## Appendix A

# WORK PROCESS SCHEDULE

### GEOSPATIAL TECHNICIAN

**Adopted by**

## Spatial Technology And Remote Sensing Geospatial Apprenticeship Program

## (STARS Geo AP)

***In cooperation with***

**The Mississippi Enterprise for Technology**
**Geospatial Center of Excellence**
**NASA's John C. Stennis Space Center**

**DEVELOPED IN COOPERATION WITH THE**
**U.S. DEPARTMENT OF LABOR**
**OFFICE OF APPRENTICESHIP**

# Appendix A

WORK PROCESS SCHEDULE
GEOSPATIAL TECHNICIAN
O*NET-SOC CODE : RAIS CODE:

This schedule is attached to and a part of these Standards for the above identified occupation.

## 1. SECTION I - TERM OF APPRENTICESHIP

The term of Apprenticeship shall be a period of reasonably continuous employment, including the probationary period. The term includes both on-the-job learning and related instruction. In the event the Apprentice is required to work overtime, they shall receive credit on the term of Apprenticeship for the actual hours worked. The Apprentice will complete a set of tasks outlined in the STARS courseware. It is the combination of the OJL and STARS coursework that will allow the apprentice to demonstrate their competence in the geospatial technology field.

The term of Apprenticeship will consist of 4,000 hours of on-the-job learning (OJL) over a period not to exceed 24 consecutive months. A minimum term of twelve (12) months or 2,000 hours of documented OJL experiences and related instruction must be completed before an Apprentice can be awarded a Certificate of Completion of Apprenticeship.

The total number of hours required for successful completion for any single apprentice is organizational-specific. The term of Apprenticeship is based on the Apprentice's Development Plan that is created by the Employer. Advanced standing may be given based on the Apprentice's previous work experience, STARS certification status, and general aptitude. An Apprentice must achieve the STARS certification and the defined level of expertise as identified in the Apprentice's Development Plan in order to acquire the title of a Geospatial Technician. The Development Plan developed by the Employer for the Apprentice dictates length of the term for each Apprentice.

## 2. SECTION II - RATIO OF APPRENTICES TO JOURNEYWORKERS

The maximum numeric ratio of ratio to five to one Journeyworker to Apprentices will be consistent with proper supervision, on-the-job learning (OJL), safety, continuity of employment, and an assurance of a reasonable opportunity for employment upon the completion of the Apprenticeship. An Apprentice will be assigned a journey level worker to supervise their OJL.

## 3. SECTION III - APPRENTICE WAGE PROGRESSION SCHEDULE

The Employer establishes the wage progression schedule for each Apprentice, based upon employment qualifications, performance, work outputs required by the Employer, and satisfactory achievement of OJL objectives and related instruction requirements. A wage progression review for each Apprentice is required at least one time per calendar year, and the Apprentice's wage and wage progression is determined by the Employer in accordance to prevailing industry averages. At no time will the starting wage rate be less than that required by any minimum wage law which may be legally applicable. If an Apprentice exceeds the minimum Apprenticeship term of 12 months, the Apprentice will continue to receive wage progression increases at least once every calendar year but should not exceed a maximum period of the program, which is 24 months.

## 4. SCHEDULE OF WORK EXPERIENCE

The business needs of the Employers determine the outputs or key deliverables needed from the apprentice based on company and customer needs. However a minimum number of hours of OJL should not be less than 2,000 hours. The maximum term of Apprenticeship will consist of 4,000 hours of on-the-job learning (OJL) over a period of 12 to 24 consecutive months.

A suggested example of the work/OJL hours is illustrated on the following Guide to Geospatial Technicians Work Process Schedule. While this program represents a standardized program of OJL and related instruction over a period of 24 consecutive months and 4,000 hours, the flexibility of a competency-based program provides the needed cross-functional training and experience this high growth industry requires. Each Employer will identify the outputs for the individual Apprentice's Competency Development Plan, the total of which will not be less than that required for a Certificate of Completion of Apprenticeship (i.e. 2,000 hours or 12 months).

