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| **1. Course title/number, number of credit hours** | | |
| Measurement Theory and Data Adjustments (SUR3520) | | 3 credit hours |
| **2. Course prerequisites, corequisites, and where the course fits in the program of study** | | |
| Prerequisite: SUR3103 and SUR 3103L AND introductory statistics course, all with Minimum Grade of “C” | | |
| **3. Course logistics** | | |
| *Semester*: Spring 2019  Classroom: CM 125 for In-person class; recorded videos will be available for DisL students  Class time: Monday, 7:10PM – 10:00PM | | |
| **4. Instructor contact information** | | |
| Dr. Sudhagar Nagarajan  Building: 36, Room: 222  Boca Raton, FL  Phone: (561) 297 3104  E-mail: [snagarajan@fau.edu](mailto:snagarajan@fau.edu)  Office hours: MT 8:30 AM – 10:30 AM | | |
| **5. 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. | | |
| **6. Course objectives/student learning outcomes/program outcomes** | | | |
| *Course objectives* | 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. | | |
| *Student learning outcomes*  *& relationship to ABET a-k objectives* | 1. Understand the random error theory confidence intervals (a, b, e, k)  2. Apply error propagation and obtain optimum results (a, b, e, k)  3. Adjust horizontal and vertical surveys, (a, b  4. Perform general Least Squares (a, b, 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 (Low)  **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 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)  **Outcome 8**: 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)  **Outcome 9**: Graduates will be successful in finding professional employment and/or pursuing further academic studies (High) | | |
| **7. Course evaluation method** | | | |
| Assignments: 60%  Mid-Term Test: 20%  Final exam: 20% | | | |
| **8. 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.  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. | | | |
| **9. Special course requirements** | | | |
| Assignments must be handed in on the due date. Late submissions will not be accepted unless approved by the instructor in advance. | | | |
| **10. Classroom etiquette policy** | | | |
| 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. | | | |
| **11. Disability policy statement** | | | |
| 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)—in Boca Raton, SU 133 (561-297-3880); in Davie, LA 131 (954-236-1222); or in Jupiter, SR 110 (561-799-8585) —and follow all SAS procedures. | | | |
| **12. 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 www.fau.edu/regulations/chapter4/4.001\_Honor\_Code.pdf. | | | |
| **13. Required texts/reading** | | | |
| Charles D. Ghilani (2010). Adjustment Computations: Spatial Data Analysis, 5th Edition, Wiley, New Jersey. | | | |
| **14. Course topical outline, including dates for exams/quizzes, papers, completion of reading** | | | |
| Week 1: Course overview and Math review  Week 2: Martin Luther King Jr. Holiday  Week 3: Introduction to Matlab; Overview and Introduction to Measurements  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 | | | |