

GEOGRAPHY FINAL COURSE OUTLINE: WINTER 2019
GEOGRAPHY 439
H(3-2)

Analytical Methods in Geography II

Section	Days	Time	Location
LEC 01	Tu/Th	09:30 – 10:45	ES 319
LAB 01	Th	12:30 – 14:20	ES 407

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Please note the appropriate emergency evacuation assembly point for classes taught in Earth Science is the ICT Food Court.

Official Course Description:

Methods for the analysis of temporal, spatial and multivariate data sets. Emphasis is placed on data sets relating to geographic phenomena, resource utilization, and environmental problems, with examples from the geographic literature. Examples will involve the use of computer packages.

Course Objectives:

The objectives of the course are designed to introduce students to multivariate statistical analysis. By the end of the course, students will be able to perform and understand an array of multivariate statistical techniques, including: regression analysis, principal component analysis, factor analysis, and cluster analysis.

Course Learning Outcomes:

The Department of Geography is committed to student knowledge and skill development. The table below lists the key learning outcomes for this course, the program-learning outcomes they facilitate and the expected level of achievement.

Course Learning Outcomes	PLO(s)	Level(s)
Perform multivariate descriptive statistics and cross-correlations; use appropriate multivariate tests for main data types and distributions. Effectively summarize and communicate analytical results.	1, 2, 3, 4, 7, 8	2
Perform basic linear algebra operations: add and multiply vectors and matrices; calculate determinant and invert matrices (manually up to 3*3). Explain eigenproblem & diagonalization.	3, 7, 8	1
Perform multivariate regression & interpret results. Verify assumptions and assess the properties of estimates. Perform model selection procedures.	1, 2, 3, 4, 6, 7, 8	2

Visually analyze and statistically test regression residuals. Validate model.		
Analyze time-series and estimate autoregressive models. Intuitively translate concepts and methods of time-series to spatial series.	1, 2, 3, 4, 7, 8	1
Perform principal component (PC) analysis. Explain underlying mathematical concepts, including correlation, orthogonality, eigenvalues and eigenvectors. Perform and criticize multivariate regression using principal components as independent variables.	1, 2, 3, 4, 6, 7, 8	2
Understand and perform cluster analysis. Explain data reduction. Explain hierarchical methods. Explain data clustering vs. spatial cluster detection.	1, 2, 3, 4, 6, 8	1
Explain non-linear multivariate regression. Perform logistic regression. Explain underlying mathematical concepts. Use appropriate inferential procedures; explain statistical properties.	1, 2, 3, 4, 6, 7, 8	1
Complete an independent research project on a chosen dataset. Define the research question; determine data level and distribution; choose and perform a multivariate analysis to address the research question on that dataset; critically assess properties and limitations of the analysis conducted.	1, 2, 3, 4, 5, 6, 7, 8	3

PLOs = Program Learning Outcomes: 1 = reflect and communicate diverse human-environment perspectives, 2 = identify and explain human-environment processes, 3 = implement sampling, data collection, analyses and communication methods, 4 = analyze spatial and temporal aspects of human-environment systems, 5 = employ knowledge, arguments, and methodologies for solving human-environment problems, 6 = evaluate geospatial data and manipulate it to create cartographic products, 7 = communicate geographic concepts using oral, written, graphic, and cartographic modes, and 8 = demonstrate literacy skills. **Levels:** (1) Introductory, (2) Intermediate, (3) Advanced.

Prerequisite: Geography 339

Learning Resources:

Recommend *one* of the following or similar:

B. Tabachnick & L. Fidell, 2013, Using Multivariate Statistics, 6th Edition. Boston: Allyn and Bacon.

J. Burt, G. Barber, D. Rigby, 2009, Elementary Statistics for Geographers. 3rd Edition. New York: Guilford Press.

P.A. Rogerson, 2015, Statistical Methods for Geography. London: Sage Publications Ltd.

Additional material will be suggested in class and may be made available in the collections room (ES 457) or on D2L or will be available online through the university library.

Grading/Weighting

Lab assignments: 36% of course grade.
Review tests: 40% of course grade (Exam 1: 15%; Exam 2: 25%).
Term project: 20% of course grade.
Quizzes: 4% of course grade.

In order to pass the course, *students must pass each of the following course components:*

- Total sum of all the labs;

- Total sum of Test 1 and Test 2;
- Total sum of the project component (proposal, literature review, written project, and presentation).

Participation is not formally graded, but students are strongly encouraged to share ideas and questions to contribute to in class discussions.

Lab exercises are due the week after the assignment (unless otherwise specified).

The final project should be viewed as an opportunity to perform an insightful statistical analysis on a research topic chosen by each student. A detailed guideline for the project completion will be provided in class.

Late Policy:

Lab assignments are due at the beginning of the lab session the week following the assignment and shall be submitted to the Teaching Assistant. Project proposal and final project are due on the date specified in the calendar provided in class. Your work is due at the beginning of the lab session or class on that date unless otherwise specified. There are no exceptions and any piece of work handed in late will be subject to an immediate 10% penalty followed by a 10% reduction in grade for each day thereafter (weekend and holidays included). Medical related circumstances will require a note from a physician. Appropriate documentation shall be provided in support of other circumstances.

Exemptions to the Examination and Tests Regulations

N/A

Grading System

96 – 100	A+	77 – 80	B	59 – 61	C-
90 – 95	A	71 – 76	B-	55 – 58	D+
86 – 89	A-	65 – 70	C+	50 – 54	D
81 – 85	B+	62 – 64	C	0 – 49	F

Human subjects

N/A

Supplementary Fees

N/A

For additional detailed course information posted by the instructor, visit the course Desire2Learn page online at <https://d2l.ucalgary.ca/d2l/home>.

