DESCRIPTION
Geography is more than just knowing the names of countries, cities, rivers, mountains, and other features of the Earth. It is the study of the spatial distribution and interrelationships of the Earth, its people and physical environment. Geographers analyze the relationship between humans and the environment; examine patterns and processes of place; and take a broad perspective to look at current topics such as climate change, global economics, urban diversity and development, immigration, origin and diffusion of disease, and natural resource use.

Geographers work with quantitative and qualitative data and use a variety of tools, such as Geographic Information Systems (GIS), Global Positioning Systems (GPS), Remote Sensing, and Unmanned Aerial Systems (UAS) to collect, display, and analyze spatial data. GIS and other spatial analysis tools allow geographers to explore the world in much greater detail, and to study and address complex issues.

GEOGRAPHIC INFORMATION SYSTEMS (GIS) CERTIFICATE.
GIS is one of the top emerging industries in the 21st century. It combines cartography, remote sensing, spatial analysis, and data management to support research and inform decision making.

PCC offers a less than one-year GIS Certificate that combines GIS concepts, technology, and real-world experience.

GIS is a framework to acquire, store, manage, analyze, and visualize spatial data. Traditional paper maps are able to display just one view of data, at one point in time. The use of GIS allows the display of information in various spaces and times. GIS provides a suite of tools used to support many kinds of decision-making, as well as statistical and spatial analysis.

The GIS Certificate prepares students to apply GIS with a solid theoretical foundation. A diverse range of geotechnical skills are covered including data capture, spatial and statistical analysis, GPS, UAS, Programming, interactive maps, modeling, and cartography.

DEGREES AND CERTIFICATES OFFERED
LESS THAN ONE-YEAR CERTIFICATE

Geographic Information Systems (GIS)

Academic Prerequisites
- WR 115 or IRW 115 or equivalent placement
- RD 115 or IRW 115 or equivalent placement
- MTH 58 or MTH 60 or equivalent placement

Academic Requirements
- None

Non-Academic Prerequisites
- None

Non-Academic Requirements
- None

GEOGRAPHIC INFORMATION SYSTEMS LESS THAN ONE-YEAR CERTIFICATE
Minimum 41 credits. Students must meet all certificate requirements.

COURSE OF STUDY
The coursework listed below is required. The following is an example of a term-by-term breakdown.

<table>
<thead>
<tr>
<th>Term</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Term</td>
<td>GEO 170</td>
<td>Maps and Geospatial Concepts</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GEO 265</td>
<td>Introduction to GIS (Geographical Information Systems)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GIS Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Geography Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Second Term</td>
<td>GEO 266</td>
<td>GIS Analysis</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GIS Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Geography Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Technical Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Third Term</td>
<td>GEO 267</td>
<td>Application Topics in Geographic Information Systems</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GEO 270</td>
<td>Creating a Map Portfolio</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GIS Elective</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total Credits</td>
<td></td>
<td>41</td>
</tr>
</tbody>
</table>

1 Electives can be distributed throughout the year in a variety of ways, not just the way it is listed above. Students can start the GIS Certificate any term during the year although some GIS-specific classes have limited offerings. It is highly recommended that you talk to the GIS Certificate Program adviser to plan your coursework.

GEOGRAPHIC INFORMATION SYSTEMS CERTIFICATE GIS ELECTIVES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 221</td>
<td>Field Geography: The Local Landscape</td>
<td>4</td>
</tr>
<tr>
<td>GEO 223</td>
<td>Field Geography: GPS &amp; GIS</td>
<td>4</td>
</tr>
<tr>
<td>GEO 240</td>
<td>Cartographic Principles and Applications</td>
<td>4</td>
</tr>
<tr>
<td>GEO 242</td>
<td>GIS Programming</td>
<td>5</td>
</tr>
<tr>
<td>GEO 244</td>
<td>Interactive Map Design</td>
<td>4</td>
</tr>
<tr>
<td>GEO 246</td>
<td>Remote Sensing and Image Analysis</td>
<td>4</td>
</tr>
<tr>
<td>GEO 248</td>
<td>Unmanned Aerial System Concepts, Operations &amp; Applications</td>
<td>4</td>
</tr>
<tr>
<td>GEO 252</td>
<td>Unmanned Aerial System Data Integration &amp; Interpretation</td>
<td>4</td>
</tr>
<tr>
<td>GEO 280A</td>
<td>CE: Geography</td>
<td>4</td>
</tr>
</tbody>
</table>

