

# **Programme Specification**

Section 1: Basic Data

Awarding institution/body University of the West of England

Teaching institution

University of the West of England

Faculty responsible for programme

Health and Life Sciences

Programme accredited by

The Forensic Science Society

Highest award title BSc(Hons) Environmental Forensics

**Default award title** 

Interim award title Cert. HE Environmental Forensics

Dip. HE Environmental Forensics

Modular Scheme title (if different)

UCAS code (or other coding system if

relevant)

F411

Relevant QAA subject benchmarking

group(s)

Chemistry, Biosciences, Earth Sciences,

**Environmental Sciences and** 

**Environmental Studies** 

On-going/valid until\* (\*delete as appropriate/insert end date)

Valid from (insert date if appropriate)

September 2010

Authorised by: SLS Quality and Standards Committee Date: June 2010

**Version Code: 5** 

#### Section 2: Educational aims of the programme

The BSc (Hons) Environmental Forensics programme provides an opportunity for students to explore the theory and practice of environmental forensics. In addition to offering the basis of vocational careers in environmental forensics, this programme provides a wider base of scientific skills, together with important generic graduate skills, particularly in an analytical approach to problems.

The design of the programme enables the students to:

- i) pursue the analytical themes in environmental science which are both appropriate to environmental forensics and which also underpin a variety of other emerging areas of scientific work and
- ii) study the breadth of environmental forensics from scenes of contamination and pollution as well as evidence gathered at outdoor scenes, through to courtroom presentations.

The specific aims of the programme are to:

- provide the educational and resource environment which will enable students with a background in science to develop
  - a practical and theoretical understanding of environmental forensics,
  - the skills of a literate and numerate student capable of independent learning, and
  - the ability to engage in constructive critical analysis
- create a friendly and supportive atmosphere that will enable individual students to use the learning experience at UWE to create a graduate foundation, on which they can develop their future careers and on-going social and educational development.
- provide a curriculum that is enhanced by a balance of experience from both consultancy and research.

# Section 3: Learning outcomes of the programme

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas:

# A Knowledge and understanding

Learning outcomes

Teaching, Learning and Assessment Strategies

### A Knowledge and understanding of:

# 1. The roles and responsibilities of environmental forensics and environmental forensic scientists.

- 2. The techniques used in crime scene investigation (ForSciSoc component standard 1).
- 3. The theory and application of the principal laboratory methods used routinely in forensic science (ForSciSoc component standard 2).
- 4. Principles and procedures relating to the interpretation, evaluation, and presentation of Evidence (ForSciSoc component standard 3).
- 5. Wider aspects of science associated with forensic science and studies.
- 6. Methodology of scientific inquiry and research.

# Teaching/learning methods and strategies:

Acquisition of 1- 4 is through the specific forensic science modules, Environmental Forensics Case Studies, Forensic Investigation, Forensic Analysis, Forensic Examination of Materials, Science in Court and Interpretation of Forensic Evidence. Mini projects with a forensic theme in Scientific Research Methods also contribute to the specific forensic science related learning outcomes.

Learning outcome 5 is addressed through modules at all levels, in the biological and chemical sciences.

Acquisition of 6 is developed through a 'data analysis and research methodology' spine of modules (part of Forensic Investigation, Scientific and Analytical Skills and Scientific Research Methods) giving a mixture of lectures, instruction, tutorials, practical work and coursework in mathematical, statistical, IT, and information skills, integrated with lectures and tutorials on research methods, and leading to an individual project.

The teaching and learning methods employed are a combination of lectures, practical classes, tutorials, discussions, computer-based activities, workshops, fieldwork, coursework and student-centred learning. The practical component is strong, with a large proportion of the contact time on taught modules being spent in the laboratory. Some modules employ 'problem centred learning', such as mini-projects and individual case-based crime scene investigations. Guest lectures ensure topicality and conformity with professional practice. Teaching is widely

informed by research, consultancy and scholarly activity.

