MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2025-26
Module Code	1301
Module Title	Environmental Epidemiology
Module Organiser(s)	Max Eyre and Anouk Reuzé
Faculty	Public Health & Policy
FHEQ Level	Level 7
Credit Value	**CATS:** 15 **ECTS:** 7.5
HECoS Code	101317 : 101335 : 101048
Term of Delivery	Term 2
Mode of Delivery	For 2025-26 this module is planned to be delivered in person, or for students taking the module from the online intensive MSc Climate Change and Planetary Health, by synchronous online delivery. For all students, teaching will comprise a combination of live and interactive activities (synchronous learning), as well as recorded or self-directed study (asynchronous learning).
Mode of Study	Full-time
Language of Study	English
Pre-Requisites	All students will require a sound basic knowledge of epidemiology (i.e. the equivalent of the Basic Epidemiology or the Extended Epidemiology modules) and statistics (i.e. equivalent of at least Basic Statistics).
Accreditation by Professional Statutory and Regulatory Body	None
Module Cap (Indicative number of students)	40
Target Audience	It is intended for anyone with an interest in the links between the environment and health, and covers both local hazards and global environmental concerns. An understanding of basic epidemiological principles is assumed such as would be gained from any introductory module on epidemiology. Students with a background in veterinary epidemiology might wish to consult the module organiser as it is assumed

	students have knowledge of human epidemiology (such topics as risks, confounding, study design) and epidemiological analytical methods, including familiarity with simple regression methods and the interpretation of regression coefficients. There is a focus on methods and principles. The module is relevant to both high and low-income settings. The module is compulsory for students taking the MSc in Climate Change & Planetary Health.
Module Description	This module focuses on understanding the epidemiological methods used to generate evidence on environmental risks to health: in other words, how we know that such risks exist and how we measure their impact. Its emphasis is on principles, methods, interpretation and critical thinking, rather than factual recall. Students will be introduced to core methods commonly used in environmental epidemiology, including time-series studies, cohort studies, risk assessment and modelling approaches. The module examines the methods and evidence used to investigate several key areas in environmental epidemiology, including extreme weather events and climate change, air and water pollution, biomarkers, water, sanitation and hygiene (WASH), disease cluster investigations, and health impact assessment. The aim is to equip students with good understanding of how to design epidemiological studies to investigate environmental hazards to health and how to interpret and critically appraise evidence from the published literature.
Duration	5 weeks at 2.5 days per week
Timetabling slot	Term 2 - slot D2
Last Revised (e.g. year changes approved)	October 2025

Programme(s) This module is linked to the following programme(s)	**Status**
MSc Climate Change & Planetary Health	Compulsory
MSc Epidemiology	Recommended
MSc One Health: Ecosystems, Humans and Animals	Recommended

Programme(s) This module is linked to the following programme(s)	Status
MSc Public Health	Recommended
MSc Public Health (Health Promotion)	Recommended
MSc Public Health (Health Services Research)	Recommended
MSc Public Health for Global Policy	Recommended
MSc Health Data Science	Recommended

Module Aim and Intended Learning Outcomes

Overall aim of the module
The overall module aim is to: • give students a theoretical and practical understanding of the design and analysis of studies in environmental epidemiology

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Apply key epidemiological and statistical concepts relevant to environmental epidemiology; 2. Identify and assess the main methodological issues in environmental epidemiology, including those related to the investigation of the health effects of air and water pollution, extreme weather events, climate change, and inadequate water, sanitation and hygiene (WASH); 3. Design, conduct and interpret a basic statistical analysis of a putative disease cluster; 4. Understand the principles of time-series and cohort studies and apply them to investigate the health effects of environmental exposures; 5. Apply quantitative health impact assessment methods and interpret outputs from modelling of projected future health impacts (e.g. under climate change scenarios) 6. Critically assess and interpret scientific evidence relating to potential environmental hazards to health

Indicative Syllabus

Session Content
The module is expected to cover the following topics: • Key concepts of epidemiology and statistics relevant to environmental epidemiology • Introduction to the use of R for statistical analyses in environmental epidemiology • Key methodological challenges in environmental epidemiology and approaches for investigating environmental hazards • Exposure assessment and measurement challenges, including external measures and biomarkers • Investigation of the health effects of: air and water pollution extreme weather events and climate change inadequate water, sanitation and hygiene (WASH) • Investigating disease clusters using epidemiological and statistical methods • Analysis of health and exposure data using Geographical Information Systems (GIS) and time-series methods • Quantitative health impact assessment methods • Modelling future health impacts of climate change • Applications, limitations, and opportunities of using large-scale and “big” data in environmental health research • Critical review of scientific papers and case studies on the health impacts of environmental hazards

Teaching and Learning

Notional Learning Hours

Type of Learning Time	Number of Hours	Expressed as Percentage (%)
Contact time	50	33%
Directed self-study	20	13%
Self-directed learning	40	27%
Assessment, review and revision	40	27%
Total	**150**	**100%**

Student contact time refers to the tutor-mediated time allocated to teaching, provision of guidance and feedback to students. This time includes activities that take place in face-to-face contexts (for students on the in person or online modes of delivery), such as lectures, seminars, demonstrations, tutorials, practical classes, project supervision as well as where tutors are available for one-to-one discussions and interaction by email. Student contact time also includes tutor-mediated activities that take place in online environments, which may be synchronous (using real-time digital tools such as Zoom or Teams) or asynchronous (using digital tools such as tutor-moderated discussion forums or blogs often delivered through the School's virtual learning environment, Moodle).

Teaching and Learning Strategy
Lectures and seminar/group activities, including class discussions; guided reading; case studies and critical review of the literature (through individual, group and class work); private study.

Assessment

Assessment Strategy
The assessment for this module has been designed to measure student learning against the module intended learning outcomes (ILOs) as listed above. The summative assessment for this module will be delivered via Moodle and will take the form of a multiple-choice test (MCQ) covering all aspects of the module. It will take place in-person for in-person students and online for online students. The assessment is open book and focuses on assessing students' understanding of core concepts, ability to interpret data and statistical outputs, and evaluate scientific evidence. Use of software introduced during the module, such as GIS and R, will not be assessed.

Summative Assessment

Assessment Type	**Assessment Length** (i.e. Word Count, Length of presentation in minutes)	**Weighting** (%)	**Intended Module Learning Outcomes Tested**
Time-limited assessment (in-module MCQ)	25 questions 1 hour 30 mins	100%	1 – 6

Resitting assessment
Resits will accord with the LSHTM's Chapter 8a of the Academic Manual. The task will be to write an essay (no more than 1,500 words) in response to a technical enquiry about an environmental epidemiology issue.

Resources

Indicative reading list

(1) Watts N, Adger WN, Agnolucci P, et al. Health and climate change: policy responses to protect public health. The Lancet. 2015;386(10006):1861-1914.

(2) Whitmee S, Haines A, Beyrer C, et al. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–Lancet Commission on planetary health. The Lancet. 2015;386(10007):1973-2028.

(3) Bhaskaran K, Gasparrini A, Hajat S, Smeeth L, Armstrong B. Time series regression studies in environmental epidemiology. International Journal of Epidemiology. 2013;42(4):1187-1195.

(4) Lopez Bernal J, Cummins S, Gasparrini A. Interrupted time series regression for the evaluation of public health interventions: a tutorial. International Journal of Epidemiology. 2016;46(1):348-355.

(5) Pope CA 3rd, Ezzati M, Dockery DW. Fine-particulate air pollution and life expectancy in the United States. N Engl J Med. 2009 Jan 22;360(4):376-86.

(6) Miller BG and Hurley JF. Life table methods for quantitative impact assessments in chronic mortality. J Epidemiol Community Health 2003;57:200–206.

(7) Goddard FGB, Ban R, Barr DB, Brown J, Cannon J, Colford JM, et al. Measuring Environmental Exposure to Enteric Pathogens in Low-Income Settings: Review and Recommendations of an Interdisciplinary Working Group. Environmental science & technology. 2020;54:11673-91.

(8) U.S. EPA (U.S. Environmental Protection Agency). (2019). Guidelines for Human Exposure Assessment. (EPA/100/B-19/001). Washington, D.C.: Risk Assessment Forum, U.S. EPA

(9) Mooney SJ, Pejaver V. Big Data in Public Health: Terminology, Machine Learning, and Privacy. Annu Rev Public Health. 2018 Apr 1;39:95-112.

(10) Armstrong B, Hajat S, Kovats S, Lloyd S, Scovronick N, Wilkinson P. Climate change: how can epidemiology best inform policy? Epidemiology. 2012 Nov;23(6):780-4.

(11) Vicedo-Cabrera AM, Sera F, Gasparrini A. Hands-on Tutorial on a Modeling Framework for Projections of Climate Change Impacts on Health. Epidemiology. 2019 May;30(3):321-329.

Other resources

Students may find it useful to consult the following websites:

- Intergovernmental Panel on Climate Change, Intergovernmental Panel on Climate Change (IPCC), Special report: Global Warming of 1.5d/C
- Introduction to R for Epidemiologists (https://ucb-epi-r.hithub.io)

Teaching for Disabilities and Learning Differences

The module-specific site on Moodle gives students access to lecture notes and copies of the slides used during the lecture. Where appropriate, lectures are recorded and made available on Moodle. All materials posted on Moodle, including computer-based sessions, have been made accessible where possible.

LSHTM Moodle is accessible to the widest possible audience, regardless of specific needs or disabilities. More detail can be found in the Moodle Accessibility Statement which can also be found within the footer of the Moodle pages. All students have access to "SensusAccess" software which allows conversion of files into alternative formats.

Student Support Services can arrange learning or assessment adjustments for students where needed. Details and how to request support can be found on the LSHTM Disability Support pages.