University of San Carlos
Cebu City, Philippines

USC Vision

The University of San Carlos sees:

A WORLD where the darkness of sin and the night of unbelief vanish before the light of the Word and the Spirit of grace.

A SOCIETY where citizens are competent, noble in character, and community-oriented:

What they know, they apply justly and honestly.

What they do not know, they seek to learn.

What they do not have, they endeavour to acquire.

What they have, they share.

USC Mission

The University of San Carlos is a Catholic institution of learning that embodies the principles of academic discipline of San Carlos Borromeo and the missionary charism of the Society of the Divine Word.

We aim to develop competent and socially responsible professionals and lifelong learners in an environment that fosters excellence in the academic core processes of teaching-learning, research and community extension service.

Our mission is to provide timely, relevant and transformative academic programs responsive to the needs of the local, national, and global communities, in a rapidly changing world.

COLLEGE OF ENGINEERING — Department of Civil Engineering

Program	Bachelor of Science in Civil Engineering	
PROGRAM EDUCATIONAL OBJECTIVES (PEOs)	Three to five years after graduation, the Carolinian civil engineering graduate is:	
	PEO1	A productive professional exhibiting competence, leadership and lifelong-learning in the field of civil engineering.
	PEO2	A global citizen who is noble in character and community-oriented.
	PEO3	Active in the profession, industry and the community while emphasizing the issues of professional and ethical conduct based on Christian values.
PROGRAM OUTCOMES (POs)	Upon completion of the program, students should have attained the following:	
	PO1	Ability to apply knowledge of mathematics, physical sciences, and engineering sciences to the practice of civil engineering
	PO2	Ability to design and conduct experiments to test hypotheses and verify assumptions, as well as to analyze and interpret data and to simulate processes.
	PO3	Ability to design, improve, innovate, and to supervise systems or processes to meet desired need within realistic constraints.
	PO4	Ability to work effectively in multi-disciplinary and multi-cultural teams in diverse fields of practice.
	PO5	Ability to identify, formulate, and solve civil engineering problems.
	PO6	Understanding of the effects and impact of the civil engineering profession on the environment and society, as well as the social and ethical responsibilities of the profession.
	PO7	Specialized knowledge in at least one field of civil engineering practice, and the ability to apply such knowledge to provide solutions to actual problems.
	PO8	Ability for effective oral and written communications particularly in the English language.
	PO9	Ability to engage in life-long learning and to keep abreast of the current trends and development in a specific field of specialization.
	PO10	Ability to use the appropriate techniques, skills and tools necessary for the practice of civil engineering.
	PO11	Knowledge of contemporary issues.
	PO12	Knowledge and understanding of civil engineering and management principles as a member and leader in a team, to manage projects and in multidisciplinary environments.

COURSE SYLLABUS

Second Semester, AY 2013-2014

Course Information		**Teacher Information**	
Course Code:	CE 421G	**Name:**	Andre-Paul C. Ampong
Course Title:	Geographic Information System	**Office:**	Civil Engineering Department
		Email:	*apcampong@usc.edu.ph*
Credit Units:	1.0	**Phone:**	(032) 2-300-100 loc 260
Pre-requisites:	CE 311C	**Website:**	mindthreshold.wordpress.com
Schedules:	10:30-11:30AM TUE 10:30-11:30AM THU	**Consultation Period:**	1:30-4:00PM MWF; 4:30-6:00PM TTh

Course Description

This course presents the concepts upon which the technology known as Geographic Information System (GIS) is based. It provides students with the opportunity to gain basic functional knowledge of GIS by processing data to produce maps, charts, images and other types of presentations. Considerable attention is also given to gaining map reading and other cartographic skills. The course introduces 4th-year civil engineering students to ways of integrating lessons learned (or to be learned) in surveying, hydrology, geology, transportation engineering, environmental engineering and other engineering sciences into a technology (i.e. GIS) that is emerging as a rapidly growing discipline in itself.

