GIS Practicum

GEOG 476

Instructor

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Office Hours: TTH 1:00pm-2:00pm and by appointment

Meeting Time and Locations

Lecture
Time: T TH 3:55 – 5:10
Room: CSA 302

Class web site

Updates to the lecture and lab syllabi as well as other course materials will be made available on the course website. It can be accessed on ELearning at http://ecampus.tamu.edu.

Catalog Description

Introduction to current topics in Geographic Information Science including ethical and legal issues surrounding spatial technologies, proper GIS management practices and professional certification. Development of professional research, technical and communication skills through participation in a coordinated internship or independent research project.

Course Description

This course is the capstone learning experience of the Department of Geography's Geographic Information Science (GISci) option. Through seminar style discussions course participants are introduced to current topics in the spatial sciences profession. An accompanying independent research project will build professional research skills. The course introduces students to professional ethical issues surrounding spatial technologies and information. Professional presentation of scientific and technical results will be taught and practiced. The course will also introduce students to GISci certification activities and help them to construct a professional GISci portfolio.

Learning Outcomes

The intent of this class is to provide students with a professionalizing academic experience. This will be accomplished in two ways. First a set of structured discussions and projects will introduce students to topics that will affect them in their professional careers as well as to develop their oral, written and cartographic communication skills. Secondly, an independent research project will provide students an opportunity to apply the geospatial skills they have learned in previous classes to an individual project. The progress on the project will be articulated in writing, through oral presentations and by the creation of maps and other graphics.

In general, it is my expectation that at the end of the class each student will be able to:

1) Explain current ethical and legal issues surrounding Geospatial technologies; and
2) Articulate the current state of professional certification in the Geospatial arena and how obtaining professional certification may affect career opportunities; and
3) Define and describe current national and international standards applicable to spatial data; and
4) Apply appropriate GIS analytical techniques to successfully solve a research problem; and
5) Communicate the methods used and results achieved in an independent research project via written, oral and cartographic methods.

Textbooks and Readings

Lecture Texts

Booth WC, Colomb GC, Williams JM. 2008. **The Craft of Research**. 3rd ed. Hoboken, NJ, Wiley. 336 pp.

Additional readings and materials will be drawn from websites, handouts, and online resources.

GIS Software

This course will utilize the ArcGIS™ suite of software developed by ESRI. Installable copies may be obtained from the instructor or teaching assistants.

Development Software

This course may utilize the Python, which is installed with ArcGIS. This course may also utilize C# in Visual Studio 2012 which can be downloaded as a student education version from Microsoft. This may also utilize Javascript which requires nothing but a web browser.

Class Attendance

The university views class attendance as the responsibility of the individual student. Information on University attendance rules can be found at http://student-rules.tamu.edu. As described below, a portion of each student's grade is based on in-class participation. This will be judged by the instructor as regular attendance and active engagement on a consistent basis that contributes to the class in some manner.

Cellular Telephones

As a courtesy to the instructor and other students please turn off all cellular telephones before the class begins.

Email

All Texas A&M students should use their Texas A&M University email accounts when emailing the instructor and teaching assistants. I may also send out class announcements via the University email system as well. It is your responsibility to check your official TAMU email account regularly.

Grading

Your grade in this class will be based on the following

A. **Written Research Report on Research Project**	**50%**
B. **Oral Presentation of Research Project**	**15%**
C. **Professional Development Assignments**	**25%**
D. **Participation in Class Discussions**	**10%**

The grading scale for this course is as follows:

≥90% A, 80-89% B, 70-79% C, 60-69% D, <60% F

Research Paper **50%**

A major portion of the course grade is a written research paper describing your independent project. The paper will be written in a style and length appropriate for a GISci journal. A Microsoft Word template to aid in correct formatting of the report will be provided as will a detailed description of the referencing style to be used. All written assignments will be extensive edited for content and proofread for grammar. Students will use these revisions to help guide improvements to subsequent drafts of the report. Students will be allowed to improve each assignment. The intent is that the writing will build to a complete research paper in the 2nd half of the semester. A breakdown of the grading of the research papers presented below. Detailed grading rubrics for each graded component will be provided that present explicit grading schema for each assignment.

1. Outline – Due 2/11/2014 ***10%***

Each student will prepare a manuscript outline your intended research project.

2. First Draft – Due2/25/2014 ***20%***

Each student will prepare a first draft of the manuscript detailing your research project. The first draft should focus on the first three parts of a typical research manuscript; the introduction, literature review and methods.

