Department of Civil Environmental and Geomatics Engineering
Florida Atlantic University
Course Syllabus

1. Course title/number, number of credit hours

Surveying Data Analysis - SUR 3643	3 credit hours

2. Course prerequisites, corequisites, and where the course fits in the program of study

Prerequisites: SUR 2101; SUR 2101L; MAP 3305; corequisite STA 4032.
This course deals with the analysis of spatial measurements. It builds upon concepts learned in SUR 2101 and provides knowledge needed in subsequent courses in the program.

3. Course logistics

Term: Fall 2011
This is a classroom lecture course
Class location and time: R 7:10-10:00 PM (Lecture) *Blackboard Collaborate*

4. Instructor contact information

Instructor's name	Loren J. Gibson, Instructor
Office address	Building EG-36, room 223 (Boca Raton campus)
Office Hours	To be announced
Contact telephone number	
Email address	(561) 297-3936 lgibso15@fau.edu

5. TA contact information

TA's name	
Office address	
Office Hours	
Contact telephone number	
Email address	

6. Course description

Applications of mathematics in surveying. Measurement theory, analysis of measurements, computation, and adjustment of spatial data. Emphasis on computer applications for adjustments and analysis.

7. Course objectives/student learning outcomes/program outcomes

Course objectives	I. Understand matrix methods for solving systems of linear equations. II. Understand the application of probability and statistics to spatial measurements. III. Understand the theory of least squares analysis. IV. Be able to adjust differential leveling, traverse, and other types of surveying engineering measurements. *V.* Understand the application of covariance propagation to spatial measurement problems.
Student learning outcomes & relationship to ABET a-k objectives	A. Understand matrix methods for solving systems of linear equations (a, k). B. Understand the application of probability and statistics to spatial measurements (a, b, e, k). C. Understand the theory of least squares analysis (a, k). D. Be able to adjust differential leveling, traverse, and other types of surveying engineering measurements (a, b, e, k). *E.* Understand the application of covariance propagation to spatial

	measurement problems (a, b, c, e, k).	
Relationship to program outcomes	**Outcome 1**: An understanding of professional and ethical responsibility.	Medium
	Outcome 2: A working knowledge of fundamentals, engineering tools, and experimental methodologies.	High
	Outcome 3: An understanding of the social, economic, and political contexts in which engineers must function.	Medium
	Outcome 4: An ability to plan and execute an engineering design to meet an identified need.	High
	Outcome 5: An ability to function on multi-disciplinary teams.	Medium
	Outcome 6: An ability to communicate effectively.	Medium
	Outcome 7: Graduates will have an advanced understanding of the following areas of Geomatics Engineering: a) Surveying, including but not limited to, boundary and land surveying, subdivision and plat creation, control surveys, and construction surveys, b) geographic information systems (GIS), c) photogrammetry and remote sensing d) mapping, to include but not limited, to topographic maps, cadastral maps, and land use maps, e) geodesy, and f) Global Navigation Satellite Positioning Systems (GPS, GLONASS, etc).	High
	Outcome 8: Graduates will have a conceptual understanding of the role of Geomatics Engineering in infrastructure planning and sustainability, including safety, risk assessment, environmental issues, and hazard mitigation.	Medium
	Outcome 9: Graduates will be successful in finding professional employment, attaining professional licensure, and/or pursuing further academic studies.	High

8. Course evaluation method

Homework: 45% Mid-term examination: 25% Final examination: 30%	*Note*: The minimum grade required to pass the course is C.

9. Course grading scale

See the supplementary *Course Policies Document*.

10. Policy on makeup tests, late work, and incompletes

Makeup tests are given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam. Makeup exam should be administered and proctored by department personnel unless there are other pre-approved arrangements.
Late work is not acceptable.
Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency situation incomplete grades will not be given.

11. Special course requirements

Students must check their official FAU electronic mail accounts and the official course web page

(Blackboard) on a daily basis for announcements and other correspondence.
Students are responsible for obtaining use of suitable computer hardware, software, and Internet connection in order to participate in the *Elluminate Live!* lecture classes.

12. Classroom etiquette policy

Attendance during the *Elluminate Live!* sessions is mandatory. Students are required to fully participate in the live sessions, and not merely log in to the classroom session and physically leave the computer terminal.

13. Disability policy statement

In compliance with the Americans with Disabilities Act (ADA), students who require special accommodations due to a disability to properly execute coursework must register with the Office for Students with Disabilities (OSD) located in Boca Raton campus, SU 133 (561) 297-3880 and follow all OSD procedures.

14. Honor code policy

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and place high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. See University Regulation 4.001 at
http://www.fau.edu/regulations/chapter4/4.001_Code_of_Academic_Integrity.pdf

15. Required texts/reading

1. Official *Course Policies* document, available on the official course web page (Blackboard).
2. Ghilani, *Adjustment Computations: Spatial Data Analysis*, 5th ed.

16. Supplementary/recommended readings

See the official course web site on Blackboard.

17. Course topical outline, including dates for exams/quizzes, papers, completion of reading

Lectures

Date	*Topic*
Thurs Aug 25	Introduction to the course. Errors in surveying measurements. Solutions to systems of linear equations.
Thurs Sep 1	Matrix notation and matrix methods for solving systems of linear equations; the use of software for these methods. Introduction to the theory of least squares ("unweighted"), forming overconstrained systems of equations.
Thurs Sep 8	Introduction to the theory of least squares, solution to overconstrained systems of equations; linear regression.
Thurs Sep 15	Probability and statistics in least squares; the normal distribution. Monovariate data sampling.
Mon Sep 19***	***Last day for withdrawal/drop receiving a 25% tuition adjustment***
Thurs Sep 22	Other useful distributions; confidence intervals; hypothesis testing.
Thurs Sep 29	EDM calibration base line application of least squares; weights in least squares analysis.
Thurs Oct 6	Differential leveling adjustment. Review for mid-term examination.
Thurs Oct 13	Nonlinear least squares problems. (Mid-term examination follows.)
Fri Oct 14***	***Last day for withdrawal/drop without receiving an "F"***
Thurs Oct 20	Traverse adjustment.
Thurs Oct 27	General adjustment procedures; minimally and fully constrained adjustments; blunder

	detection methods.
Thurs Nov 3	Covariance propagation; positional tolerances; preanalysis.
Thurs Nov 10	Special topics, time permitting (e.g., GPS networks, condition equations, equality constraints, Fisher distribution, etc.)
Thurs Nov 17	Special topics, time permitting. Review for final examination.
Thurs Dec 1*	*Final Exam*