The National Spatial Technology And Remote Sensing Geospatial Apprenticeship Program (STARS Geo AP) Committee has adopted the STARS certification curriculum materials as the program of study required to complete the STARS Geo AP. The STARS certification materials were created using "Geospatial Technology Competency Model" as a guide. The combination of OJL and the successful completion of the STARS certification materials will create a well rounded and competent Geospatial Technician.

The suggested work activities and the correlating STARS coursework are designed to allow for individualized training and work assignments. This combination of OJL (directed by the organizations Journeyworker) and geospatial studies (delivered via the STARS certification materials) allows for multiple exit and entry points based on the individual apprentice and the organization's needs.

**5. SCHEDULE OF RELATED INSTRUCTION** (Also, See attached Course Outlines)

The Geospatial Technology Competency Model (GTCM) is a leading edge piece of research and was used as the foundational building block upon which to train and develop the STARS curriculum and defines the requirements for a Geospatial Technician. The GTCM is attached as Appendix F.

What the student learns in the STARS courseware will directly help him/her achieve positive results in the workplace. The STARS certification is an output driven, competency-based program. While the apprentice is learning the process and skills of the geospatial industry, they will be applying that technology on the job. They must prove their abilities in both the work place and with the successful completion of the STARS certification exam.

The STARS Certification exam consists of two parts. The first part is a project that is designed in such a way that the apprentice must demonstrate they understand the geospatial thinking process and show that they can utilize all of the skill sets required for a Geospatial Technician. The second part is a written exam requiring the apprentice to demonstrate that they have the necessary depth of knowledge to be a Geospatial Technician.

## *Guide to Geospatial Technicians Work Process List*

WORK PROCESS SCHEDULE
GEOSPATIAL TECHNICIAN
O*NET-SOC CODE: RAIS CODE:

| **WORK PROCESS** | | **APPROX. HOURS** | |
|---|---|---|---|
| **(Roles)** | | | |
| | | **Minimum** | **Maximum** |
| **Application Development** | The role of identifying and developing tools and instruments to satisfy customer needs. | **130** | **294** |
| **Coordination** | The role of inter-organizational facilitation and communication. | **188** | **376** |
| **Data Acquisition** | The role of collecting geospatial and related data. | **72** | **196** |
| **Data Analysis and Interpretation** | The role of processing data and extracting information to create products, drive conclusions, and inform decision-making reports. | **116** | **310** |
| **Data Management** | The role of cataloging, retrieving and distributing geospatial data. | **144** | **196** |
| **Management** | The role of efficiently and effectively applying the company's mission using financial, technical and intellectual skills and resources to optimize the end-products. | **218** | **457** |
| **Marketing** | The role of identifying customer requirements and needs and effectively communicating those needs and requirements to the organization, as well as promoting geospatial solutions. | **188** | **278** |
| **Project Management** | The role of effectively overseeing activity requirements to produce the desired outcomes on time and within budget. | **174** | **294** |
| **Systems Analysis** | The role of assessing requirements for system capacities including inputs, outputs, processes, timing and performance, as well as recommending necessary additions or adaptations. | **174** | **294** |

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| **Systems Management** | The role of integrating resources and developing additional resources to support spatial & temporal user requirements. | **218** | **424** |
| **Training** | The role of analyzing, designing, and developing instructional and non-instructional interventions to provide transfer of knowledge and evaluation for performance improvement. | **218** | **473** |
| **Visualization** | The role of rendering data and information into visual geospatial representations. | **160** | **408** |
| **TOTAL HOURS** | | **2,000** | **4,000** |

