
School of Applied Engineering and Technology

COURSE NUMBER	SET 200
COURSE NAME	Introduction to Geomatics
COURSE STRUCTURE	(3-0-3) (lecture hr/wk - lab hr/wk – course credits) Classroom: CKB 120 (Monday: 6:00 pm – 8:50 pm)
COURSE DESCRIPTION	Plane surveying with angle and distance measurements; leveling; topographic mapping; traverse and area computations; horizontal and vertical curves; cross sections; triangulation; state plane coordinates; 3-D surveying using Global Positioning System (GPS), Geographic Information Systems (GIS) and remote sensing technology for surveying and mapping applications. Emphasis is on the use of the computers for solving typical field and office problems.
PREREQUISITE(s)	Pre-calculus
CO REQUISITE(s)	SET200A–Surveying Laboratory
TEXTBOOK(s)/ RECOMMENDED MATERIAL	Elementary Surveying: An Introduction to Geomatics , Latest Edition, by Charles D. Ghilani, Pearson, ISBN-13: 978-0134604657. Calculator (NCEES –recommended), Engineering Computation Pad
SUPPLEMENTARY MATERIALS	a) Route Location and Design , 5 th Ed. McGraw Hill Book Co. b) Surveying with Construction Applications , 3 rd Edition, Prentice Hall 1997. c) ASSHTO “ A Policy on Geometric Design of Highways and Streets ” 2004 Edition.
COMPUTER USAGE	MS Word, Excel
COURSE LEARNING OUTCOMES	<ol style="list-style-type: none">1. Develop an understanding of the basic principles of surveying including the traditional measurements and representations as well as such modern positioning techniques.2. Integrate CAD techniques and survey computation tools into the application of basic surveying principles.3. Understand the fundamental principles in topographic mapping and positioning techniques from modern surveying technologies.
CLASS TOPICS	Theory of measurements and errors, Distance measurements , Heights and differential leveling, Angular Measurements: Bearings and Azimuths, Traverse computations, Coordinate computations, Earthworks: Areas and Volumes, Topographic surveys and mapping, Horizontal and Vertical Curves, Construction surveys, Photogrammetry & Remote Sensing Basics, Elements of positioning with Global Positioning Systems, Introduction to Geographic Information Systems, Hydrographic surveys
STUDENT OUTCOMES	The Course Learning Outcomes (CLO) support the achievement of the following SET Student Outcomes and TAC of ABET Criterion 9 requirements:

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Student Outcome b - an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies;
Related CLO – 1 thru 3

**CONVERGED
LEARNING
INFORMATION**

The instructor will discuss these requirements on the first day of the course and/or post on their Learning Management System (LMS).

- Be sure to follow NJIT safety guidelines on pandemic recovery

Please become familiar with:

- WebEx: <http://ist.njit.edu/webex>
- Online Proctoring: <https://ist.njit.edu/online-proctoring/>
- Back2Classroom: <https://back2classroom.njit.edu/getting-started-students>

GRADING POLICY

Video Reviews..... 15% (due dates indicated on Canvas)
Homework 15% (due dates indicated on Canvas)
Exam I 20% (online with lockdown browser - Date shown on syllabus)
Exam II..... 20% (online with lockdown browser - Date shown on syllabus)
Final..... 30% (In Class. See Registrar Webpage)

Videos: Videos are recorded lectures of the important concepts outlined in the text book. Videos also demonstrate step-by-step computational procedures for surveying and mapping.

Quizzes: Canvas will host all quizzes for this course. For example, the assignment “Review V1” means that students should access the online quiz for Video 1 by the due date as posted in Canvas (and the syllabus).

Homework: Solutions to survey problems that require application of concepts learnt. Problems statements will also require the computational skills using the basic scientific calculation. It is strongly recommended to solve the homework problems (follow the format as shown in lecture videos) using either engineering calculation pad or a ruled workbook to better understand the sequence of computations that lead to the solution. This method will also be helpful during your review for the midterms and final exam. Submittals of your homework assignments are also via Canvas in the form of a quiz.

Exam: Each exam will cover the material from a particular module of the course. The course is designed as three separate modules. Exam questions will not overlap course modules. The final exam is not comprehensive but will cover materials focused in the last course module. The general **format** for each exam will be two parts. **Part I** consists of multiple choice and True/False questions in a timed quiz with lockdown browser. **Part II** of an exam comprises problem/solution type questions as a timed quiz with lockdown browser.

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Note: Students cannot pass this course if you have NOT completed more than 80% of the quizzes and the homework assignments. Penalty for late submissions will be at a rate of 10% per day after the posted deadline.
There will be no makeup exams.

