

## Syllabus MPH 2 Minors & Majors of Environmental and Occupational Health Sciences track (EOHS)

Module #	Module title	Coordinator	Contents	ECTS	Teaching Week/year
216	Minor A of the Environmental and occupational health sciences track : « Health risk assessment»	Philippe Glorennec	<p><b>Minor A « Health risk assessment»</b></p> <p>The risk assessment module encompasses the following topics:</p> <ul style="list-style-type: none"> <li>□ Environmental fate, sampling and measuring of pollutants                             <ul style="list-style-type: none"> <li>○ Chemical properties of pollutants and environment that influence transfer, accumulation and degradation</li> <li>○ Sampling and measurement techniques and performance</li> </ul> </li> <li>□ Hazard identification and dose-response relationship evaluation                             <ul style="list-style-type: none"> <li>○ Human and animal data for evaluating toxicity</li> <li>○ Animal to human and low doses extrapolation</li> <li>○ Toxicity reference values construction and choice</li> </ul> </li> <li>□ Exposure assessment                             <ul style="list-style-type: none"> <li>○ Direct and indirect approaches</li> <li>○ Measuring and modeling exposure</li> </ul> </li> <li>□ Risk assessment                             <ul style="list-style-type: none"> <li>○ Risk indicators</li> <li>○ Variability and uncertainty propagation with Monte Carlo techniques</li> </ul> </li> </ul> <p>After theoretical overview of current knowledge and practice, a large part of time will be dedicated to “as real” work with laboratory visit and work on PC for information searching, exposure modeling and risk calculations.</p> <p><b>Learning objectives: at the end of the module, the students should be able to:</b></p> <ul style="list-style-type: none"> <li>- Identify environmental media of concern regarding physical and chemical properties of pollutants</li> <li>- Cite possible sampling and analyses for a pollutant in an exposure medium (being able to discuss with lab)</li> <li>- Cite and use databases for identifying hazard and for choosing dose-response relationship</li> <li>- Distinguish if exposure can be measured or must be modeled</li> <li>- Identify data required by atmospheric and multimedia modeling</li> <li>- Cite main uncertainties due to modeling exposure</li> <li>- Calculate exposure and risk estimators</li> <li>- Distinguish variability and uncertainty</li> <li>- Describe a tiered approach for uncertainty handling</li> </ul> <p><b>Prerequisite:</b> L level in sciences.</p>	3	47, 2011

217	Minor B of the Environmental and occupational health sciences track: « Global environmental changes and health»	Marc CHOISY	<p><b>Minor B « Global environmental changes and health»</b></p> <p>This module aims at identifying the biotic and abiotic factors as well as understanding the mechanisms responsible for the emergence and reemergence of infectious diseases at the global scale. This includes climate changes, deforestation, urbanisation, agriculture development and globalisation of human exchanges. The infectious diseases the most affected by these changes are naturally the ones that are the most linked to the environment, either directly such as cholera or indirectly such as vector-borne diseases (e.g. malaria, dengue where the dynamics of the vector species is strongly dependent on the environment). A particular attention will be given to infectious diseases of domestic, agricultural and wild animal species since a number of new human infectious diseases appear to originate from these animal hosts (e.g. SARS, avian flu, HIV/AIDS). The course will discuss the major emerging infectious diseases of the last three decades, emphasizing the transfer of expertise between basic science and policy makers (e.g. WHO, various NGO, and governments) in fighting these diseases the most efficiently.</p> <p><b>Learning objectives:</b> at the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>- Explain the major phenomena involved in global environmental changes;</li> <li>- Explain how these phenomena impact on human health;</li> <li>- Critically assess scientific studies and political decisions on the subject.</li> </ul> <p><b>Prerequisite: none</b></p>	3	44-45, 2011
232	Major A of the Environmental and occupational health sciences track : « Global environmental changes: advanced topics »	Jean-François GUEGAN	<p><b>Major A « Global environmental changes: advanced topics »</b></p> <p>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. The course discusses the many different examples of disease emergence/outbreaks and their spatial spread, that are interconnected to Earth systems disruption/alteration and globalization events. It particularly focuses on the dynamics of Earth physical/biological systems and the impacts of increasing human population/consumption on these systems. The syllabus is organized around major questions including (i) the exploration of the linkages between diseases and globalization due to environmental hazards and modernization (e.g. transcontinental air transport of goods and people), (ii) the examination of the consequences of these connections on human health, and (iii) the evaluation of the risks associated with not considering the complexity of these webs of interactions. Strong emphasis will be made (i) on the consequences of nowadays vaccine strategies for disease control and their consequences on disease agent persistence, spread and evolution, and (ii) the interactions between complex disease systems and public health economy with an emphasis on situations in developing countries, <i>i.e.</i>, Africa. Recent applications to public health policies and decisions by international WHO, UNEP, UNESCO, ICSU programmes in environmental health sciences research initiatives and health perspectives will be discussed within the framework of the “emerging field” called Conservation Medicine or Darwinian Medicine</p> <p><b>Learning objectives:</b> at the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>- Identify the main determinants of (new) infectious disease risks in a changing world</li> <li>- Critically assess the quality and opportunity of national and international public health policies when facing these new disease risks</li> <li>- Specify environmental risk assessment methods that are applied for microbial agents</li> <li>- Put new emerging infectious disease risks into perspective with other (agriculture, demography, pollution, international travel and trade,...) dimension of globalization</li> </ul>	3	01, 2012

