# Cover Sheet: Request 9624

## ucc1-SUR4XXXC Practicum in UAS Mapping

### Info

| | |
|---|---|
| Process | Course\|New\|Ugrad/Pro |
| Status | Pending |
| Submitter | Sager,Scott A sasager@ufl.edu |
| Created | 10/2/2014 3:19:41 PM |
| Updated | 8/28/2015 8:06:04 AM |
| Description | new course, co-taught with SUR6XXXC Practicum in UAS Mapping |

### Actions

| Step | Status | Group | User | Comment | Updated |
|---|---|---|---|---|---|
| Department | Approved | CALS - Forest Resources and Conservation 514946000 | White, Tim | | 2/20/2015 |
| Added differences_SUR4XXXC-SUR6XXXC Practicum in UAS Mapping.doc | | | | | 10/2/2014 |
| College | Approved | CALS - College of Agricultural and Life Sciences | Brendemuhl, Joel H | Approved by CALS CC. | 8/28/2015 |
| Replaced UCC1_SUR4XXXC Practicum in UAS Mapping.pdf | | | | | 3/3/2015 |
| Replaced syllabus_SUR4XXXC Practicum in UAS Mapping.docx | | | | | 3/3/2015 |
| Replaced syllabus_SUR6XXXC Practicum in UAS Mapping.docx | | | | | 3/3/2015 |
| Added ucc1_SUR4XXXC Practicum in UAS Mapping.docx | | | | | 3/3/2015 |
| Replaced syllabus_SUR4XXXC Practicum in UAS Mapping.docx | | | | | 4/27/2015 |
| Replaced syllabus_SUR6XXXC Practicum in UAS Mapping.docx | | | | | 4/27/2015 |
| Added syllabus_SUR4XXXC Practicum in UAS Mapping2.docx | | | | | 4/27/2015 |
| Added syllabus_SUR6XXXC Practicum in UAS Mapping2.docx | | | | | 4/27/2015 |
| University Curriculum Committee | Pending | PV - University Curriculum Committee (UCC) | | | 8/28/2015 |
| No document changes | | | | | |
| Statewide Course Numbering System | | | | | |
| No document changes | | | | | |
| Office of the Registrar | | | | | |
| No document changes | | | | | |
| Student Academic Support System | | | | | |
| No document changes | | | | | |
| Catalog | | | | | |
| No document changes | | | | | |
| College Notified | | | | | |
| No document changes | | | | | |

**UF | UNIVERSITY of FLORIDA**

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**Recommended SCNS Course Identification**

1. Prefix   SUR        2. Level   4        3. Number   XXX        4. Lab Code   C

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5. Course Title   Practicum in UAS Mapping

6. Transcript Title (21 character maximum)   PRACTICUM UAS MAPPING

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7. Effective Term
   Earliest Available

8. Effective Year
   Earliest Available

9. Rotating Topic?   No

10. Amount of Credit   3        11. If variable, # minimum and # maximum credits per semester.

12. Repeatable credit?   No        13. If yes, total repeatable credit allowed   #

14. S/U Only?   No        15. Contact Type   Select Contact Type

16. Degree Type   Baccalaureate        17. If other, please specify:   Click here to enter text.

18. Category of Instruction   Intermediate

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19. Course Description (50 words maximum)

Provides students hands-on experience with flight planning and safe deployment of small UASs (Unmanned Aerial Systems), and the subsequent processing of the imagery acquired on these flights.

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20. Prerequisites

SUR3501C

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21. Co-requisites

Click here to enter text.

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22. Rationale and Placement in Curriculum

Co-taught with graduate course (SUR6XXXC Practicum in UAS Mapping).

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23. Complete the syllabus checklist on the next page of this form.

**Syllabus Requirements Checklist**

The University's complete Syllabus Policy can be found at:
http://www.aa.ufl.edu/Data/Sites/18/media/policies/syllabi_policy.pdf

The syllabus of the proposed course **must** include the following:

☒ Course title

☒ Instructor contact information (if applicable, TA information may be listed as TBA)

☒ Office hours during which students may meet with the instructor and TA (if applicable)

☒ Course objectives and/or goals

☒ A weekly course schedule of topics and assignments.

☒ Methods by which students will be evaluated and their grades determined

☒ Information on current UF grading policies for assigning grade points. This may be achieved by including a link to the appropriate undergraduate catalog web page: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx.

