



European Master in Public Health EUROPUBHEALTH+

Specialization: Environmental and Occupational Health Sciences

2017-2021



EHESP School of Public Health

TEACHING PROGRAMME

European Master in Public Health (Europubhealth+) **SPECIALIZATION:** Environmental and Occupational Health Sciences

The present document details the content of the second year specialization of the **Europubhealth+** program delivered in Paris by the EHESP School of Public Health. For the first year of the Europubhealth+ program, a foundation course with the core competences in public health is delivered at the School of Health and Related Research - University of Sheffield (United Kingdom) in English or at the Andalusian School of Public Health - University of Granada (Spain) in Spanish.

I. PRESENTATION

The specialization course lasts two semesters and students get 30 ECTS for mandatory modules and 27 ECTS for the dissertation work and related placement. A mandatory integration module worth 3 ECTS is organized by the EHESP School of Public Health in Rennes (France) at the end of the academic year.

The specialisation provides students and young professionals wishing to design their career in public health with high level of qualification which enhances intellectual approach to the subject. It offers basic and advanced schemes of study involving knowledge, skills and techniques which can variously be applied to different public health issues and in the context of health services agencies or health & environmental organizations in the public or private sector, in developed or developing countries. The specialisation is both a professional qualification and a contributor to generic skills in research. It provides traditional core courses and options with an innovative approach to developing public health agendas in different contexts including crisis situations. The international teaching staff comprises outstanding lecturers from European & North American universities and from research institutions.

In general, the EOHS programme aims to train professionals to identify risks run by the general population en masse, consumers or workers exposed to nuisances and hazardous agents, and to propose measures designed to abate exposures and health impacts. It embraces 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.

II. QUALIFICATIONS OF THE GRADUATE

The goal of the specialisation is to train young professionals to identify the health problems of a population, analyze the resources needed to preserve and improve population health, and progressively become a new generation of decision makers in health. To achieve this, the EHESP pedagogy stresses an inter-disciplinary approach, consisting in placing students in realistic problem contexts from which they utilize various professional skills and methodologies. The MPH encourages a degree of specialisation according to the students' career objectives

Graduates of the EOHS specialisation are able to:

- Apply analysis skills and techniques to assess and understand an environmental or occupational health problem
- Discuss the basic biological concepts that allow to identify the hazardous potency of chemical, physical or (micro)biological agents and to evaluate the exposure-response relationships
- Describe the principles of exposure and risk assessment for nuisances and hazards related to the environment or to occupational settings
- Discuss various risk management and risk communication approaches in relation to issues of environmental or occupational hazards and nuisances.

III. REQUIREMENTS FOR GRADUATION AND OBTAINING PROFESSIONAL TITLE

In order to graduate, students must get an overall average of at least 10/20 to obtain all mandatory credits of the second year specialization. Students must also pass all mandatory credits during the first year of the program in the partner university (Sheffield or Granada) as well as both integration modules organized at EHESP in Rennes.

IV. PRACTICAL PLACEMENT

A 4-month practical placement is mandatory and linked to the Master dissertation work.

STUDY PLAN

Specialization: Environmental and Occupational Health Sciences

1st semester

No	Name of the subject	Class form	M/F	Credit form (Mark or Pass/Fail)	Number of teaching hours	ECTS
1	Upgrading Biostatistics	Seminar	M	Mark	-	Not credited
2	Environmental and occupational health sciences Pre-requisite	Distance learning material	M	Mark	30 (teaching hours equivalent)	3
3	Advanced Core curriculum – Environmental and occupational health sciences	Seminar	M	Mark	30	3
4	Hazardous Chemicals : health risks from production to uses : an international perspective	Seminar	M	Mark	30	3
5	Global environmental changes and Introduction to Planetary Health	Seminar	M	Mark	30	3
6	Impact Assessment in environmental Health	Seminar	M	Mark	30	3
7	Critical windows of exposures and vulnerability	Seminar	M	Mark	30	3
8	Advanced Core module Epidemiology	Seminar	M	Mark	30	3
9	Advanced Core curriculum Information sciences and biostatistics	Seminar	M	Mark	30	3

