

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

<b>1. Course title/number, number of credit hours</b>	
Measurement Theory and Data Adjustments (SUR3520)	3 credit hours
<b>2. Course prerequisites, corequisites, and where the course fits in the program of study</b>	
<i>Prerequisites: SUR3103, SUR3103L, MAC2311, and introductory course in statistics, all with minimum grade of "C"</i>	
<b>3. Course logistics</b>	
<i>Semester: Spring 2019 Classroom: 401      Class time: Monday, 7:10PM – 10:00PM</i>	
<b>4. Instructor contact information</b>	
Dr. Sudhagar Nagarajan Building: 36, Room: 222 Boca Raton, FL Phone: (561) 297 3104 E-mail: <a href="mailto:snagarajan@fau.edu">snagarajan@fau.edu</a> Office hours: MT 5:00 PM- 7:00 PM	
<b>5. Course description</b>	
Applications of mathematics in surveying. Measurement theory, analysis of measurements, computation, and adjustment of spatial data. Emphasis on computer applications for adjustments and analysis.	
<b>6. Course objectives/student learning outcomes/program outcomes</b>	
<i>Course objectives</i>	To provide a fundamental level of understanding of Geomatics data estimation, analysis and interpretation. To teach students the concepts and principles related to the adjustment of observations and the estimation of derived quantities.
<i>Student learning outcomes &amp; relationship to ABET 1-7 outcomes</i>	<ol style="list-style-type: none"> <li>1. Ability to understand the random error theory confidence intervals (1, 6)</li> <li>2. Ability to apply error propagation and obtain optimum results (1, 6)</li> <li>3. Ability to adjust horizontal and vertical surveys (1, 6)</li> <li>4. Ability to perform general least squares (1, 6)</li> </ol>

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

<i>Relationship to program outcomes</i>	<p><b>Outcome 1:</b> An understanding of professional and ethical responsibility (Medium)</p> <p><b>Outcome 2:</b> A working knowledge of fundamentals, engineering tools, and experimental methodologies (High)</p> <p><b>Outcome 3:</b> An understanding of the social, economic, and political contexts in which engineers must function (Low)</p> <p><b>Outcome 4:</b> An ability to plan and execute an engineering design to meet an identified need (High)</p> <p><b>Outcome 5:</b> An ability to function on multi-disciplinary teams (Medium)</p> <p><b>Outcome 6:</b> An ability to communicate effectively (Medium)</p> <p><b>Outcome 7:</b> Graduates will have proficiency in the following areas of civil engineering: (i) structural engineering, (ii) transportation engineering, (iii) geotechnical engineering, (iv) water resources, and (v) environmental engineering (High)</p> <p><b>Outcome 8:</b> Graduates will have an adequate appreciation for the role of civil engineering in infrastructure planning and sustainability including safety, risk assessment, and hazard mitigation (Medium)</p> <p><b>Outcome 9:</b> Graduates will be successful in finding professional employment and/or pursuing further academic studies (High)</p>
<b>7. Course evaluation method</b>	
<p>Assignments: 60%</p> <p>Mid-Term Test: 20%</p> <p>Final exam: 20%</p>	
<b>8. Policy on makeup tests, late work, and incompletes</b>	
<p>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.</p> <p>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.</p>	
<b>9. Special course requirements</b>	
<p>Assignments must be handed in on the due date. Late submissions will not be accepted unless approved by the instructor in advance.</p>	
<b>10. Classroom etiquette policy</b>	
<p>University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions.</p>	
<b>11. Disability policy statement</b>	
<p>In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at <a href="http://www.fau.edu/sas/">www.fau.edu/sas/</a>.</p>	
<b>12. Honor code policy</b>	

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

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

**13. Counseling and Psychological Services (CAPS) Center**

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to <http://www.fau.edu/counseling/>

**14. Required texts/reading**

Charles D. Ghilani (2010). Adjustment Computations: Spatial Data Analysis, 5th Edition, Wiley, New Jersey.

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

Week 1: Course overview and Math review  
Week 2: Introduction to Matlab; Overview and Introduction to Measurements  
Week 3: Martin Luther King Jr. Holiday  
Week 4: Overview and Introduction to Measurements; Random Error Theory  
Week 5: Propagation of Random Errors  
Week 6: Weights of Observations and Principles of Least Squares  
Week 7: Adjustment of Level Networks and Adjustment of Trilateration Networks  
Week 8: Midterm  
Week 9: Spring break  
Week 10: Adjustment of Triangulation, Traverses Networks and Coordinate Transformations  
Week 11: Error Ellipse and Constraints and Constraint Equations  
Week 12: Blunder Detection in Horizontal Control Networks  
Week 13: General Least Squares Method and Its Applications  
Week 14: General Least Squares Method and Its Applications  
Week 15: Analysis of Adjustments  
Week 16: Course Review  
Final Exam: M (Apr 29) 7:00pm - 9:30pm