

## CORPORATE AND ACADEMIC SERVICES




### MODULE SPECIFICATION

Part 1: Basic Data					
Module Title	Environmental Forensics				
Module Code	USSKCD-15-3	Level	3	Version	3
Owning Faculty	Health and Applied Sciences	Field	Department of Biological, Biomedical and Analytical Science.		
Contributes towards	BSc Forensic Science; BSc Forensic Science (Biology); BSc Forensic Science (Chemistry); BSc Environmental Science; BSc Conservation Biology; BSc Integrated Wildlife Conservation.				
UWE Credit Rating	15	ECTS Credit Rating	7.5	Module Type	Standard
Pre-requisites	None		Co- requisites		
Excluded Combinations	None		Module Entry requirements		
Valid From	September 2016		Valid to	September 2022	

<b>CAP Approval Date</b>	28/03/2014
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Part 2: Learning and Teaching	
Learning Outcomes	<p>On successful completion of this module students will be able to:</p> <ul style="list-style-type: none"> <li>Understand the chemical, physical and biological processes that influence retention, degradation and analysis of pollutants and pharmaceuticals in the environment (Component A).</li> <li>understand the nature of trace evidence from the outdoor environment, its general distribution and potential evidential value (Component B; Component A).</li> <li>critically analyse case studies in environmental forensics (Component A, Component B).</li> <li>Understand the role of the Forensic Archaeologist in the investigation of ancient and modern burials (Component A).</li> <li>Understand the nature of national and international wildlife crime and the role played by forensic science in bringing perpetrators to justice (Component A).</li> <li>Understand the role of genetic and analytical techniques in</li> </ul>

	<p>provenancing materials of human and animal origin (Component A).</p> <ul style="list-style-type: none"> <li>Understand the role of stable and radiogenic isotopes in environmental investigations (Component A).</li> </ul>
Syllabus Outline	<p><b>Environmental Toxicology</b> The approaches used to monitor and assess environmental contamination and the implications this has in ecotoxicology. The environmental fate of contaminants and the physical, chemical and biological processes that influence their retention and degradation. Techniques used to investigate the contamination of air, soil and water, particularly with regard to hydrocarbons, pesticides and poly-aromatic hydrocarbons.</p> <p><b>Stable and Radiogenic Isotopes in Environmental Investigations</b> Formation of radionuclides and factors affecting the half-life. The use of stable and radiogenic isotopes in tracing and dating pollution events. Radiation release case studies. The use of stable isotopes in geographical provenancing of plant derived drugs and human remains.</p> <p><b>Forensic Ecology</b> The potential of materials from the natural environment in investigating serious crimes such as rape and murder. Case study focussed consideration of the potential role of plants and pollen, insects, fungi and freshwater microorganisms.</p> <p><b>Forensic Archaeology</b> Detection and investigation of ancient and modern burials by geophysical and non-geophysical techniques. Investigation of mass graves. Establishing cause of death in ancient burials e.g. mummies, ice people, peat bog people.</p> <p><b>Wildlife Forensics</b> The illegal trade in protected species. The nature of international and national wildlife crime. Genetic and analytical chemical techniques for the detection of wildlife crime.</p> <p><b>Transferable Skills</b> Location and critical evaluation of scientific literature. Data analysis and presentation. Understanding of graduate roles in environmental and forensic science.</p>
Contact Hours	<p>This module will run in semester 2. Students will have a 3 hour session each week which will be an integrated mixture of lectures and tutorial style activities.</p>
Teaching and Learning Methods	<p><b>Scheduled Learning</b></p> <p>Environmental Forensics is an extremely broad topic and this module aims to give students knowledge across the main themes. The module can be selected by students from a diverse range of programmes and must contain enough of interest and relevance for each.</p> <p>The theoretical underpinning of the module is delivered through integrated lecture and tutorial sessions (36 hours) with additional bespoke resources made available electronically. Employability focussed lectures are delivered by academic specialists from industry.</p> <p><b>Independent Learning</b></p> <p>It is expected that students will spend a significant proportion of the study time for this module engaging with relevant scientific literature, as directed by academic staff. Preparation for the coursework assessments will require significant research into relevant case studies and the ability to critically evaluate realistic forensic casework data. It is expected that independent study will take students to the notional 150 hours of study associated with this module.</p>

Key Information Sets Information	<p>Key Information Sets (KIS) are produced at programme level for all programmes that this module contributes to, which is a requirement set by HESA/HEFCE. KIS are comparable sets of standardised information about undergraduate courses allowing prospective students to compare and contrast between programmes they are interested in applying for.</p> <table><tr><th colspan="5">Key Information Set - Module data</th></tr><tr><td colspan="5"></td></tr><tr><td colspan="4">Number of credits for this module</td><td>15</td></tr><tr><td colspan="5"></td></tr><tr><td>Hours to be allocated</td><td>Scheduled learning and teaching study hours</td><td>Independent study hours</td><td>Placement study hours</td><td>Allocated Hours</td></tr><tr><td>150</td><td>36</td><td>114</td><td>0</td><td>150</td></tr><tr><td colspan="4"></td><td></td></tr></table> <p>The table below indicates as a percentage the total assessment of the module which constitutes a -</p> <p><b>Written Exam:</b> Unseen written exam. <b>Coursework:</b> Case Study.</p> <p>Please note that this is the total of various types of assessment and will not necessarily reflect the component and module weightings in the Assessment section of this module description:</p> <table><tr><td colspan="2">Total assessment of the module:</td></tr><tr><td colspan="2"></td></tr><tr><td>Written exam assessment percentage</td><td>60%</td></tr><tr><td>Coursework assessment percentage</td><td>40%</td></tr><tr><td>Practical exam assessment percentage</td><td>0%</td></tr><tr><td colspan="2">100%</td></tr></table>	Key Information Set - Module data										Number of credits for this module				15						Hours to be allocated	Scheduled learning and teaching study hours	Independent study hours	Placement study hours	Allocated Hours	150	36	114	0	150						Total assessment of the module:				Written exam assessment percentage	60%	Coursework assessment percentage	40%	Practical exam assessment percentage	0%	100%	
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Reading Strategy	<p>All students will be encouraged to make full use of the print and electronic resources available to them through membership of the University. These include a range of electronic journals and a wide variety of resources available through web sites and information gateways. The University Library’s web pages provide access to subject relevant resources and services, and to the library catalogue. Many resources can be accessed remotely. Students will be presented with opportunities within the curriculum to develop their information retrieval and evaluation skills in order to identify such resources effectively.</p> <p>Any <b>essential reading</b> will be indicated clearly, along with the method for accessing it, e.g. students may be expected to purchase a set text, be given or sold a print study pack or be referred to texts that are available electronically, etc. This guidance will be available either in the module handbook, via the module information on Blackboard or through any other vehicle deemed appropriate by the module/programme leaders.</p> <p>If <b>further reading</b> is expected, this will be indicated clearly. If specific texts are listed, a clear indication will be given regarding how to access them and, if appropriate, students will be given guidance on how to identify relevant sources for themselves, e.g. through use of bibliographical databases.</p>																																															
Indicative	The following texts are particularly recommended:																																															

