



**Course Description:**

This course is designed as an introduction to geographic information systems (GIS). The overall goal of the course is to provide students with the theoretical and practical knowledge necessary to understand the uses and limitations of GIS, and conduct typical GIS operations and analyses. We will use ArcGIS Desktop software (ESRI, Redlands, CA) as the primary software package in the course, but other programs will also be demonstrated. Students should complete the course with the necessary knowledge to enable them to extend their learning to a variety of applications and software environments, and prepare them for more advanced training in GIS. The purpose of this course is **NOT** to teach students to become experts in using ArcGIS software. Students only interested in learning how to drive ArcGIS software should not take this course.

This course consists of a lecture component and a laboratory component. The lecture part focuses on the underlying concepts for the geographic representation, spatial data modeling, storage, data analysis, and visualization of spatially distributed data and phenomena in GIS. The developments and the future of GIS will also be discussed. The lab exercises and homework assignments provide opportunities for students to experience concrete examples through intensive hands-on exercises with GIS packages. A portion of the class time (2 hours each week) will be devoted to lab and hands-on activities in the computer lab. Much of the course will focus on the technical concepts upon which operational systems are based. While recognizing that GIS is a multidisciplinary subject (it has close ties to geography, surveying, photogrammetry, cartography, remote sensing, image processing, and computer science, etc.), a geographer's perspective will form the core of the material. In addition, application examples will be drawn from any related disciplines (e.g., management, agriculture, forestry, etc).

**Course Prerequisites:**

It is strongly recommended that students take this course after having completed GEOG 211: Map Interpretation, or GEOG230: Understanding and Communicating through Maps, or its equivalent. If you have never taken a 'geographic techniques' course, you will need to be especially diligent with the readings and homework.

**Materials:**

- An account on 'Tiger,' the student server. You will need to use this space to store your work. Go to <http://tiger.towson.edu> for more information on how to get an account.
- Bolstad, P. 2008. *GIS Fundamentals: A First Text on Geographic Information Systems*, 3<sup>rd</sup> Edition. Eider Press: Minnesota.
- Supplement the book with background readings from the NCGIA Core Curriculum. [http://www.ncgia.ucsb.edu:80/education/curricula/giscc/cc\\_outline.html](http://www.ncgia.ucsb.edu:80/education/curricula/giscc/cc_outline.html)  
The Core Curriculum is a series of lecture notes and courses that have been compiled by many scientists over the past decade. It is an excellent source of information for any topic not covered in class, or as a 'deeper' source for what is covered in the book.
- USB flash drive (1GB or larger preferred).

**Course Requirements:**

This course meets twice a week for the lecture and lab. Students are required to go over the reading materials before attending each class. Lecture material will not necessarily duplicate material presented in the textbook, so if you miss a lecture, you may completely miss out on important information.

Each student will complete a series of laboratory exercises and tutorials that illustrate the typical steps in a GIS project. Operations of a particular GIS software package will be demonstrated during the lab session. Laboratory exercises are a major part of the course and provide the opportunity for students to acquaint themselves with the many practical issues related to using GIS as a research tool. Please note that this course covers a lot of material and requires that students make time to do the work. In order to succeed, it is absolutely necessary that students plan to spend a considerable amount of time outside of the class honing their technical skills on lab exercises. All students are also required to complete a project on a topic of the student's own interest related to GIS applications. Details will be discussed in class.

Students are expected to show up and leave on time. More than four unexcused absences, and/or frequent late arrival/early departure to/from class will result in points being deducted from the final grade. Active participation in class discussion is also encouraged. If there is a chance that you will not be able to attend as many as four classes, please consider dropping the course and registering a semester when you are better able to make a commitment. If you know that you will be late, please let me know ahead of time so that I can brief you on what you will miss.

### **Evaluation:**

Assessment is carried out by means of evaluation of laboratory exercises, mid-term exam, final exam, and a project. Because GIS is a tool not only for analysis, but also for communication; students will be required to prepare graphical and written materials as would be expected in a professional setting.

- There will be three **exams** – mid-tem, practical, and final exams. Exams will be composed of a combination of formats, including, but not limited to, multiple choice, matching, true-false, fill-in-the-blank, short answer, problem solving, and diagram interpretation. The final exam will not be cumulative.
- **Laboratory exercises and tutorials** will be given throughout the semester. These are designed to implement specific spatial analysis techniques through computer processes. A series of assignments using simple datasets will be conducted on a weekly basis. Written assignments shall be typed in 12 points Times New Roman font, and double-spaced on 8.5" x 11" paper, and stapled in the upper left corner. Your name, course number and assignment number should appear in the upper right corner in the margin. Students also have an option to submit an electronic version of the assignment to the instructor. The subject line should follow this format: *GIS lab #: lastname firstname*, for example, GIS lab 1: Thebpanya Paporn.
- Towards the end of the semester, students are required to design and implement a project involving spatial analysis. A team of two (max) is permitted for the **group project**. Essentially, everybody must work together on the project and not simply divide it for convenience. Students may use existing software, develop their own code, or combine the two approaches. Projects may be theoretical, methodological or applications-oriented but must include a spatial analytical result. More details will be discussed in class.

