



The Bishop Strachan School
Department Name: Canadian, Business and World Studies

Course Title: Geomatics: Geotechnologies in Action

Grade Level: 12

Ministry Course Code: CGO4M

Teacher's Name: Danny Schryburt

Developed by: Danny Schryburt

Date: August 31, 2009

Developed from: The Ontario Curriculum Grades 11 and 12 Canadian and World Studies

Text: None

Prerequisite: None

Credits: 1.0

Length: 110 hours

Course Description/Rationale

This course gives students experience in using geotechnologies to develop solutions to real-world problems involving physical and human geography. Students will extend their knowledge of geomatics in the areas of cartography, geographic information systems (GIS), the global positioning system (GPS), and remote sensing. Students will develop critical thinking and communication skills as they apply geotechnologies and geographic inquiry methods to devise and present ways of improving conditions for people and the environment. This University/College Preparation course is designed to equip students with the knowledge and skills they need to meet the expectations of a wide range of university and college level courses.

Overall Curriculum Expectations

Geographic Foundations: Space and Systems

1. Explain mapping principles that influence how the earth is depicted in maps
2. Explain basic spatial concepts
3. Analyse how geotechnologies are used in studying physical and human systems

Human-Environment Interactions

4. Analyse how geotechnologies are used in studying and managing human-environment interactions
5. Evaluate the effectiveness of geotechnologies in identifying environmental problems and finding solutions

Global Connections

6. Explain how geotechnologies are used to learn about people, places, and issues around the world
7. Analyse how perceptions of places, situations, and events are affected by maps or other forms of geographic representations
8. Evaluate the role of geotechnologies in facilitating global communication and international cooperation

Understanding and Managing Change

9. Explain the use of geotechnologies in monitoring change in dynamic systems
10. Evaluate the use of geotechnologies in modeling and predicting future change
11. Identify key stages in the evolution of geomatics

Methods of Geographic Inquiry and Communication

12. Locate and collect information for geographic inquiries from appropriate sources and using appropriate tools and methods
13. Demonstrate the understanding and skills required to use a variety of conventional and geotechnological methods and tools in geographic investigations, and to interpret findings
14. Communicate the results of geographic inquiries and investigations, using appropriate terms and concepts and a variety of forms and techniques

Instructional Hours Summary

Course Content Unit	Classroom Hours	Field Trip Hours	Exam Hours	Total
1. The Fundamentals of Geomatics	15	7		22
2. Surveying and Navigation	15			15
3. Cartography	15			15
4. Remote Sensing	23			23
5. Advanced Geographic Information Systems (GIS)	23			23
6. Independent Study Project	10			10
Total	101	7	2	110

Unit Descriptions

Unit 1 – The Fundamentals of Geomatics

Students will investigate the history of geomatics and the tools and techniques used for geographic analysis. They will be introduced to the functional concepts of a GIS and GPS including basic software functions, working with attribute data and a variety data sources. Students will begin to see the broad applicability of geotechnologies by undertaking a variety of tasks from mapping the UN millennium goals, creating emergency evacuation plans, and collecting primary data in the field for further analysis in the lab.

Unit 2 – Surveying and Navigation

Students will learn and utilize a variety of surveying techniques to gather raw data for geographic analysis. They will conduct systematic field surveys, measure distances and angles, and utilize GPS for measuring locations and elevations. Furthermore, students will practice more traditional map and compass navigation techniques while comparing and contrasting their utility to GPS technology.

Unit 3 – Cartography

Students will gain a greater understanding of the science of map making and deepen their knowledge of mapping techniques and principles. They will critically analyse how maps and cartographic bias affect people's perceptions of places, situations, and events. Students will study and practice the art of cartography as it applies to simplification, classification, symbolization, and composition.

Unit 4 – Remote Sensing

Student will gain knowledge of the principles of remote sensing as they apply to the electromagnetic spectrum, platforms, technology, and processes. They will be introduced to the skills involved with image enhancement, classification, and interpretation. Using a GIS, students will employ their knowledge and skill to study human-environment interactions using a variety of remotely sensed imagery from a variety of scales as it applies to business, industry, and government.