Additional support is provided through extensive use of a Virtual Learning Environment to enable access to on-line learning and support, both at UWE, and off-campus. Other e-learning resources include, 'forensicnetbase', and the journals and abstracts on 'science-direct'. Throughout, the student is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject.

To increase the effectiveness of their learning, students may approach academics directly for advice and assistance, but also have access to dedicated student advisers, who are available full-time to give general advice, assist with access to the facilities and help with personal difficulties and special needs.

#### Assessment:

Knowledge and understanding is assessed using a variety of methods, including: formal examinations, tests and assignments,

essays and different styles of reports, computer-based assessments, problem solving exercises and data analysis,

presentations, case studies, research assessment.

#### **B Intellectual Skills**

#### **B Intellectual Skills**

A successful graduate will be able to:

- Select appropriate strategies, techniques and procedures for the examination of a scene of crime (ForSciSoc component standard 1)
- Select appropriate strategies, techniques and procedures for the examination of forensic evidence (ForSciSoc component standard 2)
- 3. Interpret and evaluate evidence and report on it appropriately (ForSciSoc component standard 3)
- 4. Recognise and apply subject-specific theories, paradigms, concepts or principles (intellectual skills standard biosciences)
- 5. Critically analyse, synthesise and summarise information, including published research or reports, and use several lines of information to form and test hypotheses (intellectual skills standard biosciences)
- Recognise the moral and ethical issues of investigations and appreciating the need for ethical standards and professional codes of conduct (intellectual skills standard biosciences, implied standard for all ForSci Soc components)

# Teaching/learning methods and strategies

Intellectual skills are developed through the range of teaching and learning strategies outlined under section A above. They are developed in all modules, partly through examples of the 'academic approach' but mainly through student activities such as discussions, essay writing, case studies, problem solving sessions and practical/ project planning. Intellectual skills 1, 2 and 3 are initially taught and practised separately, but brought together in a mini-project like exercise as part of Interpretation of Forensic Evidence.

#### **Assessment**

Assessment of Intellectual Skills is through the full range of methods identified in section A. In particular, the wide range of different types of coursework, case studies, various forms of report/essays, problemsolving, and presentations, is important in assessing the student's ability to demonstrate generic intellectual skills. The Faculty has an agreed procedure for formative feedback, which is incorporated into the coursework submission sheet, and provides timely and helpful feedback outlining strengths and weaknesses in the student's intellectual approach to a set task. For assessment in skills 1-3 students will be required to recover evidence, select appropriate analytical techniques, write a report, and give oral and written presentations.

# C Subject, Professional and Practical Skills

# C Subject/Professional/Practical Skills

A successful graduate will be able to:

- Plan and safely execute scientific investigations, including a programme of independent research, which may involve primary or secondary data (practical skills standard biosciences; implied standard for ForSciSoc components 1 and 2)
- Obtain, record, collate and critically analyse data using appropriate techniques in the field and/or laboratory, working independently or in a group, as is most appropriate for the subject under study (practical skills standard biosciences; standard for ForSciSoc components 1 and 2)
- Handle, analyse, and report environmental forensic samples with awareness of validity and contamination issues.
- Communicate results and their interpretation clearly and unambiguously.
- 5. Synthesise a variety of appropriate skills to meet the requirements of environmental forensic analysis.
- Adhere to safe working practices (practical skills standard biosciences; standard for ForSciSoc components 1 and 2)
- 7. Comply with ethical, legal and quality assurance principles, such as animal protection legislation, the data protection act or the requirements of the chain of custody (practical skills standard biosciences; standard for ForSciSoc component 3)

# Teaching/learning methods and strategies

Subject, professional and practical skills are developed through practical and project activities, within the range of teaching and learning strategies outlined under section A above. A large proportion of contact time on taught modules is spent on practical work, emphasising the philosophy of 'learning by doing'.

