition, dispersal and migration, succession, ecosystem dynamics *Readings: Chapter 28: Pages 553-570*
Week of Nov 17	Biogeographical cycling: nutrients in the biosphere, nutient inputs to ecosystems, nutrient inputs from the ecosystem, biogeochemical cycling in the soil, nutrient cycling in the vegetation *Readings: Chapter 29: Pages 571-587*
Week of Nov 24	World ecosystems: soil and vegetation patterns, ecological relationships and the biome, savanna, desert and semi-desrt biomes, temperate grassland biomes, temperate forest biomes, tundra biomes *Readings: Chapter 30: Pages 589-615*
Week of Dec 1	Humans and the ecosystem: history of human activities, agricultural ecosystems, shifting cultivation, managed forests, human impact on aquatic ecosystems *Readings: Chapter 31: Pages 617-636*
	Final Exam To Be Announced

Lab Manuals

The following lab manuals will be required.

Labs 1-4

EAS 102 A1: Experiments to Study Our Atmospheric Environment. Department of Earth and Atmospheric Sciences, University of Alberta. 190 pgs.

Labs 6-9

ES 1020 Introduction to Environmental Earth Science, Biosphere Exercise Workbook. Grande Prairie Regional College.

Outline for Labs 1-4

Please refer to the following lab manual for the relevant pages and exercises for labs 1-4.

Week of Sept 15: Lab 1	Distance from the Sun: pages 34-36 Surface heating pages 41-44 Solar radiation: pages 45-47
Week of Sept 22 : Lab 2	Local climate: pages 48-50 Evaporation, latent heat : pages 56-58 Measuring moisture : pages 59-61

Week of Sept 29: Lab 3	Winds, Air in motion: pages 112-113 The Coriolis effect: pages 114-116 Analyzing a storm: pages 117-127
Week of Oct 6: Lab 4	Tracking hurricanes: pages 149-152 Weather radar : pages 153-158 Global warming : 181-186
Week of Oct 20: Lab 5	**Lab exam on labs 1-4**
Week of Oct 27: Lab 6	Exercise No. 6: The hydrological cycle
Week of Nov 3: Lab 7	Exercise No. 7: The nature of soils
Week of Nov 10: Lab 8	Exercise No. 8: Biochemical cycles in the biosphere
Week of Nov 17: Lab 9	Exercise No: 9: Biomes
Week of Dec 1: Lab 10	**Lab exam on labs 6-9**