

Oceans and Human Health

CSC2010M University of Exeter Spring 2019 Penryn Campus Cornwall for Second Year Undergraduates; taught 2 hours/week x 10 weeks (including 1 Field Trip 5 Hours)

Course Organisers: Dr Michiel Vos M.Vos@exeter.ac.uk; Dr Claire Eatock C.E.Eatock@exeter.ac.uk; Prof Lora E Fleming L.E.Fleming@Exeter.ac.uk with teaching participation of PhD Students including Ms Miriam Noonan (Teaching Fellow) all are based at the European Centre for Environment and Human Health (www.ecehh.org) in the University of Exeter Medical School, Cornwall UK



The module uses 2 text books and other readings:

- Oceans and Human Health: Implications for Society and Wellbeing. Bowen, Depledge, Carlarne and Fleming (Eds.) Wiley-Blackwell May 2014. SBN: 978-1-119-94131-6. <https://www.wiley.com/en-us/Oceans+and+Human+Health%3A+Implications+for+Society+and+Well+Being-p-9781119941316>
- Oceans and Human Health: Risks and Remedies from the Seas. Walsh. Smith, Fleming, Solo-Gabrielle, Gerwick (Eds.) Academic Press April 2008. ISBN: 9780123725844. <https://www.elsevier.com/books/oceans-and-human-health/walsh/978-0-12-372584-4>
- McGowan F, Thorndyke M, Solo Gabriele H, Fleming LE. (eds). Oceans and Human Health. Journal of the Marine Biological Association, 2016 <https://www.cambridge.org/core/journals/journal-of-the-marine-biological-association-of-the-united-kingdom/article/oceans-and-human-health/7F5BB99762643D8A5FDB111BA4CC3AF2>
- H2020 SeaChange. Our Ocean Our Health http://ocean-partners.org/sites/ocean-partners.org/files/public/attachments/article/Products/Oceans%20of%20Impact/Human%20Health%20and%20the%20Ocean_Factsheet_set.pdf

Additional reading included for each session/class (Below).

MODULE TITLE		Oceans and Human Health (O&HH)			CREDIT VALUE	15
MODULE CODE		CSC2010M	MODULE CONVENOR		Dr Michiel Vos, Dr Claire Eatock, Prof Lora Fleming	
DURATION	TERM	1	2	3	Number Students Taking Module (anticipated)	50
	WEEKS		11			

DESCRIPTION – summary of the module content (100 words)

Around 80% of people live in close proximity to the sea globally. Coasts, seas and the global Ocean provide a wealth of ecosystem services, from dietary protein to recreation, but also pose many dangers, from flooding to harmful algal blooms. Our seas are under increasing threat from overexploitation, climate change and pollution. This has important direct and indirect consequences for human health and wellbeing now and in the future. You will examine the wellbeing, resiliency, and sustainability of coastal human populations and ecosystems in the face of rapid global environmental change. You will cover a range of pressing marine environmental issues (e.g. plastic pollution, sea level rise and ocean acidification) integrating insights from fields as diverse as Geography, Biology, Social Sciences, Public Health and Medicine.

Delivered in Penryn, this is a module is part of the Medical Science Program. However, the module is highly interdisciplinary in focus, and is open to students enrolled in different programs, for example Marine Biology or Environmental Sciences.

MODULE AIMS – intentions of the module

The main aim of this course is to provide you with introductory knowledge of the broad field of Oceans and Human Health. The module covers a wide range of topics on the interface of marine sciences and health and wellbeing, specifically in the face of the rapid degradation of marine ecosystems. We will examine prevention-, mitigation-, and adaptation approaches to limit or counteract negative effects on the marine environment. Apart from negative effects on human health, you will also focus on how our interactions with the ocean can be beneficial, including potential positive effects on wellbeing and mental health.

