GEM: The Geomatics
Bachelor of Science Program

Programs and Faculty

Always on the leading edge, UF offers the state's only 4-year accredited degree program in Geomatics. This field uses advanced technology to detect how and where things are located on the Earth's surface. Geomatics students study how the Earth is measured, how Earth-based data are analyzed and how these data are integrated into forms and systems that people can use. They learn surveying, remote sensing, digital mapping, GIS, GPS, satellite imaging, and other technologies of geospatial science. Students gain hands-on experience working with field equipment and in high tech classrooms, and will be very well prepared for the ample opportunities offered in this challenging and exciting field.

The Geomatics major at UF is accredited by the Accreditation Board for Engineering and Technology (ABET), is strongly supported by the Florida Surveying and Mapping Society (FSMS), and is the only program of its kind in the state.

Geomatics Educational Objectives

1. Enhance the professional status and instill a sense of professionalism in future leaders of Geomatics.
2. Expand the role of Geomatics in the spatial information community.
3. Play a leadership role in the implementation of new ideas and methods through research and the dissemination of research results.
4. Expand the diversity of the Geomatics profession (students, faculty, practitioners).
5. Help satisfy the public and private sector employment demand for Geomatics professionals.
6. Improve the competitiveness of our graduates by providing them with quality knowledge base and lifelong learning skills.

The GEM program is fortunate to have faculty (Table 1) who are among the foremost experts in their areas of specialization, both nationally and internationally. They have made fundamental contributions to the knowledge being taught to Geomatics students and they carry out research having significant impacts, for example:

- Developing a land cover mapping system in Florida in a cooperative effort with a number of resource management agencies, with high resolution images to reduce the field work required for ground-truthing.
- Creating data layers and models for natural resource managers developing regional policies that influence the maintenance of biological diversity in Florida (the Gap Analysis Project). A primary objective is to conduct an analysis of potential terrestrial vertebrate, butterfly, skipper, and ant species richness in relation to existing reserves and managed areas, and to identify areas of high species richness or unique species concentrations not within existing reserves.
- Studying the effect of devolution of land use and resource rights in southern Africa on democratization, economic freedoms, poverty alleviation, governance, and environmental sustainability.
- Measuring the impact of road construction in southwest Amazon on the resilience of social-ecological systems
- Examining how indigenous communities in Latin America adapt property law and technological innovations to record complex information, and using inexpensive GPS methods to reduce the cost of plot surveys in developing countries to an affordable level.
- Applying Geomatics to resource management by augmenting and furthering the advances in navigation geo-referencing mapping (NaGeM) science and technology.
- Developing robust automated algorithms and tools that would solve complex problems in digital photogrammetry, computer vision, and image understanding.
- Analyzing climate change data to estimate sedimentation in the Aswan High Dam Reservoir.
- Applying unmanned autonomous vehicles to natural resource inventories, hurricane damage assessment, monitoring regrowth after a forest fire and wildlife habitat mapping.
- Assessing environmental impacts of a dam project between Hungary and the Slovak Republic with satellite remote sensing techniques.

		INSTRUCTOR							
		Abd-Elrahman, Amr	**Barnes, Grenville**	**Dewitt, Bon A.**	**Gibson, David W.**	**Hochmair, Hartwig**	**Mohamed, Ahmed**	**Seedahmed, Gamal**	**Smith, Scot E.**
Ph.D		Univ. of Florida	Univ. of Wisconsin	Univ. of Wisconsin	Univ. of Alabama	Tech. Univ. of Vienna	Univ. of Calgary	Ohio State Univ.	Univ. of Michigan
Areas of Specialization		Spatial Data Modeling, Remote Sensing and Pattern Recogn.	Cadastral Systems and Land Tenure Administration	Photogrammetry, Digital Mapping, and Hydrographic Mapping	Land Information Systems and Surveying Practice	GIS, Trans-portation, Spatial anal., Cognitive eng.	Geomatics, Navigation and Mapping	Digital photo-grammetry, Computer vision, Image understand.	Remote Sensing, GIS
Undergraduate Courses	1.	SUR 3393 &L (All) Geographic Inform. Systems	SUR 3501 Spatial Measurement Systems	SUR 3103 Geomatics	SUR 3323 Visualization of Spatial Information	SUR 3520 Measurement Science	FOR 3434C Forest Resource Inform. Systems	SUR 3331 Photogrammetry	SUR 4380 Remote Sensing
	2.	SUR 3641 Surveying Computations	SUR 4403 Cadastral Principles	SUR 4350 Advanced Photogrammetry	SUR 4201 Route Geometrics and Design		SUR 4530 Geodesy & Geo-detic Positioning		SUR 4912 Senior Project
	3.	Lab sections PCY: 3103L, 3331L, 3501L, 4350L, 4463L, 4530L		SUR 4463 Subdivision Design	SUR 4430 & L (All) Surveying and Mapping Practice	Lab sections FTL: 3103L, 3501L, 4530L		Lab sections FTL: 3331L, 4350L	
Graduate Courses	1.	SUR 5xxx GIS at the Corporate Level (in prep.)	SUR 5391 Geomatics: Spatial Foundations of GIS	SUR 5365 Digital Mapping		SUR 5xxx GIS programming (in prep.)	SUR 5525 Least-Squares Adjustments		SUR 5385 Remote Sensing Applications
	2.		SUR 5425 Cadastral Info. Syst.			SUR 5625 GIS Analysis	FOR 6934 GPS-INS Integr.		SUR 5625 GIS Analysis
	3.		SUR 6427 Land Tenure Administration						SUR 6375 Terrain Analysis and Mapping
	4.		FOR 6934 Forest Policy						SUR 6395 Topics in GIS