3. Second Draft – Due 4/11/2014 ***30%***

Each student will prepare a second draft of the manuscript. This draft should fix issues in the introduction, literature review and methods sections identified in the first draft by your instructor. The draft should also include a first draft of the final three parts of a typical research manuscript; results, analysis and conclusions.

4. Final Draft – Due 5/6/2014, 3pm ***40%***

Based on instructor feedback provided on the first two drafts, each student will compose a final draft of the manuscript presented as a camera-ready manuscript using a provided Word template.

Oral Presentation – Due 3/20/2014 & Due 4/22/2014 and 4/24/2014 **15%**

Each student will present an oral presentation to be delivered to the entire class mid-semester and during the final week of the semester. The presentation will use computer-based presentation software such Microsoft's PowerPoint A grading rubric will be made available for your guidance.

Professional Development Assignments **25%**

Each student will complete a number of short assignments throughout the semester that focus on various aspects of GIS. Instructions and grading rubrics will be made available for guidance.

Participation in Class Discussions **10%**

Each student is expected to participate in class discussions and working with a partner(s) will lead the class discussion one week.

Communication Skills Development

Developing good communication skills is an important part of becoming a GISsci professional. Improving student communication skills is a major aim of the course. In addition to good oral and written communication skills, GISsci professionals need to be able to convey information through maps and good cartographic skills will be stressed as well.

Writing
Written communication skills will be developed through a series of short professional development exercises. All completed exercises will be graded both for GISci content as well as for writing skill. Each graded exercise will receive extensive comments and will be edited using standard proofreading marks. Students will be given the opportunity to revise and resubmit all professional development exercises based upon the written comments. A major part of the course is for students to prepare a written report detailing the work undertaken during the student's internship or research experience. Students will prepare a rough draft that will be extensive reviewed and edited to help them prepare their final draft.

Oral
Mid semester (Week 10 – 3/20/2014) and during the last week (Week 15 – 4/22 & 4/24/2014) of the course each student will prepare and present a portfolio of materials they have produced during the course of their studies, and in particular, during their internship or independent research project.

Cartography
While students taking this course will have already had opportunities to improve their cartography skills in producing standalone maps, this course will emphasize how to best utilize maps in improving reports and other documents.

Written Research Report Materials

Production of a quality research paper detailing research done during the student's independent research project or internship is a major component of the course. The report writing process is designed to teach students to effectively communicate within the multiple fields comprising GISci.

The final report will be produced in the style and format required for submission to a major journal within the field of GISci. The research report has several components, all of which will lead to submission of the final report during the final week of class. Materials submitted at each stage will be extensively reviewed and edited. The timetable for project related assignments is as follows:

Week 3 (1/28/2014) – A 2-page memo detailing your internship or research project
Week 5 (2/11/2014) – An outline for the final project paper
Week 7 (2/25/2014) – Initial draft of your final paper that focuses on introduction, problem statement, and methods
Week 10 (3/18/2014) – A 300 word abstract describing your final project
Week 12 (4/1/2014) – Second draft of the final project that focuses on results and conclusions
Week 15 (4/22/2014 and 4/24/2014) – Oral presentations of your independent research
Final Exam Week – Final finished reports due at **3 pm on Tuesday, May 6th**

Scholastic Dishonesty

It is our hope that academic dishonesty will not be a problem in this class. Texas A&M does, however, have a *Scholastic Dishonesty* policy to which both students and faculty must comply. If you have any questions about the University's Scholastic Dishonesty policy please review the Student Rules or see me. The Aggie Honor program is the new program that will handle all cases of academic dishonesty. http://www.tamu.edu/aggiehonor

All materials used in this class are copyrighted. These materials include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy the handouts, unless permission is expressly granted.

As commonly defined, plagiarism consists of passing off as one's own the ideas, words, writings, etc., which belong to another. In accordance with this definition, you are committing plagiarism if you copy the work of another person and turn it in as your own, even is you should have the permission of that person. Plagiarism is one of the worst academic sins, for the plagiarist destroys the trust among colleagues without which research cannot be safely communicated.

If you have any questions regarding plagiarism, please consult the latest issue of the Texas A&M University Student Rules, http://student-rules.tamu.edu, under the section "Scholastic Dishonesty."

