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# CSC222 Geographic Information Systems

Professor. Leon Tabak

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## Schedule for Term 3: October 27 to November 19, 2014

	MON	TUE	WED	THU	FRI
<b>Week 1</b>	27	28	29	30	31
<b>Week 2</b>	03	04	05	06	07
<b>Week 3</b>	10	11	12	13	14
<b>Week 4</b>	17	18	19	20	21

## Our meeting times and places

My office is in Law 206C.

You may call me in my office at (319) 895 4294.

You may send me electronic mail at <1.tabak@ieee.org>.

I will be in my office and available to meet with you Monday through Friday from 3:00 p.m. until 3:30 p.m.

We will all meet together in the classroom in the mornings and in the laboratory in the afternoons.

	Where	When
<b>Classroom</b>	Law Hall 121	9 a.m. to 11 a.m.
<b>Laboratory</b>	Law Hall 113	1 p.m. to 3 p.m.

## Textbooks

You will not be asked to purchase a textbook. I will draw material from these and other books. I have placed several books on reserve in the Russell D. Cole Library.

*Introductory Geographic Information Systems*. John R. Jensen and Ryan R. Jensen. Pearson. Copyright © 2013. 978-0-13-614776-3.

*Introduction to Geographic Information Systems (Sixth Edition)*. Kang-tsung Chang. McGraw Hill. Copyright © 2012. 978-0-07-336931-0.

*Getting Started with Geographic Information Systems (Fourth Edition)*. Keith C. Clarke. Prentice Hall. Copyright © 2003. 0-13-046027-3.

## On-line Resources

- Stanford University's self-paced courses on databases [<https://class.stanford.edu/courses/DB/2014/SelfPaced/about>]
- W3Schools Online [<http://www.w3schools.com>]
- QGIS: A Free and Open Source Geographic Information System [<http://qgis.org/en/site/>]
- Codecademy [<http://www.codecademy.com/>]
- UNIX Tutorial for Beginners [<http://www.ee.surrey.ac.uk/Teaching/Unix/>]
- A Guided Tour of Emacs [<http://www.gnu.org/software/emacs/tour/>]
- Online Tutorials on LaTeX [<http://tug.org/tutorials/tugindia/>]
- From GPS and Google Maps to Spatial Computing [<https://www.coursera.org/course/spatialcomputing>]

## Goals

We will give special attention to three of Cornell College's Educational Priorities and Outcomes: [<http://www.cornellcollege.edu/about-cornell/mission/>]

- Inquiry#you will discover sources of geographic information and you will learn how to translate data into forms that you can most conveniently use.
- Communication#you will learn how to compose, format, and share documents in new ways.
- Vocation#you will learn how people use Geographic Information Systems in their work for many kinds of organizations.

## Etiquette for the Classroom

Please show respect to your classmates, to me, and to the seriousness of our enterprise by exercising the following courtesies:

- Please give your attention to whomever is speaking. That'll be me some of the time, but it will be you some of the time too.

Did you bring a computer to class? Good. We will find ways to use your computer to accomplish the goals that we have set for ourselves in this course.

Now, please turn off the games. Close windows that are displaying news, electronic mail, and scores from the world of sports. Put the earbuds away.

- Please do not interrupt and distract the class by late entries, early departures, or by coming less than fully prepared to make your contribution to the class. If you anticipate a need to be absent or late, please notify me in advance of your anticipated absence. With all due respect to Admiral Grace Murray Hopper, excuses after the fact will not succeed.
- Tastes in music vary. Some people need more quiet than others in order to concentrate. I and your classmates would like to know that we, and not an MP3 player, have your attention when we speak to you. Keep these things in mind.
- Please refrain from bringing food or drink into the classroom or laboratory.
- Please refrain from the use of vulgar language.
- Please do not wear clothing or buttons that bear vulgar messages or images. Indeed, it is best to avoid wearing messages of any kind. Outside of the classroom, I will be happy to discuss with you any issue of the day. Inside of the classroom, it is rude to broadcast opinions unrelated to our subject because our work there does not allow anyone else to respond to your challenge (or to decline your invitation to debate).
- Please keep shoes on and hats off in the classroom. Leave your pajamas and bathrobe at home. Test the limits of social conventions if you must during the more than 80% of the week during which we shall be apart.
- Please demonstrate your love for your fellow man or woman with kind words and gracious gestures but delay other physical expressions of tenderness until our work is done and you have found a more private setting.

