

Aerial Photogrammetry 航空測量

Serial Number	30004
Course Code	SDA006-*
Instructor	Chen, Liang-Chien 陳良健
Course Name(Chinese)	航空測量
Course Name(English)	Aerial Photogrammetry
Credit	3
Teaching goal	<p>Techniques of small-format aerial photography. Acquisition of airphotos with conventional cameras as well as compact digital cameras. Low-altitude, large-scale photography from airplanes, kites and balloons. Handling, scanning, processing, interpretation, enhancement, and display of analog and digital aerial images. Practical field and laboratory exercises. Course is designed for students in the geospatial analysis program.</p>
Teaching content	<p>Chapter I Introduction</p> <ol style="list-style-type: none"> 1.1. Definition, Types, and Merits of Photogrammetry 1.2. Maps and Images 1.3. Applications of Photogrammetry 1.4. History and Developments of Photogrammetry 1.5. Photogrammetric Processing and Production <p>Chapter II Principals of photography and Imaging</p> <ol style="list-style-type: none"> 2.1. Fundamental Optics 2.2. Lenses 2.3. Image Intensity Illuminance, Aperture, Focal Length, Shutter Speed, and Emulsion Sensitivity 2.4. Metric vs. Non-Metric Cameras 2.5. Digital Images (B/W & Color) <p>Chapter III Camera and Images</p> <ol style="list-style-type: none"> 3.1. Introduction (Perspective vs. Pushbroom) 3.2. Close-Range Cameras

- 3.3. Aerial Camers
- 3.4. Satellite Cameras
- 3.5. The Aid of GPS & INS

Chapter IV Camera Calibration

- 4.1. Interior Orientation Parameters
- 4.2. Items of Calibration
- 4.3. Calibration Methods
- 4.4. Resolving Power

Chapter V Image Measurements and Refinements

- 5.1. Objectives
- 5.2. Image Coordinate System
- 5.3. Measuring Methods
- 5.4. Refinement of Measured Coordinates
- 5.5. Correction Mathematics

Chapter VI Object Coordinate Systems

- 6.1. Introduction
- 6.2. Geocentric and Geodetic Coordinates
- 6.3. Map Projection
- 6.4. Orthometric Height
- 6.5. Ellipsoid Height (Geometric Height)

Chapter VII Vertical Photographs

- 7.1. Introduction
- 7.2. Geometry and Scale
- 7.3. Relief Displacement
- 7.4. Stereo pairs
- 7.5. Parallax
- 7.6. Parallax Equations

Chapter VIII Tilt Photographs

- 8.1. Introduction
- 8.2. Tilt, Swing, and Azimuth
- 8.3. ω , ψ , κ
- 8.4. Tilt Correction

Chapter IX Fundamental Mathematics in Photogrammetry

- 9.1. Introduction

	<p>9.2. Collinearity Condition Equations 9.3. Modeling for Exterior Orientation Parameters 9.4. 3-D Object Determination 9.5. Orthorectification 9.6. Epipolar Geometry</p> <p>Chapter X Digital Image Matching 10.1. Introduction 10.2. Feature for Matching 10.3. Point Matching Methods 10.4. The Aid of Epipolar Geometry 10.5. Applications of Image Matching</p> <p>Chapter XI Model-Based Object Reconstruction 11.1. Introduction 11.2. Analogue Relative Orientation 11.3. Analytical Relative Orientation 11.4. Analogue Absolute Orientation 11.5. Analytical Absolute Orientation</p> <p>Chapter XII Phototriangulation 12.1. Introduction 12.2. Independent Models 12.3. Bundle Adjustment 12.4. Phototriangulation for Satellite Images (RSM, DG, RFM)</p>
Textbooks/References	<p>Text book: Wolf , P.R. , and Dewitt , B.A. ,2000 , “Elements of Photogrammetry with Applications in GIS, 3rd edition” , McGraw-Hill . Reference: 1. Mikhail , E.M. , Bethel , J.S. ,and McGlone , J.C. , 2001 ,“Introduction to Modern Photogrammetry” , John Wiley & Sons . 2. Schenk , T. , 1999 , “Digital Photogrammetry , vol.1” , Terrascience. Course Notes: http://dpl.csr.ncu.edu.tw/download/photogrammetry</p>
Way of Instruction	Lecture
Grading	1. Six Project Reports (90%) 2. Class Interaction (10%)
Office Hour	Tuesday & Thursday (2:00~3:30pm) making appointmen

Core Competencies of Department	Rating	Corresponding Assessments
Global vision	(4) High	Test/Exam
Environmental sustainability	(4) High	Test/Exam
Professional knowledge	(5) Very High	Test/Exam
Expressiveness & teamwork	(3) Medium	Test/Exam