IInd semester

1	Advanced Global environmental changes module	Seminar	M	Mark	30	3
2	Evaluation of public health programs	Seminar	M	Mark	30	3
3	SUPRA OPTIONAL Cross-disciplinary Module: Global and International Health, Spatial Statistical analysis, Integrated Module of Public Health, Advanced cores modules in Social & Behavioural Sciences, Advanced cores modules Management & Health policy Sciences	Seminar	F	Pass/Fail	-	Not credited
4	Dissertation and placement	-	M	Mark	-	27
5	Integration Module (at EHESP in Rennes – France)	Seminar	M	Mark	30	3

F – facultative, M – mandatory to graduate

Total number of teaching hours: 300

Total number of ECTS: 60

Module title	Advanced Core curriculum – Environmental and occupational health sciences
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	<p>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.</p> <p>In this context, this introductory module to the second year of the Master focuses on principles of health security. Expertise and management of "early signals", environmental health surveillance and the risk abatement tools will be investigated. This module aims to introduce the notion of risk assessment as well (to go further: module: Impact Assessment Approaches in Environmental Health) and to consolidate notion of toxicology (to go further: Critical windows of exposures and vulnerability). Finally, this module presents epidemiological methods developed for the investigation of health problems resulting from air pollution in outdoor or occupational settings. 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.</p>
Learning outcomes	<p>Consolidate the competencies acquired in environmental health sciences in M1</p> <ul style="list-style-type: none"> • Apply analysis skills and techniques to assess and understand an environmental or occupational health problem • Discuss the basic biological concepts that allow to evaluate the exposure-response relationships • Describe the principles of exposure and risk assessment for nuisances and hazards related to the environment or to occupational settings
Assessment methods	<p>1) Group work : paper will be read, Presentation made by groups (30% of final grade)</p> <p>2) On table test of 2 hours: scientific paper reading and answers to a set of questions (critical analysis of the study design, of exposure assessment, writing of the hidden summary...).</p> <p>Final Grade on 20 at least equal to 10 (requirement).</p>
Type of classes / Workload	5 days of 6 hours face to face, and personal or group work (estimation 15h)
Number of ECTS	3
Teaching & learning methods	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 the different disciplinary areas in an integrative way.

Course topics 	<ul style="list-style-type: none">• Epidemiology (1): Methodology in occupational health• Epidemiology (2):-: methods in occupational epidemiology• Risk Assessment: An introduction, rationale, methods & application,• Exposure (1): Biomarkers; strength, limitations and applications.• Exposure (2): Construction and validation of job-exposure matrices. Examples.• Toxicology (1): Evaluation of self-training acquisition,• Toxicology (2): an introduction.• Toxicology (3): Respiratory toxicology.• Conference : Is Fertility impaired by Environmental Contaminants,• Toxicology (4): Carcinogenesis.• Toxicology (5): Neurotoxicology.• Paper analysis in environmental health (1)• Paper analysis (2): Group presentations (and exam preparation).
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Module title	Minor A « Hazardous Chemicals : health risks from production to uses : an internaional perspective »
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	<p>This course is an introduction to all aspects of "health/risk" and "chemicals" all along their life cycle. This topic is wide and it's impossible to cover its entire spectrum in details in five days.</p> <p>So, it was decided to give an overview of the main interfaces between health, chemicals and human activities, to provide students basic tool-box with international regulation elements and method or practices intended to minimize risks of chemicals for human. To allow better appropriation by students of these knowledge and tools, the module balances between face to face times and groups works times.</p> <p>Finally, the last day is dedicated to case study, allowing students to test their competencies applying the content of the module.</p>
Learning outcomes	<p>Students who successfully complete this course will be able to:</p> <ol style="list-style-type: none"> 1- Identify the main issues in Environmental Public Health for industrial and agricultural use of chemicals 2- Know main classes of harmful chemicals and their use for industrial or agricultural activities <p>Describe the risks all along the life cycle of chemicals</p> <ol style="list-style-type: none"> 3- Apply the principles of international regulations for chemicals (from their authorization of production to their final destruction) 4- Analyse critically contexts and risk situations for human health, related to industrial or agricultural activities and chemicals
Assessment methods	<p>The final grade results from a group works</p> <p>Very detailed presentation of breakdown of grades (a table can be included)</p>
Type of classes / Workload	Number of days: 5
Number of ECTS	3
Teaching & learning methods	After theoretical overview of current knowledge and practice, a large part of time will be dedicated to examples, exercises, lab visit and an integrative case study.
Course topics	<ul style="list-style-type: none"> ○ Life cycle of products and health risks ○ International regulations for chemicals ○ Introduction to environmental and health impact assessment for industrial activities ○ Harmful chemicals used in agriculture: main hazardous substances and their health effects ○ Deficiencies and irregularities in the regulations of trade and use of hazardous chemicals : the example of agricultural use of pesticides ○ Productions of chemicals : occupational health issues in the official and informal sectors ○ Household use of chemicals and risks ○ Case study : exposure assessment protocol (all week long)

Module title	Minor B « Global environmental changes and Introduction to Planetary Health »
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	This module aims at

	<p>1/ identifying different factors that drive the global environmental changes (GEC) and understanding their interactions and</p> <p>2/ understanding the impact of the GEC on health, focusing mainly on infectious diseases.</p> <p>3/ understanding how interactions between different GEC impact human health.</p> <p>The course is structured into 4 parts: After an overview of the global environmental changes and the impact on health (PART 1), the course will present the 3 main drivers of the GEC and their impact on health, namely, Climate, Biodiversity and Population Dynamics following by the exploration of the interaction between these drivers (PART 2). To illustrate the topics of the course with specific examples, 2 classes will focus on the impact on GEC on vector-borne diseases (e.g. malaria and dengue) and direct transmitted infectious diseases (e.g. cholera and meningitis) consecutively (PART 3). Finally, the course intends to emphasize the transfer of expertise between the research side and policy makers (e.g. WHO, Governments) through a session with specific situations of Public Health decision-making.</p>
Learning outcomes	<p>At the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> ○ Identify the major drivers involved in global environmental changes and their interaction ○ Illustrate those drivers with examples ○ Analyze how these drivers impact on human health (with examples); ○ Critically assess scientific studies and political decisions on the subject
Assessment methods	A two hour written examination
Type of classes / Workload	Number of days: 5 Number of hours : 35
Number of ECTS	3
Teaching & learning methods	Students are asked for actively participating each session and share some experiences when relevant.
Course topics	<ul style="list-style-type: none"> ○ Global Environmental changes and Health: an introductive overview ○ Planetary Health: a new discipline to inform the Sustainable Development Goals agenda ○ Climate changes and Health ○ Population Dynamics, Biodiversity changes and Health ○ Interactions between ecological and socio-economic drivers of disease ○ Recent approaches for sustaining health and development: background and situation games ○ Global environmental changes and direct/environmental transmitted diseases ○ Global environmental changes and vector-borne/zoonotic diseases ○ Evolutionary medicine: an introduction ○ Global environmental changes consideration and implications in Public Health

Module title	Major A « Advanced Global environmental changes module»
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	<p>There is growing understanding around the ways human-mediated environmental changes (e.g. land use change, wildlife trade, deforestation, climate change, human migration) significantly affect the health of wild and domestic animals, plants, and humans, resulting in both infectious and non-communicable diseases.</p> <p>Using a systems approach, we explore in this module the relationships between infectious diseases, biodiversity and ecosystems, the economics of disease and disease drivers, and the impacts of climate change and demography on health. Through this module, we</p>

	<p>seek to understand the health implications of current and anticipated global environmental change to identify policy and practical solutions to promote human health, ecosystem integrity, and sustainable development, i.e. Planetary health.</p> <p>We will see using different illustrations how too-narrowly focused vertical programs in medicine and public health cannot address the overlap that exists between animal and human health and even plant health, nor incorporate the necessary social, economic and ecosystem expertise.</p> <p>The adoption of more integrated approaches to human health is central in planetary health, and we need to implement a major shift in public health to better address the pressing global health challenges and achieve policy implementations by the UN's sustainable development goals. The course covers interdisciplinary scientific issues such as environmental systems, ecology, epidemiology, population dynamics, biomathematics and biostatistics, biodiversity changes, ecosystem modifications, climate change, agriculture development and intensive farming, transcontinental air transport and international trade, established and emerging diseases. The instructors are renowned international specialists in medical sciences, ecology/evolutionary biology and biomathematics affiliated to the most famous universities and research institutes in the world.</p>
Learning outcomes	<p>At the completion of the module, the students should be able to:</p> <ul style="list-style-type: none"> ○ Identify the main determinants of (new) infectious disease risks in a changing world ○ critically assess the quality and opportunity of national and international public health policies when facing these new disease risks ○ specify environmental risk assessment methods that are applied for microbial agents ○ put new emerging infectious disease risks into perspective with other (agriculture, demography, pollution, international travel and trade,...) dimension of globalization
Assessment methods	The 2-hour final exam is designed to integrate many of the concepts & methods the students have acquired in this course.
Type of classes / Workload	Number of days: 5
Number of ECTS	3
Teaching & learning methods	Students are expected to attend all lectures and group works.
Course topics	<ul style="list-style-type: none"> ○ An Introduction to Planetary Health, OneHealth and EcoHealth ○ Health and human well-being in the face of globalization ○ Avian influenza A viruses: from wild birds to pandemics <ul style="list-style-type: none"> Part I: Learning from past crises and previous studies Part II: Developing new approaches and identifying new research axis ○ Agricultural practices and plant health: lessons from the past and strategies for the future. Part I ○ The microbial nature of life and health: (micro)biological interactions and holobionts ○ Imperfect vaccines in a changing world, and their consequences for public health. Part I ○ The history of vaccination and the optimization of vaccination strategies - Presentation and discussion of several controversies around vaccination ○ Poverty Trap Driven by Feedback Between Economics and Ecology of Infectious Diseases. Part I ○ Poverty Trap Driven by Feedback Between Economics and Ecology of Infectious Diseases. Part II

Module title	Major B: « Impact Assessment in environmental Health »
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	<p>This course deals with impact assessment approaches and methods in the domain of environmental health. This course focuses on the application of quantitative techniques for impact evaluation; qualitative appraisal approaches will also be exposed.</p> <p>The main goal of the module is to give an overview of the different approaches and methods aiming to assess the health impact of exposure to environmental stressors; these include epidemiological, toxicological, economical and deliberative territorial methods which provide different metrics to give an appreciation of the health impact of a given environmental situation for use by decision makers and different stakeholders to inform their choices for action. Special emphasis will be placed on learning when, why, and how these methods and approaches are best suited.</p> <p>The module covers both methodological and applied issues.</p>
Learning outcomes	<p>At the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> - To be familiar with the most common methods aiming to assess the health impact of exposure to environmental stressors. - To interpret the results obtained from a health impact assessment study - To select and list appropriate information in order to realize a health impact assessment and to answer to the study objective
Assessment methods	Project by group (1/2 of the final mark) + Individual exam-2 hours (1/2 of the final mark) Grade on 20 at least equal to 10.
Type of classes / Workload	5 days of 6 hours face to face, and personal or group work (estimation 15h)
Number of ECTS	3
Teaching & learning methods	<p>Students have to come to class prepared to discuss issues after reading the course material on the REAL facility. In class quizz will assess learning acquisition. Thorough exploration of the data base created for the course case study on a complex pollution setting (situation analysis, choice of relevant information, cumulative risk assessment).</p> <p>Group work (about 3-4 students per group) on specific questions raised on the case study, with oral presentation.</p>
Course topics	<ul style="list-style-type: none"> ○ Impact assessment in environmental health: concepts, utility, principles and methods. ○ Health Impact assessment ○ Concepts and the quantitative methods for Burden of Disease measurement ○ Epidemiological information and risk estimates for different health consequences of environmental nuisances (example of air pollution) ○ Methods of risk assessment ○ Monetary and non-monetary measures of health benefits from exposure reduction ○ Assessment of public policies to reduce the health burden of environmental exposures ○ Case study presentations.

