



Course Syllabus: Global Geophysics - ErSE 211

Division	Physical Science and Engineering Division
Course Number	ErSE 211
Course Title	Global Geophysics
Academic Semester	Fall
Academic Year	2019/2020
Semester Start Date	08/25/2019
Semester End Date	12/10/2019
Class Schedule (Days & Time)	02:30 PM - 04:00 PM Mon Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Georgiy Lvovich Stenchikov	georgiy.stenchikov@kaust.edu.sa	+966128080265		Mon/Thu 4-5 pm, Bldg. 1, #3115
Paul Martin Mai	martin.mai@kaust.edu.sa	+966128080266	3114, 1, Al-Khwarizmi (bldg. 1)	Mon/Thu 4-5 pm, Bldg. 1, #3114

Teaching Assistant(s)	
Name	Email
None	

Course Information	
Comprehensive Course Description	The course provides introductory descriptions of the Earth solid and fluid natural systems and their interaction. In the first part of the course, focused on fluid earth systems, it discusses the history of earth climate, formation of oceans and atmosphere, biological history, energy balance climate model, general circulation of ocean and atmosphere, climate change, coupled ocean-atmosphere-biosphere climate models. The second part of the course discussed the solid Earth system, in particular, the Earth early geological history, plate motions, magnetism and sea floor spreading, earthquakes and earth structure, gravity, geochronology, heat flow, mantle convection and earth's magnetic field.
Course Description from Program Guide	The course introduces descriptions of solid and fluid Earth systems and their interaction, and is divided in two (2) parts. Part I covers the history of Earth climate, formation of oceans and atmosphere, biological history, energy balance in climate model, general circulation of ocean and atmosphere, climate change, and coupled ocean-atmosphere-biosphere climate models. Part II discusses Earth early geological history, plate motions, sea floor spreading, earthquakes and Earth structure, gravity, geochronology, heat flow, mantle convection and Earths magnetic field.
Goals and Objectives	The course provides introductory descriptions of the Earth solid and fluid natural systems and their interaction. It aims at widening the students view and emphasizing the links between solid and fluid elements of the Earth's geologic and climate systems
Required Knowledge	AMCS 201 or similar math course, or consent of instructor

Reference Texts	<p>-Required textbooks:</p> <p>-<i>Fundamentals of Geophysics (2nd)</i>, William Lowrie, Cambridge University Press</p> <p>-<i>Atmospheric Science: An introductory survey</i>, Wallace, J. M., and P. Hobbs, 2006: Elsevier, 483 pp.</p> <p>-Reference books:</p> <p>-<i>The Solid Earth: An Introduction to Global Geophysics</i>, by C.M.W. Fowler, Cambridge University Press</p> <p>-<i>Physics of Climate</i>, Peixoto, J., and A. Oort, 1992: American Institute of Physics, New York, 520 pp.</p>
Method of evaluation	<p>30.00% - Final exam 20.00% - Homework /Assignments 30.00% - Midterm exam 20.00% - Quiz(zes)</p>
Nature of the assignments	<p>Biweekly homework, containing both quantitative (i.e. numerical calculations) and qualitative (i.e. written summaries) exercises</p>
Course Policies	<p>Homeworks are due one week after dissemination, clearly labeled with name, date, homework number; qualitative answers have to be typed, numerical calculations can be shown hand-written</p>
Additional Information	<p>None</p>

Tentative Course Schedule

(Time, topic/emphasis & resources)

Week	Lectures	Topic
1	Mon 08/26/2019	Fluid Earth Intro: Earth Sciences Program, Solid, and Fluid Earth System Tracks
1	Wed 08/28/2019	Mathematical models of global circulation processes
2	Mon 09/02/2019	Solar-Earth Interactions
2	Wed 09/04/2019	Circulation Systems
3	Mon 09/09/2019	Atmospheric Thermodynamics. Home Work 1.
3	Wed 09/11/2019	Atmospheric Thermodynamics
4	Mon 09/16/2019	Quiz
4	Wed 09/18/2019	Radiation Transport, Main Quantities
5	Mon 09/23/2019	Saudi National Day
5	Wed 09/25/2019	Radiative equilibrium, greenhouse effect
6	Mon 09/30/2019	Kirchhoff's law, Lambert's law, Radiative transfer. Home Work 2.
6	Wed 10/02/2019	Schwarzschild's equation, Bouguer-Beer-Lambert's law, Plain Parallel Atmospheres
7	Mon 10/07/2019	Atmospheric absorption and remote sensing, hierarchy of climate models
7	Wed 10/09/2019	Aerosols and their effect on climate, desert dust
8	Mon 10/14/2019	Midterm Exam
8	Wed 10/16/2019	Solar System – Age of the Earth
9	Mon 10/21/2019	Break
9	Wed 10/23/2019	Age of the Earth – Introduction to Plate Tectonics
10	Mon 10/28/2019	Plate Tectonics – Paleomagnetism I
10	Wed 10/30/2019	Plate Tectonics – Paleomagnetism II. Home Work 1.
11	Mon 11/04/2019	Earth' Shape, Gravitation, Rotation
11	Wed 11/06/2019	Measuring & Interpreting Gravity
12	Mon 11/11/2019	Seismology: Seismic Waves I
12	Wed 11/13/2019	Seismology: Seismic Waves II
13	Mon 11/18/2019	Seismology: Waves II & Sources
13	Wed 11/20/2019	Seismology: Sources & Hazard. Home Work 2.
14	Mon 11/25/2019	Thermal properties of the Earth, I
14	Wed 11/27/2019	Thermal properties of the Earth, II
15	Mon 12/02/2019	Electric & magnetic properties, I
15	Wed 12/04/2019	Electric & magnetic properties, II
16	Mon 12/09/2019	Exams

Note

The instructor reserves the right to make changes to this syllabus as necessary.