☒ List of all required and recommended textbooks

☒ Materials and Supplies Fees, if any

☒ A statement related to class attendance, make-up exams and other work such as: *"Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx."*

☒ A statement related to accommodations for students with disabilities such as: *"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."*

☒ A statement informing students of the online course evaluation process such as: *"Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results."*

It is **recommended** that the syllabus contain the following:

☒ Critical dates for exams or other work

☒ Class demeanor expected by the professor (e.g. tardiness, cell phone usage)

☒ The university's honesty policy regarding cheating, plagiarism, etc.

*Suggested wording: UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students 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." The Honor Code (http://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.*

☒ Contact information for the Counseling and Wellness Center: http://www.counseling.ufl.edu/cwc/, 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies

**COURSE SYLLABUS**
**SUR4XXXC *PRACTICUM IN UAS MAPPING***

**Summer A – 1st two weeks**
**(3 credits)**

## Prerequisites

SUR3501 *Foundations of UAS Mapping* (or Permission of Instructor)

## Instructors

**Dr. Grenville Barnes** gbarnes@ufl.edu (352) 392 4998      **Reed Lab 406B**
**Dr. Ben Wilkinson** benew@ufl.edu (352) 392-3465      **Reed Lab 406A**
**Dr. Scot Smith** ses@ufl.edu  (352) 392 4990      **Reed Lab 301**
Office Hours – Immediately following daily activities (or as arranged)

## Course Description and Learning Objectives

Provides students hands-on experience with flight planning and safe deployment of small unmanned aerial systems (UASs), and the subsequent processing of the imagery acquired on these flights.

By the end of this course, the student will be able to:

- plan flights using open source software
- plan and establish ground control for subsequent quality control
- deploy a UAS in an automated mode
- process high resolution aerial imagery taken from a UAS
- produce deliverables such as orthophotos, digital elevation models (DEM), and 3-D terrain models
- analyze the spatial quality of UAS products

## Method of Instruction

The course meets for the first two weeks of the Summer A term.  Learning will occur through a combination of lectures, supervised in-lab tutorials, and field exercises.  The course is only available in Gainesville (no distance option).

## Meeting Times and Places

The class will meet at 8:30am for lectures and discussions in 302 Reed Lab, and for lab tutorials and computer work in 402 Reed Lab.

## Readings

Readings and other materials will be assigned, including (among others):

Mission Planner: http://planner.ardupilot.com/wiki/common-planning-a-mission-with-waypoints-and-events/

Agisoft (2013) PhotoScan User Manual Professional Edition, Version 1.0.0. http://downloads.agisoft.ru/pdf/photoscan-pro_1_0_0_en.pdf

## Course Evaluation

Grading is based on participation, short on-line quizzes, and a final project presentation:

- a) Attendance and participation …………….…20%
- b) On-line quizzes  …………………….…...…. 20%
- c) Course project …………….…………….... 60%

## Attendance and Participation (20%)

Students are expected to attend all lectures, lab tutorials and field sessions and actively participate in all these activities.  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.

## On-line Quizzes (20%)

Three open book on-line quizzes covering flight planning, image capture and image processing.

## Course Project (60%)

Each student is required to complete a project which summarizes the methodology, technology, and results achieved using either a vertical-take-off-and-landing (VTOL) or fixed-wing UAS. Students are required to evaluate their results and compare these with conventional approaches. On the last day of the course each student is given 10-15 minutes to present their final project. The presentation (counting one quarter of the total 60%%, i.e. 15% of the total course grade) should include a brief summary of the objective, methodology, data processing, analysis, results and conclusion(s) reached.

## Grade Scale

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

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

## *Class and Project Schedule*

Lecture and discussions will take place in Reed 302. All lab work will be done in Reed 402 where the necessary software is located. Fieldwork will be centered on two different areas, one forested and another with agriculture and infrastructure.

| Time | Activity | Location | Hours |
|------|----------|----------|-------|
| Day 1 (Mon) | Introduction to Course and Logistics<br>Introduction to applicable UASs<br>Review UAS Mapping Work Flow<br>Review facilities and available software | 302/402 Reed | 6 |
| Day 2 (Tues) | Flight Planning – each student designs their own flight plan | 402 Reed | 8 |
| Day 3 (Wed) | Reconnaissance and Ground Control at Site 1<br>**Quiz 1** | Field<br>Online | 8 |
| Day 4 (Thurs) | Review safety considerations<br>Automated flight at Site 1 | Field | 8 |
| Day 5 (Fri) | Initial Processing for Site 1 | 402 Reed | 8 |
| Day 6 (Sat) | Processing for Site 1<br>**Quiz 2** | 402 Reed<br>Online | 4 |
| Day 7 (Sun) | Independent work | | |
| Day 8 (Mon) | Reconnaissance and Ground Control at Site 2 | Field | 8 |
| Day 9 (Tues) | Automated flight for each flight plan at Site 2 | Field | 8 |
| Day 10 (Wed) | Processing for Site 1<br>**Quiz 3** | 402 Reed<br>Online | 8 |
| Day 11 (Thurs) | Complete Processing and Analysis<br>Begin Presentation Preparation | 302/402 Reed | 8 |
| Day 12 (Fri) | Continue with Presentation Preparation<br>**Final Presentations** | 302/402 Reed | 8 |
| | | TOTAL | 82 Hours |

