

# **History of Cartography and Exploration: From Pre-History to Modern Times**

**Burl Self, EdD, MAPA, MGeo, AICP**  
Professor – Department of Geography

bself2@gmu.edu

**Fall 2016**  
Thursday, 4:30 – 7:30 p.m.  
Engineering 1109  
Office location and hours: M T R 3-4  
Exploratory 2218

## **Description**

This course focuses on the pivotal points of pre-history and historical of cartographical science and a close analysis of the contributions of mapmaking to exploration.

The evolution of maps, from the paleo-period of Europe and North America, through the cartography of medieval Europe, the ancient Near and Far East to modern day computer-driven and generated maps will be covered.

## **Course Objectives**

Through the use of databases, maps and a wide range of other resources, the course objectives are:

- To understand the evolution and use of maps in the pre-historical and historical period to explore and consolidate territorial and resource control
- To understand the evolution of navigational science and its technological impact on cartography
- To understand the historical mapping traditions of Europe, Asia, Africa, Latin America, North America and Oceania

## **Informational Resources**

Learning resources will include lectures, on-line generation of credible information sources and student-generated assignments.

## **Weekly Research Assignments**

Assignment – minimum of one full page (1 ½ space, 1" margins), with a minimum of two credible sources on the following page.

**Submit print copy only. Do not email assignment.**

The Library reference staff available to assist in completing weekly assignments.

I will randomly select individuals to present summary findings of their research.

Weekly topics can vary if class consensus so directs.

I am open to broadening our course objectives and focus in the interest of promoting learning.

## **Document Resource File**

You are encouraged to maintain a file of all research.

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### **Examinations, Attendance and Grading Scale**

No exams may be administered.

#### **Attendance**

Attendance affects your grade. Sign in at beginning of each class period.

10 papers- 10 points each	=	100 points	A=	90-100%
Class participation and attendance	=	<u>50 points</u>	B=	80-89%
Total		200 points	C=	70-79%
			D=	60-69%
			F=	59% & below

#### **Affirmative Action/Non Discrimination Policy**

GMU is an Equal Opportunity institution, and maintains a grievance procedure incorporating due process available to any person who believes he or she has been discriminated against. At all times, it is your right to address inquiries or concerns. Refer to the current GMU catalog and/or Student Handbook for specific directions. I strongly support the University's nondiscrimination policy.

#### **Students with Disabilities**

All reasonable accommodations will be made. Let me know how I can help you.

#### **Academic Integrity**

GMU's Honor Code and policies will be strictly enforced. All members of the GMU community share the responsibility and authority to challenge and make known acts of apparent academic dishonesty. Any person detected participating in any form of academic dishonesty in this course will be subject to actions as described in our Honor Code. Plagiarism is using someone else's words, ideas, or data as your own without giving the owner credit. For example, when writing a paper, the verbatim copying of even a sentence from a book or journal article without acknowledging the source of the information is an act of plagiarism.

We are expected to assimilate information and derive our own ideas and words. Because plagiarizing words, data, and ideas is unethical, it will not be tolerated in this class. Anyone caught cheating will be assigned an "F" for the course. Cheating and Plagiarism are defined in other university publications.

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### **Week 1**

#### **Map making in the modern world**

- Early seafaring maps kept secret to protect trade routes
- Maps have not changed much, but mapmaking techniques have

#### **Cartography**

- Portrays characteristics of a territory
- Field work

#### **Beginnings of cartography**

- Sumerians
- Maps for sailors and soldiers

#### **Cartography: Conquest and Spread of Christianity**

- Marco Polo: Basis of first European maps (Portolani)
- Columbus, Portuguese, Henry the Navigator, Constantinople

### **Week2**

#### **Cartographical Prejudices and Rituals**

- Dogmas and Medieval Maps
- Route to Jerusalem
- Anti-Semitism

#### **Cartography and spatial relationships: Human and physical characteristics of place**

- Cultural, economic and political features
- GIS and computer technology
- Geography: Mother of Technology

#### **Arab and Chinese explorations**

- Established trade routes
- Chinese halt and Portuguese expansion
- School of Navigation at Sangres
- Vasco de Gama: Cape of Good Hope and Asian trade
- They surveyed the world: the Arab Empire

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### **Week 3**

#### **Thematic maps**

- Population
- History of the earth
- Minerals
- Earthquakes
- Seas and Oceans: currents and territories

