MODULE SPECIFICATION

Academic Year (student cohort covered by specification)	2024-25
Module Code	1301
Module Title	Environmental Epidemiology
Module Organiser(s)	Max Eyre
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 2024-25 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).
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, but there is greater emphasis on examples and methods from higher income settings. The module is compulsory for students taking the MSc in Climate Change & Planetary Health.
Module Description	This module focuses on understanding of the epidemiological methods by which evidence has been obtained on environmental risks to health: how we know what we think we know about such risks. Its chief focus is therefore on principles, methods, interpretation and critical thinking and less on factual knowledge. It concentrates on methods common in environmental epidemiology, including time series studies, cohort studies and risk assessment/ modelling methods, and considers the evidence for the main areas of current interest in environmental epidemiology. These include: climate change, air pollution, non-ionizing and ionizing radiation, biomarkers, water, sanitation and hygiene, as well as cluster investigations and risk assessment. The intention is to equip students with good understanding of how to design an epidemiological study to investigate an environmental hazard to health and how to interpret 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)	September 2024

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
MSc Public Health	Recommended
MSc Public Health (Health Promotion)	Recommended
MSc Public Health (Health Services Research)	Recommended
MSc Public Health for Development	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, with main emphasis on the industrialised world.

Module Intended Learning Outcomes
Upon successful completion of the module a student will be able to: 1. Describe the main methodological issues in environmental epidemiology, specifically those relating to the investigation of the health effects of pollution of air and water, radiation, climate change and inadequate water, sanitation and hygiene; 2. Plan, conduct and interpret the initial investigation into a putative disease cluster; 3. Appreciate the specific value of Geographical Information Systems as an investigative tool in environmental health research; 4. Describe the principles of time-series and cohort studies for the investigation of the health effects of environmental exposures; 5. Describe the methods of quantitative health impact assessment; 6. Understand the sources of data to be used in environmental epidemiology, including large routine databases; 7. Assess and critically interpret scientific data relating to potential environmental hazards to health

Indicative Syllabus

Session Content

The module is expected to cover the following topics:
• Key issues in environmental epidemiology, including methods for investigating environmental hazards
• Investigation of the health effects of:
    air and water pollution
    climate change
    ionising or non-ionising radiation
    inadequate water, sanitation and hygiene
• Analysis of health and exposure data using Geographical Information Systems and time-series methods
• Health impact assessment
• Investigating disease clusters
• Biomarkers
• Estimation of exposure and problems of measurement

Session Content
• The use of big data to link environmental exposures to health data, and challenges and opportunities associated with its use. • Critical review of key papers on air pollution epidemiology and case studies of other environmental hazards to health.

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 assessment for this module will be online. The summative assessment will be a multiple-choice test (MCQ) covering all aspects of the module.

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 15 mins	100%	1 – 6

Resitting assessment
Resits will accord with the LSHTM's[Change to Ch.8a and link] 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
- The UK Climate Change Committee website UK HSA Radon
- International Agency for Research on Cancer (IARC) monographs on non-ionizing radiation: Part 1. Static and extremely low-frequency electric and magnetic fields (2002) and Part2. Radiofrequency Electromagnetic Fields (2013).

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.