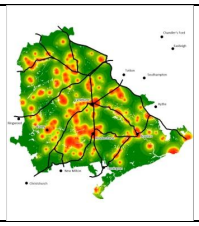	**GIS Applications and Modeling** **Geography 492/521[1] -Fall 2014**
Course Location & Time:	**Lecture: Monday, 9:30 to 11:20 am (Breland 194)** **Lab: Wednesday, 11:30 am to 1:20 pm (Breland 192)**
Instructor:	**Dr. Christopher Brown**
Office:	**Breland Hall, Room 149**
Office phone:	**505-646-1892**
EMAIL:	**brownchr@nmsu.edu**
Office hours:	**Monday – 11:30am-1:00pm; Wednesday – 9:00-10:30am; and by appointment**

Textbooks: Given the seminar nature of this class and the accompanying focus on students digging into relevant literature, no test if required for the class. However, past experience has indicated that students benefit from three very useful recommended texts, and I provide detail on these below:

- Maguire, D., M. Batty, and M. Goodchild, 2005. **GIS, Spatial Analysis, and Modeling**. Redlands, CA: ESRI Press. This book is published by Esri press, lays out some basic modeling concepts, and contains some excellent work done by spatial scientists on a range of modeling questions.
- Burrough, P.A. and R.A. McDonnell, 1998. **Principles of Geographical Information Systems.** 2nd Edition. Oxford, UK: Oxford University Press. This text from Oxford University press does an excellent job on explaining conceptual data models, explore interpolation in detail, and is just a great reference to own.
- Mitchell, Andy, 2005. **The ESRI Guide to GIS Analysis: Vol. 2: Spatial Measurements & Statistics**. Redlands, CA: ESRI Press. This is another Esri Press book that lays out the foundations on which many analytical routines from ArcGIS are built.

The first book is available through the NMSU Barnes and Noble Bookstore, and all of these books are through online booksellers, and are on reserve in Zuhl Library.

Materials in support of laboratory exercises: Esri has developed an extensive set of tutorials and short online classes for ArcGIS products, and many of these are available for free at the Esri Virtual Campus (http://www.esri.com/training/main). One of our labs has you dig into these in some detail, and we also can provide access to online tutorials that normally involve a small fee. Please let me know if you are interested, and I will provide you with an access code to these "almost free" online classes that are in the "under $100 range." Miscellaneous articles and other materials will also be posted to Canvas. In addition, various Internet resources will be accessed

[1] Given this is a cross-listed undergraduate (Geog 492) and graduate (Geog 521) class, graduate students will be doing some extra work that undergraduates are not required to do. Details are provided later in this document.

through use of the Web, and students will be reading extensively in the geographic literature in support of a Library Lunge and annotated bibliography, also to be explained below.

Course description and learning objectives – This course introduces and reviews some important technical concepts that are instrumental in the use of GIS and related modeling work, and we also explore a range of application and modeling areas where GIS technologies and spatial models are used to answer spatial queries. The class has several learning objectives, which are stated below. At the end of the class, you will be able to:

- Discuss a range of GIS application & modeling areas that are covered in class, noting major questions posed, the data models and tools used, and the outcomes of related GIS work;
- Discuss your specific application and modeling area in considerable detail, deploying the results of a focused review of current literature that you will conduct and presenting this material to your peers;
- Through both written article reviews and a presentation you make to the class, **critically review** research articles in your area of interest;
- Through a series of "hands on" laboratory exercises, become more proficient with a range of ArcGIS tools and routines; and
- Successfully complete an applied group GIS project, whereby you work with group members to plan the project, compile needed data, conduct needed analytical routines, develop a final product that "tells the story of the project," and present this final product to your peers through a classroom presentation. The goal is to produce a "whole that is greater that it's parts."

Course format - The class is designed primarily in a seminar format, which is augmented by the laboratory exercises discussed below. Early in the class, I will review some key GIS and modeling concepts that should have under your belt and outline the basic application areas we will examine. Once this foundation for the class is in place, you will "share the load" in presenting the basics of application areas and also reviewing relevant articles. Each of you will "adopt" an application area of interest and explore the research literature by means of a "Library Lunge" or a focused literature review towards the goal of becoming a "nascent expert" in your application area of choice. We will also advance technical abilities through laboratory exercises and a group GIS project in an application area of choice. For this project, students will apply appropriate GIS tools to a problem that forms the core of their project. Details of the project and lab exercises follow below and in separate handouts, and I invite students to start thinking about this project early in the term once we form the groups that will drive the project.

