Eastern Illinois University

New/Revised Course Proposal Format

(Approved by CAA on 4/3/14 and CGS on 4/15/14, Effective Fall 2014)

Banner/Catalog Information (Coversheet)

1. _X__**New Course or _____Revision of Existing Course**

2. **Course prefix and number:** __GEO5825_____

3. **Short title:** _Advanced Lidar Mapping_____

4. **Long title:** _Advanced Lidar Mapping_____

5. **Hours per week:** _2_ Class _2_ Lab _3_ Credit

6. **Terms:** ___ Fall _X_ Spring ___ Summer ___ On demand

7. **Initial term**: ___ Fall _X_ Spring ___ Summer Year: _2021_

8. **Catalog course description:** The course presents the background, theory, and various applications of lidar to mapping in the geospatial field. Both physical principles of airborne laser mapping and digital processing of datasets are examined. Special focus is given to the use of lidar in planning and modeling applications.

9. **Course attributes: none**

   General education component: _____

   ___ Cultural diversity ___ Honors ___ Writing centered ___ Writing intensive ___Writing active

10. **Instructional delivery**
    Type of Course:

    ___ Lecture ___ Lab _X_ Lecture/lab combined ___ Independent study/research

    ___ Internship ___ Performance ___ Practicum/clinical ___ Other, specify: _____

    Mode(s) of Delivery:

    _X_ Face to Face _X_ Online ___ Study Abroad

    ___ Hybrid, specify approximate amount of on-line and face-to-face instruction_____

11. Course(s) to be deleted from the catalog once this course is approved.
    __none_____

12. **Equivalent course(s):** __none_____

    a. Are students allowed to take equivalent course(s) for credit? ___ Yes ___ No

13. **Prerequisite(s):** _none_____

    a. Can prerequisite be taken concurrently? ___ Yes ___ No

    b. Minimum grade required for the prerequisite course(s)? ___

c. Use Banner coding to enforce prerequisite course(s)? ___ Yes ___ No

d. Who may waive prerequisite(s)?

___ No one ___ Chair ___ Instructor ___ Advisor ___ Other (specify)

14. Co-requisite(s): _none_____

15. Enrollment restrictions

a. Degrees, colleges, majors, levels, classes which <u>may</u> take the course:
__all_____

b. Degrees, colleges, majors, levels, classes which may <u>not</u> take the course:
__none_____

16. Repeat status: _X_ May not be repeated ___ May be repeated once with credit

17. Enter the limit, if any, on hours which may be applied to a major or minor: _3_

18. Grading methods: _X_ Standard ___ CR/NC __ Audit ___ ABC/NC

19. Special grading provisions: none

___ Grade for course will <u>not</u> count in a student's grade point average.

___ Grade for course will <u>not</u> count in hours toward graduation.

___ Grade for course will be removed from GPA if student already has credit for or is registered in: _____

___ Credit hours for course will be removed from student's hours toward graduation if student already has credit for or is registered in: _____

20. Additional costs to students:
Supplemental Materials or Software_____

Course Fee ___No _X__Yes, Explain if yes_<u>Fees will offset costs of printing and software maintenance</u>

21. Community college transfer:

___ A community college course may be judged equivalent.

_X_ A community college may <u>not</u> be judged equivalent.

Note: Upper division credit (3000+) will <u>not</u> be granted for a community college course, even if the content is judged to be equivalent.

Rationale, Justifications, and Assurances (Part I)

1. ___Course is required for the major(s) of _____
   ___Course is required for the minor(s) of _____
   ___Course is required for the certificate program(s) of _____
   _X_ Course is used as an elective
2. **Rationale for proposal** : This course is being developed to support the PSM in Geographic Information Science. In the past decade, lidar mapping has matured, going from an exotic, niche data source to one of the mainstays of GIS processing. With this newfound prevalence comes a need for professionals to understand acquisition methods, processing techniques, and analytical uses for lidar. It should also be noted that the PSM currently has a shortage of electives, forcing students to take numerous one-off seminars to fulfill requirements. Adding lidar to the rotation will help alleviate this problem.
3. **Justifications for (answer N/A if not applicable)**
   Similarity to other courses: none
   Prerequisites: n/a
   Co-requisites: n/a
   Enrollment restrictions: n/a
   Writing active, intensive, centered: n/a
4. **General education assurances (answer N/A if not applicable)**
   General education component: n/a
   Curriculum: n/a
   Instruction: n/a
   Assessment: n/a
5. **Online/Hybrid delivery justification & assurances (answer N/A if not applicable)**
   Online or hybrid delivery justification: This class will be offered online as needed to enhance accessibility for working professionals. There is also an interest in allowing Western Illinois students to take this course remotely as part of a limited curriculum-sharing program.

   Instruction: Lectures by the instructor will be recorded and posted using the learning management system to approximate the experience of lectures in a face-to-face classroom. All course materials (there are no appropriate textbooks yet available) such as readings, videos, and discussions will be available in the learning management system as well. Lab work will be accomplished using EIU's virtualization software of choice to remotely access

software and data. Instructor will be available to students in live sessions to answer questions and assist with software issues. Lab assignments and discussions will be submitted online by students. Any instructor teaching the course will have completed the appropriate online training.