Unit 5 – Advanced Geographic Information Systems (GIS)

Students will receive training on a variety of geoprocessing tools that allow for a greater range of analysis techniques. Through an exploration of the methods of data classification through the use of statistics and histograms, students will map the spatial distribution of unique human characteristics such as ethnicity, indigenous people, and socio-economic patterns. Students will learn to integrate remotely sensed imagery and vector data to identify change in dynamic systems and facilitate global communication and international cooperation.

Unit 6 – Independent Study Project (ISP)

The ISP is an integral part of the course. The ISP provides students with the opportunity to illustrate their acquired knowledge and skills in geotechnologies by developing and analyzing a solution to a real world problem. After identifying an issue and gathering the appropriate data, students must analyze the issue using their GIS skills and present their findings.

Teaching/Learning Strategies

Lecture	Brainstorming	Group Critique
Demonstration	Conferencing	Videotape Critique
Reading	Research Project	Self Analysis
Structured Discussion	Debate	Peer Analysis
Organizers	Topographic Map	Game
	Interpretation	
Diagramming	GIS	Independent Study
Case Study	Role Play	Field Trip
Conference	Discovery	Note Making
Guest Speaker	Group Work	Model Building
Researching	Cooperative Learning	Presentation

Assessment & Evaluation

Paper and Pencil	Performance Models	Personal Communication	Other
Tests	Projects	Classroom Discussion	Teacher Anecdotal
Work Stations	Presentations	Conferences	Records
Examination	Role Playing	Self Evaluation	Checklists
	Demonstration	Peer Evaluation	Rubrics
	Diagrams		
	Journals		
	Models		

Assessment/Evaluation

Seventy per cent (70%) of the final grade will be based on evaluations conducted throughout this course. This portion of the grade should reflect the students' *most consistent level of achievement* throughout this course, although special consideration should be given to the more recent evidence of achievement.

Thirty per cent (30%) of the final grade will be based on a final evaluation in the form of an examination, performance, essay, and/or other method of evaluation suitable to the course content and administered towards the end of the course.

Teachers will ensure that student work is assessed and/or evaluated in a balanced manner with respect to the four categories (see below), and that achievement of particular expectations is considered within the appropriate categories. The four categories should be considered as interrelated, reflecting the wholeness and interconnectedness of learning. The categories of knowledge and skills are:

- Knowledge and Understanding (20-30%)
- Thinking (20-30%)
- Communication (20-30%)
- Application (20-30%)

Type of Assessment	Unit Title/Length	Overall Expectations	Assessment Strategies
70%	1. The Fundamentals of Geomatics (15 hours)	1, 2, 3, 4, 6, 9, 10, 11, 12,13, 14	Paper: History of Geomatics
			Presentation: How Geomatics is used in
			Lab: data, procedures, and analysis
			Lab: Local traffic report
	2. Surveying and Navigation (15 hours)	1, 3, 6, 9, 10, 12, 13, 14	Field exercise: Good maps, good neighbours
			Surveying with GPS and GIS
	3. Cartography (15 hours)	1, 2, 6, 7, 12, 13, 14	Newspaper map critique
			Lab: Map projections
			Lab: digital compilation of a street map
			Lab: Travel map
	4. Remote Sensing (23 hours)	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	Lab: Image classification and interpretation
	5. Advanced GIS (23 hours)	2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 14	Lab: Geoprocessing

			Lab: Disaster relief and the network analyst
30%	6. Independent Study (10 hours)	1-14	
			Total

Course Resources

- Videos - CBC News in Review, CBC Geologic Journey
- Web Sites
- Current Newspaper and Magazine Articles
- Topographic Maps
- Air Photos
- Satellite Images
- ArcGIS
- Mineral and Rock Samples
- Field Guides
- Weather Maps
- Climate Statistics
- Books

