

School of Geography and Geology  
McMaster University

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**WELCOME TO**

**GEO 4GA3**

Applied Spatial Statistics



# Applied Spatial Statistics

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- Geographical Information Systems
- Follow up to 3MB3: Statistical Analysis
  - Emphasis on spatial data and spatial effects

# Instructors

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- Antonio Páez
- Patrick De Luca
- Course structure
  - Lectures
  - Labs

# Course Outline

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- Course objectives

# Course Outline

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- Evaluation

# Course Guidelines and Regulations

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- Contacting the instructor
  - Office hours
  - E-mail to set an appointment

# Course Guidelines and Regulations

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- Mark appeals:
  - Appeal directly to the person who marked your work
  - Appeals in writing: 24 hours rule (Within 15 days of receiving the work back)
  - Re-marking may result in a **higher** or **lower** grade!

# Course Guidelines and Regulations

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- Students with special needs



# Course Guidelines and Regulations

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- Missed work

# Term Project

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## ○ Projects

- In teams of 3
- Topics: to be selected by students
- Formation of teams: suggest that students with similar interests/area of study work together
- You will need to find your own dataset

# Term Project

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- Components

- Group Work Contracts

- Friday January 20<sup>th</sup> @ 4:30 PM in drop box

- Literature Review (5%)

- Friday February 10<sup>th</sup> @ 4:30PM in drop box
    - 5 pages maximum (not including references)
    - Use same style notes as for labs

# Term Project

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## ○ Components

- Project Paper (15%)
  - Friday March 24<sup>th</sup> @ 4:30PM in drop box
  - Proper report format: Intro, Data and Study Area, Methods, Results and Discussion, Conclusion, References
  - Style and Grammar, Extra Efforts
- Final Presentation – See outline for due date (10%)
  - You are required to use presentation software
  - Each group member required to speak
  - Purpose is to present the full findings of the project including recommendation
  - 5% for presentation, 5% for participation

# Group Work Contracts (1)

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- Helps resolve group conflicts by setting acceptable standards that are mutually agreeable
  - Names and contact info for all members
  - Proposed topic area (area of common interest)
  - Guidelines for scheduling group meetings
  - Guidelines for conduct as a member of the group
  - Conflict resolution scheme
  - Peer-evaluation mechanism
  - Signatures of all group members

# Group Work Contracts (2)

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- Past sources of conflict
  - Work Scope
  - Resources
  - Scheduling
  - Priorities
  - Organizational Issues
  - Personal Differences

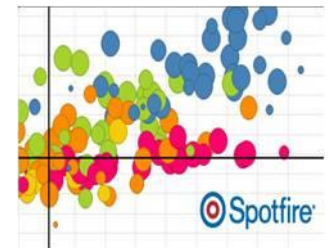
# Lectures and other events

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Tentative schedule (see outline)

# THE GIS LABS: BSB 331 & 332

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# About the Lab & GIS @ Mac

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- One of 27 Esri Development Centres (3 in Canada)
- One of 10 Centres of Excellence for GIS across Canada
  - ECCE Events this term
    - ESRI Young Scholar (national winner)
    - ECCE Student of the Year award (within McMaster)
    - EDC Student of the Year award (within McMaster)
    - 2017 App Challenges
      - ECCE App Challenge in March (open only to invited students)
      - International Year of Global Understanding Story Maps Competition
  - ESRI Scholarship (Final Date for Submissions is March 17)
    - <http://sciwebserver.science.mcmaster.ca/gislab/scholarship.html>

# About the Lab

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- Updated GIS Lab information can be found on the GIS Bulletin Board outside the labs
  - Up-to-date information about the Labs
  - GIS in the News
  - Program information
  - Employment Opportunities (including internships)

# About the Lab

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- Current Hardware Environment
  - Windows 2012 R2 Server
  - 50 Windows 7 x64 Clients
- Primary Software used this term
  - Full ArcGIS 10.4.1 Suite
  - S+ 8.2, GeoDA, CrimeStat, R (if you want)
  - OpenOffice

# Lab Software and Ownership Policies

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- Academic Site License for ArcGIS 10.4.1
  - You retain rights to your original work, but once course is done you have no rights to access the software in any lab, you must obtain additional permissions
  - Can purchase a student version of ArcGIS 10.4.1 for \$30 (good for 1 year from activation date)
    - If interested, please download form from Avenue, fill it out and bring to Pat in BSB 331A
- Much of the data used is proprietary, you cannot use it when course is completed
  - In no event will McMaster University be responsible for the use by a student of any data for which appropriate permission was not obtained.