### **Grades and Grading Policy:**

Laboratory exercises & Tutorials	35%	Mid-term exam	15%
Project	20%	Final exam	15%
		Practical exam	15%

I reserve the right to raise or lower each grade slightly, depending on circumstances such as extraordinary progress made in the course or other mitigating circumstances. Grades will be assigned as follows:

<b>A</b>	93% - 100%	<b>C+</b>	77% - 80%
<b>A-</b>	90% - 93%	<b>C</b>	70% - 77%
<b>B+</b>	87% - 90%	<b>D+</b>	67% - 70%
<b>B</b>	83% - 87%	<b>D</b>	60% - 67%
<b>B-</b>	80% - 83%	<b>F</b>	Below 60%

Grade disputes / complaints *must be lodged within two weeks* of grades being released on Blackboard. In the case of a missing grade, you must provide evidence of having done the work. In the case of clear errors in grading, I will correct your grade on Blackboard. Failure to contact me within two weeks of grades being completed for any given assignment means that you forfeit the chance for a review of the grade.

**Extra credit:**

In fairness to all students, I do not offer Extra Credit assignments at any time. Please speak with me if you are having problems. I will be happy to help you.

**Make-up Policy:**

Absences may be excused if they are verifiable documents. For expected absences, you must provide at least two business days advance notice of the absence. Acceptable reasons for absences include but are not limited to personal or family illness or emergency, religious holidays, etc. per Towson University Attendance Policies. Oversleeping, missing the bus, cannot find a parking, etc. are not excusable excuses. You may be required to provide written documentation in order to receive an excused absence.

Students are responsible for material missed during any class session. Any notes from a peer for the material covered in class should be obtained. If your absence is excused, you may have the opportunity to make up your work. Make-up exams will be given only in the event of illness or other verifiable emergency. You will have 24 hours after a missed exam to contact me or leave a message. Please do not call me at home under any circumstances. The secretary in the department (410-704-2973) will gladly take a message. If you know in advance that you must be absent on the day of a scheduled exam, please let me know so that we can schedule a make-up time. Make-up exams will be scheduled at the instructor's discretion and may not be of the exact same format. Unexcused absences from exams will result in a zero for the exam.

**Due Date Policy:**

Lab exercises must be turned in **no later than one week** from when started. In fairness to the majority of students who work hard to meet expectations and deadlines, late in-class assignments will be graded with a penalty of 10% for each day they are late. This is meant to emphasize the importance of effective time management and the need to begin work on the next module. Also, because a week or more is given to complete laboratory exercises, last minute glitches are not acceptable reasons -- do not wait until the last minute to work or submit your work.

**Cooperation between Students Policy:**

I encourage a certain amount of collaboration among students. However, each student is required to complete individual laboratory exercises. Please note that all students must complete and hand in their own work. Plagiarism will cause the student to fail the class.

**Instructor Roles:**

The instructor is chartered to facilitate learning of introductory GIS. Please note that it is not the role of the instructor to "hand feed" all course components to students, but to provide the best possible approach and means to learn GIS as a permanent knowledge and skill base.

**Student Roles:**

Each student has responsibility for learning and performing to achieve the course objectives. Students are expected to be dedicated to true learning (rather than focusing on grade outcome as the goal of the course) and to do what is necessary to achieve that success. GIS students should understand that most learning comes through experience. Generally, students are particularly responsible for independent learning, e.g., making use of available resources, doing work in an organized and timely manner, problem solving, using strong initiative, and achieving success even when the instructor does not provide all the wanted information to meet student expectations.

**Help!**

All of us learn in different ways and with varying degrees of success. If you know of any factors in your life that may hinder your ability to learn up to your potential in this course, please notify me at once. If you are having difficulty with the course material, please visit me right away. Coming to see me just before an exam is being given is a poor strategy for success. Like any of your other courses, the material in this course will build upon earlier concepts and information; if you fall behind, it will become harder and harder to catch up. This is what office hours are for!

**Technical Issues:**

This is a technology-based format, requiring a reasonably good command of modern computer communications technology and methods. If you do not understand, or cannot quickly learn, such aspects as sending attachments, knowing which browser or word processing program you use, saving jpeg/jpg images, surfing the web, etc., then this may not be the course format for you. It is the student's responsibility to maintain the course communications technology in functioning order, e.g., your email or access to the Internet. Technical problems are not acceptable excuses for late or unreadable submissions.

