JOHN A. REIF, JR. DEPARTMENT OF
CIVIL AND ENVIRONMENTAL ENGINEERING

NJIT New Jersey Institute of Technology

CE 200A – Surveying Lab – Fall 2023

Instructors: **Allison Lapatka, PE, PLS** **Contact:** email al69@njit.edu
William Zimmermann, PE **Contact:** email wjz6@njit.edu
Office Hours: email Professor with any questions or to set up a meeting.

Classroom:
Lapatka - Section 001 – Face-to-Face: Friday, 10:00 AM to 12:50 PM; GITC 2400
Lapatka - Section 003 – Face-to-Face: Friday, 1:00 PM to 3:20 PM: GITC 2400
Zimmermann - Section 101 – Face-to-Face: Saturday, 9:00 AM to 11:50 AM: GITC 2400
Zimmermann - Section 103 – Face-to-Face: Saturday, 1:00 PM AM to 3:50 PM: GITC 2400

Course Description: Students perform field exercises in CE200 utilizing in class examples, videos, and AutoCAD software.
Course Format: This course is taught as a laboratory class. It is imperative that students attend the in person classes where numerous class exercises will solidify the concepts to be learned.
Prerequisites: Math 111 - Calculus I **Co requisite:** CE 200–Surveying

Text (Required):
a) Field Book – All field work shall be recorded in the field book.
b) CE 200A Introduction to Land Surveying Laboratory Manual – available for download via Canvas.

Text (Suggested):
a) Wolf, Ghilani, Elementary Surveying An Introduction to Geomatics, 14th Edition, Prentice Hall, Inc. 2015. ISBN-13: 978-0-13-375888-7 or most current edition.
b) FE Reference Manual – most current edition

Objectives:
1. Develop an understanding of modern field measurement tools and techniques.
2. Integrate field data acquisition with appropriate CAD tools.
3. Develop an appreciation for the performance aspects of field data acquisition and the associated costs and reliability

Topics: Pacing (Distance Measurement), Leveling, Angle Measurements, Traversing, Topographic Survey, CAD Based Mapping, Staking Out

Schedule: Lecture/Recitation – (see co requisite, CE 200)
Laboratory –3 hour lab class

Professional Component: Engineering Topics
Prepared By: Allison Lapatka

A hard copy (printout) of the current version of the syllabus is to be brought to each class. If there are amendments made to the syllabus, it will be posted on the course web site. A hard copy (printout) of the current lab is to be brought to each session.

Schedule:

This schedule is tentative and subject to change as the semester progresses, particularly if weather conditions impact the class.

On rain days, appropriate indoor exercises will be conducted.

Week	Topics	Assignment Due
1	Introduction/Pacing	
2 & 3	Leveling	Pacing Lab
4 & 5	Total Station Fam. & Student Design Lab	Leveling Lab
6, 7, 8	Total Station Traverse	TS Fam & Student Design Lab
9	Traverse Computer Exercise	
10, 11	Topo Surveying	TS Traverse
12, 13, 14	Topographic Mapping/Design & Final Submission	**FINAL PROJECT AND ALL REMAINING LABS DUE (Late labs - grades WILL be reduced)**

Grading

Lab Reports: You will have a lab report for each lab, which will include the objectives, procedures, results, calculations and analysis and/or comments about your results and the lab itself. The reports must be typed. The objectives and procedures section is to show your understanding of the subject, so do NOT just copy what the handout says. Use your own words. If you were absent for a lab, a report is still due, but make a note on the lab report and in your field book that you were absent and that the data was copied from someone in your group. Each instructor will provide further details for their particular requirements.

Lab Report Components:

1. Typed write-up and calculations
2. Printout of CAD file, 8.5x11, 11x17, 24x36, 30x42 is acceptable, **as applicable**
   (All components are required unless otherwise noted or the lab is considered incomplete)

1) **Field books:** Field books are required for the lab course. If the student chooses to use the field book, make sure to keep them clear and legible, and perform all field work in the field book.

2) **Topographic Map:** A map of each group's assigned area showing physical and topographical features of the area. The project will include a design portion for proposed conditions.

Grading: See below for particular grading policies. Keep in mind that the grade for CE200A is completely separate from the grade for CE200. This means that you can pass or fail any combination of the two. A passing grade in CE200 does not mean a passing grade in CE200A and vice versa.

Grading Breakdown:

Attendance/Participation……..15%
Pacing Lab……..10%
Leveling Lab……..15%
TS Familiarization Lab……..10%
Student Design Lab……15%
Traverse Lab……15%
Final Project ……20%

TOTAL……100%

90-100% = A
84-89 = B+
80-84% = B
70-79% = C
60-69% = D
0 – 59% = F

Withdrawals: In order to ensure consistency and fairness in application of the NJIT policy on withdrawals, student requests for withdrawals after the deadline will not be permitted unless extenuating circumstances (e.g., major family emergency or substantial medical difficulty) are documented. The course Professors and the Dean of Students are the principal points of contact for students considering withdrawals

NJIT Honor Code:
Academic Integrity is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. ***Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university.*** *If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu*

Syllabus Information: The dates and topics of the syllabus are subject to change; however, students will be consulted with and must agree to any modifications or deviations from the syllabus throughout the course of the semester.

Email Policy: Emails shall be accepted at al69@njit.edu and wjz6@njit.edu. Please put the course name "CE 200A" in the subject line of the email.

All exercise instructions are to be read before the lab session in which they are performed. All assignments are to be typed, with exception to calculations. Hand written lab reports will not be graded. Lab Reports will consist of Group and Individual Reports. Students shall explain what was accomplished and what was learned from each laboratory exercise.

