School of Engineering

SURV3610: Photogrammetry

Callaghan Semester 2 - 2023



OVERVIEW

Course Description

Students will be given a brief history of photography and photogrammetry and will apply basic mathematics of optics to understand perspective geometry as it relates to photogrammetry. The course enables students to develop an understanding of single imagery photogrammetry, stereophotogrammetry and structure from motion concepts through the application perspective geometry, using various processing software applications, and current digital image processing algorithms. They will be exposed to modern digital cameras, airborne drones, and the technology associated with modern aerial and satellite imaging systems. Students will also be introduced to laser scanning methodologies and applications. After completion of this course, students will be able to plan photogrammetric projects, capture and process images and deliver basic photogrammetric products.

Assumed Knowledge Content covered in courses: SURV1200 Introduction to Surveying, SURV2210 Engineering Surveying, SURV2220 Surveying Methods and Equipment, SURV2230 Surveying Techniques and Computations, SURV3350 Analysis of Observations.

Contact Hours

Callaghan

Laboratory

Face to Face On Campus 1 hour(s) per Week for Full Term

Lecture

Face to Face On Campus 2 hour(s) per Week for Full Term

Tutorial

Face to Face On Campus 1 hour(s) per Week for Full Term Note: The above distribution of contact hours may alter on a weekly basis and will be confirmed in the lecture sessions.

Unit Weighting Workload

10

Students are required to spend on average 120-140 hours of effort (contact and non-contact) including assessments per 10 unit course.



www.newcastle.edu.au CRICOS Provider 00109J



CONTACTS

Course Coordinator

Callaghan Dr Lloyd Pilgrim Lloyd.Pilgrim@newcastle.edu.au (02) 4921 6051 Consultation: Open door policy. You can find me in Room EA122, or please send an email from your university email account with your question.

Teaching Staff

Other teaching staff will be advised on the course Canvas site.

School Office

School of Engineering EAG02 EA Building Callaghan +61 2 4921 5798 9.00am-1.00pm and 2.00pm-5.00pm (Monday to Friday)

SYLLABUS

Course Content Brief history of photography and photogrammetry Basic optics Geometry of a single image Characteristics of vertical imagery Stereophotogrammetry Orientation and transformations Camera and lens calibrations Mapping from aerial photographs Close range photogrammetry Introduction to laser scanning **Course Learning** On successful completion of this course, students will be able to: Outcomes 1. Implement a range of photogrammetric measurement techniques. 2. Apply the theory of photogrammetry to a range of measurement problems. 3. Determine the precision that can be achieved by a variety of photogrammetry techniques. Demonstrate how to use various photogrammetry software. 5. Reduce raw observational data from images to a usable form. 6. Analyse the results obtained and portray them in a cogent manner. **Course Materials** Lecture Materials: A book of lecture notes, to accompany the lecture sessions, will be made available on the Course Canvas site. PDF's of lecture presentations will also be made available through Canvas. **Other Resources:** Whilst a text book is not required to be purchased for this course, the recommended text

> for further reading is : Elements of Photogrammetry with Applications in GIS - by Paul Wolf, Bon Dewitt and Benjamin Wilkinson (4th ed), 2014, McGraw Hill.

The university library has multiple copies of this text, and earlier version are also suitable.



ASSESSMENTS

This course has 4 assessments. Each assessment is described in more detail in the sections below.

	Assessment Name	Due Date	Involvement	Weighting	Learning Outcomes
1	Single Photograph	Week 5 - Commencement of Lecture	Individual	15%	1, 2
2	Stereophotogrammetry	Week 8 - Commencement of Lecture	Individual	20%	1, 2, 5
3	Close Range Photogrammetry	Week 12 - Commencement of	Individual	25%	1, 2, 3, 4, 5, 6
4	Formal Examination	Examination will occur in Week 13, in the scheduled lecture period.	Individual	40%	2, 3, 5

Late Submissions The mark for an assessment item submitted after the designated time on the due date, without an approved extension of time, will be reduced by 10% of the possible maximum mark for that assessment item for each day or part day that the assessment item is late. Note: this applies equally to week and weekend days.

Assessment 1 - Single Photograph

Assessment Type Purpose	Written Assignment Develop an understanding of the photogrammetric geometry associated with a single image.
Description	Extracting spatial information from a single image, using knowledge of the image geometry.
weighting	15%
Due Date	Week 5 - Commencement of Lecture
Submission Method	In Class
	Assignment report to be submitted by the student to the Lecturer at the commencement of the scheduled lecture.
Assessment Criteria	Accuracy, conformance, quality and completeness of report.
	Reports are expected to be presented in a neat, structured and professional manner. All reports must include a signed copy of the University report cover sheet.
	Analysis of data is expected to be of an appropriate standard for third year students.
Return Method	In Class
Feedback Provided	Returned Work - Week 7. Specific feedback will be provided with the returned work, and general feedback will be provided in class.

Assessment 2 - Stereophotogrammetry

Assessment Type	Written Assignment
Purpose	Develop an understanding of stereophotogrammetry through the application of basic methodologies and algorithms.
Description	This task will require acquisition of spatial information from stereo pairs. Then a report based on the acquired date will be required.
Weighting	20%
Due Date	Week 8 - Commencement of Lecture
Submission Method	In Class
	Assignment report to be submitted by the student to the Lecturer at the commencement of the scheduled lecture.
Assessment Criteria	Accuracy, conformance, quality and completeness of report.
	Reports are expected to be presented in a neat, structured and professional manner. All reports must include a signed copy of the University report cover sheet. Analysis of data is expected to be of an appropriate standard for third year students.
Return Method	In Class
Feedback Provided	Returned Work - Week 10. Specific feedback will be provided with the returned work, and general feedback will be provided in class.



