Syllabus Module 206

N°	Core module in Environmental and occupational Health Science
Coordinator	Aurore Gely-Pernot
Dates	8nd, 14th , 21th , 28rd of September, 5th of October 2022
Credits/ECTS	3 ECTS
Duration	5 days of online courses, and personal or group work (estimation 30h)
Location	EHESP Paris
Description	In general, the EOHS program aims to train practitioners to identify risks run by the general population, consumers or workers exposed to nuisances and hazardous agents, and to propose measures designed to abate exposures and health impacts. It comprises a broad range of disciplines and viewpoints (from individual vulnerability factors to public policies) in order to stimulate the students' capacity to develop a consistent and cross-cutting problem-solving approach. In this context, this introductory module to the second year of the Master aims to introduce the notion of risk assessment (module to go further: "Impact Assessment in Environmental Health"), global health (modules to go further: "Planetary Health module"). It aims also to consolidate notion of human health impact of toxic agents (module to go further: Critical windows of exposures and vulnerability). Finally, this module introduces the notion of biomonitoring and presents epidemiological methods developed for the investigation of health problems. A group assignment whereby students will prepare and expose critical analyses of a set of papers from the scientific literature in a variety of domains will force them to draw from these different disciplinary areas in an integrative way. Each of these parts is presented in syllabus appendices.
Prerequisites	M1 level in the same area
Course learning objectives	-Analyze sources, pathways, and routes of exposure to these environmental and occupational hazards and safety -Apply analysis skills and techniques to assess and understand an environmental or occupational health problem -Describe the principles of exposure and risk assessment for nuisances and hazards related to the environment or to occupational settings
Structure (details of sessions title/speaker/date /duration)	- The exposome, Léa Maitre -Occupational Health, Tony Musu and John Ballard - Introduction to human biomonitoring, Arthur David - Environmental epidemiology, Bénédicte Jacquemin - Risk assessment : principles, strategies and methods, Christophe Rousselle et Nathalie Bonvallot
Resources	Books All readings and materials will be posted on REAL. Readings are available below for each session. Website, online libray
Course requirement	Assignments: Two group works (about 3-4 students) 1-Analysis of a set of papers related to human biomonitoring : Students will prepare and expose critical analyses of a set of papers from the scientific literature. It will force them to draw from these different disciplinary areas in an integrative way. We will evaluate the capacity of students to be synthetic, take a step back and made a point on a done subject. 2-Contrary debate: a role play, during which you will have to adopt the point of view of a protagonist who will have to face the defenders of different points of view during of a public debate. Prior to this debate, you prepare an argument to defend the point of view assigned to your role. Members of the

	public will thus be able to wonder about the difficulties that can arise in decision-making and in the development of health policies because, beyond the exercise itself, it is an issues for public health professionals.
Grading and assessment	Module will be asses on the group works: -50% on a written report for the first one -50% on the oral debate for the second one 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.
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**: <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.
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	**The exposome**
Speakers	Lea Maitre
Session Outline	The exposome, described as "the totality of human environmental exposures from conception onwards", recognizes that individuals are exposed simultaneously to a multitude of different environmental factors and takes a holistic approach to the discovery of etiological factors for disease. It provides an unprecedented conceptual framework for the study of multiple environmental hazards (urban, chemical, lifestyle, social) and their combined effects on health. This module will integrate seminar lectures with hands-on computer lab sessions to put concepts into practice. This module integrates the principle concepts of exposome studies, including study designs, laboratory methods and other platforms for analysis (chemical and urban exposome). Advantages and pitfalls will be discussed. It will provide an overview of the main statistical tools that can be used for exposome data visualization, multiple exposure/mixture analysis and –omics data integration. or/and This module will integrate seminar lectures with a practical exercise "design your own exposome intervention study" to put concepts into practice. This module integrates the principle concepts of exposome studies, including study designs, laboratory methods and other platforms for analysis (chemical and urban exposome). Advantages and pitfalls will be discussed. **Part 1. Why the exposome?** The Global Burden of disease and the Environment Balancing gene and environmental research Technology advances, drivers of the Exposome **Part 2. How to measure the exposome? Its promises** **Part 3. Study designs and data sources** **Exercise in peer groups**
Learning Objectives	Upon successful completion of the module, participants should be able to: (1) understand the different components of the exposome (external, internal) and its influence on human health; (2) select the right study design and statistical analysis tools to conduct exposome studies (3) learn about the different tools to measure the exposome and its biological imprints (urban environment, chemical biomonitoring, omics) (4) OPTIONAL learn how to apply statistical and visual tools for multiple environmental factors and biomarkers
Duration	3 hours
Training methods	Lecture
Reading	Maitre, Léa, et al. "Multi-omics signatures of the human early life exposome." Nature Communications 13.1 (2022): 7024.

