

COURSE SYLLABUS
SUR3331C Photogrammetry
T 5th Period + F 5-6th Period
Spring Semester
(3 credits)

Prerequisites

SUR3103C (or permission of instructor)

Instructor

Dr. Ben Wilkinson benew@ufl.edu (352) 392-3465

Reed Lab 406A

Ben Wilkinson is an Assistant Professor in Geomatics at the University of Florida. Before joining the faculty at UF in 2013, Dr. Wilkinson worked in private industry as a research scientist focused on airborne lidar and photogrammetry, and also worked as an airborne lidar operator for the National Center for Airborne Lidar Mapping. He teaches advanced photogrammetry and co-instructs the introductory UAS course at UF. He is a coauthor of *Elements of Photogrammetry with Applications in GIS*, 2014.

Teaching Assistant

Will Wright X97068@ufl.edu (352) 392-0345

Reed Lab 404A

Will is an active duty US Army officer pursuing a PhD in Geomatics. He was deployed to Bosnia in 2000 and Iraq in 2003 with 3/3 Armored Cavalry Regiment. His most recent assignment was at NORAD where we served as a Missile and Space Domain Chief for three years. His academic interests include LiDAR, Global Positioning Systems, and Geographic Information Systems. He has taught Physical Geography, Computer Cartography, Geographic Information Systems, Surveying, and Remote Sensing at the United States Military Academy at West Point, NY.

Course Description and Learning Objectives

Relates the use of aerial photographs to determine spatial information. Covers elementary techniques of photogrammetry, establishing the foundation for SUR4350 *Advanced Photogrammetry*.

The course objective is to provide students with a thorough understanding of (1) the principles of photography, (2) image measurement techniques, (3) the mathematical procedures to derive ground coordinates from these measurements, (4) the error budget associated with various measurement techniques, and (5) photogrammetric project planning.

At the completion of the course, the student should be able to:

- i. determine dimensional characteristics of digital images
- ii. conduct precise photographic measurements of photo coordinates
- iii. determine flight and object heights from vertical photographs
- iv. use stereoscopes and photogrammetric software and concepts of analytical photogrammetry to determine ground coordinates
- v. complete planimetric mapping tasks by heads up digitizing

- vi. develop a flight plan and estimation of cost for photogrammetric mapping projects

Method of Instruction

Material is learned by a combination of *lectures*, *home assignments*, and “*hands-on*” *lab exercises*. *Lab exercises* are expected to be begun during the established lab time, but typically require an additional 3-5 hours of additional work on your own time. They consist of a set of procedures to be followed by the student, and the completion and submission of a deliverable. For example, in Lab 9-10, students georeference an aerial image and digitize various features on it following detailed instructions. After digitization, they answer specific questions related to the procedures and the results they obtained. The deliverable is the digitized map and a report containing their answers. Working together on the lab exercises is encouraged, but each student must individually follow the lab procedure, analyze the data, and submit a lab report. Lab reports are due at specified dates throughout the semester according to a set schedule; the deadlines are not flexible, but may vary for non-Gainesville students. *Home assignments* consist of periodic short ungraded surveys, contributions to instructor-led online discussions via the course message board, and short quizzes made available on the course webpage. These are included as part of the *assignments & participation* portion of the grade. *Home assignments* are given at the instructor’s discretion throughout the semester to gauge student comprehension of the material and to reinforce student understanding of perceived more-challenging material.

Meeting Times and Places

The class meets weekly on Tuesday (11:45am-12:35pm) and Friday (11:45am-12:35pm) in **302 Reed Lab** for lectures focused on the topics for that week. Distance students can attend these lectures virtually at the scheduled time through the Polycom system or view the recorded version at a later time. Immediately after the Friday lecture (~50 minutes long) is the lab period (12:50pm-1:40pm), which will begin with a brief introduction of the lab procedure. Similar to the lectures, lab sessions can be attended in real time or recorded sessions can be viewed by distance students. *While live attendance of lectures is optional but highly-encouraged, Gainesville-based students are required to attend the live lab sessions.* The lab topics are selected to coincide with the lecture material. The Instructor and TA will be available during set office hours and by appointment to answer general course questions and those regarding the assignments and labs. Distance students are encouraged to use the class message board on Canvas to communicate with the instructor and TA.

Textbook

Required textbook:

Wolf, P., Dewitt, B., and Wilkinson, B. (2014). *Elements of Photogrammetry with Applications in GIS (4th Ed.)*. Boston, MA: McGraw-Hill.

Communication

The course is managed through the Canvas system and all communication with instructors should be done through the facilities in that system.

Course Evaluation

Grading for SUR3331:

- a) Assignments & participation.....10%
- b) Lab exercises.....25%
- c) Two one-hour-long exams40%
- d) Final examination.....25%

Grade Scale

A	95 -100	C	73 - 76.99
A-	90 - 94.99	C-	70 - 72.99
B+	87 - 89.99	D+	67 - 69.99
B	83 - 86.99	D	63 - 66.99
B-	80 - 82.99	D-	60 - 62.99
C+	77 - 79.99	E	0 - 59.99

No material and supply fee, or equipment fee, for this course.

Grades and Grade Points

For information on current UF policies for assigning grade points, see <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Attendance and Make-Up Work

Requirements for class attendance and make-up exams, assignments and other work are consistent with university policies that can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.