Set practicals, particularly at levels 1 and 2. place emphasis on developing practical, data analysis and interpretation skills and train adherence to safe working practices without deep reflection on ethical, legal and health and safety issues. Project work requires more planning and reflection from the students and incorporates a detailed analysis of ethical and health-and-safety issues associated with the project. The Forensic Investigation, Scientific and Analytical Skills and Scientific Research Methods modules prepare students for their roles as initially guided and later independent researchers. At level 3, the project supervisor provides individual quidance and assistance as and when required. The project includes a progression report, project work, a report and a presentation.

Skill 4 is developed in a specific forensic science context through lectures, tutorials and coursework relating to the communication of science in a legal environment, and is underpinned by the development of communication as in section D below.

Skill 5 is developed through the spine of specifically 'forensic' modules which use case studies throughout the course to develop the overview of understanding that is required in forensic science. Forensic practical and professional skills are developed through a mock-case, which trains all skills from scene examination to analysis of evidence and

reporting.

#### **Assessment**

Assessment is through a range of methods as in section A. The practical skills, in particular, are assessed through practical work and resulting practical reports, leading to the independent project. Reflection on a Health-and-Safety assessment and an ethics form are prerequisite for the commencement of practical work on the level 3 project.

The subject skills relating to forensic science are primarily assessed in the specifically 'forensic' modules using examinations, case studies, practical reports, contemporaneous notes, presentations, including a courtroom exercise, and a practical exam on processing a crime scene. See also skills 1 & 2 in B above.

#### D Transferable Skills and other attributes

# D Transferable skills and other attributes

A successful graduate will be able to:

- Evaluate their own academic performance and plan work accordingly (interpersonal skills standard biosciences, part)
- 2. Study independently in a variety of learning styles (self-management skills standard biosciences, part)
- Work effectively as a team member (teamwork skills standard biosciences; implicit standard for all ForSciSoc components)
- Practise good time management, prioritise workloads and recognise deadlines (self-management skills standard biosciences)
- 5. Communicate effectively in a variety of media and contexts; in particular, express the interpretation of results in a manner comprehensible to the intended recipient such as lawyers or a jury and write comprehensive, comprehensible, rational and impartial reports (communication skills standard biosciences; standard for ForSciSoc component 3).
- Use mathematical and statistical methods effectively in problem solving (numeracy skills standard biosciences)
- Use a variety of IT skills for data processing, communicating and supporting scientific research (numeracy and IT skills standard biosciences).

# Teaching/learning methods and strategies

Support for Skill 1 is provided through the availability of an online Personal Development Record programme for all students, and the Graduate Development Programme. This also encourages an appreciation of the importance of the other skills.

Skill 2 is developed through the wide spread of theoretical and practical science on this programme, in which the students are required to employ a diversity of study styles, and are exposed to a wide range of assessment procedures.

Skill 3 is developed through small group work in laboratory exercises and larger discussion groups in various modules. In particular, joint crime scene investigations and forensic casework encourage teamwork. The importance of the role of the forensic scientist as part of the investigative team is stressed throughout the curriculum.

Skill 4 is not taught explicitly, but the variety of subjects, classes and assessments, encourages the development of these skills.

Skill 5 is developed through a spread of assessment methods on this programme: essays, seminars, use of IT, practical reports, project proposal presentation and report, in addition to the specific communication of science in a forensic context in C above.

Skills 6 and 7 are taught using lectures, training, tutorials, practical workshops, in specifically designed modules, and are practised in a variety of contexts across the full subject range of the programme.

#### Assessment

All of these skills contribute to the general performance across the programme and, as such, performance is evidenced by the overall grade of award. The wide range of different forms of assessment and coursework (as in B above) requires the students to demonstrate the full range of transferable skills.

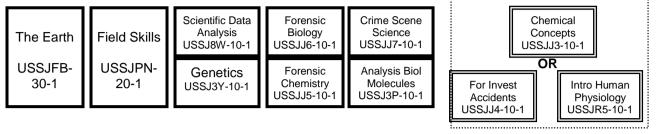
Skill 5 is assessed in a forensic science context by written reports and oral presentation. See also skills 2 & 3 in B above.

