

---

## **SUR4530/6536 *Geodesy and Geodetic Positioning***

### **1. OVERVIEW**

Geodesy is relevant for many surveying tasks today, may it be through the approximation of the earth through an ellipsoid as it is used for the State Plane Coordinate System, the use of satellite navigation systems to observe structural deformations, or for high accuracy measurements over spatially extended areas that need to take into account earth curvature and gravity anomalies. This course explains the fundamentals of Geodesy which are relevant in the survey practice both for plane surveying (cadastral surveying, engineering surveying, construction surveying) and geodetic surveys (determination of the earth's surface and gravity field over a region that typically spans a country or group of countries). Students will learn the concepts of ellipsoid, gravity, geodetic datums, reduction of measurements, satellite orbits, code and carrier phase observations in Global Navigation Satellite Systems (GNSS), and GNSS data collection and processing.

- Fall semester, 3 credits
- 100% online, synchronous and asynchronous component
- <http://elearning.ufl.edu/>

**Course Prerequisites:** SUR 3103C Geomatics or instructor consent

#### **Instructor:**

Dr. Hartwig Henry Hochmair, Ft. Lauderdale Research & Education Center, Davie West Bldg.  
Phone: (954) 577-6317; e-mail: [hhhochmair@ufl.edu](mailto:hhhochmair@ufl.edu)

#### **Teaching assistant:**

Adam Benjamin, Ft. Lauderdale Research & Education Center, Davie West Bldg.  
Phone: (954) 577-6378; e-mail: [abenjamin1@ufl.edu](mailto:abenjamin1@ufl.edu)

- Please use the Canvas message/Inbox feature for fastest response.
- Students are also welcome to arrange a video conference meeting to go over any questions.

#### **Lectures:**

Tue: 9:35am-11:30am (per. 3+4), Thu: 9:35am-10:25am (per. 3) via Zoom

Note: Most of the lectures will be pre-recorded. Links to lecture recordings will be posted in Canvas.

First day of class: 9/1/20. Last day of class: 12/8/20

#### **Office hours:**

The instructor and TA can be best reached via the conversation tool in Canvas. Students are also welcome to call by phone or arrange a video conference meeting in Zoom.

#### **Recommended textbooks (not required):**

- Elithorp, J. A. and Findorff, D. D. (2009). *Geodesy for Geomatics and GIS Professionals* (2nd ed.). Acton, MA: XanEdu Custom Publishing
- van Sickle, J. (2015). *GPS for Land Surveyors* (4th Ed.): CRC Press.

## 2. LEARNING OUTCOMES

The course objective is to provide the students with competencies to apply geodetic science as it pertains to the practice of Geomatics. At the completion of the course, the student should be able to:

- apply trigonometric computations on spherical and spheroidal earth models
- convert point coordinates between different geodetic datums and height systems
- assess how irregularities of the Earth's shape and gravity field affect the accuracy of geodetic measurements
- apply online geodetic tools for datum and height conversions
- identify best practices for surveys with GNSS
- conduct independent research on advanced topics in Geodesy and Geodetic Positioning
- demonstrate written and oral communication skills in interpreting computational results

## 3. COURSE LOGISTICS

- For each graded item (assignment, quiz, discussion post) a due date and time is given, which is usually the beginning of the next class.
- Assignments are graded based on timeliness, correctness of computations and interpretation of numerical results; quizzes are graded based on correctness of multiple choice questions, and discussion items are graded based on creativity, completeness, and technical correctness.
- There is a 1 week turnaround for assignment and discussion grading. Quizzes are auto-graded instantaneously in Canvas.
- This course is a distance education course taught primarily as pre-recorded lectures and also some live lectures using the virtual classroom software Zoom. Lecture materials can be downloaded from weekly modules on the Canvas website.

The Canvas system should be used as the primary platform for written communication between students and the instructor. Questions and suggestions to the whole class can also be posted under the Discussions tab. Any short-term changes concerning lectures or other course components will be announced through Canvas. Feel free to call the instructors with any questions.