World Wide Web Support for this class - This class is offered as a "Web-supported" class, which means that we meet "live and in color" as in a traditional class, but supplemental course material will be provided on the Web via the NMSU Canvas server (learn.nmsu.edu) that contains all of these materials. Aside from this syllabus (which of course is also available on line) and some miscellaneous materials I provide the first day in class, most other materials and assignments are provided to you via Canvas. **NOTE - I take all email at brownchr@nmsu.edu, NOT through CANVAS; Also, NMSU policy states that students should forward email received at their NMSU email address to any off campus email addresses they routinely use.**

Exams – There will be no exams for this class. Given this is a seminar-based exercise, you will be evaluated on the quality of article reviews, in class presentations, the final annotated bibliography in your application area of choice, the work done in laboratory, and the group project that builds on the lab exercises.

The Library Lunge – As noted above, I begin the term with a review of GIS modeling concepts and an overview of GIS application areas. Once I "prime the pump," you will "take the reins" from me, present a specific application area, and also lead a discussion of a relevant article you pull from the literature. Educational research indicates that "active learning is better learning," and I deploy this model to help promote better learning of class material, make for stronger connections with these concepts, and reduce the risk of "death by Powerpoint." [2]

Based on my own review of the literature and past experience, I offer the following list of application areas as a menu from which you will select a topic to research. You may also bring new ideas on what we study to the table, but here is "the preliminary menu:"

- Archeological research related to cultural resource management,
- Cadastral records and land information systems (LIS),
- Crime mapping and criminal justice applications,
- Demographic and population research,
- Environmental modeling and natural resource management,
- Hydrologic modeling and water resource management,
- Intelligence and military support applications,
- Location/allocation analysis,
- Public Participatory GIS (PPGIS) to support decision and policy making,
- Precision agriculture, linking GIS, GPS and remote sensing tools,
- Public health research and applications,
- Spatial decision support systems,
- GIS&T system planning and implementation,
- Transportation GIS and network applications, including E-911 routing,
- Urban planning and land use research, and
- Utilities mapping and management.

Article reviews and annotated bibliography - As a means of getting familiar with a broader scope of readings and digging into specific application areas in greater depth, you will do focused library work to find, read in detail, critically review, and write-up 5 peer-reviewed research articles or edited book chapters in your application area of choice. Guidance on these write-ups and due dates are already posted to Canvas, so you have adequate advance notice as to what is expected in

[2] As noted earlier, graduate students need to do work above what is required of undergraduate students. I am asking graduate students to speak with faculty and researchers in their area of interest ("experts on the job"), both on campus, and off campus, to augment their Library/Web research. Details follow in a separate document on the Library Lunge.

these write-ups and when they are due. These write-ups will require you to provide an overall summary of the article, discussion of the research questions posed, exploration of the tool(s) and data used, and critical review. You will need to include a copy of the article being reviewed or provide a link to the article on line, and each write-up should be 3-4 pages, word-processed, double spaced, and written clearly and concisely in a form suitable for publication. You will also present one of these to the class when you present your application area overview. The format of these is similar to that employed in book reviews found in research journals, **with an emphasis on critical analysis and synthesis**. **NOTE** - in discussions with numerous former students from this class that have found "work in the field," these reviews were noted as "the thing that taught me the most about how certain techniques are used and how to interpret the results," a most useful talent!

The final result of the "Library Lunge" is an annotated bibliography in which you present summaries of the articles you read in your specific application area. My hope is that this is somewhat related to your thesis or dissertation topic or general area of research interest. This annotated bibliography should cover at least 15 pieces of literature in reasonable detail and could serve as the foundation of a thesis or dissertation literature review ~ this would be a good thing! Details of the Library Lunge and annotated bibliography are provided in separate postings.

Laboratory Exercises – To provide opportunities for you to explore specific GIS routines and also develop skills to support the group GIS project, you will do several laboratory exercises during the lab session for the class. The first exercise will be a choice of a few different tutorial exercises, and we will then work on data mining, exploring Esri's geodatabase model, and using geo-processing tools to generate and manipulate statistical surfaces. The last few laboratory exercises ask you to layout how to do a multi-criteria archeological modeling project, and then actually execute this modeling exercise. These laboratory exercises will be posted on Canvas throughout the term.

Group research project – The laboratory exercises are designed to provide a foundation for the development of a group research project in which you work together with other students to define a research problem that can be examined with geo-spatial data, collect the needed data, run the analysis, and produce spatial information products that answer the questions being posed. The outcome of the project is usually a poster or Website; past students have done high quality work that has been presented at conferences. Additional detail is provided in a separate document.