Skills 6 and 7 are also specifically assessed through worked assignments and short tests.

#### Section 4: Programme structure - 2010/11

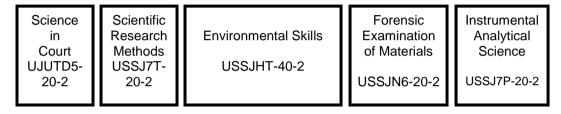
BSc (Hons) Environmental Forensics NB. No intake for levels 1 and 2

Level 1 one 30 credit, one 20 credit and seven 10 credit modules



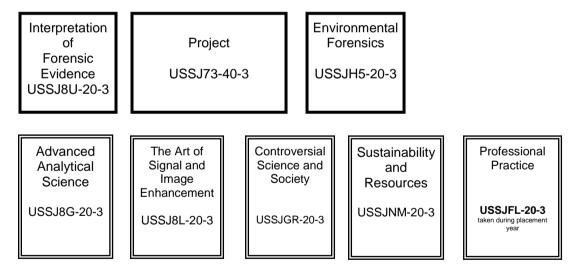
Interim award: Certificate of Higher Education 120 credits

Level 2 one 40 credit and four 20 credit modules



Interim award: Diploma of Higher Education 240 credits

Level 3 one 40 credit and four 20 credit modules



Degree with Honours 360 Credits

CORE Max of 1 (Level 1) Min of 2 (level 3)

# **Section 5: Entry requirements**

Admissions into the Environmental Forensics Programme are administered within the Undergraduate Programmes in FACS (Forensic, Analytical and Chemical Sciences). The standard UCAS entry for the programme at UWE is 240-300 points. Successful application to the programme must also meet one of the following minimum requirements:

- GCE A2 level at grade E or above in two subjects and grade C or above in three GCSE subjects. (Two GCE AS level passes are considered to be equivalent to one A2 level). GCSE subjects should include Mathematics, English Language and Science. Biology or Chemistry A-level is preferred.
- National Certificate or Diploma in an appropriate subject matter such as biology or a physical science.
- Higher National Certificate or Diploma in Applied Biology or a physical science.
- Pass in a recognised Access or Foundation course.

Additionally, applicants may be admitted to the Programme provided they meet one of the following requirements and can demonstrate to the Faculty that the GCE A level and GCSE subject areas specified above have been studied at an appropriate level:

- The Advanced General National Vocational Qualification (AGNVQ) or Advanced General Scottish Vocational Qualification (AGSVQ), a twelve unit or full AGNVQ award being equivalent to two GCE A levels, a six unit or single AGNVQ being equivalent to one A level and a three unit or part AGNVQ award being equivalent to one GCE AS Level.
- The Irish Leaving Certificate at Higher level grades BBBC.
- The Scottish Leaving Certificate of Education at Higher level grades BBBC.
- National Vocational Qualifications or Scottish Vocational Qualifications at level III.
- The European Baccalaureate 68%.
- The International Baccalaureate 26pts.
- Other European or International qualifications which the University considers to be of equivalence to the above.

#### **Section 6: Assessment Regulations**

Academic Regulations and Procedures 2010/11 (Academic Registry)

## Section 7: Student learning: distinctive features and support

This programme offers a distinctive combination of training in environmental forensics techniques and an appreciation of the legal system and the role of expert witnesses in court. In addition, the wider study of sciences underpinning environmental forensic issues promotes greater understanding and the development of intellectual reasoning. All areas have essentially a problem-solving nature, and the experience of the different subject styles further stimulates the students' development.

In each of the environmental, chemical and biological areas of this programme, the students will study with other students whose specialisms are in those particular areas, and will benefit from the support, resources, experience and excellent facilities provided by the Faculty for these subjects. The Faculty has undergone a complete refurbishment in 2004 and has state of the art teaching facilities and well-equipped general and specialist laboratories to match its commitment to excellence in teaching.