## Policies

Cornell College is committed to providing equal educational opportunities to all students. If you have a documented learning disability and will need any accommodation in this course, you *must* request the accommodation(s) from the instructor of the course and no later than the third day of the term. Additional information about the policies and procedures for accommodation of learning disabilities is available on Cornell College's Web site [<http://www.cornellcollege.edu/academic-support-and-advising/disabilities/academic-accommodation/index.shtml>].

Please also familiarize yourself with the college's statement on academic honesty [<http://www.cornellcollege.edu/registrar/pdf/Academic%20Honesty.pdf>] and its policies for dropping courses [<http://www.cornellcollege.edu/registrar/gb-resources-student/add-drop.shtml>]

## Grades

We will learn how to make maps and how to use maps to solve problems.

We will develop a project in stages. We will study problems that we can understand better by examining geography. The project will be our main work. We will present the results of our research in a book. We will all be co-authors of our book. We will each contribute chapters. We will illustrate our book with maps. We will each also present our work to our classmates in talks that we will illustrate with slides.

We will use software to gather information and to compose, format, share, and track changes in our documents. The software will be initially unfamiliar to most of you. We will help one another to master the new tools. With the new tools, we will also learn new ways of working.

Experience presenting work to peers will be a central part of the course. Practice asking your teammates questions during their presentations and suggesting improvements to their work will also be an important part of your education during this term.

	<b>Activity</b>	<b>Points</b>
	Daily work	10
	Annotated bibliography (Wednesday, October 29)	10
	Review of the literature (Friday, October 31)	10
	Abstract (Monday, November 3)	10
	Paper (first draft) (Friday, No- vember 7)	10
	Slides (Wednesday, November 12)	10
	Paper (final draft) (Friday, No- vember 14)	10
	Presentation (Wednesday, No- vember 12)	10
+	Examination (Wednesday, No- vember 19)	20
		100

## Daily schedule

### Monday, October 27

#### Read.

Instructor will present material from Chapter 1 (pages 1–23) in *Introductory Geographic Information Systems*.

#### Discuss.

What is a Geographic Information System? What are the origins and history of this technology? What is the state of the art? How can people use computers and software in making decisions?

Points, lines, and arcs. Vector versus raster data. Spatial versus aspatial data. Continuous versus discrete features.

#### Write.

Respond to Review Questions 3, 4, and 12 on page 20 in *Introductory Geographic Information Systems*.

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### Tuesday, October 28

#### Read.

Instructor will present material from Chapter 2 (pages 25–53) in *Introductory Geographic Information Systems*.

#### Discuss.

Datums, ellipsoids, and geoids. Coordinate systems. Projections.

#### Write.

Respond to Review Questions 3, 5, and 8 on pages 50 and 51 in *Introductory Geographic Information Systems*.

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### Wednesday, October 29

#### Read.

Instructor will present material from pages 55–76 in Chapter 3 in *Introductory Geographic Information Systems*.

#### Discuss.

How geographers collect data. Surveying. Sampling and census. Applications of the Global Positioning System (GPS). Digitization.

## **Write.**

Annotated bibliography due.

Respond to Review Questions 2, 3, and 6 on pages 103 and 104 in *Introductory Geographic Information Systems*.

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## **Thursday, October 30**

### **Read.**

Instructor will present material from pages 76–106 in Chapter 3 in *Introductory Geographic Information Systems*.

### **Discuss.**

Remote sensing instruments and platforms. Multispectral images.

### **Write.**

Respond to Review Questions 7, 8, and 14 on page 104 in *Introductory Geographic Information Systems*.

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## **Friday, October 31**

### **Read.**

Instructor will present material from Chapter 4 (pages 107–123) in *Introductory Geographic Information Systems*.

### **Discuss.**

Metadata, XML, kinds of errors, precision vs. accuracy, statistical measures.

### **Write.**

Review of literature due.

Respond to Review Questions 4, 8, and 10 on pages 120 and 121 in *Introductory Geographic Information Systems*.

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## **Monday, November 03**

### **Read.**

Instructor will present material from Chapter 5 (pages 125–147) in *Introductory Geographic Information Systems*.

## Discuss.

Vector and raster data, relational databases, object-oriented models, file formats, database queries (Structured Query Language), and conversions from one format to another.

## Write.

Abstract due.