Assessment 3 - Close Range Photogrammetry

Assessment Type	Written Assignment
Purpose	Develop an understanding of the application modern digital photogrammetry through the use of current SfM photogrammetric software.
Description	Extracting useful three-dimensional spatial data, and other photogrammetric outputs, from a set of digital images, vi the use of SfM software. Data may be aerial or terrestrial captured data. Analysis of the resulting data is required.
Weighting	25%
Due Date	Week 12 - Commencement of Lecture
Submission Method	In Class
	Assignment report to be submitted by the student to the Lecturer at the commencement of the scheduled lecture.
Assessment Criteria	Accuracy, conformance, quality and completeness of report.
	Reports are expected to be presented in a neat, structured and professional manner. All reports must include a signed copy of the University report cover sheet. Analysis of data is expected to be of an appropriate standard for third year students. This assessment will provide opportunities for students to present three dimensional data and other outputs in a variety of formats. The assessment process will consider the style and quality of results presentation, and the effectiveness of the communication achieved with the methods chosen.
Return Method	In Class
Feedback Provided	Returned Work - Three weeks after submission date. Specific feedback will be provided with the returned work, which will be available for collection from the Lecturer's office.

Assessment 4 - Formal Examination

Assessment Type	Formal Examination
Purpose	Assess Course Content Learning
Description	This examination will be conducted in the format of a formal examination, and it will be held in the Lecture time period in Week 13. Students will be permitted a double sides A4 memory aid sheet.
Weighting	40%
Length	2 hours
Due Date	Examination will occur in Week 13, in the scheduled lecture period.
Submission Method	In Class
Assessment Criteria	
Return Method	Not Returned
Feedback Provided	No Feedback

ADDITIONAL INFORMATION

Grading Scheme

This course is graded as follows:

Range of Marks	Grade	Description		
85-100	High Distinction (HD)	Outstanding standard indicating comprehensive knowledge and understanding of the relevant materials; demonstration of an outstanding level of academic achievement; mastery of skills*; and achievement of all assessment objectives.		
75-84	Distinction (D)	Excellent standard indicating a very high level of knowled and understanding of the relevant materials; demonstration a very high level of academic ability; sound development skills*; and achievement of all assessment objectives.		
65-74	Credit (C)	Good standard indicating a high level of knowledge and understanding of the relevant materials; demonstration of a high level of academic achievement; reasonable development of skills*; and achievement of all learning outcomes.		
50-64	Pass (P)	Satisfactory standard indicating an adequate knowledge and understanding of the relevant materials; demonstration of an adequate level of academic achievement; satisfactory development of skills*; and achievement of all learning		



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	0-49	Fail (FF)	outcomes. Failure to satisfactorily achieve learning outcomes. If all compulsory course components are not completed the mark will be zero. A fail grade may also be awarded following disciplinary action.	
Communication	*Skills are those identified for the purposes of assessment task(s). Communication methods used in this course include:			
Methods - Canvas C or annour - Email: Stu - Face to Fa		vas Course S noouncement il: Students v to Face: Cou	Course Site: Students will receive communications via the posting of content incements on the Canvas course site. tudents will receive communications via their student email account. Face: Communication will be provided via face to face meetings or supervision	
Course Evaluation	Each year feedback is sought from students and other stakeholders about the courses offered in the University for the purposes of identifying areas of excellence and potential improvement.			
Oral Interviews (Vivas)	As part of the evaluation process of any assessment item in this course an oral examination (viva) may be conducted. The purpose of the oral examination is to verify the authorship of the material submitted in response to the assessment task. The oral examination will be conducted in accordance with the principles set out in the <u>Oral Examination (viva) Procedure</u> . In cases where the oral examination reveals the assessment item may not be the student's own work the case will be dealt with under the <u>Student Conduct Rule</u> .			
Academic Misconduct	All students standards r Academic Ir all location https://polici	are required einforce the ntegrity polici ons. For ies.newcastle	d to meet the academic integrity standards of the University. These importance of integrity and honesty in an academic environment. es apply to all students of the University in all modes of study and in the Student Academic Integrity Policy, refer to e.edu.au/document/view-current.php?id=35.	
Adverse Circumstances	The Universiallowable at Applications online Adve 1. the a 2. the a specified in system; 3. you a 4. the c Before appl Procedure a https://polic	sity acknowled dverse circurs for special of rse Circumst assessment it the Course are requestin ourse has a lying you mu available at: ies.newcastled	edges the right of students to seek consideration for the impact of instances that may affect their performance in assessment item(s). consideration due to adverse circumstances will be made using the cances system where: tem is a major assessment item; or tem is a minor assessment item and the Course Co-ordinator has Outline that students may apply the online Adverse Circumstances g a change of placement; or compulsory attendance requirement. Ist refer to the Adverse Circumstance Affecting Assessment Items e.edu.au/document/view-current.php?id=236	
Important Policy Information	The Help b Learning Ma procedures <u>procedures</u>	utton in the (anagement S at <u>https</u> that support	Canvas Navigation menu contains helpful information for using the System. Students should familiarise themselves with the policies and ://www.newcastle.edu.au/current-students/no-room-for/policies-and- c a safe and respectful environment at the University.	

This course outline was approved by the Head of School on the 30/06/2023. No alteration of this course outline is permitted without Head of School approval. If a change is approved, students will be notified and an amended course outline will be provided in the same manner as the original.

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