SUPPLEMENTAL INFORMATION

Writing across the Curriculum

Writing skills are not exclusive to English courses and, in fact, should cross all disciplines. The university supports the belief that throughout their university careers students should be taught how to write well, so that when they graduate their writing abilities will be far above the minimal standards required at entrance. Consistent with this belief, students are expected to do a substantial amount of writing in their university courses and, where appropriate, faculty members can and should consider quality of

writing as a factor in the evaluation of student work. The services provided by Writing Support Services can be utilized by all undergraduate and graduate students who feel they require further assistance: www.ucalgary.ca/ssc/writing_support/overview.

Academic Accommodations

It is the student's responsibility to request academic accommodations, according to the university policies and procedures listed in the University Calendar.

The student accommodation policy can be found at: www.ucalgary.ca/access/accommodations/policy. Students needing an accommodation because of a disability or medical condition should communicate this need to Student Accessibility Services in accordance with the Procedure for Accommodations for Students with Disabilities: www.ucalgary.ca/policies/files/policies/student-accommodation-policy.pdf.

Students needing an accommodation based on a protected ground other than disability should communicate this need, preferably in writing, to the Department Head (email: geograph@ucalgary.ca).

Principles of Conduct

The University Calendar includes a statement on the principles of conduct expected of all members of the university community (including students, faculty, administrators, any category of staff, practicum supervisors, and volunteers), whether on or off university property. This statement applies in all situations where members of the university community are acting in their university capacities. All members of the university community have a responsibility to familiarize themselves with the principles of conduct statement, which is available at: www.ucalgary.ca/pubs/calendar/current/k.html.

Plagiarism, Cheating, and Student Misconduct

The University of Calgary is committed to the highest standards of academic integrity and honesty. Students are expected to be familiar with these standards regarding academic honesty and to uphold the policies of the University in this respect.

Academic dishonesty is not an acceptable activity at the University of Calgary, and students are **strongly advised** to read the Student Misconduct section in the University Calendar at: www.ucalgary.ca/pubs/calendar/current/k-3.html. Often, students are unaware of what constitutes academic dishonesty or plagiarism. The most common are (1) presenting another student's work as your own, (2) presenting an author's work or ideas as your own without adequate citation, and (3) using work completed for another course. Such activities will not be tolerated in this course, and students suspected of academic misconduct will be dealt with according to the procedures outlined in the calendar at: www.ucalgary.ca/pubs/calendar/current/k-5.html.

Internet and electronic communication device information:

There is no restriction on the use of laptops and tablets in class if they are used to take notes or find information relevant to the class, and if there is no disturbance or distraction of other students or the instructor. Phones must be turned off during class, unless you have previously identified yourself to the instructor as a health care or law enforcement professional. The use of any calculators and/or devices during examinations will not be allowed.

Freedom of Information and Protection of Privacy

Freedom of Information and Protection of Privacy (FOIP) legislation in Alberta disallows the practice of having students retrieve assignments from a public place, such as outside an instructor's office, the

department office, etc. Term assignments will be returned to students individually, during class or during the instructor's office hours; if students are unable to pick up their assignments from the instructor, they must provide the instructor with a stamped, self-addressed envelope to be used for the return of the assignment.

Posting of Grades and Picking-up of Assignments

Graded assignments will be returned by the instructor or teaching assistant personally during schedule lecture or laboratory periods, unless they are made available electronically through the course D2L webpage. Grades and assignments will not be available at the Department of Geography's main office.

Faculty of Arts Program Advising and Student Information Resources

Have a question, but not sure where to start? The Faculty of Arts Students Centre is your information resource for everything in Arts! Drop in at SS 102, call us at 403-220-3580, or email us at ascarts@ucalgary.ca. You can also visit the Faculty of Arts website at <http://arts.ucalgary.ca/undergraduate>, which provides detailed information about common academic concerns.

For guidance on course registration (add, drop, swap), information about paying fees, and assistance with your Student Centre, contact Enrolment Services at 403-210-7625 or visit them at the MacKimmie Block.

Contact Information for Student and Faculty Representation

- SU VP Academic Phone: 220-3911 and e-mail: suvpaca@ucalgary.ca
- SU Faculty Rep. Phone: 220-3913 and e-mail: arts1@ucalgary.ca
- The students ombudsman office information can be found at: www.ucalgary.ca/ombuds/

Wellness and Mental Health Resources

The University of Calgary recognizes the pivotal role that student mental health plays in physical health, social connectedness, and academic success and aspires to create a caring and supportive campus community where individuals can freely talk about mental health and receive supports when needed. We encourage you to explore the mental health resources available throughout the university community, such as counselling, self-help resources, peer support, or skills-building available through the SU Wellness Centre (Room 370, MacEwan Student Centre, <https://www.ucalgary.ca/wellnesscentre/services/mental-health-services>) and the Campus Mental Health Strategy website (<http://www.ucalgary.ca/mentalhealth/>).

Campus Safewalk

Campus Security, in partnership with the Students' Union, provides the Safewalk service, 24 hours a day, to any location on Campus, including the LRT station, parking lots, bus zones, and university residences. Contact Campus Security at 220-5333 or use a help phone, and Safewalkers or a Campus Security officer will accompany you to your campus destination.

USRI Surveys

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, so please participate in USRI surveys.