Glassboro State College Senate Curriculum Committee

# Approval Form

2nd - 193

Proposal Title: INTRODUCTION TO THE MAPPING SCIENCES

Sponsor(s) WADE CURRIER Dept.: GEOGRAPHY & Ext. 7311
DICK SCOTT
CHET ZIMOLZAK ANTHROPOLOGY

**Check one:** ☒ Course ☐ Specialization ☐ Concentration ☐ Minor ☐ Achievement Certificate

☐ Certification Program ☐ Major Program ☐ Minor Change _____ (please name: deletion or credit/title/catalog change)

☐ Undergraduate ☐ Graduate 3 Credit Hours

**Step 1 (Department)**

☒ Approved 10-8-93 Date

☐ Not Approved

X _____ Dept. CC Chairperson

☐ Reviewed 10-14-93 Date

_____ Dept. Chairperson

**Step 2 (Receipt)**

☑ SCC# 93-94-03

Proposal Received _____ Date

_____ SCC Chairperson

**Step 3 (School CC)**

Reviewed 11/4/93

☑ Approved

☐ Not Approved

**Comments:**

_____ School Curr. Comm. Chairperson

**Step 4 (Academic Dean)**

☐ Recommend

☐ Not Recommend

☐ Conditionally Recommend (see comments)

Reviewed _____ Date

**Comments:**

_____ Signature, Dean of School

**Step 5 (SCC)**

Open Hearing 11/5/93 Date

☑ Approved by Senate Curriculum Committee 11/15/93 Date

☐ Returned to sponsor(s) for the following reasons:

**Step 6 (Senate)**

Presented to Senate 2/4/94 Date

☑ Approved ☐ Not Approved

Notification to Executive Vice-President/Provost 2/7/94 Date

_____ Signature, SCC Chairperson

## Step 7 (Executive V.P./Provost)

Received 2/7/94
Date

Approved ☒ Yes ☐ No

If no, reasons are as follows:

Student credit hours 3

Faculty load hours 3

Equalized credit hours _____

Official copy and approval sheet filed 3/2/94
Date

Signature, Executive Vice-President/Provost

## Registrar

Approved course description received 13 Jan. 94
Date

Hegis Taxonomy and Course Number assigned 2206.193

Signature, Registrar

13 Jan. 94
Date

## Notification forwarded:

- ☐ Senate Curriculum Committee Chairperson
- ☐ Department Chairperson(s)
- ☐ Academic Dean(s)
- ☐ Registrar
- ☐ Sponsor(s)

**Course Proposal:**

**Introduction to the Mapping Sciences**

1. Details:

   a. Course Title: Introduction to the Mapping Sciences

   b. Sponsors: Wade Currier, Richard A. Scott, and Chet Zimolzak of the Department of Geography and Anthropology.

   c. Credit Hours: 3

   d. Course Level: Undergraduate (Freshman and Sophomore level)

   e. Curricular Effect: The course will become a member of the General Education bank in the Science and Mathematics category and will replace Cartography in the core requirements taken by all majors and coordinate majors in the geography program.

   f. Prerequisites: None.

   g. Time and scale of implementation:

      1. Time of implementation: Spring 1995

      2. Scale of implementation: Initially the course will be offered twice a year. If demand warrants, additional sections of the course will be offered within the constraints imposed by staffing levels in the department.

   h. Adequacy or resources required to offer the course:

      1. Staff: All members of the department are capable of teaching this course.

      2. Computing Facilities: The Introduction to the Mapping Sciences course will require students to complete a small number of computer based projects using software packages for which the department has

site licenses. These packages can be loaded on machines in the Social and Behavioral Sciences Computer Laboratory and on machines in open computer laboratories. Computer facilities are more than adequate to handle the additional demand that will be placed on them by the small number of computer laboratory exercises this course will require students to complete. Inasmuch as the exercises will be self-paced, and well-documented, step-by-step leadership of the instructor will not be required in all cases. This implies that maximum enrollment size for this course can be larger than in the advanced computer applications courses.

3. Space Needs. The classroom and computer laboratory space currently available to the Geography and Anthropology Department are adequate for the support of this course.