The skills you gain from discussion and critique of cutting edge research, coupled with independent review of the scientific literature, will stand you in good stead for careers in the environmental and health sectors by developing or enhancing your employability. Transferable skills to other sectors include: problem solving, time management, collaboration and writing skills.

INTENDED LEARNING OUTCOMES (ILOs) (see assessment section below for how ILOs will be assessed)

On successful completion of this module **you should be able to:**

Module Specific Skills and Knowledge:

- 1 Appraise the variety of challenges and opportunities, and the ways in which they are interconnected, faced by humans interacting with marine ecosystems.
- 2 Critically appraise the need for interdisciplinary approaches (biological, geographical, clinical, cultural) in exploring the ways in which the marine environment and human health and wellbeing are connected.
- 3 Explore, debate and create possible mitigation, adaptation, and prevention approaches to these issues from the individual and community to the national and international level.

Discipline Specific Skills and Knowledge:

- 4 Review and critique literature and communicate effectively with peers and non-specialist audiences
- 5 Confidently and capably apply qualitative and quantitative interdisciplinary approaches
- 6 Develop a project in the discipline of Environment and Health in the form of an essay and a presentation

Personal and Key Transferable/ Employment Skills and Knowledge:

- 7 Critically appraise evidence from diverse sources (scientific papers, books, and the internet).

8 Communicate ideas effectively in writing and in person to specialist and non-specialist audiences

SYLLABUS PLAN – summary of the structure and academic content of the module

This module will cover some of the main positive and negative interactions between marine environments and human health and wellbeing (from harmful algae and marine plastics to Blue Carbon and Blue Gym), potential routes of exposure, impacts on ecosystems, and related issues such as natural resources. The module is based on a wide variety of (guest) lectures and in-class discussions.

LEARNING AND TEACHING

LEARNING ACTIVITIES AND TEACHING METHODS (given in hours of study time)

Scheduled Learning & Teaching activities	20	Guided independent study	130	Placement/study abroad	0
--	----	--------------------------	-----	------------------------	---

DETAILS OF LEARNING ACTIVITIES AND TEACHING METHODS

Category	Hours of study time	Description
Scheduled Learning and Teaching	10	Lectures (10 x 1 hour)
Scheduled Learning and Teaching	10	Small Group Discussions (10 x 1 hour)
Guided Independent Study	75	Guided reading, revision and exam revision
Guided Independent Study	35	Preparation of Press Release
Guided Independent Study	20	Preparation for Class Discussion

ASSESSMENT

FORMATIVE ASSESSMENT - for feedback and development purposes; does not count towards module grade

Form of Assessment	Size of the assessment e.g. duration/length	ILOs assessed	Feedback method
Class interactions including in class discussions with guest lecturers and Module leads discussing challenges faced by humans interacting with marine ecosystems, the need for interdisciplinary approaches to solve problems based on readings and presentations	10x1	1-8	Verbal
Press Release preparation	Short discussion in/after class	1-8	Verbal

SUMMATIVE ASSESSMENT (% of credit)

Coursework	40	Written exams	60	Practical exams	
------------	----	---------------	----	-----------------	--

DETAILS OF SUMMATIVE ASSESSMENT

Form of Assessment	% of credit	Size of the assessment e.g. duration/length	ILOs assessed	Feedback method
Press Release	40	500 words	1-8	Written
Short Question Exam	60	1 hour	1-8	Written

DETAILS OF RE-ASSESSMENT (where required by referral or deferral)

Original form of assessment	Form of re-assessment	ILOs re-assessed	Time scale for re-assessment
Press Release (40%)	Press Release (750 words)	1-8	Ref/Def Period
Short Question Exam (60%)	Short Question Exam (1 hour)	1-8	Ref/Def Period

RE-ASSESSMENT NOTES –

RESOURCES

INDICATIVE LEARNING RESOURCES - The following list is offered as an indication of the type & level of information that you are expected to consult. Further guidance will be provided by the Module Convener.

