SAULT COLLEGE OF APPLIED ARTS AND TECHNOLOGY

SAULT STE. MARIE, ONTARIO

COURSE OUTLINE

COURSE TITLE: GIS Applications

CODE NO. :   GIS423   **SEMESTER:**   10W

PROGRAM: Geographic Information Systems Applications Specialist

AUTHOR: Heath Bishop

DATE: Dec. 2009   **PREVIOUS OUTLINE DATED:**   Dec. 2008

APPROVED:

"B. Punch"

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                   CHAIR   **DATE**

TOTAL CREDITS: 4

PREREQUISITE(S):   GIS417

HOURS/WEEK: 4

I.   COURSE DESCRIPTION:

This course is designed to put into practice many of the skills the student gained in the prerequisite GIS417 course. The primary software for the course is ArcGIS as well as many of its extensions. The course will explore extensions such as spatial analyst, 3D analyst and network analyst.
A growing area of GIS is dealing with the Health sector. A portion of this course will deal with Health GIS and explore some of the rapidly developing advancements in Health Informatics.

II.   LEARNING OUTCOMES AND ELEMENTS OF THE PERFORMANCE:

1.   Develop GIS applications using a Geodatabase

      Potential Elements of the Performance:
      - Describe and design a Geodatabase
      - Construct and edit a Geodatabase using ArcCatalog
      - Explore the relational database behind a Geodatabase
      - Understand the geometry inherent in a Geodatabase
      - Import and export other GIS formats to a Geodatabase

2.   Perform raster GIS analysis

      Potential Elements of the Performance:
      - Use the ArcGIS Spatial Analyst extension
      - Describe the sources, formats, data types and structures of raster GIS data
      - Describe potential raster GIS analyses
      - Use Map Algebra to perform complex spatial analyses
      - Ability to use Model Builder for spatial modeling / analysis
      - Exposure to the geostatistical analyst extension

3.   Perform 3-Dimensional Analysis

      Potential Elements of the Performance:
      - Use the ArcGIS 3-D Analyst extension
      - Describe TIN and Lattice data structures, data sources and surface concepts
      - Perform slope, aspect, analytical hillshading, visibility and surface

profiling analyses
- Perform 3-D surface area and volumetric analyses

4. Perform Network Analysis

Potential Elements of the Performance:
- Use the ArcGIS Network Analyst extension
- Describe network analysis theory
- Perform network analysis (e.g., fastest route, service areas)

5. Health GIS

Potential Elements of the Performance:
- Look into the rapidly growing field of how GIS can be applied to the Health sector
- Study the theory and practical applications in this area

6. Geocoding

Potential Elements of the Performance:
- Describe the theory surrounding Geocoding
- Perform Geocoding in the ArcMap environment

III.   TOPICS:

1. Geodatabases
- Geodatabase theory
- Designing a Geodatabase
- Geodatabase geometry and topology
- Relational databases and geodatabases
- Coverage, shapefile and projection import and export

2. Raster GIS Analysis
- Raster GIS theory
- Map algebra and spatial modeling
- Topographic analysis

- Density rasters
- Model Builder
- Surface hydrology tools (flow direction and accumulation, basin and stream delineation)
- Creating a raster, importing and exporting rasters
- ArcGIS Spatial Analyst and Geostatistical analyst extensions

3. 3-Dimensional Analysis
   - Triangular irregular network (TIN) theory
   - ArcGIS 3-D analyst extension
   - Creating a TIN, importing and exporting elevation data
   - Elevation and viewshed modeling
   - Surface profiling
   - Creating lake bathymetry surfaces

4. Network analysis

   - ArcGIS Network Analyst Extension
   - Network analysis Perform network analysis (e.g., fastest route, service areas)

5. Health GIS

   - Examine how GIS is being applied in the health field
   - Look into epidemiology and how it can be mapped
   - Perform health GIS studies on a community/regional scale

6. Geocoding

   - Geocoding addresses using local road networks
   - Geocoding businesses using data provided

IV.   REQUIRED RESOURCES/TEXTS/MATERIALS:

Price, M. 2009. Mastering ARCGIS, Fourth Edition. McGraw-Hill.

V.   EVALUATION PROCESS/GRADING SYSTEM:

Labs   50%
Tests (2)   50%
Total   100%

Note: Students must achieve a mark of at least 50% on the Test components to pass the course.