4. Library Holdings. Library holdings are more than adequate to support Introduction to the Mapping Sciences. The Department of Geography and Anthropology has offered courses in computer cartography, quantitative analysis, and remote sensing since the mid 1970s. At that time we began to order library materials to support these course offerings. More recently, we began offering two courses, one introductory and one advanced, in Geographical Information Systems [GIS]. As a consequence of our planning for these new offerings, we have acquired significant new holdings in GIS. Since we have long offered more advanced techniques courses, our library holdings are more than adequate to support this introductory course.

2. Rationale:

The latest round of strategic planning charges our department with the task of continuing to take advantage of technical developments within our major program.[1] When our program started in the early part of the 1970s, the beginning techniques course in nearly all geography major programs consisted of a broad based introduction to cartography. Over the years, cartography has remained an important technique for all geographers. However, at the same time, other technical areas have grown and developed at a rapid rate. Now, in addition to an introductory course in traditional cartography, the department offers a number of other techniques courses. Among these are Advanced Cartography, Computer Cartography, Remote Sensing / Air

[1] *The Rowan College Strategic Plan: Planning for a Regional Institution of Excellence*, (Glassboro, NJ: Rowan College of New Jersey, September, 1992), p. 122

Photo Interpretation, Introduction to Geographic Information Systems, and Advanced Geographic Information Systems. Thus, our original techniques course, Cartography, has spawned a number of offspring. As we look to re-form the curriculum of our major program, we have come to realize that the course in cartography, which once served reasonably and well as an introduction to geographic techniques, should be moved from the geography core to the techniques bank of Specialized Electives.[2] In its place we wish to substitute a broader based course that will serve to introduce students to the broad range of techniques used within the field. This approach has a number of important advantages. First, this introductory core course will provide a more accurate "road map" for the technical ground majors interested in cartography, remote sensing, and GIS will be required to traverse. Second, over the years we have discovered that there is a degree of overlap between the various techniques courses that we offer. This is inevitable given the way the courses have been added one-by-one to the program. One function of the course we are proposing will be to ensure that all students taking the more advanced techniques courses will have mastered a common core of fundamentals. Included in this core are topics such as map symbolization and graphic communication, map scale and scale conversions, class intervaling techniques, spatial descriptive statistics, and map projections and their uses. Since the course will serve as a prerequisite to all other techniques courses, valuable time will be gained by avoiding repetition of material. This time saved can be used to focus more strongly on the content of the upper level courses rather than on "background" material.

The value of the map as a fundamental tool for the analysis and presentation of spatial data is well known and appreciated by geographers, planners, resource managers, engineers, and others who work with geographically referenced information. The time, effort, and money required to construct maps by hand is also well known by practitioners in these fields. The advent of widely available digital computing resulted in attempts to automate the painstaking processes required for producing maps. This technology, which initially saw the mimicking of manual methods as its goal, is now well developed. Given good software and high quality plotting devices, in many instances the only distinction between computer generated and hand generated maps is that one was made by a computer and the other was not. Although the success of computer cartography in mimicking manual methods was slow in coming, even before this achievement, geographers, landscape architects, planners, computer scientists, and other analysts saw that the computer promised much more than its drafting capability, which computer cartography has taken advantage of so thoroughly. Once locational data were stored in the computer and tied there to attribute information [i.e., data describing characteristics of or magnitudes occurring at locations], a new set of possibilities arose. Namely, the computer could be used to query, compare, and analyze the information while maintaining the spatial context of the data. Thus, from the initial goal of automated display grew the additional objective of carrying out computer-assisted spatial analysis. Instead of merely asking the computer to reproduce a map, the analyst could use the computer as a tool to assist in answering questions

[2] For an overview of the current structure of the geography major, see the attached program description.

about sets of spatial data.

The GIS technology that accompanied automated mapping, remote sensing, and spatial analysis is undergoing a rapid rate of growth and development. Trucking companies routinely use computerized map analysis in conjunction with the Global Positioning System to route and track their vehicles. GIS is used to locate the address of the place from which a 911 emergency call is being made and then to dispatch, and in some cases route, the fire, police, or life squad that serves the address. The technology is now available to generate real time maps on a monitor located within a vehicle and to provide the driver with directions following the shortest, fastest, or most scenic route to a destination. Those contemplating locating a new bank branch, new franchise for a video store, or fast food restaurant often use a GIS to assist in their decision making. In short, this once rarified technology, available only to large private sector firms and government agencies responsible for planning and resource management, is now commonplace and is growing exponentially.