Integrity: The learning management system tools will be used to ensure the academic integrity of written assignments, and check for originality in written work. Students will receive personalized feedback and comments for assignments. Discussion board posts will be actively monitored to ensure proper online etiquette and form. Tests will require students to synthesize and analyze information from lectures and labs, and will go through appropriate checks for originality.

Interaction: Students will have access to learning management system tools including drop-boxes for assignments, discussion boards, email and synchronous communication via scheduled live sessions. Students will have access to the instructor via email or phone during office hours or at prearranged times. The instructor will provide feedback on activities (discussion posts, labs, tests, etc.) in a prompt manner.

Model Syllabus (Part II)

Please include the following information:

1. Course number and title

GEO5825: Lidar Mapping

2. Catalog description

The course presents the background, theory, and various applications of lidar to mapping in the geospatial field. Both physical principles of airborne laser mapping and digital processing of datasets are examined. Special focus is given to the use of lidar in planning and modeling applications.

3. Learning objectives.

A. Explain the physical properties and characteristics of lidar sensors and the impact of these features on data analysis. (GLG 1,3)

B. Implement and interpret processing techniques designed to produce enhanced data products. (GLG 1,2,3)

C. Differentiate appropriate techniques for a chosen lidar application in a real-world scenario. (GLG 1,2,3,4)

D. Produce an original study, executing a project from data acquisition, through processing to analysis and conclusions. (GLG 2,4)

E. Communicate results of original, lidar-derived spatial studies in written and oral form. (GLG 3, 4)

4. Course materials.

As authoritative textbooks on the subject of lidar are lacking, readings will be made available via the learning management system.

Examples include (but are not limited to):

Hudak, Evans, and Smith. 2009. "LIDAR Utility for Natural Resource Managers." Remote Sensing. 1:934-951. doi:10.3390/rs1040934

Stoker, Brock, Soulard, Ries, Sugarbaker, Newston, Haggerty, Lee and Young. 2016. "USGS lidar science strategy-Mapping the technology to the Science." Accessed at: https://pubs.er.usgs.gov/publication/ofr20151209. doi:10.3133/ofr20152019

Zheng and Xiao. 2018. "Typical Applications of Airborne Lidar Technology in Geological Investigation." The International Archives of the Photogrammetry, Remote Sensing, and Spatial Information Sicences. XLII-3.

Yan, Shaker, and El-Ashmawy. 2015. "Urban Land Cover Classification using airborne LIDAR data: a review." Remote Sensing of Environment. 158: 295-310. doi:10.1016/j.rse.2014.11.001

5. Weekly outline of content.

1. An Introduction to Airborne Laser Scanning
2. Global Positioning and Accuracy, Lab 1
3. LAS Files and the Point Cloud, Lab 2
4. Gridded DEMs Lab, 3
5. Bare Earth Models, Lab 4
6. Digital Surface Models, Lab 5
7. Building Extraction, Project Proposal
8. Constructing the 3-D City, Lab 6
9. Review and ***Exam One***
10. Animating Visualizations, Lab 7
11. Infrastructure Applications, Lab 8
12. Flood Plain Applications, Lab 9
13. Projects: Data Acquisition and Literature
14. Projects: Data Processing, Outline Due
15. Projects: Data Analysis, Presentation and Term Paper Due
16. ***Final Exam***

6. Assignments and evaluation, including weights for final course grade.

1.	Discussion Posts (10 x 10)	100
2.	Labs (9 x 20)	180
3.	Exams (2 x 150)	300
4.	Project	
a.	Proposal (1 x 10)	10

b.	Outline (1 x 10)	10
c.	Paper (1 x 300)	300
d.	Presentation (1 x 100)	100
	Total	1000

7. Grading scale.

>/=90% = A 89% to 80% = B 79% to 70% = C 69% to 60% = D <60% = F

8. Correlation of learning objectives to assignments and evaluation.

Course Objectives (Graduate Learning Objectives)	**Discussion (10%)**	**Labs (18%)**	**Exams (30%)**	**Research Project (42%)**
A. Explain the physical properties and characteristics of lidar sensors and the impact of these features on data analysis. (GLG 1,3)	X	X	X	
B. Implement and interpret processing techniques designed to produce enhanced data products. (GLG 1,2,3)		X	X	X
C. Differentiate appropriate techniques for a chosen lidar application in a real-world scenario. (GLG 1,2,3,4)	X	X		X
D. Produce an original study, executing a project from data acquisition, through processing to analysis and conclusions. (GLG 2,4)			X	X
E. Communicate results of original, lidar-derived spatial studies in written and oral form. (GLG 3, 4)		X		X

Date approved by the department or school: 9/25/2020
Date approved by the college curriculum committee: 10/7/2020
Date approved by the Honors Council *(if this is an honors course):*
Date approved by CAA: CGS: