**GEOSPATIAL TECHNOLOGY**

**– CERTIFICATE OF PROFICIENCYCTE 24 credits minimum**

**Program Division:** Division of Natural Sciences

**Program Location:** Taylorsville Redwood, Science & Industry Building, SI 245

**General Information:** (801) 957-4944

**Program Information:** (801) 957-4880 or (801) 957-4852

**Program Website:** [www.slcc.edu/geosciences](http://www.slcc.edu/geosciences)

**Academic Advisor:** <http://www.slcc.edu/academicadvising/advisors.aspx>

**Program Faculty**:

Associate Professor: R. Adam Dastrup

Assistant Professor: Maura Hahnenburger

**Program Description**:

The Geospatial Technology Certificate of Proficiency is an interdisciplinary program addressing competencies outlined by the Department of Labor’s Geospatial Technology Competency Model (GTCM) with an emphasis in geographic information systems (GIS), remote sensing, and global positioning systems (GPS). The interdisciplinary approach and flexibility of the certificate allows students to apply geospatial knowledge and skill sets to their chosen field of study. More industries need a workforce trained in spatial knowledge and skill sets. This certificate is meant to be a stackable credential, meaning students can use the spatial knowledge and technicals skills acquired to enhance their chosen field of study or employment.

**Career Opportunities**:

Students completing the GIS Certificate of Proficiency will be highly qualified for most entry-level geospatial technology positions, specifically in Geographic Information Systems (GIS). Entry-level positions could include: local, state, and federal governmental agencies, nonprofit organizations, transportation, public utilities, private sector positions, and military.

The geospatial technology industry is extremely diverse and interdisciplinary, applicable and highly needed in the following industries: business and marketing, geography, urban planning and transportation, architecture, public safety, homeland security, criminal justice and law enforcement, public health, forestry and agriculture, environmental science and wildlife conservation, energy mangagement, natural resource management, history and archeology, sociology, the military, disaster response and mitigation, surveying, computer science, and more.

**Transfer/Articulation Information**:

None

**Program Entry Requirements**:

None

**Total Program/Course Fees**:

Total of $100.00 in course fees that provides each student to receive an educational license of the latest version of ArcGIS along with Esri Virtual Courses throughout the entire program.

**Estimated Cost for Students**:

Full-time: $2,959.00 total tuition; $100.00 course lab fees; $400.00 textbooks

Part-time: $3,030.00 total tuition; $100.00 course lab fees; $400.00 textbooks

**Estimated Time to Completion**:

Full-time: 2 semesters (12 credit hours per semester)

Part-time: 3 semesters (6 credit hours per semester)