Basic reading:

1. Walsh PJ, Smith SL, Fleming LE, Solo-Gabriele H, Gerwick WH (eds.). **Oceans and Human Health: Risks and Remedies from the Sea**, Elsevier Science Publishers, New York, 2008
2. Bowen R, Depledge M, Carlarne C, Fleming LE (eds). **Seas, Society and Human Wellbeing**. Wiley, Publishers, UK, 2014.
3. McGowan F, Thorndyke M, Solo Gabriele H, Fleming LE. (eds). **Oceans and Human Health**. Journal of the Marine Biological Association, 2016

ELE – [College to provide hyperlink to appropriate pages](#)

Web based and electronic resources:

Other resources:

An up to date reading list of journal articles will be provided on ELE.

CREDIT VALUE	15	ECTS VALUE	7.5
PRE-REQUISITE MODULES			
CO-REQUISITE MODULES			
NQF LEVEL (FHEQ)	6	AVAILABLE AS DISTANCE LEARNING	NO
ORIGIN DATE		LAST REVISION DATE	
KEY WORDS SEARCH			

Module Descriptor Template Revised February 2012



Readings

Num ber	Focus/title	lecturer	Readings required	Speaker readings	comments
1	Introduction	Vos (MV)			
	Overview	Fleming (LEF)	Bowen 1-3	<p>Fleming LE, Depledge M, McDonough N, White M, Pahl S, Austen M, Goksoyr A, Solo Gabriele S, Stegeman J. The Oceans and Human Health Dec 2015 DOI: 10.1093/acrefore/9780199389414.013.12</p> <p>Fleming LE, McDonough N, Austen M, Mee L, Moore M, Depledge MH, White M, Philippart K, Bradbrook P, Smalley A. Oceans and Human Health: A Rising Tide of Challenges and Opportunities for Europe. Marine Environment Research 2014;99:16-19 http://www.sciencedirect.com/science/article/pii/S0141113614001032</p> <p>Fleming LE, Laws E. The Overview of Oceans and Human Health. Oceanography 2006;19(2):18-23.</p>	In this first session, Dr Michiel Vos (European Centre for Environment and Human Health, ECEHH) will give an overview of the module, including activities and assessment. Dr Mat White (ECEHH) will give an introduction to "Oceans and Human Health" (slides will be uploaded). In the second hour, Dr Claire Eatock (ECEHH) will lead a class exercise on science communication with help of ECEHH students.
	Activity	Eatock (CE)			
2	Climate Change	MV	Walsh 2 Bowen 6	Edward H. Allison, Hannah R. Bassett. Climate change in the oceans: Human impacts and responses. Science 13 Nov 2015: Vol. 350, Issue 6262, pp. 778-782 DOI: 10.1126/science.aac8721	The first hour of this session will feature a lecture by Michiel Vos on Climate Change in the context of the marine environment.
	Activity	CE, LEF, MV			The second hour will feature small group discussions on a paper you will have picked beforehand. As explained in Session 1 (see intro slides):

					<ul style="list-style-type: none"> • the paper should not be older than ten years (the more recent, the better) • it should not be a review-, opinion or perspective paper, government report or a book(chapter), but a 'data paper' i.e. based on original research • think about some of the main topics to be featured in the module, including plastic pollution, harmful algal blooms, oceans and climate change (e.g. sea level rise, blue carbon, ocean acidification), the sea and wellbeing etc etc. • search using PubMed or Google Scholar, preferably using BOOLEAN operators • think about whether the paper is novel, newsworthy and interesting to the general public • print out your paper in duplo and bring it along to the next session
3	Engagement/Press Release	Alex Smalley (AS)			This session is dedicated to the 'art' of engaging the public with research. The first hour will feature Science Communication Specialist Alex Smalley (ECEHH).