GEOGRAPHIC INFORMATION SYSTEMS CERTIFICATE GEOGRAPHY ELECTIVES

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>GEO 105</td>
<td>Human Geography</td>
<td>4</td>
</tr>
<tr>
<td>GEO 106</td>
<td>World Regional Geography</td>
<td>4</td>
</tr>
<tr>
<td>GEO 110</td>
<td>The Natural Environment</td>
<td>4</td>
</tr>
<tr>
<td>GEO 202</td>
<td>Geography of Europe</td>
<td>4</td>
</tr>
<tr>
<td>GEO 204</td>
<td>Geography of Middle East</td>
<td>4</td>
</tr>
<tr>
<td>GEO 206</td>
<td>Geography of Oregon</td>
<td>4</td>
</tr>
<tr>
<td>GEO 209</td>
<td>Physical Geography: Weather and Climate</td>
<td>4</td>
</tr>
<tr>
<td>GEO 212</td>
<td>Geography of Global Issues</td>
<td>4</td>
</tr>
<tr>
<td>GEO 215</td>
<td>Geography of Latin America</td>
<td>4</td>
</tr>
<tr>
<td>GEO 230</td>
<td>Geography of Race &amp; Ethnic Conflicts</td>
<td>4</td>
</tr>
</tbody>
</table>
GEO 201. Geography of Europe. 4 Credits. Examines the physical and human characteristics of Europe, including the natural environment, population distribution and settlement, and cultural differences. Topics include history, culture, politics, and economics.

GEO 202. Geography of Europe. 4 Credits. Examines the cultural geography of Europe, focusing on the differences between national cultures and their impact on regional development.

GEO 203. Geography of Europe. 4 Credits. Explores the impact of modernization and globalization on European societies, focusing on issues such as urbanization, industrialization, and immigration.

GEO 204. Geography of Middle East. 4 Credits. Explores the social, economic, and political factors that have contributed to the formation of the Middle East, including issues such as religion, language, and history.

GEO 205. Geography of the Americas. 4 Credits. Examines the physical and cultural geography of North and South America, focusing on the impact of European settlement and globalization.

GEO 206. Geography of Africa. 4 Credits. Explores the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 207. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 208. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 209. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 210. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 211. Geography of Central Asia. 4 Credits. Examines the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 212. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.

GEO 213. Geography of Africa. 4 Credits. Examines the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 214. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 215. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 216. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 217. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 218. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.

GEO 219. Geography of Africa. 4 Credits. Examines the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 220. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 221. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 222. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 223. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 224. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.

GEO 225. Geography of Africa. 4 Credits. Examines the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 226. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 227. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 228. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 229. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 230. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.

GEO 231. Geography of Africa. 4 Credits. Examines the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 232. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 233. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 234. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 235. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 236. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.

GEO 237. Geography of Africa. 4 Credits. Examines the physical and human geography of Africa, including topics such as climate, land use, and population distribution.

GEO 238. Geography of South Asia. 4 Credits. Examines the physical and cultural geography of South Asia, focusing on the impact of historical and political factors on regional development.

GEO 239. Geography of Southeast Asia. 4 Credits. Explores the physical and human geography of Southeast Asia, including topics such as religion, language, and history.

GEO 240. Geography of East Asia. 4 Credits. Examines the physical and human geography of East Asia, focusing on the impact of historical and political factors on regional development.

GEO 241. Geography of Central Asia. 4 Credits. Explores the physical and human geography of Central Asia, focusing on the impact of historical and political factors on regional development.

GEO 242. Geography of the Americas. 4 Credits. Explores the physical and human geography of the Americas, focusing on the impact of European settlement and globalization.
GEO 240. Cartographic Principles and Applications. 4 Credits.
Explores basic cartographic design principles and how to apply them to produce high quality maps using GIS software. Introduces cartographic terminology, principles, and map-making tools. Covers visual representation and communication; how to turn geographic data into effective maps for print and the web; how to critique maps; map design and elements; and color, fonts, labels, and symbols for maps. Prerequisite: GEO 265, and (WR 115 and RD 115) or IRW 115 and MTH 20 or equivalent placement. Audit available.

GEO 242. GIS Programming. 5 Credits.
Introduces the fundamentals of computer science in the context of Geographic Information Systems (GIS). Covers concepts used in automating mapping procedures, handling different types of data, and building custom functions using ESRI’s ArcGIS software platform. Provides opportunities to understand the dynamic inner workings of GIS using Python scripting language. Prerequisite: (WR 115 and RD 115) or IRW 115 and MTH 20 or equivalent placement. Audit available.