Grading and evaluation ~ All written assignments must be word-processed or similarly computer-generated, and these assignments must be handed in on time. If you are turning work in late with a valid excuse, written documentation of such excuse must be attached to the work when you turn it in. Work turned in late without a valid excuse will lose 10% for each day late. No extra credit assignments will be given or accepted, as ample opportunities exist for you to earn the grade you wish to earn.

NOTE - NMSU recently moved to a differential grading system, whereby +/- grades earn more or less GPA points than a straight grade of A/B/C/D earned in the past. The following links provide detail on how this grading system generates the GPA points students will receive for grades, at both the graduate and undergraduate level:

- http://nmsu.smartcatalogiq.com/en/2014-2015/Undergraduate-Catalog/General-Information/Regulations/University-Grading-System
- http://nmsu.smartcatalogiq.com/en/2014-2015/Graduate-Catalog/General-Information/Regulations-and-Procedures-for-Students/Grading-System

Final grades are based on a "90/80/70/60" interpretation of the percentage of total possible points earned by you during the semester, and the GPA points earned follow the system detailed above. Withdrawals from this course are **your** responsibility, and **I will not withdraw you from this class under any circumstances.** Incomplete grades will not be given except in the case of extraordinary circumstances related to serious illness, bereavement, or personal crises. Documentation will be required in these limited cases, and granting of incomplete grades is solely at my discretion. Details of the various activities we will do in this class and their weight towards the final grade in the course are provided below:

Library Lunge - Reviews/write-ups (n=5)	25%
Laboratory Exercises	25%
Final Group Project	25%
Annotated Bibliography	15%
Class participation and student lead sessions	10%

Academic Integrity - As stated in the NMSU Graduate and Undergraduate Catalog, "students at NMSU are expected to observe and maintain the highest academic, ethical, and professional standards of conduct." I expect all work submitted in this class to represent your own individual efforts, and documented instances of cheating or plagiarism[3] will be subject to the strictest disciplinary action, including issuance of a failing grade and additional administrative sanctions. If you have any questions or concerns regarding the honesty or integrity of work being done by you or a classmate, please feel free to talk to me. Further information concerning the University's Code of Conduct and how to avoid plagiarism can be found at the following URLs:

- http://deanofstudents.nmsu.edu/student-handbook/1-student-code-of-conduct/
- http://lib.nmsu.edu/plagiarism/

Students with disabilities and discrimination issues - As a faculty member at NMSU, I subscribe to university policy on students with disabilities and special needs in meeting class requirements. If you have physical, psychological, or learning disabilities, you are encouraged to contact the Students Accessibility Services (SAS) office concerning issues related to the Americans with

[3] NMSU's definition of plagiarism is noted at http://deanofstudents.nmsu.edu/student-handbook/1-student-code-of-conduct/ and also at http://lib.nmsu.edu/plagiarism/. Even with a citation, failure to put quotation marks around direct quotations also constitutes plagiarism, because it implies that the writing is your own. Material should either be paraphrased or clearly designated as a quotation. Note that replacing words with synonyms, changing verb tense or other minor alterations do not qualify as paraphrasing. Also, as stated by the Academic Dean of Students in the NMSU College of Arts and Sciences, "both intentional and unintentional plagiarism are considered academic misconduct."

Disabilities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. If you have a documented disability and anticipate needing accommodations in this course, please discuss your needs with me soon. For more information about the programs and services available, including academic accommodations for students with disabilities, please contact the SAS office, 646-6840. If you have a condition which may affect your ability to exit safely from the premises in an emergency or which may cause an emergency during class, please discuss any concerns with me and staff within the office of SAS early in the term. All information shared with me in this area will be treated confidentially.

I also subscribe to and work very hard to abide by NMSU's policy to support a work and study environment free of harassment and discrimination. Please feel free to contact me to discuss any issues or concerns you have in this area. Jerry Nevarez, NMSU's Director of the Office of Institutional Equity, can also be contacted at 575-646-3635 with any questions you may have about NMSU's Non-Discrimination Policy or concerns you have related to discrimination or harassment.

Seeking help and access to faculty ~ If you feel that you are having difficulty keeping up with class assignments or in understanding the material we are covering, **please speak with me as soon as possible!** I truly want you to do well in this class, and I am willing to work with you as needed to help make this a successful class that will support your research. Please note the office hours posted at the beginning of the syllabus. If you cannot make it to my office during these hours, please contact me via EMAIL (brownchr@nmsu.edu) or phone (646-1892) to make an appointment. I hope you all enjoy this class and find the things we will learn to be of interest and of use to you in your course work and research at NMSU. Good luck!