Achievement Chart – Canadian and World Studies, Grades 9–12

Categories	50–59% (Level 1)	60–69% (Level 2)	70–79% (Level 3)	80–100% (Level 4)
Knowledge and Understanding <i>Subject-specific content acquired in each grade (knowledge), and the comprehension of its meaning and significance (understanding)</i>				
The student:				
Knowledge of content (e.g., facts, terms, definitions)	– demonstrates limited knowledge of content	– demonstrates some knowledge of content	– demonstrates considerable knowledge of content	– demonstrates thorough knowledge of content
Understanding of content (e.g., concepts, ideas, theories, procedures, processes, methodologies, and/or technologies)	– demonstrates limited understanding of content	– demonstrates some understanding of content	– demonstrates considerable understanding of content	– demonstrates thorough understanding of content
Thinking <i>The use of critical and creative thinking skills and/or processes</i>				
The student:				
Use of planning skills (e.g., focusing research, gathering information, organizing an inquiry, asking questions, setting goals)	– uses planning skills with limited effectiveness	– uses planning skills with some effectiveness	– uses planning skills with considerable effectiveness	– uses planning skills with a high degree of effectiveness
Use of processing skills (e.g., analysing, generating, integrating, synthesizing, evaluating, detecting point of view and bias)	– uses processing skills with limited effectiveness	– uses processing skills with some effectiveness	– uses processing skills with considerable effectiveness	– uses processing skills with a high degree of effectiveness
Use of critical/creative thinking processes (e.g., inquiry process, problem-solving process, decision-making process, research process)	– uses critical/creative thinking processes with limited effectiveness	– uses critical/creative thinking processes with some effectiveness	– uses critical/creative thinking processes with considerable effectiveness	– uses critical/creative thinking processes with a high degree of effectiveness
Communication <i>The conveying of meaning through various forms</i>				
The student:				
Expression and organization of ideas and information (e.g., clear expression, logical organization) in oral, visual, and written forms	– expresses and organizes ideas and information with limited effectiveness	– expresses and organizes ideas and information with some effectiveness	– expresses and organizes ideas and information with considerable effectiveness	– expresses and organizes ideas and information with a high degree of effectiveness

Categories	50–59% (Level 1)	60–69% (Level 2)	70–79% (Level 3)	80–100% (Level 4)
Communication (cont.)				
The student:				
Communication for different audiences (e.g., peers, adults) and purposes (e.g., to inform, to persuade) in oral, visual, and written forms	– communicates for different audiences and purposes with limited effectiveness	– communicates for different audiences and purposes with some effectiveness	– communicates for different audiences and purposes with considerable effectiveness	– communicates for different audiences and purposes with a high degree of effectiveness
Use of conventions (e.g., conventions of form, map conventions), vocabulary, and terminology of the discipline in oral, visual, and written forms	– uses conventions, vocabulary, and terminology of the discipline with limited effectiveness	– uses conventions, vocabulary, and terminology of the discipline with some effectiveness	– uses conventions, vocabulary, and terminology of the discipline with considerable effectiveness	– uses conventions, vocabulary, and terminology of the discipline with a high degree of effectiveness
Application <i>The use of knowledge and skills to make connections within and between various contexts</i>				
The student:				
Application of knowledge and skills (e.g., concepts, procedures, processes, and/or technologies) in familiar contexts	– applies knowledge and skills in familiar contexts with limited effectiveness	– applies knowledge and skills in familiar contexts with some effectiveness	– applies knowledge and skills in familiar contexts with considerable effectiveness	– applies knowledge and skills in familiar contexts with a high degree of effectiveness
Transfer of knowledge and skills (e.g., concepts, procedures, methodologies, technologies) to new contexts	– transfers knowledge and skills to new contexts with limited effectiveness	– transfers knowledge and skills to new contexts with some effectiveness	– transfers knowledge and skills to new contexts with considerable effectiveness	– transfers knowledge and skills to new contexts with a high degree of effectiveness
Making connections within and between various contexts (e.g., past, present, and future; environmental; social; cultural; spatial; personal; multidisciplinary)	– makes connections within and between various contexts with limited effectiveness	– makes connections within and between various contexts with some effectiveness	– makes connections within and between various contexts with considerable effectiveness	– makes connections within and between various contexts with a high degree of effectiveness