COURSE OUTCOMES (CO)

Upon completion of this course students should be able to do the following:	**Targeted Program Outcomes (PO)** *Introductory (I), Enabling (E), Demonstrative (D)*											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1: explain, orally or in writing, the definition, goals and principles of geographic information;	E	E		E		E	E	D	E	I	E	I
CO2: point out the influence of different geographic information principles on GIS outputs (e.g. maps);	E	E		E		E	E	D	E	I	E	I
CO3: interpret maps for their intended purpose;	D	D		E	D	D	E	I		D	D	E
CO4: create maps reflecting the elements and principles learned while addressing a local problem.	D	D	D	E	D	D	E	I		D	D	E

ASSESSMENT OF OUTCOMES

As evidence of having attained the course outcomes, students have to produce outputs and pass exams:

Output 1: Compilation of individual reports (CO1, CO2, CO3, CO4)

Activities will be given at specific points throughout the course. They are designed to reinforce the lecture and to stimulate critical thinking. Some of these exercises are to be done individually while others require group effort. A single output is required for each group activity; reports, however are to be done individually.

Exams (CO1, CO2, CO3)

Two exams will be given in the semester. The first one will be done during the midterms and will cover the introductory topics and cartography. The second test will be given at the end of the semester and will cover all topics discussed in the course.

Output 2: Thematic map (CO1, CO3, CO4)

Students shall be divided into groups and will be asked to identify a local problem or issue. Each group will then create geographic and cartographic representations of the issue thus chosen.

Assessment Rubrics

The quality of the outputs and performance in the exams will be rated using rubrics that distinguish four different levels of attainment. The actual rubrics with analytic descriptors are provided as annexes to this syllabus.

Rubric 1. Assessing and grading individual reports from group activities (CO)

Quality Level	1.0	2.0	3.0	5.0
General Descriptor	Exceeds expectations	Meets expectations	Needs improvement	Does not meet expectations
Syntax	All sentences and paragraphs are well-written and are free from errors in word choice, grammar, punctuation and spelling	All sentences and paragraphs are generally well-written but contain a few errors in word choice, grammar, punctuation and spelling	Some sentences and paragraphs are generally well-written, but contain several errors in word choice, grammar, punctuation and spelling	All sentences and paragraphs are generally poorly written and contain a numerous errors in word choice, grammar, punctuation and spelling
Content	Subject in question is concisely described, defined or compared with another without any irrelevant or out-of-place details	Subject in question is satisfactorily described, defined or compared with another but with a few irrelevant or out-of-place details	Subject in question is described, defined or compared with another but with several irrelevant or out-of-place details	Subject in question is barely described, defined or compared with another

Rubric 2. Assessing and grading examinations (CO)

Quality Level	1.0	2.0	3.0	5.0
General Descriptor	Exceeds expectations	Meets expectations	Needs improvement	Does not meet expectations
Mastery of mathematical applications to surveying	Correct answers are provided with clean and orderly solution sets	Correct answers are provided but solution sets are messy	Correct answers may not have been provided but correct solution sets are presented	Answers and solutions are incorrect
Knowledge in terminologies and procedures	All terminologies and procedures are presented correctly and completely	Several terminologies are presented correctly but procedures are incomplete	Only a few terminologies are correctly presented and procedures are heavily incomplete	No answer.

Rubric 3. Assessing and grading the creation of a map to solve a spatially related problem (CO)

Quality Level	1.0	2.0	3.0	5.0
General Descriptor	Exceeds expectations	Meets expectations	Needs improvement	Does not meet expectations
Content	Information displayed is accurate and contains all of the required elements	Information displayed is accurate and contains most of the required elements	Information displayed is not accurate and contains some of the required elements	Information displayed is not accurate and contains none of the required elements
Creativity	Required elements show Interpretation beyond face value, adding a definite point of view	Required elements show some interpretations	Required elements show little interpretations	Required elements show no interpretation
Aesthetics	Text is typed or written straight and neatly. Visual elements are colorful, and easily distinguished. All elements are drawn carefully, with no distracting eraser marks.	Text is typed or written but a little messy. Visual elements are colorful by not all easily distinguishable. Most elements not carefully drawn, with some eraser marks.	Text is not always legible and messy. Visual elements are colorful but not easily distinguishable. Some elements are not carefully drawn.	Text is messy. Visual elements are not colorful or distinguishable. Many elements are not carefully drawn.
Completeness	Map includes all required elements of specialty map including title, key, scale, compass. All steps of the project were completed thoroughly.	Map includes most of the required elements of specialty map. All steps of the project were completed with time wasted on some tasks.	Map includes some of the required elements of specialty map. Some steps of the project completed with time wasted on most tasks.	Map includes few of the required elements of specialty map. Many steps of the project not completed due to time wasted on most tasks.