GEO 244. Interactive Map Design. 4 Credits.
Introduces interactive and web-based mapping technologies and applications. Develops knowledge and skills to plan, design, develop, and publish custom interactive, web-based maps. Covers how to prepare spatial data and apply cartographic principles to web maps. Prerequisite: GEO 265. Audit available.

GEO 246. Remote Sensing and Image Analysis. 4 Credits.
Introduces theory, methods, and application of remote sensing and image analysis. Includes remotely sensed data acquisition and analysis, aerial photographs and photogrammetry, visual image interpretation, characteristics of various sensing systems, and digital image processing techniques. Prerequisite: GEO 265, and WR 115, RD 115 and MTH 20 or equivalent placement. Audit available.

GEO 248. Unmanned Aerial System Concepts, Operations & Applications. 4 Credits.
Introduces the fundamental principles and concepts of unmanned aerial systems (UAS). Includes history, classes of unmanned aerial vehicles (UAV), airframes, ground support equipment, optical systems, applications, operation theory, mission planning and control, and the Federal Aviation Administration (FAA) Certificate of Authorization process. Prerequisite: (WR 115 and RD 115) or IRW 115 and MTH 20 or equivalent placement. Audit available.

GEO 250. Geography of Africa. 4 Credits.
Introduces the various historical, social, economic, physical, and geographic factors that have contributed to the modern African landscape. Includes the study of spatial dimensions and the distribution patterns of phenomena such as population mobility, urbanization, poverty, and slum formation. Explores why Africa has become a place of such deep contrasts between crisis and hope. Focuses on breaking down the stereotypes of one Africa and deepening knowledge of this multi-faceted continent in both a historical and current context. Prerequisites: (WR 115 and RD 115) or IRW 115 and MTH 20 or equivalent placement. Audit available. This course fulfills the following GE requirements: Cultural Literacy, Social Sciences/AAT, Social Sciences/AS, Social Sciences/AAS, Social Sciences/AGS, Social Sciences/ASOT-B.

GEO 252. Unmanned Aerial System Data Integration & Interpretation. 4 Credits.
Introduces the fundamental principles and concepts of using Unmanned Aerial Systems/Vehicles (UAS/UAV) to create orthomosaics, point clouds for Digital Terrain Models and Digital Surface Models, and 3D models of buildings and other structures. Covers the FAA authorization process, mission planning and control, launch and recovery, and GIS integration. Required: Current UAS Certificate of Authorization from the FAA or meet course prerequisites. Prerequisites: GEO 265 and GEO 248 or instructor permission. Audit available.

GEO 265. Introduction to GIS (Geographical Information Systems). 4 Credits.
Provides a conceptual overview and hands-on experience using ArcGIS software. Introduces basic principles of maps and map design and uses ArcGIS to create, edit, display, query and analyze geographic and tabular data and to create maps and charts. Prerequisite: (WR 115 and RD 115) or IRW 115 and MTH 20 or equivalent placement. Audit available. This course fulfills the following GE requirements: Social Sciences/AAT, Social Sciences/AS, Social Sciences/AAS, Social Sciences/AGS, Social Sciences/ASOT-B.

GEO 266. GIS Analysis. 4 Credits.
Provides a more advanced overview of ArcGIS software and introduces extensions to the main ArcMap interface. Topics include preparing data for analysis, creating and managing databases, geocoding, creating and editing spatial data, and analyzing data using the Spatial Analyst and 3D Analyst extensions. Prerequisite: GEO 265; or instructor permission. Audit available.

GEO 267. Application Topics in Geographic Information Systems. 4 Credits.
Application focus varies and provides an opportunity for extended exposure to one or more of the analytical techniques first learned in prerequisite courses. Attention to institutional and professional GIS application issues and programming environments. Prerequisite: GEO 266, or instructor permission. Audit available.

GEO 270. Creating a Map Portfolio. 1 Credit.
Provides an overview on the creation and production of print and web portfolios in preparation for employment as GIS professionals and/cartographers. Prerequisite: GEO 266. Prerequisite/concurrent: GEO 267. Audit available.

GEO 280A. CE: Geography. 1-4 Credit.
Enables students to extend their knowledge of Geography through work in settings which provide learning experiences that are not available in the classroom, but which supplement classroom learning. Under the employer’s supervision the student learns to apply classroom theory to actual work situations. Department permission required. Audit available.

GEO 288. Independent Study: Geography. 4 Credits.
Offers individualized study at an advanced level in areas of geography not considered in other courses to meet special interests or program requirements. Requires completion of a term project and readings approved by the instructor. Recommended: prior study of geography. Audit available.