

### Syllabus Module 233

<b>Module # 233</b>	<b>Module 233 “Geographic Information System and Environmental Health”</b>
<b>UE coordinator</b>	Bertrand Lefebvre, Department of Environmental and Occupational Health and Sanitary Engineering, EHESP School of Public Health, bertrand.lefebvre@ehesp.fr
<b>Dates</b>	Week 02: 06 to 10 January 2020
<b>ECTS</b>	3
<b>Duration</b>	Number of days: 5
<b>Location</b>	Room : Grande Salle, EHESP 20 Avenue George Sand 93210 LA PLAINE ST DENIS
<b>Description</b>	<p>Geographic Information Systems (GIS) have been absolutely fundamental in revealing patterns of inequalities in environmental exposures and mapping them. Many advances (GPS, remote sensing, open geographic data...) that have occurred in the past 20 years have helped us to better understand the spatial and temporal dimensions of exposures that are either harmful or beneficial for people’s health.</p> <p>Students will learn how to apply GIS principles and tools to create maps and conduct basic spatial analysis investigations in environmental health. Using GoogleMaps, QGIS and a range of online geographic and environmental databases, students will learn how to create and manage spatial information. The module will introduce the best practices regarding cartographic principles and manipulation of vector and raster layers to create powerful maps and visualizations. Students will learn how to interpret and communicate results based on maps. Finally, basic spatial analysis tools (buffers, kriging, distance and density measures) will be introduced to the audience. While course’s materials will be based on environmental health cases (i.e. planetary health), the methods and tools covered can be applied to other areas (i.e. health services research).</p> <p>This module, while being open to any student, is <b>a required introduction to the module 231</b> on Spatial Statistical Analysis (ISB Track).</p>
<b>Prerequisites</b>	Advanced Core modules in environmental and occupational health sciences, in information sciences and biostatistics, in social & behavioral sciences in public health and in management & policy sciences
<b>Course learning objectives</b>	<p>At the end of the module, the students should be able to:</p> <ol style="list-style-type: none"> <li>1. Investigate a public health issue using geographic information and spatial analysis</li> <li>2. Create and manage geographic information</li> <li>3. Design, create and interpret maps as well as basic spatial analysis results</li> </ol>
<b>Structure (details of session)</b>	<p>Monday, Jan 06</p> <ol style="list-style-type: none"> <li>1. What are spatial data and GIS? Key principles</li> <li>2. Field survey: How to use your smartphone to collect and create spatial information?</li> <li>3. Designing and sharing maps with GoogleMaps</li> <li>4. Exploring online geospatial resources for environmental health research</li> </ol> <p>Tuesday, Jan 07</p> <ol style="list-style-type: none"> <li>5. Introduction to QGIS: user interface, data management, creating spatial information, requests and selections tools</li> <li>6. Group work</li> </ol> <p>Wednesday, Jan 08</p> <ol style="list-style-type: none"> <li>7. Mapping with QGIS: Symbology, cartography, exporting maps, interpreting maps</li> <li>8. Group work assessment</li> </ol> <p>Thursday, Jan 9</p> <ol style="list-style-type: none"> <li>9. Basic spatial analysis tools: buffers, kriging, distance and density measures</li> <li>10. Group work assessment</li> </ol> <p>Friday, Jan 10</p> <ol style="list-style-type: none"> <li>11. Group work assessment</li> <li>12. Group work assessment: Presentations &amp; General Discussion</li> </ol>

<b>Resources</b>	Students will be provided with textbooks and papers for each session described below
<b>Course requirement</b>	<p>Students are expected to attend all lectures and group works. Students will be required to arrive to each class well prepared by reading materials provided on REAL, online course EHESP platform. Beyond 4:00 pm, attendance to group works is not required but permitted for preparing the final presentation.</p> <p>Students need to bring their own laptop and smartphone. QGIS is a free and open source Geographic Information System that can be installed on any operation system. A Google account is necessary to use GoogleMaps tools.</p>
<b>Grading and assessment</b>	<p>40% group work (Student's presentations) and 60% for a mini-atlas project to be submitted by January 25<sup>th</sup> (individual homework).</p> <p>Note also that students will complete a questionnaire that assesses their own and their teammates' contributions to group work. All team members will receive the same grade except if it is clear that a student has not participated effectively (attended and contributed to meetings; made timely, helpful contributions; been constructive, etc.). In that case, the student's grade will be lowered accordingly.</p>
<b>Course policy</b>	<p><b>Attendance &amp; punctuality</b>  <b>Regular and punctual class attendance is a prerequisite for receiving credit in a course.</b> 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 <a href="http://mph.ehesp.fr">http://mph.ehesp.fr</a> 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.</p> <p>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.</p> <p><b>Lateness:</b> Students who are more than 10 minutes late may be denied access to a class. Repeated late arrivals may be counted as absences (See <a href="http://mph.ehesp.fr">http://mph.ehesp.fr</a> EHESP Academic Regulation Article. 3 Attendance &amp; Punctuality)</p> <p><b>Maximum absences authorized &amp; penalty otherwise</b>  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)</p> <p><b>Exceptional circumstances</b>  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 <a href="http://mph.ehesp.fr">http://mph.ehesp.fr</a> EHESP Academic Regulation Article 4 Examinations).</p> <p><b>Courtesy:</b> <u>All cell phones/pages MUST be turned off during class time.</u>  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.</p>
<b>Valuing diversity</b>	<p>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.</p>

