

Salahaddin University – Erbil
College of Engineering
Geomatics (Surveying) Engineering Department

Course Book

“Global Geodesy”

Class: 3rd year

Academic Year 2020-2021

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Course Description

This course provides an introduction to Global Geodesy. Topics covered include:

1. The shape of the earth
2. Flatness, eccentricity, and normal section
3. Radii of the earth
4. Reduction of measurement distances
5. Coordinate Systems and transformation between them
6. Measurements on the Earth
7. Spherical distance
8. Ellipsoidal parameters
9. Forward and inverse computations
10. Spherical triangle and spherical excess
11. Celestial triangle
12. Time systems
13. Physical geodesy
14. Rotations of the earth
15. Satellite geodesy

Course Objective

The objective of this course is for students to gain a solid understanding of the principles of Global Geodesy as a part of their professional studies in a manner that will attain the best possible results. This course will present a number of practical problems, and in sufficient depth, such that the student will be capable of solving real geodesy related problems.

Course Requirements

1. Homework assignments. The objective of these homework assignments are to assist in the learning of course material, so discussion of homework among students is encouraged, but remember that it will be in your best interest to understand all of the assigned problems. However, every student is responsible for turning in an individual assignment. The main goal of the homework is for you to learn the concepts of the course, so that you can prove it on the quizzes and exams. Homework assignments will be accepted until the beginning of the next lecture period.
2. Class illustrative problems. These are comprehensive problems covering the major topics of each chapter. These will be worked on in class, with the assistance of the lecturer. They are to be completed in groups (2-3).
3. Quizzes. These quizzes will be closed-book, consisting of qualitative questions addressing major concepts of the chapter. Lowest quiz score dropped
4. Two semester exams. These exams will be closed book. The exams will consist of comprehensive quantitative problems that relate to any of the material covered during the semester.
5. One final exam. This exam will be closed-book. The exam will consist of comprehensive quantitative problems that relate to any of the material covered during the academic year.

Class Attendance

Students are expected to attend all class meetings. There is specific penalty for missing a class; however, students are responsible for the content of each lecture, which may or may not be contained in the textbook. In-class illustrative problems are expected to be worked on during the scheduled class time; thus, students must present during these class sessions to receive credit for these assignments.

Syllabus

Date	Week No.	Name of the Chapter	Names of the Topics
October 2018	Week 1	1.Introduction	Definitions and elements of geodesy
	Week 2	2.shape of the earth	Geoid, ellipsoid, spheroid,
	Week 3		Flatness, eccentricity, and some relations
	Week 4	3. radii of the earth	Normal section, radii of the earth
November 2018	Week 1	4. reduction in measuring	Reduction of the measuring distance, (t-T) correction and convergence angle.
	Week 2	5. coordinate system	Geographic, geodetic, and Cartesian coordinate system
	Week 3		Astronomical and Celestial Coordinate systems and rectangular coordinate system.
	Week 4		Polar and cartographic coordinate system and Transformation between coordinates.
December 2018	Week 1	6. measurement in the earth	Relationship between latitudes, distance measurement
	Week 2	7.spherical distance	Distance along small and great circle, computing an arc length
	Week 3		Shortest distance, properties of geodesic line
	Week 4	8. Forward and Inverse Computations	Forward computations
January 2019	Week 1		Inverse Computations
	Week 2	9. Spherical triangle and spherical excess	Spherical triangle and spherical excess and properties of spherical triangle
	Week 3		Legendres theorem and soldnar law
	Week 4		Right angle and quadrantal spherical triangle and napiers rule
February 2019	Week 1	7. Celestial Coordinate System	Definition of astronomical terms and coordinate systems
	Week 2		Astronomical triangle and right angle of astronomical triangle
	Week 3		Worked examples on celestial coordinate systems
	Week 4	8. Time Systems	Solar time, sidereal time, standard time and atomic time
March 2019	Week 1		Relationship between time systems and worked examples
	Week 2	9. Physical Geodesy	Gravity, Geoid models, global and local geoid models
	Week 3		Absolute and Relative Gravimeters
	Week 4		Orthometric height, normal height

April 2019	Week 1		Dynamic height, Geoid ellipsoid separation
	Week 2		Geodynamics
	Week 3		Monitoring of earth's movements
	Week 4		Application examples with presenting related data
May 2019	Week 1	10. Rotations of the Earth	The main four rotations, their properties and measurements
	Week 2		Coordinate systems equations with accounting for the rotations
	Week 3	11. Satellite Geodesy	Satellite missions, principle of working and applications
	Week 4	Revisions	

Grading

The grade distribution is as follows:

First semester Exam.	15
Second semester Exam.	15
Quizzes, homework assignments, and attendances	10

Total	40
Final Exam.	60
Final grade	100

References

No.	Title
1	Wofgang Torge, 1991, "Geodesy", Germany, de Gruyter
2	Benhard Hofmann and Helmut Mortiz, 2005, "Physical geodesy", Austria, Springer-verlag Wein
3	Aylmer Johnson, 2004, "Plane and geodetic surveying", London, Spon press
4	E.J. Krakiwsky and D.B. Thomson, 1974, "Geodetic position computations", Canada
5	William M Kaula, 2000, "Theory of satellite geodesy", USA, Dover publications
6	Punmia, Ashok and Aron, 2005, "Higher Surveying", India, Laxmi publications
7	R. Agor, 2008, "A text book of advanced surveying", India, Khanna publications