Due date for assignments is Sunday 11:59 pm of the week of the assignment

Final Grade/Score Assignment (out of 100 %)

D= 50-56
C= 57-62
C+= 63-69
B = 70-76
B+ = 77-84
A > 85

ACADEMIC INTEGRITY	NJIT has a zero-tolerance policy regarding cheating of any kind and student behavior that is disruptive to a learning environment. Any incidents will be immediately reported to the Dean of Students. In the cases the Honor Code violations are detected, the punishments range from a minimum of failure in the course plus disciplinary probation up to expulsion from NJIT with notations on students' permanent record. Avoid situations where honorable behavior could be misinterpreted. For more information on the honor code, go to http://www.njit.edu/academics/honorcode.php
STUDENT BEHAVIOR	<ul style="list-style-type: none">See NJIT policy at https://www.njit.edu/doss/code-student-conduct-article-11-university-policy-academic-integrity/
MODIFICATION TO COURSE	The Course Outline may be modified at the discretion of the instructor or in the event of extenuating circumstances. Students will be notified in a timely manner of any changes to the Course outline. The color scheme used in the syllabus is to differentiate in-class (see converged learning information above) and online learning activities. Red denotes in-class instruction for hands-on problem solving computations to apply concepts presented in the learning videos. Blue denotes student activities outside of the modified Face-to-Face (see converged learning above) instruction.
PREPARED BY	Dr. L. V. Potts
Office Hours	2510 GITC by appointment: Monday 4:00 – 5:30 pm Contact: email lpotts@njit.edu

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Course Outline

Fall

Week	Date: Week of	Assignments online via Canvas	Reading/ Activity	Topics
1.	9/06		Chp 1 -2 Chp 3	<u>Introduction (Video)</u> <ul style="list-style-type: none"> • Introduction to Surveying • Math Review & Geodetic Coordinate Systems • Geodetic Datums for Construction • Principles of Geospatial Mapping <u>Measurements & Errors</u> <ul style="list-style-type: none"> • Theory of Errors • Corrections & Calibration • Review of Statistics for Surveying Data <u>Surveying & Measurements (Video - V1)</u> Overview of Statistical Concepts Measurement Correction & Instrument Calibration Electronic Distance Measuring Instrument
2 & 3	9/12	Review V1 Review V2 HW #1	Chp 4-5	<u>Concepts on Heights (Video – V2)</u> Introduction to Height determination Differential Leveling <u>Height/Elevation</u> <ul style="list-style-type: none"> • Orthometric Height • Differential leveling • Leveling Computations & Adjustments • Trigonometric leveling • Profiles
4.	9/19	Review V3 HW #2	Chp 11 Chp: 19	<u>Azimuth and Bearing (Video – V3)</u> <ul style="list-style-type: none"> • Angle Measurements: Azimuth & Bearings <u>Geodetic Datums & Coordinate Geometry</u> <ul style="list-style-type: none"> • Map Projections for Surveying and Mapping • Computations in Rectangular Coordinates
5.	9/26	HW #3	Chp 6: Part III & Chp: 7	<u>Surveying</u> <ul style="list-style-type: none"> • Electronic Distance Measurements • Angles, Azimuth & Bearing (Video – V4) <u>Surveying Coordinate System</u> <ul style="list-style-type: none"> • Geodetic Surfaces and Datums
6.	10/03	Review V4	Chp: 9	<u>Traverse (Video – V5)</u> Geodetic Control for Mapping Traverse Adjustment

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7.	10/10	In class Exam I - (covering material from Lectures 1-4)		
8.	10/17	Review V5	chp : 10	<u>Surveying Coordinates (COGO)</u> Planar Coordinates: Departures and Latitude Computing Coordinates
9.	10/24	HW #4 Review V6	chp: 10	<u>Survey Control</u> <ul style="list-style-type: none"> • General Concept of Geodetic Control • Traverse Adjustment Computation • Triangulation (& Intersection) Horizontal Curves (Video – V6)
10.	10/31	HW #5	Chp: 24	<u>Horizontal Curves</u> <ul style="list-style-type: none"> • Review of Geometry and Formulae • Practice problems on curve layout Vertical Curves (Video –V7)
11.	11/07	Review V7	Chp: 25	<u>Vertical Curves</u> <ul style="list-style-type: none"> • Overview of Geometry and Formulae • Curve Layout & Cut and Fill Computations
12.	11/14	Exam II (Material from Lectures 5 - 9)		Global Positioning System (GPS) Introduction to GPS (Web) GPS Operation, Systems & Measurements (Video – V8)
13.	11/21	Review V8 HW #6	chp: 13-14 chp: 27	Surveying with GPS <ul style="list-style-type: none"> • Pseudo Range Observation • Receiver Location (XYZ) & Numerical Examples Surveying from Imagery <ul style="list-style-type: none"> • Principles of Photogrammetry & Remote Sensing
14.	11/28	Review V9 HW #7	Chp: 28	Surveying from Imagery (cont.) <ul style="list-style-type: none"> • Surveying from Imagery Geographic Information System (GIS) (Video – V9) <ul style="list-style-type: none"> • GIS theory • Database Types & Applications on Engineering & Construction
15.	12/05	Review V10 HW #8	chp: 12, 16	Construction Surveys (Video – V10) <ul style="list-style-type: none"> • Equipment & Construction Stake out • Area & Volume Computations • Contours, and Gradients • Course Summary & Review
Final Exam (see Registrar Homepage for schedule details)				