The following semester grades will be assigned to students:

Grade	Definition	Grade Point Equivalent
A+	90 – 100%	4.00
A	80 – 89%	
B	70 - 79%	3.00
C	60 - 69%	2.00
D	50 – 59%	1.00
F (Fail)	49% and below	0.00

CR (Credit)	Credit for diploma requirements has been awarded.
S	Satisfactory achievement in field /clinical placement or non-graded subject area.
U	Unsatisfactory achievement in field/clinical placement or non-graded subject area.
X	A temporary grade limited to situations with extenuating circumstances giving a student additional time to complete the requirements for a course.
NR	Grade not reported to Registrar's office.
W	Student has withdrawn from the course without academic penalty.

VI.   SPECIAL NOTES:

Course Outline Amendments:
The professor reserves the right to change the information contained in this course outline depending on the needs of the learner and the availability of resources.

Retention of Course Outlines:
It is the responsibility of the student to retain all course outlines for possible future use in acquiring advanced standing at other postsecondary institutions.

Prior Learning Assessment:
Students who wish to apply for advance credit transfer (advanced standing) should obtain an Application for Advance Credit from the program coordinator (or the course coordinator regarding a general education transfer request) or academic assistant. Students will be required to provide an unofficial transcript and course outline related to the course in question. Please refer to the Student Academic Calendar of Events for the deadline date by which application must be made for advance standing.

Credit for prior learning will also be given upon successful completion of a challenge exam or portfolio.

Substitute course information is available in the Registrar's office.

Disability Services:
If you are a student with a disability (e.g. physical limitations, visual impairments, hearing impairments, or learning disabilities), you are encouraged to discuss required accommodations with your professor and/or the Disability Services office. Visit Room E1101 or call Extension 2703 so that support services can be arranged for you.

Communication:
The College considers **WebCT/LMS** as the primary channel of communication for each course. Regularly checking this software platform is critical as it will keep you directly connected with faculty and current course information. Success in this course may be directly related to your willingness to take advantage of the **Learning Management System** communication tool.

Plagiarism:
Students should refer to the definition of "academic dishonesty" in *Student Code of Conduct*. A professor/instructor may assign a sanction as defined below, or make recommendations to the Academic Chair for disposition of the matter. The professor/instructor may (i) issue a verbal reprimand, (ii) make an assignment of a lower grade with explanation, (iii) require additional academic assignments and issue a lower grade upon completion to the maximum grade "C", (iv) make an automatic assignment of a failing grade, (v) recommend to the Chair dismissal from the course with the assignment of a failing grade. In order to protect students from inadvertent plagiarism, to protect the copyright of the material referenced, and to credit the author of the material, it is the policy of the department to employ a documentation format for referencing source material.

Student Portal:
The Sault College portal allows you to view all your student information in one place. **mysaultcollege** gives you personalized access to online resources seven days a week from your home or school computer. Single log-in access allows you to see your personal and financial information, timetable, grades, records of achievement, unofficial transcript, and outstanding obligations. Announcements, news, the academic calendar of events, class cancellations, your learning management system (LMS), and much more are also accessible through the student portal. Go to https://my.saultcollege.ca.

Electronic Devices in the Classroom:
Students who wish to use electronic devices in the classroom will seek permission of the faculty member before proceeding to record instruction. With the exception of issues related to accommodations of disability, the decision to approve or refuse the request is the responsibility of the faculty member. Recorded classroom instruction will be used only for personal use and will not be used for any other purpose. Recorded classroom instruction will be destroyed at the end of the course. To ensure this, the student is required to return all copies of recorded material to the faculty member by the last day of class in the semester. Where the use of an electronic device has been approved, the student agrees that materials recorded are for his/her use only, are not for distribution, and are the sole property of the College.

Attendance:
Sault College is committed to student success. There is a direct correlation between academic performance and class attendance; therefore, for the benefit of all its constituents, all students are encouraged to attend all of their scheduled learning and evaluation sessions. This implies arriving on time and remaining for the duration of the scheduled session.

Tuition Default:
Students who have defaulted on the payment of tuition (tuition has not been paid in full, payments were not deferred or payment plan not honoured) as of the first week of March will be removed from placement and clinical activities. This may result in loss of mandatory hours or incomplete course work. Sault College will not be responsible for incomplete hours or outcomes that are not achieved or any other academic requirement not met as of the result of tuition default. Students are encouraged to communicate with Financial Services with regard to the status of their tuition prior to this deadline to ensure that their financial status does not interfere with academic progress.