1. **Course:** CPSC 695: Data Management in GIS  
   **Lecture Sections:**  
   L01, TR 14:00-15:15, ST 027A, Marina Gavrilova, ICT 709, marina@cpsc.ucalgary.ca  
   Office Hours: By Appointment  
   **Course Website:** [www.cpsc.ucalgary.ca/~marina/695](http://www.cpsc.ucalgary.ca/~marina/695)  
   **Computer Science Department Office, ICT 602, 220-6015, cpsc@cpsc.ucalgary.ca**

2. **Prerequisites:** Consent of the Department  
   ([http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620](http://www.ucalgary.ca/pubs/calendar/current/computer-science.html#3620))

3. **Grading:** The University policy on grading and related matters is described in sections F.1 and F.2 of the online University Calendar. In determining the overall grade in the course the following weights will be used:  
   - Assignments/ Quizzes: 40%  
   - Project: 40%  
   - Presentations: 20%  
   This course will not have a Registrar's Scheduled Final Exam.  
   Special Regulations affecting the Final Grade: None.

4. **Missed Components of Term Work:** The regulations of the Faculty of Science pertaining to this matter are found in the Faculty of Science area of the Calendar, Section 3.6. It is the student's responsibility to familiarize theirself with these regulations. See also Section E.6 of the University Calendar.

5. **Scheduled Out-of-Class Activities:** REGULARLY SCHEDULED CLASSES HAVE PRECEDENCE OVER ANY OUT-OF-CLASS-TIME ACTIVITY. If you have a clash with this out-of-class activity, please inform your instructor as soon as possible so that alternative assignments can be arranged.

6. **Course Materials:**  
   None.

   **Online Course Components:**  
   A list of recommended resources will be available on the course webpage. D2L will be used as well.

7. **Examination Policy:** None. Students should also read the Calendar, Section G, on examinations.

8. **Approved Mandatory and Optional Course Supplemental Fees:** None.

9. **Writing across the Curriculum Statement:** In this course, the quality of the student's writing in the weighted components of the course will be a factor in the evaluation of these components. See also Section E.2 of the University Calendar.

10. **Human Studies Statement:** Students will be expected to participate as subjects or participants in projects. See also Section E.5 of the University Calendar.

11. **OTHER IMPORTANT INFORMATION FOR STUDENTS:**
a) **Misconduct:** Academic misconduct (cheating, plagiarism, or any other form) is a very serious offense that will be dealt with rigorously in all cases. A single offence may lead to disciplinary probation or suspension or expulsion. The Faculty of Science follows a zero tolerance policy regarding dishonesty. Please read the sections of the University Calendar under Section K, Student Misconduct to inform yourself of definitions, processes and penalties.

b) **Assembly Points:** In case of emergency during class time, be sure to FAMILIARIZE YOURSELF with the information on assembly points which can be found in each classroom and building.

c) **Student Accommodations:** Students needing an Accommodation because of a Disability or medical condition should contact Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities available at http://www.ucalgary.ca/policies/files/policies/procedure-for-accommodations-for-students-with-disabilities_0.pdf. Students needing an Accommodation in relation to their coursework or to fulfill requirements for a graduate degree, based on a Protected Ground other than Disability, should communicate this need, preferably in writing, to the Associate Head of Computer Science.

d) **Safewalk:** Campus Security will escort individuals day or night (http://www.ucalgary.ca/security/safewalk/). Call 403-220-5333 for assistance. Use any campus phone, emergency phone or the yellow phones located at most parking lot pay booths.

e) **Freedom of Information and Privacy:** This course is conducted in accordance with the Freedom of Information and Protection of Privacy Act (FOIPP). As one consequence, students should identify themselves on all written work by placing their name on the front page and their ID number on each subsequent page. For more information see also http://www.ucalgary.ca/secretariat/privacy

f) **Student Union Information:** VP Academic (403) 220-3911 suvpaca@ucalgary.ca SU Faculty Rep (403) 220-3913 science1@su.ucalgary.ca, science2@su.ucalgary.ca and science3@su.ucalgary.ca. Student Ombuds Office: (403) 220-6420 ombuds@ucalgary.ca http://ucalgary.ca/provost/students/ombuds

**Internet and Electronic Device Information:** You can assume that in all classes that you attend your cell phone should be turned off unless instructed otherwise. All communications with other individuals via laptop computers, cell phones or other devices connectable to the internet in not allowed during class time unless specifically permitted by the instructor. If you violate this policy you may be asked to leave the classroom. Repeated abuse may result in a charge of misconduct.

h) **U.S.R.I.:** At the University of Calgary feedback provided by students through the Universal Student ratings of Instruction (USRI) survey provides valuable information to help with evaluating instruction, enhancing learning and teaching, and selecting courses (www.ucalgary.ca/usri). Your responses make a difference – please participate in USRI surveys.

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Department Approval__________________________________________Date__________________________

Associate Dean’s Approval for out of regular class-time activity: ________________________________Date:__________________________

Associate Dean’s Approval for Alternate final examination arrangements:_________________________Date:__________________________

*A signed copy of this document is kept on file in the Computer Science main Office ICT 602*
Tentative Topics Covered:

Week 1. Introduction. Algorithmic foundations of GIS.

Week 2. Advanced geometric data structures (progressive mesh, ROAM, multidimensional Delaunay triangulation, quadtree, trapezoidalization, etc)

Week 3. Data representation and algorithm design techniques (incremental, divide-and-conquer, sweep-plane, dimension reduction).

Week 4. Selected computational problems in GIS.

Week 5. Quiz


Week 7. Selected statistical problems.

Week 8. GIS software/hardware.


Week 10. Image analysis and visualization of GIS models. Applications in natural sciences.

Week 11. Current issues and trends

Week 12. Current issues and trends

Week 13. Presentations

Learning Outcomes:

The objective in offering this course is to study advanced data management and pattern recognition methods in the area of applied sciences, computer graphics, GIS and security. The course introduces geometric data structures used for efficient representation and analysis of spatial models. The methods and techniques learned in the course find a variety of applications in the areas of computer graphics, modeling, and spatial databases. Some applications to simulation of complex dynamic systems, optimization and visualization will also be discussed.

Ideally, on successful completion of this course, students will be familiar with a variety of methods in representation, optimization and visualization in a variety of applications, will have a working knowledge of advanced data structures and techniques, and be prepared to apply this knowledge in related disciplines. The students will also be exposed to an in-depth analysis of a selected method, writing a research paper, and making a presentation on a subject.

The course is suitable for graduate student enrolled in M. Sc or Ph. D program in CPSC Department, as well as students enrolled in graduate degree granting programs in other departments, including MGIS students.