#### **Western vs. Polynesian navigation**

- No use for cardinal directions
- Captain James Cook

#### **Northern Italy: Cradle of map making**

- 3000-year old map scratched in rock
- Use and design

### **Week4**

#### **Earliest known maps 12,000 BCE and 2,500 BP**

- Lascaux cave maps Pavlov Czech Republic
- Cuevas de El Castillo

#### **North American Indian pre-history maps**

#### **Ancient Near East**

- Ancient Babylonia – world map
- Turin Papyrus map - Egypt

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## Week5

### Influence of Early Greek Literature

- Homer considered by Strabo to be the father of geography
- Hesiod's poems –describe the Black Sea, Bosphorous, Gaul, Sicily. His work was used in maps made by Anaximander, Hecataeus of Miletus
- Maps were drawn by: Herodotus, Eratosthenes and Ptolemy

### Early Greek Maps

- Maps were drawn by: Herodotus, Eratosthenes and Ptolemy
- Other map makers included: Anaximenes, Pythagoras, Scylax (Sailor) wrote the periploi, or sailing instructions, which becomes the foundation for future maps
- Pharaoh Necho II sent Phoenicians to circumnavigate Africa
- Aristotle proved the earth's sphericity

## Week6

### Roman Empire

- Pomponius Mela
- 5<sup>th</sup> Century Roman road map

### China

- Qin state maps – oldest economic maps predating Strabo
- Early geographic writing – Tribute of Yu or Yu Gong
- Tu – Crown Prince Dan of Yan – map used in attempted assassination of Qin
- Han Dynasty – cardinal direction is south at top; Qin maps cardinal direction is north at top
- Rites of Zhou mentions maps
- Chang Chu's Hua Yang Guo Chi "Historical Geography of Szechuan"
- Pei Xiu – used geographical grid  
Evaluated historical maps of China and found them to be of little use.  
Used topographical elevation on maps
- Sui Dynasty – Pei Ju created gridded maps
- Tang Dynasty – Jia Dan created map of China, including references to Persian Gulf and light houses created to aid navigation by Abbasid Iranians
- Song Dynasty – Precise maps of coast and settlements as far as Korea and India

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### **Week7**

#### **Ming and Qing Dynasties**

- Maps in multicolor
- 40 maps compiled into an atlas
- Naval explorer Zheng He's 15<sup>th</sup> Century voyage along the coasts of China, Southeast Asia, India and Africa
- County officials drew maps based on surveying and observations

#### **Mongol Empire**

- Mongols used Persian and Chinese cartographers or their foreign colleagues to create maps of: Mongol Yan or relay stations, communication routes and cities
- Mongols required officials in subject territories to provide them maps  
Published a map of the Mongol world in 1330, "Suvar al-Aqalim"

### **Week8**

#### **Indian Cartography**

- Early Indian maps used the Pole Star and other constellations for navigational purposes
- 8<sup>th</sup> Century Bhavabhuti used paintings to describe geographical regions
- Francisco I reproduced Indian maps in "La Cartografia Antica dell Indian"
- 11<sup>th</sup> Century Kashmir – Lokaprakasa
- Dravidian people produced early maps
- Warren Hastings – Kingdom of Nepal map
- Ain-e-Akbari is a Mughal document detailing early cartographic traditions
- Pundits and the "Great Game" of Central Asia

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## Week9

### Arab Cartography

- Advanced map making in the Middle Ages include access to the Muslim world, as well as Asia, Africa, Russia, and India
- 8<sup>th</sup> Century Abassid caliph, Al-Mamun, ordered the re-measure of the distance on earth that corresponds one degree of Celestial Meridian  
Refined the Arab definition of one mile
- 10<sup>th</sup> Century's Abu Zayd al-Balkhi founded the Balkhi School of Terrestrial Mapping in Baghdad. Produced many theme maps of the Arab/Muslim world
- Ibn Battuta (1304-1368) wrote Rihlah (travels) covering 120,000 kilometers through three continents
- Al-Kharizm set the Prime Meridian or the Old World at 10-13 degrees of Alexandria
- Muhammad al-Idrisi – In 1154, he created Medieval atlas “Tabula Rogeriana,” or “Travel through the Countries”  
Identified the dual sources of the Nile and the coast of Ghana and mentions Norway  
Used by European geographers for 300 years without alteration
- Ottoman cartographer Piri Reis’s map created in 1513 is the earliest showing the Americas

## Week10

### Pacific Islanders

- Navigated vast distances of the ocean using sticks tied in a grid with palm strips representing wave and wind patterns with shells showing location of islands