Grading System

Rubric-based ratings for all assessment tasks are given corresponding weights to comprise the grade that the student gets for the course:

Compilation of reports (20%) Rubric 1 Rating x 0.20

Exam 1: Midterms	(20%)	Rubric 2.1 Rating	x 0.20
Exam 2: Finals	(30%)	Rubric 2.2 Rating	x 0.20
Special project (thematic map)	(30%)	Rubric 3 Rating	x 0.30
		Total	**Grade**

Passing Grade: 3.0
Condition for Passing:
Rates from rubrics 1, 2.2, and 4 must at least be 3.0.

LEARNING PLAN

Course Outcome	Topic	Week	Learning Activities
CO1 CO2	GIS Defined • The concept of GIS • Goals of GIS • Applications of GIS	1	Short lecture **Group activity**
CO1 CO2 CO3	Projections and coordinate systems • The geographic coordinate system (GCS) and the projected coordinate system (PCS) • Types of map projections	2,3	Short lecture **Reflection activity (individual report):** Projections **Group work**: Sinusoidal projection activity
CO1 CO2 CO3	Data models in GIS • Databases • Vector and raster data models	4,5	Short lecture **Group work**: vector and raster data
CO1 CO3	Data acquisition and processing • Existing GIS data • Metadata • Conversion of existing data • Creating new data	6	Short lecture **Group work:** Data acquisition and representation
CO1 CO2 CO3	Geometric Transformation	7	Short lecture Discussing illustrative examples
CO1 CO2 CO3	Data accuracy and quality • Location of errors • Spatial data accuracy standards • Topological editing • Non-topological editing • Other editing operations	8	Short lecture Discussing illustrative examples
CO1 CO2 CO3	Management of attribute data	9	Short lecture Discussing illustrative examples
CO1 CO2 CO3	GIS and cartography • Cartographic representation • Types of qualitative maps • Map design • Map production	10,11	Short lecture **Group work:** Representation
CO1 CO2 CO3	Manipulation of GIS data • Data exploration • Map-based data manipulation • Queries	12	Short lecture Discussing illustrative examples

CO1 CO2 CO3	Analysis of vector data • Buffering • Overlay • Distance measurement • Pattern analysis • Feature manipulation	13	Short lecture Discussing illustrative examples
CO1 CO2 CO3	Analysis of raster data • Data analysis envinronment • Local operations • Neighbourhood operations • Zonal operations • Physical distance measure operations • Other raster data operations	14	Short lecture Discussing illustrative examples
CO4	Focus on special project	15	Group work: special project
CO2 CO3	Display of map	16	Individual report: Peer review of maps

Learning Resources

Books

Chang, Kang-tsung, (2012), *Introduction to Geographic Information Systems, 6th ed*, McGraw-Hill International Edition, Singapore

Harvey, F. (2008), *A primer of GIS: Fundamental geographic and cartographic concepts,* The Guilford Press, New York

Class Policies

Attendance and Tardiness

A student who incurs unexcused absences of more than 20% of the prescribed number of class hours or laboratory periods during the term should be given NC or 5.0. (USC Student Manual Section 5.1, page 19)

Class Sessions

The use of cellular phones, iPods or other similar electronic/communication gadgets inside the classroom while classes, examination or other academic activities are going on will be subject to: 1st offense – warning/reprimand, 2nd offense – suspension/probation for Discipline and 3rd offense – temporary exclusion. (USC Student Manual, page 56).

Consultation

Please refer to schedule of consultation period above.

Communication

Communications may be course through the provided email address or website

Group Project

Students will work in groups of five.

During Examinations

Cheating during any examinations, quiz or long test (including take home examination or written reports required for submission) or any other academic requirements will be subject to: 1st offense - permanent exclusion.

Copying from or allowing another to copy from one's examination papers, assigned reports, reaction papers and other similar materials will be subject to: 1st offense – temporary exclusion and 2nd offense – permanent exclusion. (USC Student Manual, page 58)

Students who missed an exam should present excuse letter together with appropriate certifications: due to sickness – medical certificate and due to university activity – VPAA approved letter of absence.

Prepared by **Engr. Andre-Paul C. Ampong** Faculty Date Submitted for Approval	Approved by **Engr. Janice B. Jamora** Department Chair Date Approved