

## Course Number and Title: GIS 220 Programming for GIS Technicians

**Campus Location:**

Stanton

**Effective Date:**

2021-51

**Prerequisite:**

GIS 110, ITN 160

**Co-Requisites:**

None

**Course Credits and Hours:**

4.00 credits

3.00 lecture hours/week

2.00 lab hours/week

**Course Description:**

The course covers customization of geographic information systems (GIS) software applications using modified service interface elements. Topics include the theory and implementation of a variety of current scripting languages. In addition, students solve geospatial problems and streamline GIS workflows through the creation and modification of scripts.

**Required Text(s):**

Obtain current textbook information by viewing the [campus bookstore - https://www.dtcc.edu/bookstores](https://www.dtcc.edu/bookstores) online or visit a campus bookstore. Check your course schedule for the course number and section.

**Additional Materials:**

None

**Schedule Type:**

Classroom Course

**Disclaimer:**

None

**Core Course Performance Objectives (CCPOs):**

1. Compare and contrast various automated geoprocessing functions. (PGC 6, 8)
2. Create and modify geoprocessing scripts. (CCC 2, 6; PGC 1, 5, 6, 8)
3. Construct, compile, and troubleshoot script according to best practices. (CCC 2, 6; PGC 6, 8)
4. Design and develop custom GIS applications to solve spatial problems and streamline GIS workflows. (CCC 2, 6; PGC 1, 4, 5, 6, 8)
5. Demonstrate professional and ethical conduct as expected in industry. (CCC 4, 6; PGC 7, 8)

See Core Curriculum Competencies and Program Graduate Competencies at the end of the syllabus. CCPOs are linked to every competency they develop.

**Measurable Performance Objectives (MPOs):**

Upon completion of this course, the student will:

1. Compare and contrast various automated geoprocessing functions.
  1. Define *geoprocessing*.
  2. Discuss methods of customizing geoprocessing functions, including but not limited to ArcGIS ModelBuilder, Python scripting, and ArcObjects.
  3. Explain various programming languages available to create and/or customize geoprocessing applications.
  4. Compare and contrast object-oriented programming and scripting.
2. Create and modify geoprocessing scripts.
  1. Discuss data storage and retrieval in ArcGIS.
  2. Use a script to read and write vector attribute data.
  3. Use a script to read and manipulate raster data.
  4. Read and parse text files, write geometries, and work with map documents.
  5. Identify the differences among a script, tool, and model.
  6. Practice common methods of running scripts, tools, and models.
  7. Convert between scripts, tools, and models.
3. Construct, compile, and troubleshoot script according to best practices.
  1. Identify scripting language fundamentals such as variables, statements, expressions, strings, and lists.
  2. Recognize fundamental constructs such as variables, loops, decision structures, error handling, and objects.
  3. Identify purpose and proper methods for commenting scripts.
  4. Discuss methods of controlling workflow using conditional statements and loop structures.
  5. Discuss methods of error handling and debugging.
  6. Employ conditional statements and loop structures.
  7. Use methods of error handling and debugging.
  8. Demonstrate proper coding guidelines.
4. Design and develop custom GIS applications to solve spatial problems and streamline GIS workflows.
  1. Identify the steps to solve a geoprocessing problem.
  2. Discuss how to make code reusable through functions and modules.
  3. Develop logic to solve the geoprocessing problem.
  4. Compose computer code to solve a geoprocessing problem.
5. Demonstrate professional and ethical conduct as expected in industry.
  1. Identify the need for self-discipline and time management in technical industries.
  2. Communicate and function effectively as a member of a team.
  3. Integrate a commitment to address professional and ethical responsibilities under the GIS Certification Institute's Code of Ethics and Rules of Conduct.

**Evaluation Criteria/Policies:**

The grade will be determined using the Delaware Tech grading system:

90	-	100	=	A
80	-	89	=	B
70	-	79	=	C
0	-	69	=	F

Students should refer to the [Student Handbook - https://www.dtcc.edu/handbook](https://www.dtcc.edu/handbook) for information on the Academic Standing Policy, the Academic Integrity Policy, Student Rights and Responsibilities, and other policies relevant to their academic progress.

**Final Course Grade:**

Calculated using the following weighted average

Evaluation Measure	Percentage of final grade
Summative: Exams (4-6) (equally weighted)	20%
Summative: Labs (4-8) (proportionally weighted to be determined)	50%
Summative: Final Project	10%
Formative (Homework, In-Class Activities, Discussion Boards)	20%
TOTAL	100%

**Core Curriculum Competencies (CCCs are the competencies every graduate will develop):**

1. Apply clear and effective communication skills.
2. Use critical thinking to solve problems.
3. Collaborate to achieve a common goal.
4. Demonstrate professional and ethical conduct.
5. Use information literacy for effective vocational and/or academic research.
6. Apply quantitative reasoning and/or scientific inquiry to solve practical problems.

**Program Graduate Competencies (PGCs are the competencies every graduate will develop specific to his or her major):**

1. Apply knowledge, techniques and skills of geography and geospatial technologies such as geographic information systems (GIS), Global Navigation Satellite System (GNSS), and remote sensing (RS).
2. Employ cartographic design principles to develop effective visual representations of geospatial data, including maps, graphs and diagrams.
3. Design and implement GIS systems using common geospatial software and hardware to acquire, store, manage, analyze and visualize spatial data for a variety of disciplines.
4. Utilize geospatial techniques and common analytical methods to solve problems.
5. Evaluate and employ effective data management and database design techniques.
6. Apply fundamental concepts of programming, application development, geospatial information technology and related technologies.
7. Integrate a commitment to address professional and ethical responsibilities, including a respect for accuracy standards and diversity.
8. Recognize the need for and an ability to engage in self-directed continuing professional development.

**Disabilities Support Statement:**

The College is committed to providing reasonable accommodations for students with disabilities. Students are encouraged to schedule an appointment with the campus Disabilities Support Counselor to request an accommodation needed due to a disability. A listing of campus Disabilities Support Counselors and contact information can be found at the [disabilities services - https://www.dtcc.edu/disabilitysupport](https://www.dtcc.edu/disabilitysupport) web page or visit the campus Advising Center.