All assignments are to be emailed to the instructor prior to the beginning of the next lab unless otherwise specified. If you will not attend a session, your lab report must still be submitted. Absence from a lab does not remove your requirement to hand in the lab write-up on time. CAD files will not be accepted as assignment submissions.

Part of this course is the understanding of how CAD work fits in with the surveying profession. Students are encouraged to collaborate with other students in the current class section for lab write ups, calculations, and CAD work. However, identical or similar CAD files will be graded as if they were not handed in. This includes but is not limited to title blocks, typical blocks, etc...

The first assignment that is handed in late will have its grade reduced by 1 letter grade. Assignment will be reduced by 1 letter grade for each additional week late.

All CAD files are to have a title block. The title block is to include the same information shown on the sample that is to be distributed to the class. If a title block is not present, points will be deducted from the assignment.

Class participation, including attendance and punctuality are considered in the final grade.
Course Objectives Matrix:

Strategies and Actions	Student Learning Outcomes	Outcomes (1-7)	Prog. Object.	Assessment Methods/Metrics
Course Objective 1: Develop an understanding of modern field measurement tools and techniques.				
Introduce measuring tools for distance and angular measurements.	Learn how to setup and operate levels, theodolites and total stations.	1,3,6,7	1	Lab and homework
Introduce field note taking.	Learn how to record field measurements.	3,4,6,7	1	Lab and homework
Introduce survey design.	Learn how to plan and execute a survey.	1,2,3,6	1	Lab and homework
Course Objective 2: Integrate field data acquisition with appropriate CAD tools.				
Introduce practical CAD mapping.	Learn the elements of CAD mapping and how to perform it.	1,6,7	1,2	Lab exercises.
Course Objective 3: Develop an appreciation for the performance aspects of field data acquisition and the associated cost and reliability.				
Perform data acquisition tasks with different instruments.	Learn how to apply different equipment to distance and angular measurements.	1,2,7	1	Lab exercises.
Compare and evaluate results from the different measurements.	Produce a report comparing the different surveying methods.	1,3,6	1	Homework, quizzes and exams.

CEE Mission, Program Educational Objectives and Student Outcomes

The mission of the Department of Civil and Environmental Engineering is:

- to educate a diverse student body to be employed in the engineering profession
- to encourage research and scholarship among our faculty and students
- to promote service to the engineering profession and society

Our program educational objectives are reflected in the achievements of our recent alumni:

1 – Engineering Practice: Alumni will successfully engage in the practice of civil engineering within industry, government, and private practice, working toward sustainable solutions in a wide array of technical specialties including construction, environmental, geotechnical, structural, transportation, and water resources.

2 – Professional Growth: Alumni will advance their skills through professional growth and development activities such as graduate study in engineering, research and development, professional registration and continuing education; some graduates will transition into other professional fields such as business and law through further education.

3 – Service: Alumni will perform service to society and the engineering profession through membership and participation in professional societies, government, educational institutions, civic organizations, charitable giving and other humanitarian endeavors.

Our Student Outcomes are what students are expected to know and be able to do by the time of their graduation:

1. an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics
1. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors
2. an ability to communicate effectively with a range of audiences
3. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts
4. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives
5. an ability to develop and conduct appropriate experimentation, analyze and interpret data and use engineering judgment to draw conclusions an ability to acquire and apply new knowledge as needed, using appropriate learning strategies
6. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

FIELD BOOK CHECK LIST

The following outline should aid you in producing neat, clear and concise field notes. If you have any questions about certain parts of this outline, ask your instructor for assistance.

GENERAL

1. **Print your name on the outside of the cover in the upper right-hand corner. Place the "if lost" notice on the inside of the cover.**
2. Provide a table of contents on the first page.
3. **Number pages in the upper right-hand corner of the right page and upper left-hand corner of the left page.**
4. Do not skip pages unless absolutely necessary.
5. Do not tear out pages.
6. Keep your pencil sharp or use a mechanical pencil. Do not use pen, it will run and become illegible if it becomes wet.
7. **Do not erase any of the original data, even if erroneous.**
8. **Do not write over any information. Use one line to cross out. The information that is crossed out may be useful later.**
9. When voiding an entire page, print VOID in large letters across the page.
10. If a page has been recopied, indicate by printing COPY prominently.
11. Letter all notes very neatly.
12. Additions or changes made in the office should be done in red pencil.
13. Do not be sloppy. Above all, field work requires that others be able to read, interpret and act on the information that you provide from the field. If that information is illegible, the information that you provide the office is useless or will require too much explanation to be effective.
14. Those processing your information in the office have not necessarily seen the site or know the order of what was done.
15. **LEFT HAND PAGE:**
    a. Put title of exercise at head of each page.
    b. Put column headings as required on each page.
    c. Final calculated values should not show more precision than field observations.
    d. Make page checks for level notes.
    e. Show corrected values in red ink or red pencil. Be sure pencil is sharp.
    f. Put initials of student who is performing the work as well as team members
16. **RIGHT HAND PAGE**
    a. Remarks should include weather, time, group members present, and instrument information as well as party members and each of their duties. Note that instrument serial number from either the level or total station is important for legal and practical reasons. This information is to be noted at each lab session; as you may or may not receive the same instrument from session to session.
    b. Make a clear sketch.
    c. Describe benchmarks and occupied stations; i.e. benchmark # or TP # with description of what it is- (concrete monument, nail, etc.), elevation of benchmark.
    d. If questions arise, consult the sample field notes in the Appendix of the surveying textbook, or ask your instructor.