CIEE Global Institute – Berlin

Course name:	Global Sustainability Workshop – Geospatial Information Systems
Course number:	ENVS 3101 BRGE
Programs offering course:	Berlin Global Sustainability and Environment
Language of instruction:	English
U.S. semester credits:	3
Contact hours:	45
Term:	Fall 2018

Course Description

This workshop focuses on Geospatial Information Systems (GIS). Powerful technologies have emerged in recent years that expand our abilities to manage, process, and analyze data. These tools can help us to better understand and integrate social, economic, and environmental systems, invaluable in building more sustainable society and environment. GIS and other technologies are already integrated in our lives in many ways, from digital maps on phones and in cars, to the management of infrastructure. It's expected that efficiencies and reliance on these tools will only increase and the world urbanizes further. Smart cities, automated transportation, even urban farming are some areas under development. This courses provides training and investigates the application of GIS and other data management platforms in creating more sustainable cities. The tools celebrated but also viewed critically. How can we ensure the benefits are reaching broad segments of society?

Learning Objectives

By the end of the course, students will be able to:

- communicate ideas critically about a multi-systemic understanding of sustainable cities.
- work effectively in a group using new technologies applied in urban context.
- assess data gained from various tools or external data sets to and to apply data sets to drive the sustainability paradigm.
- learn the theory and application of GIS software.

Course Prerequisites

Data and statistical modelling skills. Students in the Open Campus program must submit work examples for review by the Global Programs Coordinator prior to enrolling.

Methods of Instruction

In-class slide lectures and desk critiques of project development; hands-on software training.

This course transcends GIS-software training. It is a course on the underlying theory and concepts in GIS. The methodologies are illustrated in the context of abroad education by visiting real world sites and projects, gathering data, and conducting analysis. The understanding of these concepts and theories will help you to perform spatial analysis in a GIS system properly and efficiently. Students work individually and in teams. The course is designed to support a range of experience with GIS and students will be paired accordingly.

Software Requirements

Student version of GIS software or freeware QGIS.

Assessment and Final Grade

Participation in Class	20%
Workshop Progress	20%
Homework Assignments	20%
Transfer and Application	40%

Course Requirements

Participation in Class
Students engage in class discussions and participate in team work and field research

Workshop Progress
Term assignment conducted in teams demonstrates that students can transfer and apply their new skills into real-world projects. The assignment will factor in data collection and mapping in Berlin.

Homework Assignments
Weekly homework assignments reinforce the in-class training.

Transfer and Application
A term assignment demonstrates that students can transfer and apply their new skills to solve a real-world challenge.

Class Attendance
Regular class attendance is required throughout the program, and all unexcused absences will result in a lower participation grade for any affected CIEE course. Due to the intensive schedules for Open Campus and Short Term programs, unexcused absences that constitute more than 10% of the total course sessions

will also result in a lower final grade.

Students who transfer from one CIEE class to another during the add/drop period will not be considered absent from the first session(s) of their new class, provided they were marked present for the first session(s) of their original class. Otherwise, the absence(s) from the original class carry over to the new class and count against the grade in that class.

For CIEE classes, excessively tardy (over 15 minutes late) students must be marked absent. Attendance policies also apply to any required co-curricular class excursion or event, as well as to Internship, Service Learning, or required field placement. Students who miss class for personal travel will be marked as absent and unexcused. No make-up or re-sit opportunity will be provided.

An absence in a CIEE course will only be considered excused if:

- a doctor's note is provided
- a CIEE staff member verifies that the student was too ill to attend class
- satisfactory evidence is provided of a family emergency

Attendance policies also apply to any required class excursion, with the exception that some class excursions cannot accommodate any tardiness, and students risk being marked as absent if they fail to be present at the appointed time.

Unexcused absences will lead to the following penalties:

Percentage of Total Course Hours Missed	*Equivalent Number of Open Campus Semester classes*	*Minimum Penalty*
Up to 10%	1	No academic penalty
10 – 20%	2	Reduction of final grade

More than 20%	3 content classes, or 4 language classes	Automatic course failure, and possible expulsion

Weekly Schedule

NOTE: The workshop is structured in a series of exercises. Time and duration of the exercises will be dependent on the level of digital modeling skills of participants.

Module 1 ***Theoretical Introduction: The Nature of Geographic Information***

Session 1-3 Topics:

- GIS application and examples.
- Students conduct case studies, survey application in human and environmental systems.
- Visit and discuss featured projects in Berlin.

Module 2 ***Data Collection and Management***

Session 4-6 Topics:

- Types of geospatial information: social, political, demographic, environmental, economic, typological.
- Students work in teams to generate a database on selected districts.
- Project database design and planning

Module 3 ***Data Representation in GIS***

Session 7-9 Topics:

- Measuring Systems: Topology and Attributes.

- Spatial Data Models: Introduction to spatial data models, Raster data models, Relational Data Models, Vector Data Models.
- Application of data to project models.

Module 4 Database and map creation, application to project

Session 10-12 Topics:

- GIS Database Creation and Maintenance: Data Input & Editing, Measurement & Connectivity, Interpolation, Digital Terrain.
- Analysis, Statistical Operations & Point Pattern Analysis
- GIS-based Modeling and Spatial Overlay, Visualization.
- Application to project, results and conclusions.

Readings

Chang, K.T. *Introduction to Geographic Information Systems* (sixth edition). New York: McGraw Hill, 2012.

Longley, P.A., M.F. Goodchild, D.J. Maguire, and D.W. Rhind. *Geographic Information Systems and Science*. New York: Wiley, 2011.