*"**Aggies don't lie, cheat, or steal, nor tolerate those that do**"*

Student Support

The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Department of Student Life, Services for Students with Disabilities in Room B118 of Cain Hall. The phone number is 845-1637.

Services for Students with Disabilities

Room B118 of Cain Hall, 845-1637 or on the web at http://disability.tamu.edu/

There are numerous other student support organizations on campus including

Student Counseling Service

Cain Hall, 845-4427, http://scs.tamu.edu

Student Counseling Helpline 5:00pm-8:00am: 845-2700

University Writing Center

Suite 1.214 of the Evans Library, 458-1455, http://writingcenter.tamu.edu/

Course Schedule (Tentative)

Part I – Current Issues in Geographic Information

Week 1 – Introduction to the Course
January 14 & 16

The first class meeting will focus on introductions, describing the course content and schedule as well as a discussion of what should be expected of student performance in the class. The second class will cover the logistics of reestablishing computer accounts and students will learn about the potential research projects they will conduct as part of the class.

In general over the course of the semester, the Tuesday class period will be used to discuss the topics described below. The Thursday class period focus on helping students improve their writing through discussion and examples and (2) affording students the opportunity to work on their projects and discuss research problems with the instructor.

Week 2 – What it means to be a Geospatial Professional

January 21 & 23

A structured discussion on what it means to be a professional Geographer. The discussion will focus on what the skill set that is expected of a Geospatial professional as well what the general expectations of a professional are. Differences between software certification and professional certification will be highlighted.

Assignment – Due 1/28/2014

Each student will write a 2-page memo summarizing their perceptions of the major difference between an ESRI certification and the Geospatial Technology Competency Model.

Readings

Booth *et al.*, 1 – 2

ESRI Technical Certification (focusing on a ArcGIS Desktop Professional). Available online at: http://training.esri.com/certification/index.cfm.. You should read the feature article Building a community of highly skilled GIS professionals (http://www.esri.com/news/arcuser/0911/esri-technical-certification.html)

United States Department of Labor. 2010. Geospatial Technology Competency Model. June 1, 2010. Available online at: http://www.careeronestop.org/competencymodel/pyramid.aspx?GEO=Y

DiBiase et al. 2006. Geographic Information Science & Technology Body of Knowledge. Washington: UCGIS and AAG. 162 pp. Read Chapter 2 which is Available online at. http://www.uio.no/studier/emner/matnat/ifi/INF5210/h07/undervisningsmateriale/Why%20is%20a%20GIS%26T%20Body%20of%20Knowldge%20needed.pdf

DiBiase, D. 2012. Strengthening the GIS Profession. ArcNews. Available online at: http://www.esri.com/news/arcnews/summer12articles/strengthening-the-gis-profession.html

Week 3 – Certification Issues in GISci

January 28 & 30

Continuing on the first week's topic, the focus of week three will be a structured discussion of the rationale behind and needs for certifying GISci professionals. The certification criteria for GISci professionals developed by the Urban and Regional Information Systems Association (URISA) will be a major focus of the discussion, but certification of remote sensing and mapping specialists by the American Society for Photogrammetry and Remote Sensing (ASPRS) as well as specific state and international certification programs will also be addressed.

Assignment – Due 2/4/2014

Each student will write a 3-page memo summarizing what which certification program they feel is best suited to their needs. The first 2 pages will details the rationale for choosing this certification route and the third page who if at all your education and activities to this point can contribute to your progress towards certification.

Readings

Booth *et al.*, 3 – 6

Kemp, K. K. 2003. Why GIS Professional Certification Matters To All of Us. Transactions in GIS 7:159–163. doi:10.1111/1467-9671.00137. Available online: http://onlinelibrary.wiley.com/doi/10.1111/1467-9671.00137/abstract

URISA's GIS certification requirements. http://www.gisci.org/certification_program_description.aspx.

ASPRS certification programs. http://www.asprs.org/Certification-Program/Introduction-to-ASPRS-Certification-Program.html

United States Geospatial Intelligence Foundation. http://usgif.org/education/accreditation

Wilson, S. 2011. GISP and ESRI technical Certification Programs are Complementary. ArcNews. Available online at: http://www.esri.com/news/arcnews/spring11articles/gisp-and-technical-certification-programs-are-complementary.html.

Wilson, S. 2012. The top 10 things you should know about GIS certification. Directions Magazine. Available online at: http://www.directionsmag.com/articles/the-top-10-things-you-should-know-about-gis-certification/245516.