Session 2	**Introduction to human biomonitoring (HBM)**
Speakers	Arthur David
Session Outline	As estimated one hundred thousand xenobiotics are currently in use in the human population. Some xenobiotics (e.g. plasticizers, pesticides) can enter the human body as complex mixtures and can affect critical biological targets inside the body. However, the contribution of chemical pollution by xenobiotics to the global burden of disease is still unknown due to the lack of data regarding human exposure. Human Biomonitoring (HBM) aims to assess to what extent these environmental substances have entered our bodies and how exposure may be changing over time. This session will start with a group work aiming to understand the methodologies involved and some of the challenges related to HBM. The results of this work will be shared by one group and then a lecture will address these points (methodologies used and associated) and introduce examples of HBM studies performed at the national and European levels.
Learning Objectives	- Why HBM and what is HBM: context and aims - How to do human biomonitoring: methodologies and challenges - Interpretation of results - National and European human biomonitoring studies - Futures of HBM
Duration	introduction to the documents provided for the groups : 1h independent work group presentation by one group: 1/2h discussion and synthetic lecture : 1h
Training methods	Working group and lecture
Reading	- P.J. Landrigan, R. Fuller, N.J.R. Acosta, O. Adeyi, R. Arnold, N.N. Basu, A.B. Balde, R. Bertollini, et al., The Lancet Commission on pollution and health, Lancet (2017) - Angerer, J., Ewers, U. & Wilhelm, M. 2007 Human biomonitoring: state of the art.Int. J. Hyg. Environ. Health 210 , 201–228. (doi:10.1016/j.ijheh.2007.01.024) - Human biomonitoring: facts and figures. WHO/Europe - World Health Organisation. European Environment and Health Process.

Session : 3	**Environmental epidemiology**
Speakers	Bénédicte Jaquemin
Session Outline	This session is dedicated to the specific aspects of epidemiology in the field of environmental health. Environmental epidemiology is one of the most useful tools available for environmental management decision to assess and monitor environmental hazards as well as to quantify their health impact on the population. During the session, the lecturer will present environmental epidemiology, what is it and its specific challenges. Indeed, environmental epidemiological studies have to face and often overpass several limitations of most of the classical epidemiologic methods but also some that are specific to them; these need to be known and understand to design properly the study in different settings of environmental health.
Learning Objectives	After this lecture, the student should be able: - to understand the goal of an environmental epidemiological study - to identify the specific issues of epidemiological methods in environmental
Duration	Introduction : 90 minutes

	Independent work group Presentation by three groups: 90 minutes (15 minutes presentation and 15 minutes discussion for each group)
Training methods	Lectures and working group
Readings	Materials available on real Platform

Session 4	**Introduction to Risk assessment**
Speakers	Christophe Rousselle & Nathalie Bonvallot
Session Outline	An introduction to risk assessment: rationale, methods and applications: in this course students will identify the interest of risk assessment for prevention of chemical hazards, discover the main practical applications of this approach and current methodologies. Limitations will also be discussed regarding the different uses for risk assessment.
Learning Objectives	Describe the principles of risk assessment for nuisances and hazards related to the environment or to occupational settings
Duration	6 Hours
Training methods	Lesson in Virtual classroom, videos,lecture and practical exercise with a debrief in virtual classroom.
Reading	(1) National Research Council of the National Academies. Science and decisions. Advancing risk assessment. Washington DC, USA: The National Academies Press; 2009. (2) OEHHA A guide to health risk assessment http://www.oehha.ca.gov/pdf/HRSguide2001.pdf

Session	**Occupational health**
Speakers	John Ballard & Tony Musu
Session Outline	Tony Musu will come to give a talk about occupational exposure and cancer. Since 2003, Tony Musu has been working as researcher in the ETUI's Health and Safety Department. On behalf of the ETUC, he takes part in various REACH-related EU working groups and he was a Board member of the European Chemicals Agency (ECHA) in the period 2007-2012. John Ballard will provide an overview of occupational health and its relevance to public health. It will explore the impact of work on health and of health on work, the professional disciplines involved, and further analysis of key topics: - Defining occupational health, Some history, OH service delivery - Functions of an OH service Occupational diseases (work-caused and work-related)
Learning Objectives	At the end of the session, the students should be able to: - Discuss occupational health in relation to public health - Define occupational health, and some occupational diseases - Describe some current issues in occupational health - Interpret some Cost-benefit finding from occupational health interventions
Duration	5 hours

Training methods	lecture
Reading	