Module title	Major C: « Critical windows of exposures and vulnerability module»
Faculty	-
Conducting unit	Department of environmental and occupational health and sanitary engineering
Teaching Language	English
Aim of the course	The toxicity of chemicals or of other environmental stressors is highly dependent on

	exposure conditions and on the particular vulnerability of the exposed individual or group of persons. The module will address these issues with some emphasis on vulnerability during development and growth and on occupational exposures. The module is essentially multidisciplinary with epidemiological, toxicological and social sciences perspectives. The following items will be discussed: importance of windows of exposure to carcinogens or reprotoxic agents during pregnancy, in early life and at the workplace; vulnerability of children to physical agents; transgenerational epigenetic effects both in experimental animals and in humans; examples of gene-environment interaction and mechanistic basis of vulnerability, notably during development.
Learning outcomes	<ul style="list-style-type: none"> ○ Describe the hypothesis of the developmental origin of adult health and disease (DOHaD) ○ Identify the role of parental exposure at work or in the general environment in developmental toxicity ○ Describe gene-environment interactions in fetal development and disease
Assessment methods	On table test of 2 hours: scientific paper reading and answers to a set of questions. Grade on 20 at least equal to 10.
Type of classes / Workload	5 days of 6 hours face to face, and personal or group work (estimation 15h)
Number of ECTS	3
Teaching & learning methods	The courses are highly interactive; students are expected to do some reading before attending the course (required readings are posted on the site before the course).
Course topics	<ul style="list-style-type: none"> ○ Toxicological basis of vulnerability. ○ Environmental exposure and genetic susceptibility in Parkinson Disease. ○ Epigenetics in Health and Disease. ○ Gene-environment interaction in fetal development and disease. ○ Children exposure to electromagnetic waves. ○ Social vulnerability. ○ Is adulthood fertility affected by prenatal or childhood exposure to environmental hazards? Epidemiological and toxicological evidence. ○ Reprotoxic agents at the workplace or as drugs. Paper discussion. ○ Developmental vulnerability to neurotoxicity. ○ Precautionary assessment of critical windows'. ○ "Transgenerational Epigenetic Effects and Endocrine Disruptors: Experimental approach".

Module title	Advanced Core module – Epidemiology
Faculty	-
Conducting unit	Department of Quantitative Methods in Public Health
Teaching Language	English
Aim of the course	<p>Epidemiology is one of the pillars of public health. Epidemiologists study the distribution and determinants of disease in human populations; they also develop and test ways to prevent and control disease. The discipline covers the full range of disease occurrence, including genetic and environmental causes for both infectious and noninfectious diseases. Increasingly, epidemiologists view causation in the broadest sense, as extending from molecular factors at the one extreme, to social and cultural determinants at the other.</p> <p>This course introduces students to the theory, methods, and body of knowledge of epidemiology and provides an integrated approach to the disciplines of Epidemiology. The primary objective of the course is to teach the basic principles and applications of epidemiology and introduce students to the theory, methods, and body of knowledge of epidemiology. This course will cover fundamental concepts of epidemiology, causal</p>

