**University of Kansas**

**Proposed Course Syllabus**

Course: GEOG 658 - Special Topics in GIS

Course Title: Maps & Geotools for Educators

Term: Spring 2014

Credits: 3.0

Days/Times: Monday evenings, 4:30-7:00 pm

Class Location: Edwards Campus

**INSTRUCTOR:**

Instructor of record: Dr. Thomas R. Baker, Center for STEM Learning (Adjunct Researcher)

Office: TBD

Phone: 913-787-6660

E-mail: tbaker@ku.edu

Office Hours: By appointment, face to face or virtual

**COURSE DESCRIPTION:**

From geographic information systems (GIS) to geogaming, the application of geospatial tools (e.g. GPS, GIS mapping, remotely sensed imagery, web mapping, or digital globes) and activities (e.g. field studies, geotagging, geogaming, educational geocaching) can enhance student problem solving, critical thinking, collaboration, and spatial thinking in the classroom, when situated in appropriate instructional designs. The proliferation of geospatial tools and their ease-of-use in classrooms warrants a deeper exploration of the implication on geographical thinking, instructional design, and learning. This course will emphasize hands-on activities using no-cost and readily available geospatial tools and data for standards-based middle and secondary education, with specific applications in natural and social sciences. Implementation planning and resource evaluation are included in this course.

**INSTRUCTIONAL APPROACH AND STRATEGIES:**

This course is designed to model the philosophy and practices in the Next Generation Science Standards, the College, Career, and Civic Life (C3) Framework for Social Studies Standards, and the National Education Technology Standards for Teachers (NETS-T). As a learner in this course, you will experience these standards-based approaches to teaching and learning with geospatial tools. This course is based upon the philosophy that the most productive learning happens when you are actively engaged in developing your own knowledge and abilities.

This course is learner-centered, which means that you will have the opportunity and responsibility for identifying the learning opportunities and tasks that will make up the course. You will work in small groups with your classmates to investigate and to develop a shared understanding of important ideas in teaching with and creating geospatial applications. The instructor’s role is to provide the student with opportunities to explore and experience teaching and learning and to interpret, evaluate, and apply concepts and strategies associated with effective teaching.

I expect that each student will come to class weekly prepared to ask questions and to share insights regarding the topic to be studied.

**USER OF EDUCATIONAL TECHNOLOGY:**

An Edmodo site provides learners with information on all assignments, a substantial collection of readings, and copies of presentations used in the course. Learners are also required to post all assignments on the site.

Learners will routinely use desktop and web based geospatial tools for creating or examining maps and other data visualizations. These may include Esri ArcGIS, QGIS, Google Earth and others. Learner smartphones may be used at the discretion of the learner for reporting field data in projects designed by learners (an alternative will be provided if needed). Learners will need to create free user accounts in online tools/systems like: Google, ArcGIS Online, Edmodo, and others.

**COURSE OBJECTIVES:** Learners will demonstrate their understanding of:

1. Inquiry-based project designs, which utilize various geospatial tools.
2. Map use and design
3. Data collection and handling to facilitate and extend classroom concepts.
4. Data analysis teaching techniques to facilitate learning across the curriculum.
5. Geospatial tools such as GIS, GPS, web-based mapping and designing geospatial activities.
6. Application of web mapping to support collaborative inquiry project development.
7. Existing instructional materials utilizing geospatial tools.
8. How to identify and differentiate geospatial tools, data, and curricula for students of various developmental levels.

**REQUIRED BOOKS:**

* Current curriculum standards documentation from learner’s field of interest
* Kimerling, A.J., Buckley, A.R., Muehrcke, P.C. and Muehrcke, J.O. (2011). *Map Use: Reading, Analysis, & Interpretation*. Esri Press: Redlands, CA.
* Palmer, R.T. & Baker, T.R. (2013). *Tech-Enabled Field Studies*. Carte Diem Press: Dallas, TX.

**OPTIONAL BOOKS:**

* Christmann, E.P. (2011). *Beyond the numbers: Making sense of statistics*. NSTA Press.
* Lo, B. (2010). *GPS and Geocaching in Education*. ISTE Press.