Table 1: Geomatics Faculty Degrees, Areas of Specialization, and Course Assignments

Delivery of Geomatics Courses to Students

Innovations in educational technology now allow UF, IFAS, and the School of Forest Resources and Conservation (SFRC) to serve Geomatics students in new ways that supplement and improve the traditional classroom setting. These innovations, known generally as e-learning, distance learning, or online learning, bring several advantages to the learning experience, as described below. The emphasis in the Geomatics Program in the SFRC is on quality education including good course design, management, and instruction to engage students and ensure exposure to all Geomatics faculty.

The University of Florida is committed to and supports e-learning in several ways (http://www.distancelearning.ufl.edu/), including the Blackboard course management system, student access to electronic journals through the libraries, collaborative meeting software and hardware that allows real time interaction, facilities where faculty can prepare electronic material, and a responsive help desk for students.

There is no doubt that distance- and e-learning is growing in the U.S.[1] Important reasons for this include improved student access and the growth in professional education, but the use of these new technologies provides real advantages, including:

- Flexibility - Students are able to fit required courses into their schedules and have access to course material at any time and any place where a computer can access the Internet;
- Costs - Not having to travel to a classroom as often saves time, travel costs, and energy;
- Access to more faculty - Students have access to a wider variety of faculty and other experts who may provide lectures for the course (e.g., SFRC has highly qualified Geomatics faculty at 3 UF locations throughout Florida who can now collaborate to reach all students);
- Access to more "places" - In some courses case studies and field visits can be shown as videos, taking students to places beyond the reach of traditional field trips.
- Access to more students - A broader variety of students enroll in e-courses, and when they interact they can draw on each other's experiences to improve the learning experience and create networks that last after the course is over;
- Equal or better student satisfaction - It has been shown in several studies that, if good course design and management principles are followed and the students are engaged in the course, student satisfaction and learning in online courses are equal to or better than in traditional

[1] Allen E and Seaman J. 2007. Online Nation: Five Years of Growth in Online Learning. The Sloan Consortium. This publication notes that:
• Almost 3.5 million students were taking at least one online course during the fall 2006 term; a nearly 10 percent increase over the number reported the previous year.
• The 9.7 percent growth rate for online enrollments far exceeds the 1.5 percent growth of the overall higher education student population.
• Nearly twenty percent of all U.S. higher education students were taking at least one online course in the fall of 2006.

classroom courses. In part this is because students tend to have many more individual interactions with the instructor and classmates, and these interactions are more thorough and thoughtful than is possible in a traditional one-hour class where only a few students can dominate the discussion;

- Comfort with technology - The generation of students currently enrolled has grown up with electronic means of communication, and they expect to use them as they learn. E-learning allows this to happen naturally and easily, and can include chat sessions, threaded discussions, email, links to Web sites, and podcasts.

