SOUTHEAST COMMUNITY COLLEGE
DIVISION OF ARTS AND SCIENCES
Social Science
Revision Date: 07-01-19
Syllabus Statements

I. CATALOG DESCRIPTION

Course Number:	GEOG1000/GIST1000
Course Title	Exploring Our World: Fundamentals of Geospatial Science
Prerequisite(s):	None
Catalog Description:	Introduction to the fundamental concepts of Geographic Information Science and Technology including Geographic Information Systems (GIS), Global Positioning Systems (GPS), cartography, remote sensing, geovisualization and interpretation, Internet mapping, and spatial statistics. Exploration of how geospatial technologies are used in addressing human and environmental issues. Explores how geospatial technologies and tools are used in data collection, analysis, presentation, and problem solving.
Credit Hours:	3.0
Class Hours:	45
Lab Hours:	0
Total Contact Hours:	45

II. COURSE OBJECTIVES: *Course will:*

A. Describe the fundamental concepts and applications of geographic information science and technology and their use in collecting, analyzing, and displaying geospatial data.
B. Describe and explain the principles of mapping and spatial data modeling.
C. Describe different sources of spatial data and demonstrate how to acquire spatial data, including the fundamental concepts and use of Global Positioning Systems (GPS).
D. Discuss and describe the varying methods of spatial analysis and modeling.
E. Discuss the fundamental principles of remote sensing and image analysis.
F. Identify remote sensing platforms and their respective functions.
G. Discuss and demonstrate fundamental cartographic concepts and principles.
H. Discuss and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.

III. STUDENT LEARNING OUTCOMES AND GENERAL EDUCATION LEARNING OUTCOMES:

A. Student Learning Outcomes: *Student will be able to:*
1. The student will describe the fundamental concepts and applications of Geographic Information Science and Technology (GIS&T), including the problems and challenges of representing change over space and time.
2. The student will demonstrate the use of web mapping tools to study and develop possible solutions to real world problems.
3. The student will describe and explain the historical development of GIS&T and how GIS&T helps to solve problems of a spatial context.
4. The student will demonstrate basic proficiency in map reading, interpretation, and design principles, including map projections and the geographic grid.
5. The student will describe fundamental concepts and applications of remote sensing and Global Positioning Systems.
6. The student will describe and demonstrate how to access different sources of data, describe the process of creating data, and discuss the fundamental concepts of data quality.

7. Identify, explain, and interpret spatial patterns and relationships, such as how places are similar and different, the nature of transitions between places, and how places are linked at local, regional, and/or global scales.

B. General Education Learning Outcomes

1. GELO #3: Critical Thinking & Problem Solving

Outcome: Collect, identify, interpret and analyze data.
Outcome: Synthesize information to arrive at reasoned solutions to problems.
Outcome: Evaluate ideas presented in writing, medial, speech, or artistic presentations.

2. GELO #4: Global Awareness and Citizenship

Outcome: Discuss issues from a global perspective.

3. GELO #5: Analytical, Quantitative, and Scientific Reasoning

Outcome: Understand and create logical arguments supported by quantitative and scientific evidence and communicate those arguments in a variety of formats.
Outcome: Manipulate formulas, data sets, graphs, tables, etc. in a way to produce a meaningful outcome.

IV. CONTENT/TOPICAL OUTLINE (*course outline may provide more detailed information*)

A. Module 1- Introduction to the Course and Moodle

1. Students will be introduced to the course structure and policies; this includes course syllabus, outline, calendar, textbooks, grading criteria, discussion forums, and messaging.

B. Module 2- What is Geospatial Science and Technology?

1. Describe and provide examples of how geospatial technologies are being applied in the area of transportation, the environment, local government, business, and other areas.
2. Discuss the components of geospatial technology (for example, remote sensing, GIS, and GPS).
3. Describe the fundamental concepts and applications of geographic technologies and their use in collecting, analyzing, and displaying geospatial data.
4. Describe and explain the historical development of GIS and how GIS helps to solve problems of a spatial context.
5. Demonstrate awareness of the various stakeholders (for example, the private sector, non-profit organizations, and government agencies) and their respective roles that comprise the geospatial technology industry.
6. Discuss the historical origins of the geospatial technology industry.
7. Compare the capabilities and limitations of different types of geospatial software.
8. Identify legal, ethical, and business considerations that affect an organization's decision to share geospatial data.
9. Discuss codes of professional ethics and rule of conduct for geospatial professionals.

C. Module 3- Principles of Mapping and Spatial Data

1. Describe characteristics and appropriate uses of common map projections.
2. Analyze the relationship between scale and the level of geographic detail in a representation.
3. Describe the scientific method, including the formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of a hypothesis.

D. Module 4- Sources of Spatial Data and GPS

1. Describe and demonstrate how to access different sources of data, describe the process of creating data, and discuss the fundamental concepts of data quality, topology, and uncertainty.
2. Describe characteristics and appropriate uses of common geospatial coordinate systems.
3. Describe characteristics and appropriate uses of common map projections.
4. Describe the principles behind GPS, and some of its applications, including recreational, mapping, and surveying.