**READING LIST:**

1. Uttal, D.H. (2000). Seeing the big picture: Map use and the development of spatial cognition. *Developmental Science*, 3(3), 247-286.
2. Ishikawa, T. (2012). Geospatial Thinking and Spatial Ability: An Empirical Examination of Knowledge and Reasoning in Geographical Science*. The Professional Geographer* 0(0), 00-00.
3. *Review the standards content for your area and find connections to geospatial technology.*
4. Kimerling, A.J., Buckley, A.R., Muehrcke, P.C. and Muehrcke, J.O. (2011). *Map Use: Reading, Analysis, & Interpretation*. Esri Press: Redlands, CA.
5. Bodzin, A.M., Fu, Q., Peffer, T.E., Kulo, V. (2013). Developing Energy Literacy in US Middle-Level Students Using the Geospatial Curriculum Approach. International Journal of Science Education 35(9), 1561-1589.
6. National Research Council (NRC). (2005). Learning to Think Spatially: GIS as a Support System in the K12 Curriculum. National Academies Press: Washington, DC. [free download]
7. Mitchell, A. (1999). *The Esri guide to GIS analysis: Volume 1 Geographic patterns and relationships*. Esri Press: Redlands, CA.
8. Supplemental GPS article (TBD)
9. Webster, M.L. & Milson, A.J. (2011). Visualizing Economic Development with ArcGIS Explorer. *Social Education 75*(2), 114‐117.
10. Berson, I.R. & Berson, M.J. (2011).Integrating Literature and the Social Studies with Google LitTrips. *Social Education 75*(2), 111‐113.
11. Esri. (2013). *Mapping Our World: ArcGIS Online Edition.* Esri Press: Redlands, CA. Online at: <http://edcommunity.esri.com/Resources/ArcLessons/OWGE> [free download]
12. Palmer, R.T. & Baker, T.R. (2013). *Tech-Enabled Field Studies*. Carte Diem Press: Dallas, TX.
13. Baker, T. R., Kerski, J. J., Huynh, N. T., Viehrig, K., and Bednarz, S. W. (2012). Call for an Agenda and Center for GIS Education Research. Review of International Geographical Education Online, 2 (3), 254-288.
14. Huynh, N.T. & Sharpe, B. (2013). An Assessment Instrument to Measure Geospatial Thinking Expertise, *Journal of Geography, 112*(1), 3-17.
15. Baker, T.R. (2001). Let GIS Be Your Guide. *The Science Teacher 68*(12), 38-41.

**GRADING POLICY & SCORING:**

1000 points total:

* 92% = A
* 91-90% = A-
* 89-88% = B+
* 87-83% = B
* 82-80% = B-
* 79-78% = C+
* 77-73% = C
* 72-70% = C-
* 69-67% = D+
* 66-60% = D
* Below 60% = F

**LATE ASSIGNMENTS:**

Students are expected to submit classroom assignments by the posted due date and to complete the course according to the published class schedule. The readings and curriculum design assignments may be submitted ahead of schedule.

As adult students and working professionals, we understand you must manage competing demands on your time. In the rare case you need additional time to complete an assignment, please contact me *before the due date* so we can discuss the situation and determine an acceptable resolution. Submission of late assignments is unacceptable and may result in receiving a zero for the assignment and may result in receiving an “F” for the course.

**UNIVERSITY POLICIES**

Students with Disabilities: If there is any situation (e.g., hearing loss, learning disability) requiring special arrangement, please inform me after the first class so that proper arrangements can be made.

The scope and content of the material included in this course are defined by the instructor in consultation with the responsible academic unit. While the orderly exchange of ideas, including questions and discussions prompted by lectures, discussion sessions and laboratories, is viewed as a normal part of the educational environment, the instructor has the right to limit the scope and duration of these interactions. Students who engage in disruptive behavior, including persistent refusal to observe boundaries defined by the instructor regarding inappropriate talking, discussions, and questions in the classroom or laboratory may be subject to discipline for non-academic misconduct for disruption of teaching or academic misconduct, as defined in the Code of Student Rights and Responsibilities (CSRR), Article 22, Section C, and the University Senate Rules and Regulations, Section 2.4.6. Article 22 of CSRR also defines potential sanctions for these types of infractions.