E-learning technologies are being applied as they are appropriate for the course content and the needs of the students and as a way for all students to access the expertise of UF Geomatics faculty stationed outside the main campus. Some courses will be delivered entirely online, some will be a mixture of classroom and online, and others will be taught traditionally. Some of the innovative online methods instructors use to deliver their lectures include:

- Live interactive lectures using PolyCom hardware in studio classrooms (these will be recorded for later reference)
- Narrated PowerPoint presentations
- Videotaped lectures
- Lectures that record a video image of the instructor along with a PowerPoint lecture
- Recorded screen capture of what is happening on the instructors computer
- Live interactive lectures using Elluminate software (can be recorded for later reference)

Some of these methods are accessed by the student from their computers, others require going to a classroom; some are experienced in real time, others are stored online and can be referred to at any time. The overriding consideration however, is that a sense of community is created among the students, the students take charge of the learning process by interacting among themselves and the instructor, that they are satisfied with the experience, and that they learn the material. SFRC will monitor and adjust this process to provide the best possible outcomes.

Lecture and lab delivery methods to students located at three campuses

Table 2 shows how students based at the Gainesville, Plant City, and Ft. Lauderdale campuses can expect to receive their lectures and laboratory classes—the numbers represent numbers of courses. The notation used in the table is as follows:

- F2F (face to face) lectures are delivered traditionally in a classroom. However, the three main lecture rooms in Gainesville, Fort Lauderdale, and Plant City are able to record the lectures on PolyCom equipment, and many of these will be available online for later viewing by students using personal computers for about two weeks after each lecture.
- PolyCom lectures are delivered live to students in the classroom by a professor located at a remote site. You will be able to see, hear, and interact with the professor and the remote students, as well as see the material being presented on big screens. As described above, the lecture can be recorded and viewed online for about two weeks.
- Elluminate is collaborative software that allows the professor and students to interact in real time from computer workstations located anywhere. If the instructor chooses, there will be a live video feed of the speaker. Students will hear the professor speak and, if their PC has a microphone, they will be able to speak with the professor and other students. Normally the lecture is PowerPoint based. A chat tool runs simultaneously during the lecture, and other interactive tools (polling, breakout groups, application sharing) can be used as well. As in PolyCom, Elluminate sessions can be recorded for later viewing online.
- Asynch. (asynchronous) lectures are delivered online via the University of Florida E-Learning System (ELS). This category includes videotaped lectures, screen capture of the instructor's computer, narrated PowerPoint lectures, and lectures showing a video of the instructor along with the accompanying PowerPoint slides. Although these lectures are pre-recorded, the ELS course site allows for several kinds of student-instructor interaction, including discussions and email.
- Hybrid: Some instructors will use a mix of live PolyCom and pre-recorded lectures. Several combinations are possible.

Year	Delivery	Gainesville		Plant CIty		Ft. Lauderdale	
		Lecture	Lab	Lecture	Lab	Lecture	Lab
Junior	F2F	2	3	2	3	1	3
	PolyCom	3		3		4	
	Elluminate		1		1		1
	Hybrid	2		2		2	
	Aysnch.						
Senior	F2F	5	3		3		3
	PolyCom			5		5	
	Elluminate						
	Hybrid	3		3		3	
	Asynch.		1		1		1

Table 2: Number of undergraduate courses at three campuses by method of delivery

Geomatics students in all three locations will have the opportunity to experience live lectures with instructor interaction (either face-to-face or via PolyCom) in about two-thirds of their classes; 75% of the lab components will be delivered face-to-face. Note that all of the courses, whether face-to-face or delivered over a distance, will be supplemented by e-learning methods such as threaded discussions, chat rooms, online quizzes, posted readings, etc. as thought best by the instructors.

Online Procedures and Effective DE Methods

At the beginning of the semester instructors will email students registered for online courses some guidelines such as shown in the following text.

The course management system used by UF is called E-Learning System (ELS), and is based on Blackboard software. Below are some pointers that will help you find the course web site and begin to become acquainted with taking distance courses at UF. Please read these and then log on to the course Web page on the first day of class. Students are advised that a broadband Internet connection will be necessary; slower dial-up Internet accounts will not be able to handle video lessons adequately.

How to access the e-Learning System (ELS) course home pages

Most of your courses, whether they are face-to-face or online, will be supplemented with an ELS course home page. This is used by the instructor for various functions, such as discussion boards, announcements, posting course readings and other content, and to keep a gradebook. Course home pages are accessed as follows:

- Use Internet Explorer, Netscape or Mozilla browser (Safari also works for Mac users). Do not use AOL.
- Point your browser to http://lss.at.ufl.edu. Bookmark this page. This is where you will always access ELS. Do not bookmark any other page.