### Technology Requirements:

- A computer or mobile device with high-speed internet connection to view lectures.
- A headset and/or microphone and speakers
- For Zoom: A supported web browser on a supported operating system (Windows, Mac OS, Linux); and minimum bandwidth. More details can be found [here](#).

### Using Zoom:

Live lectures and office hour meetings (per individual student requests) will be conducted with the Zoom conferencing software. Sessions can be joined by clicking a link posted by the instructor on Canvas.

Synchronous online sessions will be recorded. By sharing your video, screen, or audio during any synchronous online class sessions, you are consenting to being recorded for the benefit of students who cannot attend live as well as for class review during the current semester. If you have special circumstances or concerns about privacy, it is your responsibility to discuss it with your instructor.

**Grades:**

<i>Item</i>	<i>Percentage</i>
Timeliness and completeness of assignments (UG: 7 assignments @ 4% each; G: 8 assignment @ 3.5% each)	28%
Online quizzes (7 quizzes @ 2% each)	14%
Online discussions (5 discussions @ 2% each)	10%
Attendance (2 events where attendance required @ 2% each)	4%
Mid-term exam	20%
Final exam (cumulative)	24%
<b>Total</b>	<b>100%</b>

**Grading scale:**

<i>Grade</i>	<i>Percentage</i>	<i>Grade</i>	<i>Percentage</i>
A	90.0-100.0	C+	73.0-74.9
A-	87.0-89.9	C	67.0-72.9
B+	85.0-86.9	C-	65.0-66.9
B	77.0-84.9	D	50.0-64.9
B-	75.0-76.9	E	0-49.9

Graduate students will be given a capstone home assignment (HG) which consists of advanced tasks relating to topics taught throughout the semester. Completing the tasks requires independent research efforts (e.g., finding resources on the Internet, trying alternative software packages) that go beyond class materials provided in the lecture. The additional tasks involve mathematical computations, use of software, and written essays that combine lectured theoretical concepts with critical thinking. The capstone assignment counts as an additional regular assignment. A minimum point score is not required on the capstone assignment to receive a final course grade.

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

**4. COURSE CONTENT**

<b>Week</b>	<b>Topic (Assignments in parentheses)</b>	<b>Book chapter</b>
Week 1, Sep 1	Introduction (D1)	EF ch. 1
Week 2, Sep 8	Latitude and longitude Geometry of the sphere (H1)	EF ch.-2 EF ch. 3
Week 3, Sep 15	Earth's gravity field (Q1) Geometry of the ellipsoid (H2)	EF ch. 4 EF ch. 5
Week 4, Sep 22	Geodetic perspective on the USPLSS (D2) Geodetic coordinate systems (H3)	EF ch. 6 EF ch. 7
Week 5, Sep 29	Geodetic datums (Q2)	EF ch. 8
Week 6, Oct 6	The Geoid Reduction of observations (H4)	EF ch. 9 EF ch. 10
Week 7, Oct 13	<i>Exam review Q&amp;A (10/13) – attend. req'd (D3)</i>	
Week 8, Oct 20	Mid-term exam (10/20) Satellite coordinate systems (H5)	
Week 9, Oct 27	Overview of GPS (Q3)	EF ch. 11 VS ch. 1
Week 10, Nov 3	Error budget (D4) Receivers and survey methods (Q4)	VS ch. 2+4
Week 11, Nov 10	Mathematical models for solutions (Q5) Dilution of precision	VS ch. 2+4 VS ch. 3
Week 12, Nov 17	Planning a GPS Survey (H6)	VS ch. 6
Week 13, Nov 24	RTK and DGPS surveying (Q6) GPS technology in practice (D5)	VS ch. 7
Week 14, Dec 1	Data processing (Q7) Other GNSS (H7)	VS ch. 8
Week 15, Dec 8	<i>GNSS student presentations (HG) Final exam Q&amp;A – attendance req'd (12/8)</i>	

D: Discussion, Q: Quiz, H: Home assignment  
EF: Elithorp and Findorff; VS: van Sickle

**Exam dates:**

Mid-term exam: Tue 10/20/20 from 9:35am-11:30am

Final exam: Tue 12/15/20 from 10:00am-12:00pm

**Other dates with attendance required:**

Tue 10/13, 9:35 am -11:30 am: Exam review Q&A

Tue 12/8, 9:35 am – 11:30 am: Student paper presentations, Final exam Q&A

**5. POLICIES AND REQUIREMENTS**

This syllabus represents current plans and objectives for this course. As the semester progresses, changes may need to be made to accommodate timing, logistics, or to enhance learning. Such changes, communicated clearly, are not unusual and should be expected.