The issue of digital plagiarism has raised concerns about ethics, student writing experiences, and academic integrity. KU subscribes to a digital plagiarism detection program called Turnitin.com that may be used to check papers submitted in this course. You may be asked to submit your papers in a digital format (email attachment, LMS, or on disk) so that your paper can be checked against web pages and databases of existing papers. Although you may never have engaged in intentional plagiarism, many students do incorporate sources without citations; this program can alert me to your academic needs.

KU has satellite writing centers called Writer's Roosts. The consultants there will work with you as you prepare drafts of papers; they do not edit your papers, but they do help you meet the goals of your assignments. Writer's Roosts are open in several locations across campus; please check <http://www.writing.ku.edu> for current locations and hours.

**COURSE TOPICS AND ASSIGNMENT SCHEDULE:**

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| **Week** | **Topic** | **Assignment Due** |
| 1 | Course overview  Introduction to digital maps and map design | Exercise: Reflection 1 (R1) |
| 2 | Spatial & Geospatial Thinking  Collecting & organizing data with students  Educational standards | Exercise: Web Mapping, R2  Readings: 1, 2, 4(2), 12 (3) |
| 3 | Designing inquiry-based instruction  GIS & Map design I (ArcGIS Online)  Students: Standards Presentations | Exercise: Standards, R3  Readings: 3, 4 (3-skim), 4(8) |
| 4 | GIS & Map design II (QGIS)  Spatial thinking in inquiry instruction | Readings: 5, 6 (Exec Summary)  Exercise: R4 |
| 5 | Analyzing data with maps (ArcGIS)  Basic statistics  Evaluating geospatial curricula | Readings: 4(10), 11 (skim)  Exercise: R5 |
| 6 | GPS technology  GPS-based instructional activities | Readings: 8, 16, 4(14)  Exercise: R6 |
| 7 | Digital Globes (e.g. Google Earth, Worldwind) & Remote Sensing  Digital Globe-based instructional activities | Readings: 9, 10, 4(9)  Exercise: R7 |
| 8 | Geotagging and Social media  Smartphones for data collection in instruction | Readings: 12(8)  Exercise: R8 |
| 9 | Advanced ArcGIS Online (for education) | Readings: 12 (2)  Exercise: R9 |
| 10 | MIDTERM EXAM  Geogaming & educational geocaching | Exercise: Geogaming, R10 |
| 11 | Citizen science & crowd sourcing  Collaborative field studies | Readings: 12 (6)  Exercise: R11 |
| 12 | Spatial analysis with GIS | Readings: 12 (7), 4(17)  Exercise: R12 |
| 13 | Assessing student learning with geospatial projects | Readings: 15  Exercise: Project proposal, R13 |
| 14 | Trends and issues in geospatial education research | Readings: 13, 14  Exercise: R14 |
| 15 | Project Presentations | Exercise: Project presentation |
| 16 | Project Presentations | Exercise: Project presentation |

**EXERCISE DESCRIPTIONS:**

1. Web mapping: Create a free/public account at <http://arcgis.com>. Create, save, and share a map you have created using at least one base map and two operational layers. In the map description (metadata) describe where the map would be used in your existing or proposed curriculum.
2. Standards: Find five to seven connections to geographic mapping or geospatial technologies in the content standards of your choice. Create a five-slide presentation and present your findings in class. Plan for a five-minute presentation.
3. Geogaming: Dyads will locate and present one geogame that has useful educational extensions for the classroom. The geogame selection must be approved by the instructor prior to presentation. Each dyad is to present for no more than 5 minutes.
4. Project proposals: Describe the proposed collaborative project, including relevant educational standards, instructional strategy, data model, data collection strategy, and data presentation via GIS. Project proposal should not exceed four pages.
5. Project presentation: Develop a collaborative inquiry project which teaches standards-based content, follows a defined instructional model, uses a defined data collection and analysis strategy. The project presentation should include an assessment strategy that supports the project. Additional details will be provided on the project presentation by mid-semester.
6. Reflections (R): Fourteen “Reflections” will require the learner to assimilate new knowledge into their existing or professional practice. Reflections should connect curriculum, instruction, assessment, and geospatial tools in a relevant and practical manner. A guiding question will be presented each week (14) to encourage structured thinking.