**Strong Recommendation:**

When working, save often--very often (after each paragraph). All work, all data, everything, should be backed up on a regular basis, and appropriate safety precaution taken whenever necessary. Save the draft or final version on disk and then at least one other place. I often email myself the latest version in case the computer really does crash and the disk is bad. Excuses involving lost data, program crashes, network slowdowns, viruses, etc, will not be accepted.

**Academic Honesty:**

Academic honesty and integrity is expected at all times. Students are responsible for the Scholastic Dishonesty Code, which can be found in Appendix F of the Towson University Catalog under the "Student Academic Integrity Policy" section. Scholastic dishonest includes but is not limited to: copying others' work, using notes during tests, and sabotaging others'

work. Dishonesty in this class will not be tolerated. Cheating and/or plagiarism will result in an automatic failing grade for this course. Cases of academic dishonesty will be handled according to University guidelines.

**Student with Disabilities:**

This course is in compliance with Towson University policies for students with disabilities. Students with disabilities are encouraged to register with Disability Support Services (DSS) 7720 York Road, Suite 232, (410) 704-2638. Students who suspect that they have a disability but do not have documentation are encouraged to contact DSS for advice on how to obtain appropriate evaluation. A memo from DSS authorizing your accommodation is needed before any accommodation can be made.

**Class Schedule:**

The lecture schedule indicates the intended scope and timing of materials presented in the course. If unanticipated events occur, the lecture schedule will be modified accordingly.

Week	Date	Topics	Readings
1	Sep 2 Sep 4	Course Overview Introduction to GIS; defining GIS; components of GIS Introduction to data models <b>Lab 1: Exploring ArcCatalog &amp; ArcMap</b>	See Syllabus Ch. 1 Ch. 2 pp.25-31 <b>Due: Sep 11</b>
2	Sep 9 Sep 11	Vector and raster data models; Triangulated Irregular Networks; data files and structures <i>Wednesday September 10: Last day to drop/add a course</i> <b>Tutorials: ArcScan; Creating a topology</b> <b>Lab 2: Raster and vector data models</b>	Ch. 2 pp.33-67 <b>Due: Sep 18</b>
3	Sep 16 Sep 18	Map projection and coordinate systems <b>Tutorials: Projecting data on the fly; Defining a projection</b> <b>Lab 3: Coordinate systems</b>	Ch. 3 <b>Due: Sep 25</b>
4	Sep 23 Sep 25	Data entry and editing; re-projection, coordinate transformation and generalization <b>Tutorials: Editing GIS features (Part I)</b> <b>Lab 4: Spatial data input</b>	Ch. 4 <b>Due: Oct 2</b>
5	Sep 30 Oct 2	Coordinate transformation and generalization (cont.) Spatial data sources; modifiable areal unit problem <b>Tutorials: Editing GIS features (Part II)</b> <b>Lab 5: Data editing</b>	Handout Ch. 7 <b>Due: Oct 9</b>
6	Oct 7 Oct 9	Attribute data and tables; data query <b>Lab 6: Attribute data input and management</b> <b>Lab 7: Data query</b>	Ch. 8 <b>Due: Oct 16</b>
7	<b>Oct 14</b> <b>Oct 16</b>	<b>Mid-term exam (written)</b> <b>Mid-term exam (lab)</b>	<b>Ch. 1-4, &amp; 7</b>
8	Oct 21 Oct 23	Basic spatial analyses: overlay and buffering <b>Tutorials: Buffering features</b> <b>Lab 8: Proximity Analysis</b>	Ch. 9 <b>Due: Oct 30</b>
9	Oct 28 Oct 30	Topics in raster analysis: local and neighborhood functions <b>Tutorials: Geocoding</b> <b>Lab 9: Raster data analysis</b>	Ch. 10 <b>Due: Nov 6</b>

Week	Date	Topics	Readings
10	Nov 4 Nov 6	Terrain analysis Project discussion <b>Tutorials: 3D Analyst (Part I)</b> <b>Lab 10: Terrain mapping and analysis</b>	Ch. 11  <b>Due: Nov 13</b>
11	Nov 11 Nov 13	Spatial models and modeling <i>Wednesday November 12: Last day to withdraw with a grade of W</i> <b>Tutorials: 3D Analyst (Part II)</b> <b>Lab 11: GIS models and modeling</b>	Ch. 13  <b>Due: Nov 20</b>
12	Nov 18 Nov 20	Data standards and data quality Project discussion; work time for a project <b>Lab 12: GIS Output</b>	Ch. 15  <b>Due: Nov 25</b>
13	Nov 25 Nov 27	Work time for a project <b>Thanksgiving – No class</b>	
14	Dec 2 Dec 4	Work time for a project Work time for a project	
15	Dec 9 Dec 11	Work time for a project Work time for a project	
16	<b>Dec 17</b>	<b>Final exam 12:30 - 2:30 pm</b> <b>Project submission: Wednesday December 17 by 2:30 pm</b>	<b>Ch. 8-11, 13, &amp; 15</b>