Today those who are lost in their own land because of an inability to read, interpret, or understand maps can hardly claim to be "liberally educated." Given the rapid growth of remote sensing, GIS, and automated mapping and the increasingly pervasive impact of these technologies on every day life, the importance of cartographic and spatial literacy to the liberally educated citizen is of ever growing importance. Thus, we believe that this course will serve a dual function within the Rowan College curriculum. It will serve to introduce our majors to the mapping sciences. It will also serve to introduce both majors and non-majors to the map as a tool of analysis, data communication, persuasion, propaganda, and way finding. Geographers and cartographers have long been aware of the "false innocence" of the map, which seems so concrete, so clear, and so forthright in its presentation and is, just because of these characteristics, able to be used by the unscrupulous as a diabolical tool of purposeful mis-communication. Maps now appear in electronic form with increasing frequency. This implies that many of us will be exposed to many more cartographic designs than was formerly the case. It also implies that the person making the map may have had little in the way of formal cartographic training and may be unfamiliar with the principles and conventions of effective cartographic communication. The need for the unwary map reader to be made aware of the basics of cartographic communication, and the principles of map reading and design are evident.

3. Essence of the Course:

a. Objectives of the course. Upon completion of the course, Introduction to the Mapping Sciences, students will be able to:

1. Define and manipulate concepts and ideas that serve as the common base on which the mapping sciences are built. Examples of such concepts include: spherical coordinate systems, plane coordinate systems, map projections and their characteristics and uses, map scale and scale manipulations.

2. Discuss and explain clearly the common principles and conventions of cartographic communication including figure ground relationships, topographic, thematic, and cadastral mapping communication principles.

3. Discuss and explain clearly the various communication errors that lead to intentional and unintentional distortion in the message communicated by the map.

4. Discuss and define each of the various specializations of the mapping sciences and explain how each of the specializations is related to the others.

5. Demonstrate basic spatial, and cartographic literacy in reading and interpreting large and small scale maps.

b. Topical Outline:

1. Characteristics of the globe as the basis of the map

   a. shape of earth
   b. global coordinate system
   c. specifying location on the globe
   d. measuring distance on the sphere

2. Elements of the map as a scale model of the earth

   a. map projection: converting the sphere to the plane
   b. map scale and scale manipulation

c. map symbolization
    1. perceptual principles
    2. cartographic conventions
d. cartographic design principles
e. data classing principles and techniques

3. Cartographic misrepresentation: an overview of the history and methods of using maps to distort the message

    a. inadvertent misrepresentation: common errors in presenting spatial data in map form
    b. purposeful misrepresentation: maps as propaganda tools

4. Overview of mapping science disciplinary areas

    a. cognitive and perceptual mapping
    b. profiles and traverses
    c. landscape sketching
    d. surveying
    e. cartography
        1. manual
        2. computer-assisted
    f. production cartography
    g. air photo interpretation
    h. photogrammetry
    i. remote sensing

5. Survey of selected mapping science application areas

    a. map production
    b. vehicle navigation
    c. Geographical Information Systems
    d. Global Positioning System GPS

c. Evaluation of students:

The students' progress in mastering the fundamentals of Introduction to the Mapping Sciences will be ascertained in several ways: 1) midterm and final essay examinations, 2) problem exercises, 3) computer laboratory assignments, and 4) a short paper in which the student will investigate one of the disciplinary or application areas in more depth.

d. Course evaluation:

We will use a course evaluation strategy in this course similar to that used in the other geography techniques courses. For overall evaluation of the teaching quality we will use the SIR form. For evaluation of the content, exercises, examinations, demonstrations, and laboratory sessions we will use a questionnaire designed specifically for the course.

## 4. Catalogue Description:

**Introduction to the Mapping Sciences 22061xx.** This course provides the student with the conceptual tools required for intelligent and critical use and interpretation of maps. In addition the course furnishes the student with an introduction to and overview of the mapping sciences. Students learn the concepts, methods, and techniques common to the several branches of the mapping sciences and are introduced to cartography, satellite remote sensing, computer-assisted cartography, and geographical information systems.