Week 4 – Professional Ethics and GISci

February 4 & 6

A structured discussion of the ethical behavior of GIS professionals assessing the ethical dilemmas and correct ethical conduct from current case studies which have been prepared as part of the Ethics Education for Geospatial Professionals (http://gisprofessionalethics.org)

Assignment – Due 2/6/2014

As a follow on to the Tuesday class discussion, groups of three to four students will work together on an additional case study. Each group will evaluate the case study using the "seven-step guide to ethical decision making" and orally present their conclusions to the class on Thursday. Supporting visuals and other materials are required will be shown using Powerpoint or similar software.

Readings

Booth *et al.*, 7 – 11

American Institute of Certified Planners. 2005. AICP Code of Ethics and Professional Conduct, http://www.planning.org/ethics/ethicscode.htm

ASPRS. 2001. Code of Ethics of the American Society for Photogrammetry and Remote Sensing, http://www.asprs.org/About-Us/Code-of-Ethics-of-the-American-Society-for-Photogrammetry-and-Remote-Sensing.html

Association for Computing Machinery. 1992. ACM Code of Ethics and Professional Conduct, http://www.acm.org/about/code-of-ethics.

GIS Certification Institute.2008. A GIS Code of Ethics. http://www.gisci.org/code_of_ethics.aspx.

Dibase et al. 2009. The GIS professional ethics project. Practical ethics education for GIS Pros. Proceedings of the 24th International Cartography Conference. Santiago, Chile, 15-21 November. https://www.e-education.psu.edu/files/sites/file/DiBiase_et_al_GIS_Pro_Ethics_ICC2009.pdf

Week 5 – The importance of "soft skills" to a GIS professional
February 11 & 13

A structured discussion of the "soft" interpersonal skills as well as basic academic preparedness required for success in Geospatial fields as well as a discussion of who well a Texas A&M education prepares students in these critical but hard to assess skills.

Assignment – Due 2/13/2014
Prepare a draft resume or curriculum vitae based on our discussions of GIS certification. Also prepare a 1-page summary identifying areas or competencies that you may need to address if you wish to become a certified GIS professional by the *GIS Certification Institute*.

Readings
Booth *et al.*, 12 – 14
United States Department of Labor. 2010. Geospatial Technology Competency Model. June 1, 2010. Available online at:
http://www.careeronestop.org/competencymodel/pyramid.aspx?GEO=Y

Week 6 – Spatial Data Standards

February 18 & 20

A structured discussion on the rationale behind and need for standards in spatial data. Specifics about some of the spatial data standards currently in use for both vector and raster data will be discussed. The metadata standards developed by the Federal Geographic Data Committee (FGDC) will also be described.

Assignment – Due 2/25/2014

Working in teams, students will create the appropriate metadata that adheres to the FGDC's standards to accommodate a GIS spatial data product.

Readings

Booth *et al.*, 14 – 16

ESRI. 2003. Spatial data standards and GIS Interoperability. ESRI White Paper. Available at: http://www.esri.com/library/whitepapers/pdfs/spatial-data-standards.pdf.

FGDC Standards Reference Model: http://www.fgdc.gov/standards/standards_publications/ Please examine the Part 0. The Base Document (FGDC-STD-014.0-2008)

Geospatial Metadata Standards including the Content Standard for Digital Geospatial Metadata. http://www.fgdc.gov/metadata/geospatial-metadata-standards. Please examine the current standard (http://www.fgdc.gov/standards/projects/FGDC-standards-projects/metadata/base-metadata/index_html) as well as how the standard is required to be modified to meet ISO (International Standard Organizations) requirements.

Week 7 – Research Progress Report
February 25 & 27

A roundtable discussion in which each student describes their progress and any hurdles they have faced with their internship or independent research project at the midway point in the semester. Each student will be expected to give a concise 10-minute synopsis of their research to date. Other members of the group will be expected to provide feedback.

Assignment – Due 2/25/2014
Prepare a rough draft of your final research paper focusing on the introduction and problem statement.

Part II – How to Present Your Results in a Professional Manner

Week 8 – A Brief Introduction to Writing a Professional Paper

March 4 & 6

This week features a structured discussion focusing on writing a professional paper for a Geographic literate audience. The lecture will focus on correct structuring of a professional paper depending on the venue and audience as well as how to select a proper publication outlet. Different types of professional literature will be discussed including referred journals, conference proceedings and other gray literature as well as the role of an abstract. The academic peer-review process will also be discussed. The material presented here should aid students in writing their final class report.