- Under the "Popular Links" heading (lower left of the page) note the **Student E-Learning Demos** and the **Students Intro to ELS** links, where you can find tutorials and information on using ELS. Also see the **Student Tips** area.
- Under the "Self Help" heading, click on the **Browser Tuneup** link. Follow the step-by-step instructions to configure your browser to allow ELS to run properly. It is important that you enable pop-ups on your browser for the ELS course web site; otherwise some functions will not work.
- Note under the **Java Checker** banner to see if your computer has the correct version of Java. If you need to download the correct version, click on the link provided.
- The **E-Learning Systems Entry** box is in the upper left of the page. Use the default radio button selections "E-Learning System" and "Gatorlink", then click continue. Log in using your Gatorlink username and password. You will see a listing of all your ELS courses. Click on the link for the course you wish to enter.

If you are not able to login after following these instructions, contact the UF Computing HelpDesk at 352.392.HELP (4357), Mon – Thur (7:30 AM – 10:00 PM), Fri – 7:30 AM to 5:00 PM and Sun – 6:00 PM to 10:00 PM. You can also email at learning-support@ufl.edu, or come by the HelpDesk in the Hub.

Once you are in the ELS course page:

Navigating – Do not use your browser's back and forward buttons. Navigate by clicking links or breadcrumbs. You can open a tree view of the site by clicking the double chevron icon at the top left next to **Course Content**. Navigate using the tree view by clicking where you want to go.

Email – A green check will appear on the **Mail** icon when you have a new email. The email tool is internal to this course. You can only email other students enrolled in this class and the instructor using the ELS email tool. You can attach short files, but course assignments should normally be attached via the Assignment tool (see below). Please email the instructor from the course email tool when you first log on to the course page, and please use only this email tool to communicate with him/her or other students on class topics.

My Grades – A green check will appear on the **My Grades** icon when there are new grades posted. You will be able to see your grades as soon as they are released.

Assessments (online quizzes and exams) – Save each answer individually as soon as you choose your answer. If the quiz requires a long answer (essay), click **Save Answer** every couple of minutes so you don't lose what you've typed so far. If your computer crashes or you lose Internet connection while taking a quiz, don't worry. Just log back in to the course and click the **Continue Assessment** button for that quiz.

Discussions – Be aware that when you are participating in a discussion in ELS, everyone in the course can see all posts and who made the post. Be responsible for your words.

Assignments – You will submit attachments to the instructor by uploading your document from your computer. Instructions on how to do this are under the **Student Demos** link on the http://lss.at.ufl.edu page.

Final Course Assessment – Please give feedback about the course design and management throughout the semester to the instructor. At the end of the semester you will receive an email with a link to the UF course evaluation form. Please complete this because your comments are very valuable to the instructor and you will get extra points for submission.

How to access lectures saved on the PolyCom recorder

Many of the face-to-face and PolyCom courses will be recorded and stored for a period of about two weeks as a convenience for students unable to attend lectures or who wish to review them. This time period is a function of the storage space available on the recording machine, and toward the end of the semester it could be reduced to one week due to heavy use by other courses. **WARNING:** For those students who are unable to attend class, it is very important to keep up with the lectures. Once the recorded lecture has been overwritten, it can no longer be viewed.

- **Access the website** – To watch a recorded lecture, go to the URL http://128.227.156.84:7734 in your browser. Use Internet Explorer—Firefox version 3 will not display the video player correctly. (It is also a good idea to bookmark this address for future viewing.)

- **Access the Geomatics folder** – Click on "GEM" under Public folders. You should now see a list of recordings with a name, length, and date recorded. The names will contain the course number, date, and time of the lecture.

- **Select the lecture** – Click on the "Watch" link for the appropriate lecture.

- **Select the download speed and viewer** – On the next page, select "384 kbps video/audio using Windows Media Player" from the Media drop-down list.

- **Start the lecture** – Click on the "Start Streaming" button. The first time you do this you may have to download a codec. There is a link to the codec provided under the viewer. Once the codec is installed you may need to restart your browser before the codec will take effect. You should now be able to see and hear the lecture.

How to access Elluminate teaching sessions

Some laboratory sessions and office hours meetings will be conducted virtually using the Elluminate virtual classroom software. The software is invoked through clicking a link sent by the instructor through E-Learning. The instructor will schedule multiple sessions at a time (normally 10 sessions to cover 10 weeks). **IMPORTANT!** – Be sure you click on the link corresponding to the meeting date you intend to join.

- **Download and Install Java Web Start** (First Time Only) – Before you can launch an Elluminate Live! session, you will need to download and install Java Web Start on your computer. Please ensure that you allow sufficient time to complete the download and installation before your first session. Java Web Start can also be obtained directly from http://www.java.com/en/ (click on the "Free Java Download" button) or Sun Microsystems at http://java.sun.com/products/javawebstart (look for Java Version 6 Update 7). After downloading, you may need to restart your browser.

