Texas A&M University - Corpus Christi
College of Science and Technology
Department of Computing Sciences
Geographic Information Science Program
Spring 2010

COURSE INFORMATION:
Course: GSEN 5385, Analytical and Digital Photogrammetry
Lecture: 8:00 -12:00 a.m. Wed; 1:00 – 4.00 p.m. Th.
Instructor: Peter Kuntu-Mensah, Ph.D., CP (ASPRS)
Phone: 361-825-3419, Email: peter.kuntu-mensah@tamucc.edu
Office: CBI 105, Office hours: MW 10:30 – 12:00 p.m., 1:00 – 2:30 p.m. (or by appt)

COURSE DESCRIPTION:
A study of the mathematical and geometric models of modern photogrammetry. Covers principles of stereoscopic vision, collinearity, coplanarity, epipolar geometry, ground control densification and extension by analytical aerotriangulation. Explores automation in photogrammetric procedures - digital aerotriangulation, automated data capture.

PREREQUISITES:
instructor’s permission; Knowledge of elementary photogrammetry

REQUIRED TEXT:
“Elements of Photogrammetry with Applications in GIS”, 3rd ed, Paul R. Wolf and Bon Dewitt
http://www.surv.ufl.edu/wolfdewitt
“Digital photogrammetry, A Practical course”, 2nd edition, Wilfred Linder
“Manual of Photogrammetry”, 2nd Ed. C. C. Slama, ASPRS

COURSE OUTLINE:
• Review of Basic Photogrammetric principles:
  What is Photogrammetry?
  Geometric Elements of Aerial photographs
  Image Parallax
  Measurement using photographs
  Ground control
  Orthophotographs
  Mission planning
Photogrammetric instruments

- **Analytical photogrammetry:**
  - Comparators and point-transfer devices
  - 2D-, 3D coordinate transformation
  - Distortions
  - Collinearity
  - Rotation matrices
  - Single photo resection and rotation
  - Two-photo intersection
  - Aerotriangulation
  - Constraints
  - Calibration
  - Airborne GPS photogrammetry

- **Digital Photogrammetry:**
  - Digital Cameras
  - Edge Detection
  - Image matching
  - Object Extraction
  - DEM, Orthophoto generation
  - Automatic Aerotriangulation
  - GIS data capture

**OUTCOME OBJECTIVES**
- Students will understand the basic concepts of Photogrammetry and its utility in collecting spatial data for various applications
- the importance of ground controls in all facets of photogrammetric mapping
- Concepts of collinearity condition in Analytical Photogrammetry.
- Least Squares Adjustment and Computational aspects of Analytical and Digital Photogrammetry.
- the basis for epipolar geometry, image matching and stereo image creation in digital photogrammetry
- the significance of the digital aerial photography in “automatic” creation of these products (mosiacs, othophotos, DEM, orthomaps, topographic map etc)

**EVALUATION AND GRADE ASSIGNMENT:**
Grading will be based on the following weighted averages*

<table>
<thead>
<tr>
<th>Component</th>
<th>Weightage</th>
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</thead>
<tbody>
<tr>
<td>Homework Assignments</td>
<td>40%</td>
</tr>
<tr>
<td>Projects &amp; Research</td>
<td>20%</td>
</tr>
<tr>
<td>Mid term Exam</td>
<td>20%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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Grade Computation:
- **A**  \( \geq 90 \)
- **B**  \( \geq 80 \) and <90
- **C**  \( \geq 70 \) and <80
D $\geq 60$ and $<70$
F $<60$

*Maybe be subject to change*