Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: Cindy Nance **Date:** 12/17/2019

Department	Subject	Course Number	Title
Geography	Geography GEOG	105	Map Interpretation and Spatial Analysis

Units/Hours

Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
Each laboratory unit requires 3 hours per week of class time.
Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Total Units
3.00	3.00
Lecture Contact Hours	**Total Contact Hours**
48.00 - 54.00	48.00 - 54.00
Lecture Homework Hours	
96.00 - 108.00	

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

A NATURAL AND PHYSICAL SCIENCES

General Education Justification:

This course fits Area A Natural and Physical Sciences: This course introduces students to scientific methods for systematically questioning geographic information to identify human activity and physical patterns, trends and relationships. The relationship between science and other human activities are examined as mapping applications for various disciplines. Students examine complex spatial issues, make connections and correlations to reach a conclusion through lecture, in-class activities and homework exercises (GELO1); analyze real and potential problems in homework exercises (GELO2); analyze and evaluate, using graphics to interpret evidence as final map products and reports (GELO3); analyze and explain quantitative issues represented in maps (GELO4) and choose appropriate tools for organizing and preparing a map for specific scientific analysis and results (GELO6).

Maximum Enrollment: 32

Maximum Enrollment Justification:

	Justification:
Grading Method:	**Letter Grade or P/NP**
TOP code:	**2206.00**

Can be Taken 1 **time(s) for credit** (max 4)

- ☐ - Visual or Performing Arts course that is required to meet major requirements for UC/CSU
- ☐ - Intercollegiate athletics course
- ☐ - Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**75 words** or less in gray box below).

This course introduces students to the cartographic principles necessary for spatial analysis. Topics covered include the history of map making, symbolic standards, layout aesthetics, geographic coordinates and projections, map scales, map accuracy, map interpretation and reading, way finding, aerial and satellite imagery and computer assisted mapping. Students will create hand drawn and digital maps. Cartographic skills are useful to students preparing for degrees in the natural, physical, social and behavioral sciences.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(**25 words** or less in gray box below).

This course introduces students to spatial analysis with map making fundamentals, map interpretation, image analysis, and automated mapping services and systems.

Need for the course:

An introduction to map reading, interpretation and spatial analysis skills is useful to students interested in natural, physical, and environmental sciences. This course is a requirement for a Certificate in GIS, AS in GIS and an elective for the ADT in Geography (CID GEOG 150). This course is an elective for the AS in Environmental Studies, Biology (pending), Science and an AA in Business and Technology.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)

Upon the completion of the course the student will be able to do the following:

1. Consider the history and future of map making and compare the tools of the past to modern digital mapping techniques.
2. Interpret USGS map standards and symbols, determine appropriate use of map scale, latitude and longitude, common coordinate systems, projections and datum.
3. Compare systematic and unsystematic land-partitioning systems and write a legal property description with Base and Meridian, Township and Range, Section and aliquots.
4. Design a large scale geocache or site map using coordinate geometry (COGO) from a datum along with dead reckoning, compass and other wayfinding techniques.
5. Appraise cartographic design principles to create and edit visual representations of spatial data, and deduce how selection of data classification and symbolization impact the message of various map types.
6. Organize, compile, produce and critique maps for informing an intended audience of locations, patterns, trends, events and feature relationships.
7. Construct maps from surveyorâ€™s coordinate geometry (COGO), assessor parcel descriptions, and Global Positioning Systems (GPS).
8. Relate the basic components and operations of the Global navigation Satellite System with Global Positioning Systems and recognize the role of geometric approximations of the earthâ€™s shape.
9. Scrutinize the electromagnetic spectrum for explaining differences between remote sensors and differentiate types of resolution that characterize remotely sensed imagery.
10. Consider the quality of orthoimagery in terms of terrain correction, control points and georeferencing.
11. Experiment with Geographic Information Science applications and methods for creating terrain model, statistical and analytical maps that are dynamically queried and modified from both spatial and nonspatial data.

Course Content:

(please number the outline of main topics and subtopics)

1. Introduction to Cartography
    1. History of map making
    2. Limitations of Maps
    3. Cartographic Processes
    4. Latitude and Longitude
    5. Map Types
        1. Road maps
        2. Thematic maps
        3. Topographic quadrangles
2. Map Production Methods
    1. Manual
    2. Digital
3. Map Elements
    1. Legend
    2. Scale
    3. Source
    4. North arrow
    5. Bounding boxes
    6. Inset
    7. Date
    8. Author
    9. Purpose and intended audience
4. Map biases
    1. Political
    2. Derogatory