			<p><b>Prerequisite:</b> Good training, or research interest, in biology, international public health, science of complexity are requested. Strong aptitude to re-interpret basic knowledge in medical sciences and biology. Course #217 attending is an advantage to follow course #230, not an obligation.</p>		
233	<p><b>Major B of the Environmental and occupational health sciences track : «Advanced issues in risk assessment »</b></p>	<p>Denis ZMIROU-NAVIER</p>	<p><b>Major B «Advanced issues in risk assessment »</b></p> <p>This specialization module, covering both methodological and applied issues in risk assessment, aims to train the type of qualified professionals who are urgently needed in Europe and beyond, in particular in the framework of the implementation of the REACH system for hazard and risk assessment of chemical substances. This curriculum will also represent meeting opportunities for French and international researchers in this field which experiences a steady development, a promise for collaborative scientific production in support to public policies targeted at controlling risks related to the general and occupational environments. This programme is, by nature, inter-disciplinary, at the interface between toxicology, biomathematical modeling, epidemiology and engineering sciences.</p> <p>Students will be exposed to state-of-the-art presentations from leading scientists in their field, dealing with hazard dose-response modeling, assessment of cumulative exposures, alternative methods currently under development for hazard characterization, and with extrapolation issues regarding short to long term exposures, hazard and risks from mature to less mature (infant and children) organisms, or from animals to humans. Illustrations will encompass chemical substances and physical stressors, along with microbial agents encountered in the environment and at the workplace.</p> <p><b>Learning objectives:</b> at the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>- Critically assess the quality of the methods used in risk assessment papers and reports</li> <li>- Identify the main sources of uncertainties that lie in a risk assessment study and assess their impact on the study results and interpretation</li> <li>- Specify environmental risk assessment methods that are applied for microbial agents.</li> </ul> <p><b>Prerequisite:</b> module 216 or equivalent.</p>	3	02, 2012
234	<p><b>Major C of the Environmental and occupational health sciences track : «Critical windows of exposures and vulnerability»</b></p>	<p>Robert BAROUKI</p>	<p><b>Major C «Critical windows of exposures and vulnerability»</b></p> <p>The toxicity of chemicals or of other environmental stressors is highly dependent on exposure conditions and on the particular vulnerability of the 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.</p> <p>The courses are highly interactive and students are expected to do some reading before attending the course (required reading will be posted on the site before the course). The major aim is to delineate new paradigms of toxicity which cannot be restricted to the dose of the toxic agents and to provide students with the ability to understand some mechanisms of vulnerability, the identification of windows of toxicity and long term effects (including transgenerational effects).</p> <p><b>Learning objectives:</b> at the end of the module, the students should be able to:</p> <ul style="list-style-type: none"> <li>- To identify the importance of exposure to carginogens &amp; reprotoxic agents at different stage of life cycle</li> <li>- To critically assess different methods to measure vulnerability of children to physical agents</li> <li>- To specify transgenerational epigenetic effects both in animals and humans</li> </ul>	3	04, 2012

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**Prerequisite:** Some background in biological basis of disease and molecular biology is helpful. Such background is provided by the M1 (for example course 118)