**Specialized Accreditation**:

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| **Program Student Learning Outcomes** | **Related College-Wide Student Learning Outcomes** |
| 1. Students will apply spatial science techniques to analyze physical and human patterns spatially and over time 2. Students will apply Earth geometry and geodesy techniques to geospatial applications  * Geoids, ellipsoids, and spheres * World and local datums, geographic and projected coordinate systems, and projections  1. Students understand basic measurement systems of satellite positioning to determine location  * Global Navigation Satellite Systems (GNSS) and Global Positioning Systems (GPS) * Collect and integrate GNSS/GPS positions  1. Students will apply the science of remote sensing and photogrammetry techniques and analysis  * Electromagnetic spectrum, optical sensors, microwave sensors, multispectral and hyperspectral sensors * Differentiate spatial, spectral, radiometric, and temporal resolutions * Active and passive remote sensing * Ground-truthing and quality assurance * Orthoimagery, terrain correction, and georeferencing  1. Students will demonstrate skill sets in Geographic Information System analysis and modeling  * Representing spatial change over time * Acquire and integrate field data, image data, vector and raster data, attribute data, and maintaining a geodatabase * Using non-spatial data models in a GIS * Apply geospatial software to perform GIS analysis, spatial measurements, distance, data queries and retrieval, vector overlays, and topological relationships | 1 – Acquire Substantive Knowledge |
| 1. Students will apply cartographic and visualization techniques to communicate spatial and non-spatial data.  * Apply cartographic principles to create and edit visual representations of spatial and non-spatial data including maps, graphs, and diagrams * Demonstrate appropriate data selection, classification, and symbolization * Critique the design of a map based on the intended audience | 2 – Communicate Effectively |
| 1. Students will apply and analyze spatial and non-spatial data sets  * Apply various data models to measure the shape of Earth’s surface and how that impacts accuracy and measurement * Demonstrate an ability to apply various geospatial referencing techniques in relation to earth | 3 – Develop Quantitative Literacy |
| 1. Demonstrate an ability to apply critical thinking in geospatial environments  * Apply various geospatial referencing techniques in relation to spheres, datums, coordinate systems, and projections * Assess the geometric relationship between datums and coordinate systems * Demonstrate an ability to transform geographic coordinate systems into plane projections and explain the various distortions that can occur * Demonstrate knowledge of the importance of geospatial data quality in terms of uncertainty within the data, primary versus secondary sources, and appropriate use of data for a particular project * Demonstrate an understanding of geospatial data standards of metadata for maximum efficiency, accuracy, and investment, and to reduce errors, uncertainty, and redundancy * Apply primary and secondary source data within a geospatial system | 4 – Think Critically and Creatively |
| 1. Students will analyze legal and ethical issues related to geospatial data  * Identify legal, ethical, and business considerations that affect an organization’s decision to share geospatial data * Demonstrate knowledge of the ethical and moral choices and implications of decision making for individuals and organizations using geospatial information * Demonstrate knowledge with the relationship with web-based mapping programs and social media * Demonstrate an understanding of how geospatial technology is used in government, military and homeland security, humanitarian work, environmental science and conservation, private sectors, non-profit organizations, and society at large | 5 – Civic Engagement |
| 1. Students will develop professional skills related to the discipline of geospatial technology  * Identify allied fields that rely on geospatial technology and that employ geospatial professionals * Participate in scientific and professional organizations * Demonstrate familiarity with codes of professional ethics and rules of conduct for geospatial professionals * Identify legal, ethical, and business considerations that affect an organization’s decision to share geospatial data * Demonstrate the ability to work on large projects and within teams | 6 – Work Professionally and Constructively |
| 1. Students will conceptually understand, apply, and analyze geospatial technology  * Demonstrate application in ArcGIS, Multispec, and Garmin GPS technology * Demonstrate use of word processing, presentation, and statistical software * Develop a professional ePortfolio to showcase artifacts of professional development | 7 – Develop Computer and Information Literacy |

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| **REQUIRED COURSES: (21 CREDITS)** | | | | |
| **COURSE** |  | **CR** | **SEM** | **PREREQUISITE** |
| GEOG 1000  OR  GEOG 1300  OR  GEOG 1400  OR  GEOG 1700 | Physical Geography  Regional Geography  Human Geography  Natural Disasters | 3.0 | All | None |
| GEOG 1780 | Remote Sensing of Earth (PS) | 3.0 | All | None |
| GEOG 1800 | Mapping Our World (ID) | 3.0 | All | None |
| GEOG 1820 | Intermediate GIS | 4.0 | All | GEOG 1800 or instructor approval |
| GEOG 2100 | Cartographic Principles | 4.0 | F | GEOG 1800 may be taken concurrently or instructor approval |
| GEOG 2920 | Spatial Analysis | 4.0 | Sp | GEOG 1820 may be taken concurrently or instructor approval |
| GEOG 2990 | Geography Capstone | 3.0 | Sp | GEOG 2920 may be taken concurrently or instructor approval |

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| **SAMPLE SCHEDULE** | | | |
| **FALL SEMESTER** | | **SPRING SEMESTER** | |
| GEOG 1000 | 3 | GEOG 1780 | 3 |
| GEOG 1800 | 3 | GEOG 1820 | 4 |
| GEOG 2100 | 4 | GEOG 2920 | 4 |
|  |  | Geography Capstone | 3 |
|  |  |  |  |
| **Total** | **10** | **Total** | **14** |

**Advising Notes**:

It is the student’s responsibility to examine each course description for details of prerequisite courses. Those prerequisites must be satisfied before the designated course may be taken. Students who need to take preparatory classes to meet the requirements of first semester courses should plan on extra time to complete the full program. The semesters in which courses are taught are listed below. Students should check the semester class schedule for day/evening availability and modifications caused by varying enrollment.