

## Checklist for the Minor in Geospatial Analysis

The interdisciplinary minor in geospatial analysis promotes the use of geospatial data so students can build technical and analytical skills for solving problems where location is important. The courses explore three fundamental aspects of Geographic Information Science (GIS): critical thinking and spatial reasoning, geo-spatial data manipulation and management, and communication using maps and graphics.

Spatial analysis refers to the process of examining locations, attributes, and relationships of features in spatial data. It involves using various tools and techniques to identify patterns, trends, and relationships within the data, which can be both quantitative and qualitative. This analysis allows for the interpretation of geographical phenomena and the making of informed decisions based on geographical data. Techniques such as overlay analysis, buffer analysis, and spatial interpolation are commonly applied to solve problems, predict outcomes, and visualize data in ways that reveal insights about spatial relationships, making it essential in fields like urban planning, environmental science, and resource management.

*The minor consists of a minimum of twenty-eight (28) quarter units. Students must complete one lower-division course and six upper-division courses, three of which include applied learning related to geospatial issues.*

### Core requirements (3 courses total):

- ENVS 15 (Intro to Coding for Geospatial Analysis, no prereqs) **OR** CENG 15 (L&L, no prereqs)
- ENVS 116 Intro to GIS ([prereqs ENVS 21, 22, or 23] or permission by instructor) **OR** CENG 160 GIS in Water Resources (prereq junior standing)
- ENVS 117 Intermediate GIS (prereq: [ENVS 15 and ENVS 116] or permission by instructor)

### Upper Division requirements (4 courses total):

*To complete the minor, ESS students will need to take one upper division course from the list below that does not also count towards fulfillment of either an Environmental Studies or an Environmental Science major.*

1. **One** of the following upper division courses emphasizing data:

- ENVS 119 Remote Sensing (prereq: [ENVS 15 and ENVS 116] or permission by instructor)
- BIOL 170 Advanced Analysis of Biological Data (prereqs ENVS 110 or BIOL 160, BIOL 1C)
- MATH 101 Survey of Geometry (prereq MATH 13)
- MATH 141 Mathematical Modeling (prereqs MATH 53 and MATH 144)
- ECON 43 Data Wrangling and Visualization (prereqs: ECON 1 and 2, 41, 42)

2. **Three (3)** of the following courses from natural science and social justice dimensions, at least one (1) from each.

A.) Natural Science or Engineering Dimensions:

- BIOL 111 Zoonoses and Emerging Infectious Diseases (prereqs BIOL 1A, 1B, 1C)
- BIOL 117 Epidemiology L&L (prereqs BIOL 1C)
- BIOL 134 California Plant Diversity (prereqs BIOL 1C)
- BIOL 153 Conservation Science (prereqs BIOL 1C)
- BIOL 156 General Ecology (prereqs BIOL 1C)

- BIO 180 Marine Ecology L&L (prereqs BIOL 1C)
- CENG 125 L&L Municipal Engineering
- CENG 139 Groundwater (prereq CENG 141 or permission)
- CENG 140 L&L Water Resources (prereqs AMTH 108 or 112, or permission)
- CENG 161 Sustainable Water Resources (prereq CENG 140 or permission)
- ENVS 151 Restoration Ecology L&L (prereq ENVS 21 L&L, BIOL 1C)
- ENVS 160 Water Resources L&L, (prereq ENVS 23L&L)
- ENVS 166 Climate Change: Past to Future L&L (prereq ENVS 23 L&L)
- ENVS 175 Oceanography (prereq ENVS 23 L&L)
- ENVS 180 Energy and the Environment
- ENVS 185 Garbology
- PHSC 142. Environment and Health

B.) Social science courses that address justice and discuss inequities expressed in geography

