

# GGG 773-001 Interoperability of Geographic Information Systems

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Spring 2023 Semester

Office Hours: Friday 1-2 pm

Class: Friday 3:30 pm - 6:10 pm, Commerce I, Room 2006

## ***Course Overview***

This is an advanced course designed for students who are interested in theory, standards, and implementation of Web-based interoperable geographic information systems for on-line data and information services. Students registered to this class should have some knowledge of Geographic Information Systems and geospatial data.

***Prerequisite:*** General knowledge of GIS and remote sensing. Prefer to have taken either GGS 553 or GGS 754.

***Textbook:*** None

***Major References:*** The standards and interoperability specifications discussed in this course can be found in the following websites:

1. Federal Geographic Data Committee (FGDC): <http://www.fgdc.gov>
2. International Organization for Standardization (ISO) TC 211: <http://www.isotc211.org>  
<https://www.iso.org/committee/54904.html>
3. Open Geospatial Consortium (OGC): <http://www.opengeospatial.org>

The instructors will also provide some ISO standards and specifications, which are not available through the ISO website, for reviews and discussions.

***Course Work:*** Each student is required to review and present a standard or specification. Each presentation will last for about twenty to thirty minutes. There is a mid-term exam. At the end of the semester, each student is required to turn in a semester paper of their selected topics related to GIS interoperability and standards. Grades will be determined from classroom discussions, mid-term exam, presentation of standard reviews, and the paper.

**Grading:** Presentation and classroom discussions: 25%  
Mid-term exam: 25%  
Semester paper: 50%

***Syllabus:***

Week 1 (January 27): Introduction of the course; what is Geographic Information Systems; the definition of GIS interoperability

Week 2 (February 3): The needs and level of interoperability; How to make the GIS interoperable (the roles of standards); Types of Geographic Information Standards, their definitions, and roles; Who are the major players in defining federal, national, and international standards on geographic information and what is the relationships among the standards defined by different players.

Week 3 (February 10): Introduction to Unified Modeling Language (UML)

Week 4 (February 17): Introduction to Federal Geographic Data Committee and its roles and standards; Information on US national GIS standards; the InterNational Committee on Information Technology Standards (INCITS) Technical Committee L1 and their roles; The ISO TC 211 organization; The ISO 191XX series of standards.

Week 5 (February 24): Introduction to Open Geospatial Consortium, its organization, roles, and activities; OGC SP and IP programs; OGC Abstract Specifications on geographic information; OGC Implementation Specifications; The relationships between geographic information standards; The relationship between ISO standards and OGC specifications.

Week 6 (March 3): What is metadata? The FGDC Content Standard for Digital Geospatial Metadata; the FGDC Remote Sensing Metadata Extensions; The ISO 19115-1, ISO 19115-2, and ISO 19115-3 Geographic Information—Metadata; The ANSI adoption processes of ISO metadata standards.

Week 7 (March 10): ISO 191XX Standards on Imagery, and current ISO TC 211 projects on imagery and gridded data.

Week 8 (March 17): Spring Break

Week 9 (March 24): Mid-term exam

Week 10 (March 31): Web-based interoperable Geographic Information Services; OGC Web service architecture and technology; OGC Specifications on Chainable Web Services, semantic geospatial web. Assign standards and specifications to students for review.

Week 11 (April 7): OGC Web Map Service Specification (WMS); OGC Web Coverage Service Specification (WCS); OGC Web Feature Service Specification (WFS); OGC Catalog Service for Web (CS/W).

Week 12 (April 14): Student presentation on standard review.

Week 13 (April 21): Sensor Web Technology and OGC Sensor Web Enablement (SWE) specifications (Dr. Genong Yu)

Week 14 (April 28): Big data and geospatial cloud; Implementation considerations of the geographic information standards; GeoBrain, CropScape, VegScape, Crop-CASMA, CyberConnector, iCrop, and WaterSmart

Week 15 (May 5): Where are the interoperability technologies heading (Classroom discussions). Also, each student should give a short presentation about the topic of his/her semester paper.

The last day to turn in the semester paper: May 17.