Distance Students Complaints

Each online distance learning program has a process for, and will make every attempt to resolve, student complaints within its academic and administrative departments at the program level. See <http://distance.ufl.edu/student-complaints> for more details.

Weekly Lecture, Project, and Quiz Schedule

Lectures in 302 Reed will be available through Polycom and will also be recorded for distance students who cannot ‘attend’ those classes. Labs will begin with a short lecture in 302 Reed to introduce the lab topic and will continue in either the classroom or one of the computer labs (for Gainesville students). Lab deliverables are generally due by the beginning of the next new lab session.

Day	Week Activity	Reading
Week 1 Jan 6 - 9		
<i>Tue</i>	1: Introduction	Ch. 1
<i>Fri</i>	L1: No lab	
Week 2 Jan 12 - 16		

<i>Tue</i>	2: Units, errors, significant figures	Appendix A
<i>Fri</i>	3: Optics for photogrammetry	Ch. 2-1:3
<i>Fri</i>	L2: Significant figures – statistics exercise	
Week 3 Jan 20 – 23		
<i>Tue</i>	4: Principles of photography	Ch. 2-4:11
<i>Fri</i>	5: Digital images	Ch. 2-12:14
<i>Fri</i>	L3: Digital images	
Week 4 Jan 26 - 30		
<i>Tue</i>	6: Aerial cameras	Ch. 3-1:8
<i>Fri</i>	7: Camera calibration & photo measurements	Ch. 3-9:14, 4-1:6
<i>Fri</i>	L4: Fundamental photo measurements	
Week 5 Feb 2 - 6		
<i>Tue</i>	8: Photo coordinate refinement	Ch. 4-7:14
<i>Fri</i>	9: Vertical photos	Ch. 6-1:6
<i>Fri</i>	L5: Scale and flying height of a vertical photo	
Week 6 Feb 9 - 13		
<i>Tue</i>	10: Vertical photos	Ch. 6-7:10
<i>Fri</i>	11: Stereoscopic viewing	Ch. 7
<i>Fri</i>	L6: Relief displacement of a vertical photo	
Week 7 Feb 16 – 20		
<i>Tue</i>	EXAM I: Covers through lecture 10	
<i>Fri</i>	12: Stereoscopic parallax	Ch. 8-1:6
<i>Fri</i>	L7: Introduction to stereo viewing	
Week 8 Feb 23 - 27		
<i>Tue</i>	13: Stereoscopic parallax	Ch. 8-7:11
	14: Object space coordinate systems	Ch. 5
<i>Fri</i>	L8: Parallax measurement	
Week 9 Mar 2 – 6 Spring Break		
Week 10 Mar 9 – 13		
<i>Tue</i>	15: Elementary planimetric mapping	Ch. 9
<i>Fri</i>	16: Tilted photos	Ch. 10-1:5
<i>Fri</i>	L9-10: Planimetric mapping by heads-up digitizing	
Week 11 Mar 16 – 20		
<i>Tue</i>	17: Stereoscopic plotting instruments: Introduction	Ch. 12-1:5
<i>Fri</i>	18: Stereoscopic plotting instruments: Orientation	Ch. 12-6:8
<i>Fri</i>	L9-10: (continued)	
Week 12 Mar 21 – 27		
<i>Tue</i>	19: Mechanical, analytical, softcopy plotters	Ch. 12-9:18
<i>Fri</i>	20: Vertical photos	Ch. 6-1:6
<i>Fri</i>	L11: Softcopy stereoplotter orientation & measurement	
Week 13 Mar 30 – April 3		
<i>Tue</i>	EXAM II: Covers lectures 11-19	
<i>Fri</i>	21: Project planning	Ch. 18-1:7
<i>Fri</i>	L12-13: Flight planning and cost estimation	
Week 14 April 6 - 10		
<i>Tue</i>	22: Project planning	Ch. 18-8:12
<i>Fri</i>	23: Introduction to lidar	Ch. 14
<i>Fri</i>	L12-13: (continued)	
Week 15 April 13 - 17		

<i>Tue</i>	24: Close-range photogrammetry	Ch. 19-1:6
<i>Fri</i>	25: Close-range photogrammetry	Ch. 19-7:9
<i>Fri</i>	L14-15: Close range photo analysis (graphical)	
Week 16 April 20 - 22		
	No lecture – finish close range lab	
<i>Tue</i>	April 29th (10:00 a.m.-12:00 p.m.)	
	FINAL EXAM	

Online Course Evaluation Process

Student assessment of instruction is an important part of efforts to improve teaching and learning. At the end of the semester, students are expected to provide feedback on the quality of instruction in this course using a standard set of university and college criteria. These evaluations are conducted online at <https://evaluations.ufl.edu>. Evaluations are typically open for students to complete during the last two or three weeks of the semester; students will be notified of the specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results>.

UF Academic Honesty

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: *"We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity."* You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida, the following pledge is either required or implied: *"On my honor, I have neither given nor received unauthorized aid in doing this assignment."*

It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code>.

Software Use

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

Services for Students with Disabilities

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues. Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

0001 Reid Hall, 352-392-8565, www.dso.ufl.edu/drc/

Campus Helping Resources

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, www.counseling.ufl.edu/cwc/*
 - Counseling Services
 - Groups and Workshops
 - Outreach and Consultation
 - Self-Help Library
 - Wellness Coaching
- *Career Resource Center, First Floor JWRU, 392-1601, www.crc.ufl.edu/*