**Late submissions and make-up requests:**

It is the responsibility of the student to access on-line lectures, readings, quizzes, and exams and to maintain satisfactory progress in the course.

- A 10% penalty per day will be applied to late assignments. A late submission on the due date results also in a 10% deduction.
- Assignments will not be accepted if handed in more than seven days after the due date.
- Quizzes cannot be taken past the deadline.
- Exceptions to the late policy are only allowed per university policy.

Computer or other hardware failures, except failure of the UF e-Learning system, will not excuse students for missing assignments. Any late submissions due to technical issues MUST be accompanied by the ticket number received from the Helpdesk when the problem was reported to them. The ticket number will document the time and date of the problem. You MUST e-mail your instructor within 24 hours of the technical difficulty if you wish to request consideration.

For computer, software compatibility, or access problems call the HELP DESK phone number—352-392-HELP = 352-392-4357 (option 2).

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>.

**Semester Evaluation Process:**

Student assessment of instruction is an important part of efforts to improve teaching and learning.

At approximately the mid-point of the semester, the School of Forest Resources & Conservation will request anonymous feedback on student satisfaction on various aspects of this course. These surveys will be sent out through Canvas and are not required but encouraged. This is not the UF Faculty Evaluation!

At the end of the semester, students are expected to provide UF with feedback on the quality of instruction in this course using a standard set of university and college criteria (UF Faculty Evaluations). 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>.

**Netiquette: Communication Courtesy Semester Evaluation Process:**

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions and chats. Failure to do so may result in loss of participation points and/or referral to the Dean of Students' Office. <http://teach.ufl.edu/docs/NetiquetteGuideforOnlineCourses.pdf> Student

**Academic Honesty Policy:**

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 or 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>

**University Policy on Accommodating Students with Disabilities:**

Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking the quizzes or exams. Accommodations are not retroactive; therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

**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.

**6. CAMPUS RESOURCES**

**Student Life, Wellness, and Counseling Help:**

- *U Matter, We Care:* If you or someone you know is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu), 352-392-1575, or visit [U Matter, We Care website](#) to refer or report a concern and a team member will reach out to the student in distress.
- *Counseling and Wellness Center:* [Visit the Counseling and Wellness Center website](#) or call 352-392-1575 for information on crisis services as well as non-crisis services.
- *Student Health Care Center:* Call 352-392-1161 for 24/7 information to help you find the care you need, or [visit the Student Health Care Center website](#).
- *University Police Department:* [Visit UF Police Department website](#) or call 352-392-1111 (or 9-1-1 for emergencies).
- *UF Health Shands Emergency Room / Trauma Center:* For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [Visit the UF Health Emergency Room and Trauma Center website](#).

**Academic Resources:**

- For issues with technical difficulties for e-learning in Canvas, please post your question to the Technical Help Discussion in your course, or contact the UF Help Desk at: [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu) | (352) 392-HELP - select option 2 | <http://elearning.ufl.edu>
- Library Help Desk support <http://cms.uflib.ufl.edu/ask>
- SFRC Academic Hub <https://ufl.instructure.com/courses/303721>

**Student Complaint Process:**

The School of Forest Resources & Conservation cares about your experience and we will make every effort to address course concerns. We request that all our online students complete a course satisfaction survey each semester, which is a time for you to voice your thoughts on how your course is being delivered.

If you have a more urgent concern, your first point of contact should be the SFRC Academic Coordinator or the Graduate/Undergraduate Coordinator for the program offering the course. You may also submit a complaint directly to UF administration:

- *Student Complaints On-Campus:* [Visit the Student Honor Code and Student Conduct Code webpage for more information](#)
- *On-Line Students Complaints:* [View the Distance Learning Student Complaint Process.](#)