RELATED INSTRUCTION OUTLINE
GEOSPATIAL TECHNICIAN
O*NET-SOC CODE: RAIS CODE:

| ***Required/Optional*** | ***Title*** | ***Est. Self Study Hours*** | ***Description*** |
|---|---|---|---|
| Required | Introduction to GIS | 45 hrs. | This introductory course launches you into the exciting world of Geographic Information Systems and Remote Sensing. While learning about the basics from the evolution of maps and projections, to learning about the modern uses of a Geographic Information Systems GIS, you will complete many "hands-on" activities such as creating your own maps using compasses, rulers and tape measures. You will also utilize an actual program that NASA uses to simulate satellite movements. The specific areas of focus for this course will be an Introduction to GIS and Remote Sensing, an Introduction to the Project Management Model, an Introduction to GIS concepts, an Introduction to Remote Sensing Concepts, and the Satellite Tool Kit. |
| Optional | GEODESY ( All customized Data) | 45 hrs. | This course introduces the user to the GEODESY (**GEO**graphy **D**evelopment: an **E**ducational **S**eries for **Y**outh) Program and goes in depth in using the Project Management Model. The student will use GEODESY, a program that will allow them to make an easy transition to Arc Map. They will use local air or satellite photographs as well as over 120 layers of local data to create numerous thematic maps of their area. This course will end with the students completing a GIS project dealing with a GIS related problem in their area using the Project Management Model. |
| Required | Application-Based Training in GIS Part One | 45 hrs. | This hands-on course is a natural progression from Course 1. It introduces you to two very important components of the Arc GIS program; Arc Catalog and Arc Map. You will be provided with step by step instructions that will take you from learning the basics of these programs; like launching a map, viewing and editing metadata, to creating new shape files, and eventually to building a local map with data that you download from the Internet. While learning these valuable skills, you will be using the same geospatial tools that people in the industry are using. |

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| Required | Application-Based Training in GIS Part Two | 45 hrs. | You may know how and where to get data for various types of analysis. The trick is now to know what to do with this data. This course picks up where Course 2, Book 1 leaves off. In this course, you will use your knowledge of Arc Map and Arc Catalog to complete numerous geospatial applications. You will learn techniques in displaying, managing, querying, symbolizing, and creating geospatial data. You will even plan and build an inventory of local data to be used for analyses. In the Data Collection part of this course you will use Global Positioning Systems (GPS) units to collect, store and import data so that you will be able to create a map of your campus using GIS software. In the last portion of the course, you will use scenarios that will allow you to map features and study relationships that exist in your local community. |
| Required | Advanced Tools of GIS/RS - Applications in Remote Sensing | 24 hrs. | This course takes you through the Leica Geosystems Image Analysis software extension for Arc GIS in detail. Remote sensing plays a huge part of image analysis in that it involves gathering data about our environment and analyzing it. Generally, the gathering of this data, or these images, is by satellite or airplane. You will develop skills that will allow you to take images and convert them to data that you will use for different types of analyses. The types of analyses you will be performing in this course will be using data in Image Analysis, Orthorectification, Feature Extraction, Vegetation Mapping and Change Detection, and Image Enhancement. |
| Required | Advanced Tools of GIS/RS - Applications in Surface Analysis | 24 hrs. | This course directs you through five types of applications in Surface Analysis using the Arc GIS Spatial Analyst software extension. This course focuses on various methods and uses of displaying continuous, or grid, data over a surface. The five types of analyses that you will be using in this course are: mapping distance, density, interpolation, surface analysis, and statistics. This course will conclude with a short project where you will use the skills you have acquired to perform surface analysis tasks to your local area. |