### European Cartography

- Medieval maps used much earlier Babylonian world map showed earth as single land mass surrounded by water
- Majoram Cartographic School – 13<sup>th</sup> to 15<sup>th</sup> Century. Were Jewish map makers who developed:  
Normal Portolan Chart  
Carta Pisana Portolan Chart -- shows accurate navigational directions
- Catalan Atlas is the first map to show compass rose with north star set at north
- Age of Exploration  
15<sup>th</sup> Century monk Nicholas Germanus created the Dorris map showing accurate placement of lines of latitude and longitude  
1485 – Pedro Reinel, the oldest Portuguese nautical chart  
1492 – Martin Behaim made oldest surviving globe, but lacked the Americas

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### **Week11**

#### **First maps of the Americas**

- Juan de la Cosa sailed with Columbus and made first map showing the Americas, Africa and Eurasia
- 1507 – Martin Waldseemuller’s map – first to use the term “America” after explorer Amerigo Vespucci

#### **Diogo Ribeiro map – first scientific world map**

Significantly influenced by geographic information obtained by Magellan’s trip around the world.

Shows the demarcation of Treaty of Tordesillas (Papal decree)

### **Week12**

**16<sup>th</sup> Century Gerardus Mercator**, or the Mercator Projection, is a conformal projection

It was a nautical breakthrough in cartography, and a conventional view of the world that is used today

#### **Enlightenment and Scientific map making**

- 1715 – Beaver map of North America copied from 1698 work by Nicolas de fer
- 1767 – Captain James Cooke mapped Newfoundland



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### **Week13**

#### **Modern Cartography**

- In 1722, Johann Lambert developed the Lambert Conformal Conic and the Lambert Azimuthal Equal Area projections
- In 1740, Mathias Seutter created the Vertical Perspective projection – used today in Google Earth
- Joseph – Nicolas Delisle 1745 – Equidistant Conic Projection
- In 1805, Heinrich Albers draws the Equal Area Conic Projection, which has no distortion along the parallels
- Early explorers mapped trails and public lands during the 1700-1800's in the United States. Later, government agencies established the U. S. Geological Service, the US Coast and Geodetic Survey, now the National Geodetic Survey and NOAA
- The Greenwich Prime Meridian was established in 1884
- Hans Maurer drew the Two-Point Equidistant Projection in 1919
- 1935 and 1966 – Waldo Tobler created the Loximuthal projection

### **Week14**

#### **WEB Mapping**

- USGS – National atlas and map
- National Geospatial Intelligence Agency
- Central Intelligence Agency (CIA)
- Department of Defense (DOD) and associated armed services

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## Weekly Research Assignments

Papers must be at least one complete typewritten page (1 ½ spaced lines using a 1" margin all round, APA style) . Include as source material a minimum of five recommended readings to support the assignment.

### Week 1

Profile the contributions to cartography made by one of the following individuals: Marco Polo, Henry the Navigator, Christopher Columbus, or the Ancient Sumerians

### Week 2

Why is geography considered to be the "Mother of Technology?"

Alternatively, assess the cartographical contributions made by the Arab Empire

### Week 3

Describe Polynesian Navigation and how it is used. Alternatively, discuss the reasons northern Italy is called the "Cradle of Map Making"

### Week 4

What evidence do we have that Native Americans produced navigational or situational maps? Alternatively, discuss the contributions to cartography of the "Babylonia World Map"

### Week 5

Profile the contributions to cartography of one of Strabo, Anaximander or Eratosthenes

### Week 6

Select one of the following and describe their contributions to cartography:  
Roman maps, Qin State Maps, Pei Xiu, Jia Dan, or the Song Dynasty

### Week 7

Profile Zheng He's contributions to cartography, or the contributions to map making by the Mongol Empire

### Week 8

Describe the use of geography by the Bhavabhuti, or Francisco contributions, by using Indian maps.

Alternatively, describe the role maps played in "The Great Game?"

### Week 9

Describe the Balkh School of Terrestrial Mapping and its importance to cartography. Alternatively, profile Ibn Battuta and his contributions to cartography.

### Week 10

Describe the maps of Pacific Islanders and their application. Alternatively, discuss the Majoram Cartographical School and the role played in European cartography by the "Map Jews and Compass Jews."

### Week 11

Describe the significance of the "Waldseemuller's map."

What was the Diogo Ribeiro map?

### Week 12

Profile Gerardus Mercator, alternatively, describe the Beaver Map of North America

### Week 13

Profile Matthias Seutter and how his cartographical contributions have been applied in Google Earth. Alternatively, describe the Greenwich Prime Meridian and its usage and the Loximuthal Projection

### Week 14

Describe the "National Atlas," or the "National Maps" project. Identify the unique cartographical missions of the CIA and the National Geospatial-Intelligence Agency (NGA), and the ways in which the organizations differ.