- ANTH 185 Anthropologies of Latin America: Culture, Politics, and Power
- ECON 111 Economics of the Environment (prereq ECON 1)
- ECON 129 Economic Development (prereqs ECON 1,2,3,41,42)
- ECON 134 African Economic Development (prereqs ECON 1,2,3,41,42)
- ECON 135 Gender Issues in the Developing World (prereqs ECON 1,2,3,41,42)
- ECON 151 Economics of Education (prereqs ECON 1,2,3,41,42)
- ECON 160 The Economics of Poverty and Inequality (prereqs ECON 1,2,3)
- ECON 181 International Trade (prereqs ECON 1,2,3,41,42)
- ENVS 128 Sustainable Urban Planning
- ENVS 146 Agriculture, Environment, and Development: Latin America
- ENVS 147 International Environment and Development
- ENVS 149 African Environment and Development
- ENVS 155 Environmental and Food Justice (prereq ENVS 22)
- ENVS 161 Water and Climate Justice
- ENVS 170 Environmental Justice
- ENVS 177 Race and the Environment
- ETHN 112. Indigenous/Native Peoples of the United States and Mexico
- ETHN 122 Chicana/o/x Communities in the United States
- ETHN 125 Latinas/os/xs in the United States
- ETHN 142 Asian American Communities
- ETHN 151 Race, Class, and Gender in the United States (also listed as SOC 153)
- ETHN 153 U.S. Racial Identities, Issues, and Political Action (also listed as WGST 113)
- ETHN 156 Race, Gender and Environmental Justice
- ETHN 163 Multiracial Communities in Central California
- ETHN 167 Race and Inequality (also listed as SOC 175)
- ETHN 171 Immigrant Communities (also listed as SOC 180)
- ETHN:174 Educational Inequality, Racism and Resistance
- PHSC 125 Race, Class, Gender and Public Health
- PHSC 131 Community Health
- PHSC 142 Environment and Health
- SOC 134 Globalization and Inequality
- SOC 135 Social Change in Latin America
- SOC 137 Global Development and Social Change
- SOC 141 Climate Justice
- SOCI 175 Race and Inequality (also listed as ETHN 167)

## Proposed Paths through the minor for students from different schools.

	<b>Arts and Sciences Student *</b>	<b>Business Student</b>	<b>Engineering Student</b>
<b>Technical Dimensions</b>	ENVS 15/CENG L&L ENVS 116 ENVS 117  <i>And one class from:</i> ENVS 197 BIO 170 Math 101 Math 141 ECON 43	ENVS 15/CENG L&L ENVS 116 ENVS 117  <i>And one class from:</i> ENVS 197 BIO 170 Math 101 Math 141 ECON 43	CENG 15 L&L CENG 160 ENVS 117  <i>And one class from:</i> ENVS 197 BIO 170 Math 101 Math 141 ECON 43
<b>Natural Science or Engineering Dimensions</b>	<i>At least one from<sup>1</sup>:</i> BIO 111 BIO 117 BIO 134 BIO 153 BIO 156 BIO 180 ENVS 151 ENVS 160 ENVS 166 ENVS 175 ENVS 180 ENVS 185 PHSC 142	<i>At least one from<sup>1</sup>:</i> ENVS 151 ENVS 160 ENVS 166 ENVS 175 ENVS 180 ENVS 185	<i>At least one from<sup>1</sup>:</i> CENG 125 L&L CENG 139 CENG 140 L&L CENG 161
<b>Social Science Dimension</b>	<i>At least one from<sup>1</sup>:</i> <ul style="list-style-type: none"> <li>• ANTH 185</li> <li>• ECON 111</li> <li>• ECON 129</li> <li>• ECON 134</li> <li>• ECON 135</li> <li>• ECON 151</li> <li>• ECON 160</li> <li>• ECON 181</li> <li>• ENVS 128</li> <li>• ENVS 146</li> <li>• ENVS 147</li> <li>• ENVS 149</li> <li>• ENVS 155</li> <li>• ENVS 161</li> <li>• ENVS 170</li> <li>• ENVS 177</li> </ul>	<ul style="list-style-type: none"> <li>• ETHN 112</li> <li>• ETHN 122</li> <li>• ETHN 125</li> <li>• ETHN 142</li> <li>• ETHN 151</li> <li>• ETHN 153</li> <li>• ETHN 156</li> <li>• ETHN 163</li> <li>• ETHN 167</li> <li>• ETHN 171</li> <li>• ETHN:174</li> <li>• PHSC 125</li> <li>• PHSC 131</li> <li>• PHSC 142</li> <li>• SOCI 134</li> <li>• SOCI 135</li> <li>• SOCI 137</li> <li>• SOCI 141</li> <li>• SOCI 175</li> </ul>	

<sup>1</sup>A second course must be taken from either Natural Science or Engineering or Social Science Dimension category.

\* Environmental Studies and Environmental Science majors will need to take one upper division course that does not count towards their major requirements.