- **Follow the instructor provided link** – The instructor will send you a link to the Elluminate Live! site. This may be via your gator email account or the link maybe found within the E-Learning website.

- **Click on the appropriate link** – Once you find the links provided by your instructor, click on the link with the appropriate date and time for your session. The Elluminate Live! session will then launch. **IMPORTANT!** – Be sure you click the correct link for the session you are trying to access; otherwise you will not be able to log in.

- **Enter Login Name and Password** – At the Elluminate Live! website, enter your full name for the username and the password provided by the instructor. Then click "Log In." (If Internet Explorer blocks the Elluminate site from downloading files to your computer, you will temporarily need to do so. Click on the warning, then on "Download File." Allow a few seconds for the session to activate.

- **Select Connection Speed** – Use the drop down menu to select your computer's connection speed.

- **Make audio adjustments** – Before the session begins, you may need to make adjustments to the audio setup. To do this, click on "Tools" on the menu bar, then "Audio", then "Audio Wizard." Follow the instructions for proper set up of your speakers and microphone.

The following link explains the minimum computer requirements and the instructions to connect to a session. Generally, recent computer configurations satisfy the requirements. In order to communicate with the instructors and the students attending the session, you may need additional hardware. To hear the attendees, you will need speakers attached to your computer. For the attendees to hear you, you will need a microphone hooked up to your computer.

How to access recorded Elluminate sessions

To view a recorded Elluminate session, go to http://elm.elluminate.com/UniversityOfFlorida/. Click on the "recordings" button in the upper left. Use the calendar tool in the upper right and click on the date of the lecture. There may be several recordings for that date; find yours and click on the link in the "Recording name" column. After a few moments Elluminate software will load and the recorded session will play.

Some tips for online success based on a well known publication[2]:

- Study skills required for online courses are the same as those needed for traditional ones, however it is probably more important for the online student to be self-disciplined and develop good time management skills:
    - Plan your time and follow your plan
    - Schedule 9 to 12 hours for course work each week for a 3-credit course
    - Read the online syllabus and become familiar with all the contents of the course web site
    - Keep track of assignments and complete them on time.
    - Purchase the text early
    - Create a folder on your hard drive where you can store materials downloaded from the course ELS site

- Participation and Communication
    - High levels of participation and interactivity are important so that a sense of community develops—the broad range of student backgrounds in online courses allows for student networks to develop that last even after the course is over. And some of the course points are awarded for participation.
    - Many of the communications between students and instructors are "asynchronous", meaning that the interaction is not done in real time; there is a delay between when a communication is sent and when the response is made. Allow for this delay, but make an effort to reply within an agreed-upon time.
    - Use all the communications tools built in to the course site (email, threaded discussions, chats) to communicate with the instructor and fellow students.
    - Students should follow proper "netiquette" in their online communications. The course management system keeps a log of all emails, chats, and discussions. For clarification on the accepted rules that guide online communications, refer to http://www.library.yale.edu/training/netiquette/ or http://www.emailreplies.com/.
    - Only you and the instructor can access your online grades, and only the instructor and registered students can use the course email and discussion sessions.

- Course and instructor evaluation
    - Feedback about how the course is going is very important any time, especially early in the course. The instructor will appreciate your opinions.
    - An official UF online course evaluation email will be sent by UF to the students directly towards the end of the semester. It is very important that every student complete this online form, and the instructor may provide extra credit for doing so.
    - The official online evaluation form is based on the traditional paper form used in face to face classes, so some questions are lacking for online courses. There will be a supplemental online evaluation form to cover those aspects. SFRC is interested in having the best possible online program; we value your input!

[2] Christ FL and Ganey Jr LR, 2003. 100 Things Every Online Student Ought to Know. The Cambridge Stratford Study Skills Institute, Williamsville, NY.

- Resources
    - It is possible to link to UF library e-journals to do research for course assignments; your instructor will show you how.
    - Use academically credible web sites for your course work; discuss how to recognize a credible site with your instructor.
    - Use the instructor and other students as support if you have difficulty with some aspect of either the online procedures or the course content.
    - Technical assistance is available through the UF help desk (352 392-4357 option 2) and the ELS home page (http://lss.at.ufl.edu/).
    - Check with your instructor before you use online references for purposes other than the course—they may be covered by copyright restrictions.