3. Coerce
4. Promote
5. Others

5. Concept of Scale
    1. Measurements and purposes
        1. Bar
        2. Graphic
        3. Representative Fraction
    2. Determining scale for situation
    3. Scale dependent mapping
    4. Virtual scale
    5. Scale thresholds
    6. Map duplication
6. Map Projection
    1. Types
    2. Determining Appropriate Use
    3. Distortion and Map Purpose
    4. Algorithms
7. Common U.S. Coordinate Systems
    1. Latitude and longitude grid
    2. Universal Transverse Mercator grid
    3. Township, range and section
8. Land Partitioning Systems
    1. Systematic
    2. Unsystematic
    3. Zones
    4. Baselines and meridians
    5. Legal descriptions
    6. Beyond the U.S.
9. Map Design
    1. Cartographic integrity
    2. Cartographic aesthetics
    3. Execution of design
    4. Text and typography
    5. Color
    6. Symbolism
10. Cartographic Symbolism
    1. Standards
    2. Linear and aerial data
    3. Point locations
11. Statistical surface modeling
    1. Qualitative versus Quanitative
    2. Nominal, Ordinal, Ratio and Interval
    3. Choropleth maps
    4. Data analysis
    5. Dot density and isolines
    6. Charts, graphs and tabular insets
12. Terrain Representation
    1. Surface modeling
    2. Contours and relief
    3. Slope and aspect
    4. Profiles and perspectives
    5. Area and volume
13. Maps Produced Statistically

1. Reports
2. Data Accuracy
3. Error Propogation
4. Misrepresentation
5. Problems of Interpretation

14. Base Map Development
    1. Data Acquisition
    2. Source ccuracy and Intent for Data
    3. Input Methods
    4. Metadata
    5. Map accuracy
    6. Error measurements
15. Data Sources
    1. Field Documentation
    2. Digital Downloads from Internet
    3. Aerial photography
    4. Remote sensing and satellite magery
    5. Scanning and digitizing
    6. Coordinate geometry
16. Navigation
    1. Compass use
    2. Ground Truth
    3. Field Map interpretation
    4. Global Positioning
    5. Direction, Distance and Angle
    6. Dead reckoning
    7. Geocaching
17. Future of digital map making
    1. Spherical earth
    2. Satellites and GPS
    3. Geographic Information Science
    4. Beneath the ocean floor
    5. Outer space and other frontiers

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
  Integration: Lectures cover map making history and future, cartographic concepts, methods and applications, and scientific methods for spatial analysis of patterns, trends and relationships.
- **Method:** Observation and Demonstration
  Integration: Demonstration and observation of cartographic methods and techniques for map reading and interpretation, land survey and partitioning, and location analysis.
- **Method:** Activity
  Integration: Application of technology using various mapping services, such as Google Maps Pro and GIS software, introduce students to innovative methods for data analysis and presentation.
- **Method:** In-class Exercises
  Integration: In-class activities challenge students to think critically about map design, symbols, interpretation and quality.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Exams/Tests
  Integration: Exams consist of various question formats to assess student understanding of cartographic principles, concepts and terms presented in the text, lectures and demonstrations. Students are evaluated based on correctness and completion of test material.
- **Method:** Class Work
  Integration: In-class map-making and critiquing enforce concepts and terms from lecture and text. Students will be evaluated based on correctness and completion of class activity.
- **Method:** Homework
  Integration: Out-of-class individual exercises focus on critiquing cartographic principles, developing spatial reasoning skills, map and aerial photograph interpretation, Global Positioning Systems and Geographic Information Science. Students will be evaluated based on correctness and completions of home work assignments.
- **Method:** Class Participation
  Integration: Active participation on in-class demonstrations are awarded points on a sliding scale.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. In a hypothetical field study, you are asked to map discrete point locations for historic sites. You are using a GPS coordinated with an historic USGS 1:24,000 scale map.
    1. Which projection and coordinate system would you choose to use?
    2. Which North American Datum?
    3. What scale would use in making your point location map?

   Use the Romoland 1970s and Murrieta 1940s quadrangles for comparison of map marginalia and display of historic features. Justify your answers.
2. The manager of your department has given you digital data for implementation in a GIS project with a one month deadline to produce a publishable hardcopy map. However, the manager has not given you any information about the origin of the data, the intended use of the map or the desired outcome. Use the class map critique sheet to create a list as a table of information you need in order to produce a quality map that includes disclaimers, and in another column describe why you need this information.

Textbooks:

- Kimerling, B (2016). *Map Use: Reading, Analysis, Interpretation* Pearson. ISBN: 9781589484696

Other Resources:

- ArcGIS. ESRI, (10/e).
- Esri Virtual Campus online training courses.
- Access code for MasteringGeography exercises and tests, with option to buy etext.

Minimum Qualification

- Geography (Masters Required)