	<p>inference, study design, confounding and bias, ethics, sample size calculation and data collection methods.</p> <p>If Public Health is not a simple, reactive, “take the pill three times a day” solution, but a purposeful approach to preventing disease and promoting health, then being able to document, measure and understand all the consequences becomes imperative. The methods introduced in this course begin to provide some of the tools necessary to help estimate the relationships between the smaller pieces that comprise the complex and dynamic web of systems in Public Health.</p>
Learning outcomes	<p>Students who successfully complete this course will be able to:</p> <ul style="list-style-type: none"> • Discuss the role of epidemiology within the broader field of public health • Discuss the principles of disease prevention within populations • List and describe key terms used in the epidemiology and prevention of infectious disease • Calculate and interpret basic population measures of health and disease occurrence including incidence and prevalence • Make appropriate comparisons of disease rates within and between populations • Distinguish between basic measures of association, including rate ratio, risk ratio, incidence density ratio, odds ratio, attributable risk, and population attributable risk • Select and apply fundamental epidemiologic study designs including randomized clinical trial, cohort, case-control, and ecologic for the purpose of investigating public health problems • Identify the role of bias and confounding in epidemiologic research and apply methods appropriate to assessment of confounding and various types of bias • Differentiate between various epidemiologic study designs and compare their respective strengths and weaknesses • Critique published epidemiological studies and identify their strengths and weaknesses
Assessment methods	<p>Student grades will be based on:</p> <ol style="list-style-type: none"> 1. Readings and Class Participation (20 % of grade or points) 2. Homework Assignments (30% of grade or points) 3. Final Exam (50 % of grade or points)
Type of classes / Workload	5 days of 6 hours = 30 hours
Number of ECTS	3
Teaching & learning methods	<p>Lectures: Attendance at lectures is an essential and mandatory part of the course for which there is no suitable substitute.</p> <p>A list of the topics and lecturers is found below. Weekly lectures are the foundation upon which the course is based. Material is covered which may not necessarily be presented elsewhere and an invaluable opportunity for questioning and interacting with expert practitioners is provided. Reading assignments should be done prior to lectures.</p> <p>Homework: The homework assignments are interactive exercises on the EpiVillage training site (epiville.ccnmtl.columbia.edu), an online learning tool developed by Columbia University faculty and students. -EpiVillage can be entered through the course website. After completing the online exercises, students are asked to submit answers to the first discussion question listed at the end of each exercise.</p>
Course topics	<p>Session 1. Introduction, Fundamental Concepts of Epidemiology</p> <p>Session 2 Clinical trials</p> <p>Session 3. Measurement, validity and reliability</p> <p>Session 4. Study Design</p>

	Session 5. Confounding and bias
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Module title	Advanced Core curriculum – Information sciences and biostatistics
Faculty	-
Conducting unit	Department of Quantitative Methods in Public Health
Teaching Language	English
Aim of the course	If not all MPH students decide to become “biostatisticians”, knowledge of biostatistics is required in almost every field of public health and its applications. Therefore, all students have to develop solid knowledge base in biostatistics. This course will present the most fundamental methods used in biostatistics including applied learning exercises by means of computer-based live examples with STATA software® during all lectures, exercises within small working groups as well as project-based learning.
Learning outcomes	At the end of the module, the students should be able to: <ul style="list-style-type: none"> ○ Investigate a public health issue through quantitative data ○ Make comparisons through basic and multivariate statistical analysis from STATA software ® ○ Interpret and summarize statistical results, with a focus on logistic regression
Assessment methods	Group work (continuous) and Individual exam (2 hours)
Type of classes / Workload	5 days of 6 hours = 30 hours
Number of ECTS	3
Teaching & learning methods	All students will be asked to practice and become familiar with the use of the statistical package. Various statistical analyses with different sets of data will be conducted, from basic to advanced applications, the latter targeting students who wish to develop an in-depth knowledge of biostatistics and continuing biostatistics in further classes or internships. In all cases, public health field examples will highlight that course material is connected to real-life situations.
Course topics	Day 1: Introduction to logistic regression – Computer lab Day 2: Sample size and power calculation – Computer lab Day 3: Collinearity, interaction – Computer lab Day 4: Goodness-of-fit, choice of final model – Computer lab Day 5: Sensitivity analysis, Presentation and interpretation of results - Computer lab