Respond to Review Questions 4, 5, and 9 on page 146 in *Introductory Geographic Information Systems*.

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## Tuesday, November 04

### Read.

Instructor will present material from pages 149–165 in Chapter 6 in *Introductory Geographic Information Systems*.

### Discuss.

Analysis of vector data, constructing buffers around features, building overlays.

### Write.

Respond to Review Questions 1, 3, and 4 on page 191 in *Introductory Geographic Information Systems*.

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## Wednesday, November 05

### Read.

Instructor will present material from pages 165–193 in Chapter 6 in *Introductory Geographic Information Systems*.

### Discuss.

Analysis of raster data, zooming in and out on raster data, computing elementary statistics (e.g., minimum and maximum), classifying regions, algebraic methods of combining layers, filters to blur and sharpen images.

### Write.

Respond to Review Questions 8 and 10 on pages 191 and 192 in *Introductory Geographic Information Systems*.

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## Thursday, November 06

### Read.

Instructor will present material from Chapter 7 (pages 195–231) in *Introductory Geographic Information Systems*.

### Discuss.

Geocoding, modeling networks (such as networks of highways) with graphs (vertices and edges), directed and undirected graphs, finding shortest paths in graphs,

### Write.

Respond to Review Questions 1, 3 and 4 on pages 229 and 230 in *Introductory Geographic Information Systems*.

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## Friday, November 07

### Read.

Instructor will present material from Chapter 8 (pages 233–255) in *Introductory Geographic Information Systems*.

### Discuss.

Euclidean and Manhattan measures of distance, measuring lengths of boundaries and areas of regions, statistics for describing how closely bunched measured values are.

### Write.

First draft of paper due.

Respond to Review Questions 1, 3, 7, and 8 on pages 252 and 253 in *Introductory Geographic Information Systems*.

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## Monday, November 10

### Read.

Instructor will present material from chapter 9 (pages 257–278) in *Introductory Geographic Information Systems*.

### Discuss.

Ways of describing and analyzing three-dimensional data, ways of interpolating data, computing the slope of terrain given measurements of elevation.



## **Write.**

Respond to Review Questions 1 3, 5, and 9 on pages 276 and 277 in *Introductory Geographic Information Systems*.

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## **Tuesday, November 11**

### **Read.**

Instructor will present material from Chapter 10 (pages 279–320) in *Introductory Geographic Information Systems*.

### **Discuss.**

Map-making in ancient and modern times, map-making conventions, types of maps.

### **Write.**

Respond to Review Questions 1 3, 5, and 7 on pages 317 and 318 in *Introductory Geographic Information Systems*.

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## **Wednesday, November 12**

### **Read.**

Instructor will present material from Chapter 11 (pages 321–337) in *Introductory Geographic Information Systems*.

### **Discuss.**

Types of computers, components of computers, the rate of progress, operating systems, open source software, object-oriented programming and software engineering.

### **Write.**

Slides due. Begin presentations.

Respond to Review Question 7 on page 335 in *Introductory Geographic Information Systems*.

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## **Thursday, November 13**

### **Read.**

Instructor will present material from Chapter 12 (pages 339–360) in *Introductory Geographic Information Systems*.

## **Discuss.**

Opportunities to learn more about GIS, the work of professional societies, advantages of joining a professional society, legal and ethical guidelines for the use of GIS data, the future of GIS.

## **Write.**

Respond to Review Questions 3, 8, 9, and 10 on page 358 in *Introductory Geographic Information Systems*.

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## **Friday, November 14**

### **Read.**

To be announced.

### **Discuss.**

Students' projects.

### **Write.**

Final draft of paper due.

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## **Monday, November 17**

### **Read.**

To be announced.

### **Discuss.**

Students' projects.

### **Write.**

Complete presentations.

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## **Tuesday, November 18**

### **Read.**

To be announced.

### **Discuss.**

Students' projects.

## **Write.**

Evaluate the course.

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## **Wednesday, November 19**

### **Read.**

There is no reading assignment today.

### **Discuss.**

There is no discussion scheduled for today.

### **Write.**

Examination.

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## **Thursday, November 20**

### **Read.**

There is no reading assignment today.

### **Discuss.**

We will not meet today.

### **Write.**

There is no writing assignment today.

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## **Friday, November 21**

### **Read.**

There is no reading assignment today.

### **Discuss.**

We will not meet today.

### **Write.**

There is no writing assignment today.

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