Communication Skills

The importance and practice of writing an abstract.

Assignment – Due 3/18/2014

Write a 300 word abstract describing the results of your research project or internship

Week 9 – Spring Break
March 11 & 13

Enjoy yourselves in a safe manner!

Week 10 – Professional Presentations: a how-to guide
March 18 & 20

This class will provide students an introduction to presenting research to a professional audience as a poster or oral presentation. Recent talks and posters by faculty and graduate students will serve as examples.

Communication Skills
How to create an effective oral presentation.

Assignment – Due 3/20/2014
Prepare a computer-aided brief 5 minute presentation describing the underlying question of interest in your research project or internship following the guidelines presented in class. This presentation will be given in class and provide an outline for your final project paper.

Readings
David A. Patterson, David A. circa 1983. How to Give a Bad Talk.
http://www.cs.wisc.edu/~markhill/conference-talk.html#badtalk

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Week 11 – A Brief Introduction to Producing Professional Quality Graphics
March 25 & 27

This lecture and discussion will address the production of publication and commercial quality graphics focusing on issues associated with the creation and production of large format map

Communication Skills
How to create an effective critique of professional work.

Assignment – Due 3/27/2014
Write a 2-3 page critique of a map from a recent ESRI® Map Book and present Map and critique in class.

Readings
Additional readings from the works of Edward Tufte

Week 12 – Preparation of a Professional GISci Portfolio
April 1 & 3

This seminar discussion will discuss how to prepare a professional GISci portfolio. Examples of professional materials produced by current faculty and graduate students will serve as examples.

Communication Skills
How to communicate your experience and achievements.

Assignment – Due 4/3/2014
Prepare your GISci portfolio.

Week 13 – Presentation of a Professional GISci Portfolio
April 8 & 10

Following the previous week's discussion, this week's seminar will consist of an open presentation of each student's professional GISci portfolio. Each student will present a collection of GISci materials that demonstrates their technical proficiency to potential employers. Each student's portfolio will be critiqued by his or her peers.

Communication Skills
How to communicate, present and critique professional portfolios.

Week 14 – Research Preparation Time
April 15 & 17

This week will be used to provide students a chance to complete work on their independent projects.

Week 15 – Presentation of Student Research
April 22 & 24

Each student will give an oral presentation of their project to the class using the professional presentation skills learned in class. The amount of time allocated to each student will determined by class size.

Course Schedule (Tentative)

Week	Class	Class Topics	Project Assignment Due*	Homework Assignment Due*
1	1/14	Introduction to the Course		
	1/16	...Continued		
2	1/21	Geospatial Professionals		
	1/23	...Continued		
3	1/28	Certification Issues in GISci	Project Memo	Esri/GTCM Comparison Memo
	1/30	...Continued		
4	2/4	Professional Ethics and GISci		Certification Memo
	2/6	**- Student Presentation of Etics Case Study**		Ethics Case Study
5	2/11	"Soft Skills" of a GIS professional	Project Outline	
	2/13	**- Student Discussion of CVs**		CV & Skill Assessment
6	2/18	Spatial Data Standards and Metadata		
	2/20	...Continued		
7	2/25	**- Student Discussion of Research Progress**	First Draft	Metadata
	2/27	**- Student Discussion of Research Progress**		
8	3/4	Writing Professional Papers		
	3/6	...Continued		
9	3/11	**SPRING BREAK**		
	3/13			
10	3/18	Professional Presentations	Project Abstract	
	3/20	**- Student Presentation of Research Project**	Prelim Project Presentations	
11	3/25	Producing Professional Quality Graphics		
	3/27	**- Student Presentation of Map Critique**		Map Critique
12	4/1	Preparation of Professional GISci Portfolios	Second Draft	
	4/3	...Continued		
13	4/8	**- Student Presentation of Portfolios**		Portfolio
	4/10	**- Student Presentation of Portfolios**		
14	4/15	Research Preparation Time		
	4/17	...Continued		
15	4/22	**- Student Presentation of Research Project**	Final Project Presentations	
	4/24	**- Student Presentation of Research Project**	Final Project Presentations	
	5/6	3:00 PM	Final Report	

***** *All assignments due at start of class*

I reserve the right to make changes to the course schedule