Syllabus Module 231 Major. Spatial statistical Analysis

Module 231	Spatial analysis
UE coordinator	**Cindy Padilla, PhD : Biostatistic and spatial epidemiology Professor Department MeTis, EHESP**
Dates	From November 20th to November 24th 2023
Credits/ECTS	3 (1 ECTS = 30 h student's work)
Duration	5 days of 6 hours = 30 hours
Module description	Mapping is a useful and powerful tool to represent information which varies on a territory. The course will introduce students to some descriptive measures in spatial epidemiology and explore methods and important concepts commonly used to reveal risk factors of the health event It is particularly true in public health issues where health determinants are multiples and may be related to individual behavior and also to neighborhood factors which are not equally distributed in the space. Detecting clusters grouping small areas at greater health risk tends to be an appropriate method to orientate public health action. An explanatory spatial analysis can then be applied assessing the relationship between the cluster and the neighborhood characteristics in order to reveal risk factors of the health event.
Prerequisites	Core curriculum in Biostatistics and Epidemiology and basics in GIS :
Course learning objectives	After completing this course, students will be able to: ✓ Create and interpret maps using QGis ✓ Develop methods for create geographic indicators of public healths ✓ Use Spatial autoregressive models when appropriate ✓ Conduct complete spatial statistical analysis using R Software ✓ Discuss spatial analysis for public health policies and programs
Competences	**Competences :** 1.2 Is able to describe the key features of the epidemiology of the significant causes of morbidity and mortality in the population for which they have responsibility 1.3 Uses vital statistics and health indicators effectively to increase knowledge and generate evidence about population health, including within at-risk and vulnerable groups 1.4 Knows how to retrieve, analyse and appraise evidence from all data sources to support decision-making

	Evaluation : Spatial project will ask you to describe territorial inequalities in geographic variation in health. Discussing the results useful for public health policies and programs
UE structure (details of sequences : title /speaker/date/duration)	✓ Session 1: presentation and concepts = 3H ✓ Session 2 : Creating maps and geographic indicators = 3H ✓ Session 3 : Detection cluster analysis : 6 H ✓ Session 4 : Statistical regression with autocorrelation term : 12H ✓ Exam project = 6H
Course requirement	Students will be expected to prepare lesson class, participate actively and discuss some issues related to methods studies and their application and self-practice on the software.
Grading and assessment	**Participation in class 5%** **Individual work : 40% of the final grade** **Exam project for 55% of the final grade**
Location	
Course policy	**Attendance & punctuality** **Regular and punctual class attendance is a prerequisite for receiving credit in a course.** Students are expected to attend each class. Attendance will be taken at each class. The obligations of attendance and punctuality cover every aspect of the course: - lectures, conferences, group projects, assessments, examinations, as described in EHESP Academic Regulations http://mph.ehesp.fr EHESP Academic Regulation Article. 3). If students are not able to make it to class, they are required to send an email to the instructor and to the MPH program coordinating team explaining their absence prior to the scheduled class date. All supporting documents are provided to the end-of-year panel. . Students who miss class are responsible for content. Any student who misses a class has the responsibility for obtaining copies of notes, handouts and assignments. If additional assistance is still necessary, an appointment should be scheduled with the instructor. Class time is not to be used to go over material with students who have missed class. **Lateness**: Students who are more than 10 minutes late may be denied access to a class. Repeated late arrivals may be counted as absences (See http://mph.ehesp.fr EHESP Academic Regulation Article. 3 Attendance & Punctuality) **Maximum absences authorized & penalty otherwise** Above 20% of absences will be designated a fail for a given class. The students will be entitled to be reassessed in any failed component(s). If they undertake a reassessment or they retake a module this means that they cannot normally obtain more than the minimum pass mark (i.e. 10 out of 20) **Exceptional circumstances** Absence from any examination or test, or late submission of assignments due to illness, psychological problems, or exceptional personal reasons must be justified; otherwise, students will be penalized, as above mentioned. Students must directly notify their professor or the MPH academic secretariat before the exam or before the assignment deadline. Before accepting the student's justification, the professor or the MPH academic secretariat has the right to request either a certificate from the attending physician or from a psychologist, or from any other relevant person (See http://mph.ehesp.fr EHESP Academic Regulation Article 4 Examinations). **Courtesy**: All cell phones/pages MUST be turned off during class time.

	Students are required to conduct themselves according to professional standards, eating during class time is not permitted during class time, such as course or group work.
Valuing diversity	Diversity enriches learning. It requires an atmosphere of inclusion and tolerance, which oftentimes challenges our own closely-held ideas, as well as our personal comfort zones. The results, however, create a sense of community and promote excellence in the learning environment. This class will follow principles of inclusion, respect, tolerance, and acceptance that support the values of diversity. Diversity includes consideration of: (1) life experiences, including type, variety, uniqueness, duration, personal values, political viewpoints, and intensity; and (2) factors related to "diversity of presence," including, among others, age, economic circumstances, ethnic identification, family educational attainment, disability, gender, geographic origin, maturity, race, religion, sexual orientation and social position.
Course evaluation	EHESP requests that you complete a course evaluation at the end of the school year. Your responses will be anonymous, with feedback provided in the aggregate. Open-ended comments will be shared with instructors, but not identified with individual students. Your participation in course evaluation is an expectation, since providing constructive feedback is a professional obligation. Feedback is critical, moreover, to improving the quality of our courses, as well as for instructor assessment.

Session #1	**GIS and Cartography presentations and concepts**
Speakers	Cindy Padilla, professor in EHESP MeTis departement
Session Outline	The session comprises two sub-sessions. ✓ The first is used for introducing students to basic principles of geographic studies and spatial analysis. ✓ The second sub-session is dedicated to creating maps and interpreting them create geographic indicators.
Learning Objectives	At the end of the session, the students should be able to: ✓ Understand what GIS mean and objectives of spatial analysis ✓ Using QGis software to create maps and geographic indicators
Duration	6 H
Training methods	Lectures alternate with lab

Session #2	**Detection cluster analysis**
Speakers	Cindy Padilla, professor in EHESP MeTis departement
Session Outline	The session comprises two sub-sessions. ✓ The first is used for principles and methods to autocorrelation principe ✓ The second is detected hot and cold spot of a disease distribution
Learning Objectives	At the end of the session, the students should be able to:

	✓ Provide students with hands-on experience combining cluster statistics with GIS.
Duration	6 hours
Training methods	Lectures alternate with lab

Session #3	**Statistical Regression with spatial autocorrelation**
Speakers	Cindy Padilla, professor in EHESP MeTis departement
Session Outline	The session comprises two sub-sessions. ✓ The session is dedicated to use statistic regression model using autocorrelation
Learning Objectives	At the end of the session, the students should be able to: ✓ provide SAR models ✓ provide GWR models - provide students with hands-on experience combining cluster statistics with GIS.
Duration	12 hours
Training methods	Lectures alternate with lab