Reading List	<p><b>Hardcopies in the library</b></p> <ul style="list-style-type: none"> <li>• Bergslein, E. (2012) <i>An Introduction to Forensic Geoscience</i>. Hoboken, NJ: Wiley-Blackwell.</li> <li>• Murray, R.C. (2004) <i>Evidence from the Earth: Forensic Geology and Criminal Investigation</i>. Missoula, Mont.: Mountain Press.</li> <li>• Ruffell, A., McKinley, J., Donnelley, L.J., Harrison, T.M., Keaney, A. (2008) <i>Geoforensics</i>. Hoboken, NJ: Wiley.</li> <li>• Walker, C.H. (2006) <i>Principles of Ecotoxicology</i>. Boca Raton, FL: CRC Press.</li> </ul> <p><b>e-books from the library</b></p> <ul style="list-style-type: none"> <li>• Gennard, D. (2012) <i>Forensic Entomology: An Introduction</i> [online]. 2<sup>nd</sup> ed. Hoboken, NJ: Wiley-Blackwell.</li> <li>• Hall, D., Byrd, J. (2012) <i>Forensic Botany: A Practical Guide</i>. [online]. Hoboken, NJ: Wiley-Blackwell.</li> <li>• Huffman, J.E., Wallace, J.R. (2011) <i>Wildlife Forensics: Methods and Applications</i>. [online]. Hoboken, NJ: Wiley-Blackwell.</li> <li>• Meier-Augenstein, W. (2010) <i>Stable Isotope Forensics: An introduction to the Forensic Application of Stable Isotope Analysis</i>. [online] Hoboken, NJ: Wiley-Blackwell.</li> </ul> <p><b>e-books from FORENSICnetBASE</b></p> <ul style="list-style-type: none"> <li>• Byrd, J. (2009) <i>Forensic Entomology: The utility of arthropods in legal investigations</i>. [online]. Boca Raton, FL: CRC Press.</li> <li>• Coyle, H.M. (2004) <i>Forensic Botany: Principles and applications to criminal casework</i>. [online]. Boca Raton, FL: CRC Press.</li> <li>• Mudge, S.M. (2009) <i>Methods in Environmental Forensics</i>. [online]. Boca Raton, FL: CRC Press.</li> <li>• Wheeler, S.M., Dupras, T.L., Schultz, J.J. (2011) <i>Forensic Recovery of Human Remains: Archaeological Approaches</i>. [online]. Boca Raton: CRC Press.</li> </ul> <p><b>Journals</b></p> <p>Assessments in this module will require students to engage with current research in environmental forensics and the way that this is presented in scientific journals. Students have access to a huge range of electronic journals free through membership of the university library. Of particular relevance to this module are <i>Environmental Forensics</i>, <i>Science and Justice</i>, <i>Forensic Science International</i>, <i>Journal of Forensic Sciences</i> and <i>Ecotoxicology</i>. Journal articles of relevance to a particular lecture will be indicated by the academic leading the session.</p>
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Part 3: Assessment	
Assessment Strategy	<p><b>Coursework (40%)</b></p> <p>Forensic Palynology and Entomology case study. An assignment based on the processing and critical evaluation of palynological and entomological evidence from an outdoor body site, in order to determine key facts relating to the case e.g. characteristics of previous locations of the victim, minimum post-mortem interval. Students will be introduced to the coursework including the detailed marking scheme, when they encounter these evidence types during the taught sessions.</p> <p><b>Examination: 3 hours (60%)</b></p>

Identify final assessment component and element		
% weighting between components A and B (Standard modules only)	<b>A:</b>	<b>B:</b>
	<b>60%</b>	<b>40%</b>
<b>First Sit</b>		
<b>Component A</b> (controlled conditions) <b>Description of each element</b>	<b>Element weighting</b> <b>(as % of component)</b>	
1. 3 hour examination	100%	
<b>Component B</b> <b>Description of each element</b>	<b>Element weighting</b> <b>(as % of component)</b>	
1. Palynology and Entomology Case Study	100%	

Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) Description of each element	Element weighting (as % of component)
1. 3 hour examination	100%
Component B Description of each element	Element weighting (as % of component)
1. Palynology and Entomology Case Study	100%
If a student is permitted an <b>EXCEPTIONAL RETAKE</b> of the module the assessment will be that indicated by the Module Description at the time that retake commences.	