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| Required | Advanced Tools of GIS/RS - 3D Visualization of Geospatial Data | 24 hrs. | This course allows you study the area you live in as well as the world in three dimensions. This exciting course not only allows you to view the world as it truly appears, you also will learn how to add animation as well. You will use two components of Arc GIS 3D Analyst for this course: Arc Scene and Arc Globe. You will learn skills such as viewing and displaying data in Arc Scene, how to acquire and process data from online resources, how to display non-elevation data in 3D, how to apply surface analysis to 3D, how to add raster and vector data to Arc Globe, and how to animate and export projects. |
| Required | Advanced Tools of GIS/RS - Geospatial Networks and Routing | 24 hrs. | This course takes you deeper in exploring data layers that you have studied in the past to analyze the flow or navigation of networked data. In this course you will delve into the specifics of Network Analyst extension program of the Arc GIS 9.1 suite and examine how problems dealing with geospatial networks and routing may be found in the business world and in communities. The five types of analyses that you will cover in this course will be: Exploring Geospatial Networks, Finding the Best Route, Finding the Closest Facility, Determining Service Areas, and Modeling Real World Traffic Flow. |
| Required | Creating a shared campus model | 15 hrs. | This course will allow the student to apply all skills and techniques learned up to this point to create their first extensive GIS and Remote Sensing project. In this project, the students will create a three-dimensional map of their campus. The student will work with others to complete this project using the Project Management Model as their guide. They will be involved with all parts of the process from data collection using GPS units to presenting the project to interested stakeholders |
| One of three requires | Self-guided Applications in Geospatial Technology - Agriculture/Material Resources Project | 45 hrs. | This course focuses on applications of GIS/RS technology in the field of Agriculture & Natural Resource Technology. Specifically this project deals with the field of forestry and involves the creation of a campus-wide tree inventory. By utilizing GIS/RS technology, the benefits of having trees on campus can be quantified and expressed in terms that are relevant to environmentalists, government officials, land developers, and the public in general. Although the extent of your study for this project will be limited to the tools that you have utilized up until this point in your SPACESTARS education, this project will give you a tremendous amount of experience and information in the focus of spatial technology in the field of forestry. |

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| One of three requires | Self-guided Applications in Geospatial Technology - Site Selection Project | 45 hrs. | This course is about the application of GIS/RS technology in setting up a Site Suitability Project for your campus. Whether finding an appropriate site for a business or finding a place for a garden on your campus, location is one of the most critical factors to consider. Geospatial analysis is an excellent tool to use for this endeavor. In this course, the student will use Arc Map and its components to analyze various factors to consider when scouting out locations such as; open space, sunlight, air circulation, slope/drainage, wind protection, irrigation and soil suitability. The student will make appropriate layouts and will compose a written report to document his findings. The course will conclude with the student presenting their project findings to the appropriate stakeholders. |
| One of three requires | Self-guided Applications in Geospatial Technology - Public Health & Safety Project | 45 hrs. | This course is about the application of GIS/RS technology in setting up a public health and safety, or emergency plan, for your campus. The student will compose a written plan which will lay out the procedures and responsibilities of campus personnel in the event of an emergency, and will identify the various responses each of these key personnel will have given each specific emergency. Using their GIS/RS skills and technology, the students will create maps supporting documents to these plans that lay out the location of existing facilities and essential supplies, as well as the response position of students and campus personnel given each specific crisis. The course will end with the student presenting their project findings to the appropriate stakeholders. |
| Optional can Substitute for Advanced GIS Part Two | GIS in Homeland Security | 45 hrs. | This course directs you through the five stages of a Homeland Security plan. It walks you through step by step with the data, software tools and strategy to create your communities Homeland Security plan. The maps you create show you how to apply Geospatial tools and thinking to this common problem. The five stages illustrated are; Risk Assessment, Mitigation, Preparedness, Response and Recovery. |
| Optional can Substitute for Advanced GIS Part Two | GIS in Economic Development | 45 hrs. | This course directs you through the three stages of site selection. Site selection techniques are used in real estate, banking, business, restaurants, economic development, military planning, civil engineering, landscape architecture, and many other fields. This course walks you through step by step with the data, software tools and strategy to find a site for a small warehousing facility. The maps you create show you how to apply Geospatial tools and thinking to this common issue. The three stages illustrated are; regional indicators, site suitability, and site selection. |

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| Optional can Substitute for Advanced GIS Part Two | GIS in Law Enforcement | 45 hrs. | This course focuses the use of Geographic Information Systems (Intelligent mapping) on the field of law Enforcement. To begin the course you will create a **base map** of the geographic study area. This base map will be the basis for all future maps created in this lesson series. Then you will be directed through three topics of geographic analysis and they are Hot Spots, Calls for Service Time Analysis, and Spatial Associations. |
| **TOTAL HOURS** | | **516** | |