					He will use examples from recent research to explain how to communicate effectively with journalists, policy makers and the general public. We will also explain the requirements for the Press Release (summative assessment, due at the end of the module).
	Activity	AS, MV			During the second hour, you will assemble in your group and discuss your paper as well as one paper from another group. Specifically, you will be asked to come up with 1) a headline and 2) a tweet (including hashtags) for both papers. At the end of the session, we will discuss the different headlines and tweets in class.
4	HABs	LEF	Walsh 10-16	<p>Berdalet E, Fleming LE, Gowen R, Davidson K, Hess P, Backer LC, Moore SK, Hoagland P, Enevoldsen H. Marine harmful algal blooms, human health and wellbeing: challenges and opportunities in the 21st century. JMBA 2016;96(1):61–91. doi:10.1017/S0025315415001733</p> <p>Friedman M, Fernandez M, Backer L, Dickey R, Bernstein J, Shrank K, Kibler S, Stephan W, Gribble M, Bienfang P, Bowen R, DeGrasse S, Flores-Quintana H, Loeffler C, Weisman R, Blythe D, Berdalet E, Ayyar D, Clarkson-Townsend D, Swajian K, Benner R, Brewer T, Fleming LE. An Updated Review of Ciguatera Fish Poisoning: Clinical, Epidemiological, Environmental, and Public Health Management. Marine Drugs 2017;15(3):72; doi:10.3390/md15030072</p> <p>Hinder et al. Toxic marine microalgae and shellfish poisoning</p>	This session will be led by Prof. Fleming and is devoted to Harmful Algal Blooms ('HABs'). The first hour will feature a lecture.

				in the British isles: history, review of epidemiology, and future implications. Environmental Health 2011, 10:54 http://www.ehjournal.net/content/10/1/54	
	HAB exercise	LEF	Walsh 11	El Beso de la Ciguatera https://www.youtube.com/watch?v=aKoGwsxJmkg Ciguatera STUDENT Handout (with access to ANSWERS after class)	The second hour will feature a HAB epidemiology WHO class exercise.
5	Chemical Pollution: Plastics	Morrissey (KM)	Walsh 6-9	Warford JJ. Environment, health, and sustainable development: the role of economic instruments and policies. Bulletin of the World Health Organization 1995;73 (3):387-395 Oosterhuis F, Papyrakis E, Boteler B. Economic instruments and marine litter control. Ocean & Coastal Management 102 (2014) 47e54 Newman S, Watkins E, Farmer A, ten Brink P, Schweitzer JP. Chapter 14 The Economics of Marine Litter. Bergmann et al. (eds.), Marine Anthropogenic Litter, DOI 10.1007/978-3-319-16510-3_14	Dr. Karyn Morrissey (ECEHH) will talk about plastic pollution in the ocean and economic incentives to prevent it
	Activity	KM, MV, LEF	Walsh 5 Bowen 4, 5		
6	Human Pathogens	MV	Walsh 17-20 Bowen 7		We will continue looking at microbes, moving from HABs to microbial pathogens as well as microbes that could provide us with useful products. A lecture on marine pathogens by Michiel Vos.
	Natural Products	Mike Allen	Walsh 21-26, 27		This session will feature a guest lecture by Prof. Mike Allen (University of Exeter / Plymouth Marine Laboratory) on marine biotechnology