## 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/**

## Other Requirements

Cellular phones must be silenced during class.  They may be used in field sessions for field work communication pertaining to this course work only.

## COURSE SYLLABUS
## SUR6XXXC *PRACTICUM IN UAS MAPPING*

### Summer A – 1st two weeks
### (3 credits)

### Prerequisites
SUR6XXX *Foundations of UAS Mapping* (or Permission of Instructor)

### Instructors
**Dr. Grenville Barnes** gbarnes@ufl.edu (352) 392 4998       **Reed Lab 406B**
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- process high resolution aerial imagery taken from a UAS
- produce deliverables such as orthophotos, digital elevation models (DEM), and 3-D terrain models
- analyze the spatial quality of UAS products

### Method of Instruction
The course will meet daily over a period of 2 weeks for a total of 82 hours. Learning will occur through a combination of lectures, supervised in-lab tutorials and field exercises.  The course is only available in Gainesville (no distance option).

### Meeting Times and Places
The class will meet at 8:30am for lectures and discussions in 302 Reed Lab, and for lab tutorials and computer work in 402 Reed Lab.

### Readings
Readings and other materials will be assigned, including (among others):

Mission Planner: http://planner.ardupilot.com/wiki/common-planning-a-mission-with-waypoints-and-events/

Agisoft (2013) PhotoScan User Manual Professional Edition, Version 1.0.0. http://downloads.agisoft.ru/pdf/photoscan-pro_1_0_0_en.pdf

Watts, A, Perry, J, Smith, S, Burgess, M, Wilkinson, B, Szantoi, Z, Ifju, P, Percival, H. (2010) Small unmanned aircraft systems for low-altitude aerial surveys. The Journal of Wildlife Management. 74(7):1614-1619.

Dall'Asta E, Roncella R (2014). A comparison of semiglobal and local dense matching algorithms for surface reconstruction. Remote Sensing and Spatial Information Sciences 40:187-194.

Pajeres, G. (2015) Overview and current status of remote sensing applications based on unmanned aerial vehicles. Photogrammetric Engineering and Remote Sensing, 81(4):281-329

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### Course Project (60%)
Each student is required to complete a project which summarizes the methodology, technology, and results achieved using either a vertical-take-off-and-landing (VTOL) or fixed-wing UAS. Students are required to evaluate their results and compare these with conventional approaches. On the last day of the course each student is given 10-15 minutes to present their final project. The presentation (counting one quarter of the total 60%, i.e. 15% of the total course grade) should include a brief summary of the objective, methodology, data processing, analysis, results and conclusion(s) reached. Graduate students are required to produce a journal-style paper describing the analysis and results of their course project due by the end of the Summer A semester.

## Grade Scale

A        95 -100%
A-       90 - 94.99%
B+       87 - 89.99%
B        83 - 86.99%
B-       80 - 82.99%
C+       77 - 79.99%
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    Self-Help Library
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## Other Requirements
Cellular phones must be silenced during class.  They may be used in field sessions for field work communication pertaining to this course work only.

**Institute of Food and Agricultural Sciences**                406 Reed Lab
School of Forest Resources & Conservation                    PO Box 110565
Geomatics Program                                          Gainesville, FL
32611-0565

September 11, 2014

Dear Curriculum Committee:

**RE: Undergraduate/graduate differentiation in dual enrolled SUR4XXXC/ SUR6XXXC**
*Practicum in UAS Mapping*

We appreciate your consideration of the undergraduate and graduate sections of *Practicum in UAS Mapping* for formal approval and assignment of a course number.  The course is co-taught – designed for upper division (junior and senior) undergraduates or early stage graduate students.

Graduate students are required to produce a journal-style paper describing the analysis and results of their course project, whereas undergraduate students are only required to give a presentation. This paper makes up 30% of the final grade for graduate students and is expected to contain a more in-depth analysis of the data collected with a UAS.

Sincerely,

Grenville Barnes
Professor

Ben Wilkinson
Assistant Professor