



## 課 綱 Course Outline

自然資源與環境學系碩士班國際組

中文課程名稱 Course Name in Chinese	攝影測量在地表變遷調查應用				
英文課程名稱 Course Name in English	The application of digital photogrammetry on earth surface change				
科目代碼 Course Code	NRESM0510	班 別 Degree	碩士班 Master' s		
修別 Type	選修 Elective	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					
課程目標 Course Objectives					
The earth changes could be detected by using remote sensing techniques. Among those techniques, digital photogrammetry has been mostly used due to the widely use of drone images captured in the air and ground images captured on the ground. This course focuses on building 3D model using image capturing on the ground and in the air to monitoring the earth surface change of different scales. The course divided in tot the following topics,					
系教育目標 Dept.' s Education Objectives					
1	培養兼具國際視野與本土關懷的學生 To develop students who care about local issues and have an international perspective.				
2	培養具備自然科學與社會科學知識的人才 To educate students to have knowledge of both the natural and social sciences.				
3	培養具備環境倫理與人文素養的環境公民 To teach students to be environmental citizens (i.e., knowledgeable about environmental ethics and human issues.).				
系專業能力 Basic Learning Outcomes				課程目標與系專業能力相關性 Correlation between Course Objectives and Dept.' s Education Objectives	
A	能覺知多元的自然科學與社會科學理論並具備研究能力 To have knowledge of natural and social science theories.				●
B	具備自然資源與人類社會議題之調查分析、規劃與經營之能力 To be able to investigate, analyze, plan, and manage both natural resource and human social issues.				●

C	具備將環境倫理與生態思想落實於永續性生活型態的能力 To implement sustainable lifestyles based on environmental ethics and ecological principles.	●
D	能以整全式的觀點來解析環境問題，並具備發展系統性解決方案的能力 To resolve environmental issues and develop systematic solutions with a global perspective.	●
E	具備系統分析、未來思考、溝通協調與團隊合作的能 The ability to analyze, plan, communicate, and coordinate with others (teamwork)	●
F	具備終身學習、國際視野與外語溝通的能力 To instill the values of lifelong learning, an international perspective, and the ability to communicate in a foreign language.	

圖示說明Illustration：● 高度相關 Highly correlated ○ 中度相關 Moderately correlated

課程大綱  
Course Outline

1. Introduction of Remote Sensing, the following textbook will be used, Remote sensing and image interpretation (2000) by Lillesand, T. M. and Kiefer, R. W., 4th edition. Willey. chaps. 1-3, p. 1-189.
2. The introduction of stereoscope and the 3D vision using stereo images: the idea of relief displacement and image parallax.
3. Aerial photos and the application of stereoscope to measure relative high of two points on image. (Assignment 1)
4. Global Navigational Satellite Systems (GNSS) and map projection.
5. Exercise 1&2: Linder, W. (2006) Digital photogrammetry, 2nd edition, Springer. Chaps. 4-5, p. 31-108, The digital elevation model from aerial stereo images.
- Introduction of Lisa and Foto program.
6. PCI Geomatica and Orthoengine/Pix4D mapper.
7. Assignment 2 The digital elevation model created from Hualien aerial stereo images with ground control points.
8. Digital elevation model technologies and application: The DEM users manual (2001) Maune, D. F. (Editor) ASPRS. Chap. 5, p. 121-141.
9. Close range photogrammetry: Linder, W. (2006) Digital photogrammetry, 2nd edition, Springer. Chap. 6, p. 109-132.
10. Camera calibration using Photomodeler Scanner
11. Matterport and 3D digital twins.

資源需求評估 (師資專長之聘任、儀器設備的配合 . . . 等)  
Resources Required (e.g. qualifications and expertise, instrument and equipment, etc.)

課程要求和教學方式之建議  
Course Requirements and Suggested Teaching Methods

其他  
Miscellaneous

1. Linder, W. (2006) Digital photogrammetry, 2nd edition, 209 pp.
2. Remote sensing and image interpretation (2000) by Lillesand, T. M. and Kiefer, R. W., 4th edition. Willey. chaps. 1-3, p. 1-189
3. Digital elevation model technologies and application: The DEM users manual (2001) Maune, D. F. (Editor) ASPRS. Chap. 5, p. 121-141
4. <http://www.photomodeler.com/products/pm-scanner.htm>
5. <http://www.pcigeomatics.com/>

6. <http://www.erdas.com/>

7. DIGITAL PHOTOGRAMMETRIC CHANGE ANALYSIS AS APPLIED TO ACTIVE COASTAL DUNES IN MICHIGAN(1999) <http://www-personal.umich.edu/~danbrown/papers/pers.pdf>

8. Correcting the Data Mapping of IKONOS Images Using (2008)

<http://www.pcigeomatics.com/pdfs/Ikonos.pdf>

9. Habib, A. F., Lee, Y. R., Morgan, M. (2001) Surface matching and change detection using a modified hough transformation for robust parameter estimation. Photogrammetric Record, 17(98): 303 - 315 (October 2001)