



GTCM: From Concept to Implementation


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Roadmap


- Brief review of competency offerings
- Review of GTCM creation
- Introduction of model course outlines
- Production of GTCM-aligned content based on model course outlines



What Geospatial Technology skills and competencies are needed by the geoscience workforce?

How can curriculum be created to meet those needs?


What existed to help?




Many past efforts to define skills & competencies of a “Geospatial Industry”

GIS&T: Body of Knowledge

- Knowledge Areas (10)
 - Analytical Methods (AM)
 - Conceptual Foundations (CF)
 - Cartography and Visualization
 - Design Aspects (DA)
 - Data Modeling (DM)
 - Data Manipulation (DM)
 - Geocomputation (GC)
 - Geospatial Data (GD)
 - GIS & T and Society (GS)
 - Organizational and Institutional Aspects (OI)



1,660 Educational Objectives


Skill Areas

Specific Geospatial

Interpersonal

Domain Knowledge

Business & Computer



U.S. Dept of Labor Geospatial Technology Competency Model

- Industry defined competencies
- Building Block Tiers:
 - Personal
 - Academic
 - Workplace
 - Industry Wide – this is a good source of competencies
 - Industry Sectors
- Each block “links to full” description

<http://www.careeronestop.org>

Building Block Details – download as a PDF

Tier 6 & 7 Occupation Specific Competencies

Entry Level Geospatial workforce

DACUM Job Analysis

- Panels of 8 to 10 expert workers and a facilitator over two - 8 hour days
- What do they do and what do they need to know

DACUM: Developing A Curriculum used regionally for competency based education & training by industry, government & education

DACUM Research Chart for GIS Technician

Duties **Tasks**

Meta-DACUM Methodology

By consolidating validated results from multiple DACUM analyses for a single job taken at various US locations, we can identify a comprehensive list of national competencies.

Geotech Center, 2009

Methodology – How to Go From Lists to Curriculum?

- **GTCM structure:**
 - 5 Tiers compiled by **experts from Industry**
 - approved by USA Dept of Labor in 2010
- **MetaDACUM:**
 - 320 plus skills & competencies from **expert workers**
 - Vetted by 475 GISP's across USA
- **Create Program Content and Assessment Tools and Curriculum:**
 - Expert Geospatial Educator Panels:
 - Take long "lists" of competencies in an **Excel worksheet**
 - Determined courses/descriptions and SLOs
 - Parse list of competencies by **depth** into model course outlines



Model Courses Outlines

- Geo 100 – Awareness Stand alone Model Course
- “Model Courses & Certificate”
 - GST 101 – Introduction to Geospatial Technology
 - GST 102 – Spatial Analysis
 - GST 103 – Data Acquisition and Management
 - GST 104 – Cartographic Design and Visualization
 - GST 105 – Introduction to Remote Sensing
 - GST 106 – Introduction to Geospatial Programming
 - GST 107 – Geospatial Web Application and Development
 - GST 108 – Capstone
 - GST 109 – Internship



Value	Level of inclusion in course	Bloom's Key Word Examples from 6 Levels*	Representative type of Presentation and/or Activity
0			do not include
1	Awareness	recognize, communicate	included as part of a lecture or demo
2	Comprehension	grasp meaning, interprets, comprehends	included as part of a lecture and as part of an activity
3	Application /Analysis	apply, calculate, demonstrate, employ, illustrate, interpret, relate, use	included as part of a major topic of a Module and applied in an activity
4	Synthesis Mastery	Compare, construct, contrast, design, develop, ...	included in depth as major topic of a Module with a significant activity to apply the skill or competency independently



Course	Competency	Value	Status	Average	Variance
A MANAGE DATA	KNO	1	In	2.51	1.49
	A1	4	In	2.82	1.56
	A2	2	Out	1.96	0.85
	A3	3	Out	0.91	1.09
	A4	2	Out	0.55	0.67
	A5	2	Out	0.27	0.32
	A6	2	Out	0.25	0.87
	A7	1	TP	2.55	2.17
	A8	4	TP	2.42	2.27
	A9	4	Out	0.51	1.89
B GENERATE DATA	KNO	1	In	1.36	0.65
	B1	4	TP	2.18	1.96
	B2	3	TP	2.64	2.05
	B3	4	TP	2.09	2.29
	B4	4	TP	2.08	2.05
	B5	4	Out	1.36	1.85
	B6	1	In	1.55	2.67
	B7	1	Out	0.82	0.98
	B8	3	TP	1.55	2.47
	B9	2	Out	0.82	2.16