<b>Course evaluation</b>	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.
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Sessions 1-4	Module 233 "Geographic Information System and Environmental Health"
Session Title	<b>An introduction to spatial data and GIS</b>
Lecturer	Bertrand LEFEBVRE, Associate Professor, Ecole des Hautes Etudes en Santé Publique, Rennes <a href="mailto:Bertrand.lefebvre@ehesp.fr">Bertrand.lefebvre@ehesp.fr</a>
Session outline	<ul style="list-style-type: none"> <li>- An introduction to spatial data and GIS</li> <li>- Field survey: How to use your smartphone to collect and create spatial information?</li> <li>- Designing and sharing maps with GoogleMaps</li> <li>- Exploring online geospatial resources for environmental health research</li> </ul>
Learning Objectives	<ul style="list-style-type: none"> <li>- To understand the specificities of spatial data</li> <li>- To search and create spatial data with online tools</li> </ul>
Reading	Cromley, E., McLafferty S. (2011) <i>GIS and Public Health</i> , Guilford Press
Duration	6 hours
Dates	Monday January 6 <sup>th</sup> 2018, 9.00 a.m.-12.00 a.m. & 1:00 pm to 4:00 pm
Training methods	Short Lectures and Lab Active participation of the students
Validation	None (at the end of the Module)

Sessions 5-12	Module 233 "Geographic Information System and Environmental Health"
Session Title	<b>Mapping and basics spatial analysis tools with QGIS</b>
Lecturer	Bertrand LEFEBVRE, Associate Professor, Ecole des Hautes Etudes en Santé Publique, Rennes <a href="mailto:Bertrand.lefebvre@ehesp.fr">Bertrand.lefebvre@ehesp.fr</a> Olivier TELLE, Researcher, UMR Geographie-Cités, CNRS, Paris
Session outline	<ul style="list-style-type: none"> <li>- Managing and creating spatial information with QGIS: projection system, creating spatial objects, from raster to vector objects, selection/request tools, attribute table management</li> <li>- Designing and interpreting maps with QGIS: graphic semiology and symbologie rules, maps design, exporting and sharing maps, interpreting results</li> <li>- Basic spatial analysis tools (spatial joint, distance measures, kriging and kernel density) with QGIS</li> </ul>
Learning Objectives	<ul style="list-style-type: none"> <li>- Create and manage spatial information with QGIS</li> <li>- Create maps, use basic spatial analysis tools and interpret results</li> <li>- Analyze certain bias related to spatial information (ecological fallacy, MAUP)</li> </ul>
Reading	Cromley, E., McLafferty S. (2011) <i>GIS and Public Health</i> , Guilford Press
Duration	24 hours
Dates	Tuesday January 7 <sup>th</sup> 2019, 9.00 a.m.-12.00 a.m. & 1:00 pm to 4:00 pm Wednesday January 8 <sup>th</sup> 2019, 9.00 a.m.-12.00 a.m. & 1:00 pm to 4:00 pm Thursday January 9 <sup>th</sup> 2019, 9.00 a.m.-12.00 a.m. & 1:00 pm to 4:00 pm Friday January 10 <sup>th</sup> 2019, 9.00 a.m.-12.00 a.m. & 1:00 pm to 4:00 pm

Training methods	Short Lecture, Group Work Active participation of the students
Validation	Group Work (Students presentation based on the production and the analysis of a series of maps) will account for 40% of the module grade.  Homework will account for 60% of the module grade.