5. Describe the basic components and operations of the Global Navigation Satellite System, including the Global Positioning System and similar systems.
6. Describe how radio signals broadcast by Global Positioning System satellites are used to calculate positions on the surface of the Earth.

E. Module 5- Spatial Analysis and Modeling

1. Be familiar with the basic concepts of spatial analysis and modeling.
2. Identify, explain, and interpret spatial patterns and relationships, such as how places are similar and different, the nature of transitions between places, and how places are linked at local, regional, and /or global scales.
3. Describe examples of geospatial data analysis in which spatial relationships such as distance, direction, and topologic relationships (e.g. adjacency, connectivity, and overlap) are particularly relevant.
4. Describe the use of overlaying, buffering, and basic spatial statistics to analyze feature and spatial relationships.
5. Use geospatial software tools to perform basic GIS analysis functions.
6. Demonstrate the use of web mapping tools to study and develop possible solutions to real world problems.

F. Module 6- Remote Sensing

1. Describe the fundamental concepts and applications of remote sensing.
2. Identify remote sensing platforms and their respective functions.
3. Compare advantages and disadvantages of standard spatial data models, including the nature of vector, raster, and object-oriented models.
4. Compare and contrast the characteristics of image data produced by photography and digital remote sensing systems.
5. Describe the electromagnetic spectrum and the fundamental principles of electromagnetic radiation.

G. Module 7- Image Analysis

1. Discuss and demonstrate different techniques of image processing, image analysis, and image interpretation.
2. Be familiar with the problems associated with place-names, street addresses, and other systems.
3. Discuss the concept of uncertainty, and the ways in which it arises from imperfect representation of geographic phenomena.
4. Discuss the technologies that support real-time acquisition and distribution of geographic information.

H. Module 8- Cartographic Principles

1. Discuss and demonstrate cartographic concepts and principles.
2. Demonstrate how the selection of data classification and /or symbolization techniques affects the message of the thematic map.
3. Critique the design of a given map in light of its intended audience and purpose.
4. Analyze the relationship between scale and the level of geographic detail in a representation.
5. Employ cartographic design principles to create and edit visual representations of geospatial data, including maps, graphs, and diagrams.

I. Module 9- GIS and Society

1. Discuss and debate the future of geospatial technologies, ethical questions related to the field, and societal implications.
2. Describe and provide examples of how geospatial technologies are being applied in the areas of transportation, the environment, local government, disaster managements, business, and other areas.
3. Identify allied fields that rely on geospatial technology.

4. Explore the capabilities of mobile devices for map making and geographic information systems.

J. Module 10- Final Project and/or Exam

1. Solve a spatial problem using geospatial technology.

V. INSTRUCTIONAL MATERIALS (*All of the books noted below are free, open-share, and online*)

A. Required Text(s):

1. DiBiase, D., (continually updated) *Nature of Geographic Information*, Penn State: https://www.e-education.psu.edu/natureofgeoinfo/

2. Schmandt, M., (continually updated) *GIS Commons: An Introductory Textbook on Geographic Information Systems:* http://giscommons.org

3. Natural Resources Canada publisher, http://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/earthsciences/pdf/resource/tutor/fundam/pdf/fundamentals_e.pdf

4. Sutton, T., Dassau, O., Sutton, M., (2009) *A Gentle Introduction to GIS*, Eastern Cape, South Africa: http://download.osgeo.org/qgis/doc/manual/qgis-1.0.0_a=gentle-gis-introduction_en.pdf

VI. METHODS OF PRESENTATION/INSTRUCTION

A. Methods of presentation typically include a combination of the following:

1. Readings

2. Virtual Learning Modules

3. Discussions

4. Virtual Lab exercises

VII. METHODS OF EVALUATION

A. Methods of evaluation typically include a combination of the following:

1. Examinations: There will be 4 exams covering the textual readings as well as assignments. If it is necessary for you to miss an exam, you must make arrangements prior to the regular exam data to take the make-up exam. Please see the Course Outline for exam dates.

2. Internet Exercises: There are a number of Web based exercises for you to complete. Each exercise provides you the opportunity to increase your spatial analysis skill-set. The Web-based tools (such as ArcGIS Online and Google Earth) are free and readily available.

3. YouTube Videos, TED Lectures and Khan Academy Lectures: This class has a number of video assignments. The content of the videos include both conceptual and practical information. Periodically, you will be asked to complete (and turn-in) a questionnaire based upon the video you watched. The videos range in time from 1 min to 30 minutes.

4. Discussion Board: There will be a number of Discussion Board prompts that will require your participation.

B. SCC GRADING SCALE

A+	95-100	C+	75-79	F	59 or less
A	90-94	C	70-74		
B+	85-89	D+	65-69		
B	80-84	D	60-64		

VIII. SPECIFIC COURSE REQUIREMENTS:

A. Access to industry standard geospatial software and a computer with an Internet connection.