320 Competencies

Competency Certificate Tool

Go to the GTCM Competency Model

Enter course name(s) in the columns to the right; cut/paste for additional columns or delete as needed.

Enter 0 through 4 for each course based on the Scale Below

Refer to the "Definitions" tab in this worksheet for an explanation of how it should be included in the course

0 Not important for this course - do not include in this course

1 Slightly important for this course, include only if time permits

2 Important - include at an awareness level

3 Very important, should be included at some level above awareness

4 Critically important, must be included in depth

Competency	Geo 100	GST 101	GST 102	GST 103	GST 104	GST 105	GST 106	GST 107	GST 108	GST 109
1.KNO Explain how map scale affects data collection and management	0	0	0	0	0	0	0	0	0	0
2.A1.1 Create and build topology	0	0	0	0	0	0	0	0	0	0
3.14. Dataums and grids	0	0	0	0	0	0	0	0	0	0
4. C3. Validate spatial and tabular data (e.g. topology, bulk, verification)	0	0	0	0	0	0	0	0	0	0
5. C. Define data's spatial reference	0	0	0	0	0	0	0	0	0	0
6. C. Transform spatial data (e.g. reprojections)	0	0	0	0	0	0	0	0	0	0
7. C. Acquire appropriate projections	0	0	0	0	0	0	0	0	0	0
8.KNO Describe different methods of indicating locations (e.g., decimal degrees, UTM)	0	0	0	0	0	0	0	0	0	0
9. C. Calculate scale transformations	0	0	0	0	0	0	0	0	0	0
10. C. Resolve spatial conflicts	0	0	0	0	0	0	0	0	0	0
11. C. Determine appropriate scale and projection	0	0	0	0	0	0	0	0	0	0
12. D. Number Operations and Computation - addition, subtraction, multiplication, and division	0	0	0	0	0	0	0	0	0	0
13. D. Number Systems and Relationships - whole numbers, decimals, fractions, and percentages	0	0	0	0	0	0	0	0	0	0
14. T2. In obtain approximate solutions when necessary	0	0	0	0	0	0	0	0	0	0
15. T2. Geometry - use, shape, and position of features using geometric principles to solve problems	0	0	0	0	0	0	0	0	0	0
16. T2. Mathematical Reasoning and Problem Solving - inductive and deductive reasoning, conjectures	0	0	0	0	0	0	0	0	0	0



Model Course Outline and Pack Contents

- **Example syllabus**
 - Description & Student Learning Outcomes
 - Course Learning Units & other resources
- **Course outline**
 - Aligned with course syllabus teaching units/SLOs
 - Resource List
- **Evaluation Rubrics**
- **Model Course Spreadsheet**
- **Curriculum for some courses**



Geotechcenter.org – GTCM Resources



<http://moodle.delmar.edu>

Production of GTCM-Aligned Course Content

- DOL TAACCCT Grant providing funding
- Building out GST 101-110
- All released under Creative Commons Share-Alike 3.0



Course Design Philosophy

- Create turn-key curriculum
- Modularize
- Provide raw materials
- Release under Creative Commons
 - Required by DOL TAACCCT Grant
- Be vendor agnostic in lectures
- No textbook required...but still recommended



Let's consider GST 104

- Cartographic Design



Content of Each Course

- Course:
 - Course Module
 - Lab
 - Virtual machine image / lab data
 - Lectures – broken into modular sections
 - Scripts
 - Quiz
 - Exams



Format of Material

- Raw
 - Powerpoints/Word Documents
- Finished
 -still working on this part
 - Was considering storyline
 - Might end up with text on screen with interactive elements



Let's take a tour!



Thank You!

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