# Lab Policies (1)

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**NO FOOD OR DRINK ALLOWED  
NO EXCEPTIONS AND IT WILL BE POLICED**

## Lab Policies (2)

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- FOR ACADEMIC USE ONLY!
- Primarily for: 3GV3, 3SR3, 4GA3
- User Accounts are your own, please don't share them
- Disk Storage is not provided, please use a USB drive
- Please be aware that PCs in the labs will be re-formatted at least once a month but may be more often depending on security or performance software patches

# Lab Policies (3)

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- Reporting bugs with software/hardware
  - Please email any issues to Patrick DeLuca
  - [delucapf@mcmaster.ca](mailto:delucapf@mcmaster.ca)
- Student access is available as long as the building is open.
- Login ID/Password
- Change password immediately upon first logon
- Room maintenance
  - Please keep the lab clean, remember you are on camera!

# Lab Schedule

BSB331						BSB332					
	MON	TUE	WED	THUR	FRI		MON	TUE	WED	THUR	FRI
830				3GV3 L03							
930							3SR3 L04	3SR3 L02	3SR3 L05		
1030											
1130	3GV3 L01	3GV3 L05	3GV3 L02	4GA3 L02							
1230											
1330											
1430		3GV3 L04								3SR3 L03	
1530							3SR3 L01				
1630			4GA3 L01								
1730											
1830											
1930											
2030											
2130											
2230											
2330											

Door Code: 3412



# Course Description

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- Intermediate methods of spatial analysis
- Course contents

# Potential of Spatial Data

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- Formally test **hypotheses** through statistical methods
  - Scientific method
- Estimate extent and form of **relationships**
- Usually proceeds by identifying any **heterogeneities** in mean value and then modeling residuals or deviations from this trend.

# Career potential

- Nature, 2004
- Nanotechnologies, biotechnologies
- Geospatial

## CAREERS AND RECRUITMENT



## Mapping opportunities

**Scientists who can combine geographic information systems with satellite data are in demand in a variety of disciplines. Virginia Gewin gets her bearings.**

**F**orest fires ravaging southern California, foot-and-mouth disease devastating the British livestock industry, the recent outbreak of severe acute respiratory syndrome (SARS) — all of these disasters have at least one thing in common: the role played by geospatial analysts, mining satellite images for information to help authorities make crucial decisions. By combining layers of spatially referenced data called geographic information systems (GIS) with remotely sensed aerial or satellite images, these high-tech geographers have turned computer mapping into a powerful decision-making tool.

Natural-resource managers aren't the only ones to take notice. From military planning to real estate, geospatial technologies have changed the face of geography and broadened job prospects across public and private sectors.

Earlier this year, the US Department of Labor identified geotechnology as one of the three most important emerging and evolving fields, along with nanotechnology and biotechnology. Job opportunities are growing and diversifying as geospatial technologies prove their value in ever more areas.

The demand for geospatial skills is growing

most are government agencies — local, national and international. A ten-year industry forecast put together last year by the American Society for Photogrammetry & Remote Sensing (ASPRS) identified environmental, civil government, defence and security, and transportation as the most active market segments.

Business at the Earth-imagery provider Space Imaging, of Thornton, Colorado, increased by 70% last year, says Gene Colabattisto, executive vice-president of the company's consulting service. To keep up momentum, the company plans to hire more recruits with a combination of technical and business skills. Colabattisto cites the increased adoption of GIS technologies by governments as a reason for the rise. He adds that the US military, the first industry to adopt GIS and remote sensing on a large scale, has spent more than \$1 billion on commercial remote sensing and GIS in the past two years.

### LOOKING DOWN IS LOOKING UP

The private sector hasn't traditionally offered many jobs for geographers, but location-based services and mapping — or 'geographic management systems' — are changing the field. "The business of looking down

# Career potential

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- Fastest growing jobs:
- #5 Statistician
- #15 Cartographer
- <http://www.forbes.com/pictures/fihh45hmgl/introduction/#61648d06e266>

# Career potential

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- Skills in demand in 2017
- #2 Statistical analysis and data mining
- Also:
  - #1 Cloud and distributed computing
  - #7 Mobile development
- <http://www.businessinsider.com/skills-that-can-get-you-hired-2016-10>