7	Evidence Synthesis	Anne Leonard (AL)	<p>Fleisher JH, Fleming LE, Solo Gabriele HM, Kish JK, Sinigalliano C, Plano L, Elmir SM, Wang J, Withum K, Shibata T, Gidley M, Abdelzaher A, He G, Ortega C, Zhu X, Wright M, Hollenbeck J, Backer LC. The BEACHES Study: Health Effects and Exposures from Non-point Source Microbial Contaminants in Subtropical Recreational Marine Waters. International J Epidemiology 2010 ;39(5): 1291-1298. https://doi.org/10.1093/ije/dyq084 https://academic.oup.com/ije/article/39/5/1291/803618</p> <p>Ihekweazu C, Barlow M, Roberts S, Christensen H, Guttridge B, Lewis DA, Painter S. Outbreak of E. coli O157 infection in the south west of the UK: risks from streams crossing seaside beaches. Eurosurveillance, Volume 11, Issue 4, 01 April 2006 Euro Surveill. 2006;11(4):pii=613. http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=613</p>	<p>In this session, Dr. Anne Leonard (ECEHH) will present a guest lecture on Evidence Synthesis in the first hour. In the second hour, she will lead a small-group exercise in the second hour.</p>
	Activity	AL, MV		<p>First, you will screen titles and abstracts in the attached document and make a decision on the given selection criteria on whether they think each record should go through the next stage of the review (full text review). Next, to study the risk of bias assessment, you will have 15 minutes to read one of the attached papers (either Fleisher et al 2010 which is 7 pages long or Ihekweazu et al 2006 which is 4 pages long) and discuss whether there is a high, moderate, or low risk of bias in the paper (a tool will be available in class to help with this).</p>

8	Field Trip	MV, Tim van Berkel	Walsh 10	Caroline Warwick-Evans. Tim van Berkel, the Cornish Seaweed Company. The Seaweed Cookbook: A guide to edible seaweeds and how to cook with them. Lorenz Books, Jan 2018	Castle Beach 13:00-17:00 for our field trip focusing on seaweeds. Meet in front of the Gyllyngdune Gardens at the tunnel entrance to the beach. Joining us will be Tim van Berkel from the Cornish Seaweed Company, who authored a seaweed cookbook. https://www.cornishseaweed.co.uk We will show you the diversity of edible species, have a taste and a Q&A session.
	Activity	MV			Divided into four groups to research the following questions: Group 1 (surnames starting with A-C): What are the nutritional benefits of eating seaweed? Group 2 (surnames starting with D-J): What are the environmental benefits of farming and eating seaweed? Group 3 (surnames starting with K-P): What are the potential dangers of eating seaweed? Group 4 (surnames starting with R-Z): What are possible uses of seaweed other than food?

					Please use the power of the internet to compile as many answers possible and bring them to the beach to facilitate group discussion. More information on the field trip will be given subsequent Session.
9	Health & Wellbeing	Lewis Elliott (LE)		<p>White MP, Pahl S, Wheeler BW, Fleming LE, Depledge MH. The ‘Blue Gym’: What can blue space do for you and what can you do for blue space? JMBA 2016;96(1):5–12. doi:10.1017/S0025315415002209 https://bluehealth2020.eu</p> <p>Grellier J, White MP, Albin M, Bell S, Elliott LR, Gascon M, Gualdi S, Mancini L, Nieuwenhuijsen MJ, Sarigiannis DA, van den Bosch M, Wolf T, Wuijts S, Fleming LE.. BlueHealth: a study programme protocol for mapping and quantifying the potential benefits to public health and well-being from Europe’s blue spaces. BMJ Open 2017;7:e016188. doi:10.1136/ bmjopen-2017-016188</p> <p>Easkey Britton, Gesche Kindermann, Christine Domegan, Caitriona Carlin. Blue care: a systematic review of blue space interventions for health and wellbeing. Health Promotion International, 2018, 1–20 doi: 10.1093/heapro/day103 Article</p>	Dr. Lewis Elliot (ECEHH) will join us for a guest lecture and a class activity on the Blue Health project.
	Activity	LE, CE			
10	Case study: Maldives	MV		<p>WHO. CLIMATE AND HEALTH COUNTRY PROFILE – 2015 MALDIVES</p> <p>HE Abdulla Nazim Ibrahim, Arvind Mathur Climate change and health in Maldives: protecting our common future. WHO South-East Asia Journal of Public Health September 2017;6(2):1-2 http://www.searo.who.int/publications/journals/seajph/issues/seajph2017v6n2p1.pdf?ua=1</p>	
	Revision	MV	Bowen 10, 11		