Due to the nature of the combination of subjects important to environmental forensic

scientists, all modules in the first and second year are compulsory and some choice is available in the final year.

The modules Forensic Investigation, Forensic Analysis, Forensic Examination of Materials, Science in Court and Interpretation of Forensic Evidence provide a core of specifically forensic modules and these are directly supplemented by modules on chemical and biological analysis. The Environmental Forensics module offers the students teaching in this specialised area, making use of site visits and computer modelling to further develop important skills. Recent and important case studies are used extensively to develop the necessary practical understanding, coupled with guest lectures by a range of professionals.

Specifically 'environmental forensic' issues are extremely well supported with an extensive array of analytical equipment in the Faculty. The programme is fully integrated with the other programmes from 'Forensic, Analytical and Chemical Sciences' and also has modules from Environmental Science and Biosciences.

Forensic science at UWE is well established and has benefited from recent and ongoing large investment: facilities include a fully equipped Scenes-of-Crime house and vehicle examination facility. Specific forensic instrumentation includes a Video Spectral Comparator, Microspectrophotometer, electrostatic document analysers (ESDA), Infra-Red microscope and golden gate attachment, comparison microscopes, , glass refractive index and breath alcohol instrumentation. Forensic DNA analysis facilities include a filtered cabinet for sample preparation, a real-time DNA amplification instrument, capillary electrophoresis for DNA analysis and ancillary equipment.

The students make extensive use of a Blackboard based Virtual Learning Environment (VLE), both as a source of information and lecture notes, and for online tutorials and self-assessment. The WWW is also widely used for access to services, such as library catalogues and facilities and web-based learning resources such as 'science-direct'. Email is used as an important means of communication between students and staff and within the student community.

The programme is administered within the FACS (Forensic, Analytical and Chemical Sciences) group of programmes which establishes common and mutual support for students across a range of overlapping programmes.

A Student Handbook is provided during Induction to year 1 that includes information on the Faculty, the University, its regulations and procedures, and is supplemented at a programme level by a FACS Handbook and Guides for each module. Students are supported during their time at UWE by student advisers, with the backup of central student support services for students with needs that cannot be dealt with directly within the Faculty.

The Graduate Development Programme, centred around groups of approximately 15 students with a tutor, provides support and encourages reflection on learning and skills development leading to consideration of careers and employability.

Part-time attendance of the programme is possible, and part-time students will be advised by a part-time study tutor to optimise their timetable and assist with any specific problems.

# Section 8 Reference points/benchmarks

# Qualification descriptors used in the QAA Framework for Higher Education Qualifications

The learning outcomes for the programme have been developed with reference to the qualification descriptors used in the QAA Framework for Higher Education Qualifications. In particular, the learning outcomes for modules at level one and level two have been considered to be consistent with the award of a Certificate in Higher Education and a Diploma in Higher Education respectively. Graduates of the award achieving an Honours classification will develop an understanding of a complex body of knowledge related to forensic science. In addition, the graduate will develop analytical techniques, problem-solving skills and communication skills that can be applied to a range of employment opportunities.

### • Subject benchmark statements

Owing to its interdisciplinary nature, this programme draws on several subject benchmark statements for guidance.

## **Forensic Science Benchmarking**

The specific requirements for forensic science have been informed by the knowledge and experience of staff who have been trained, and are professionally active, in this rapidly developing field. Benchmarking for forensic science has however been derived from the accreditation standards of the Forensic Science Society. In addition, elements of the chemistry and bioscience benchmarks are relevant for the analytical aspects of forensic science.

# Earth Sciences, Environmental Sciences and Environmental Studies Benchmarking

This programme maps to the benchmark statements for Earth Sciences, Environmental Sciences and Environmental Studies. The benchmarking statement identifies key features which should characterise degree programmes in the Environmental/Earth Sciences:

- a holistic, multi-disciplinary and inter-disciplinary approach. This is evident in this
  programme from the breadth of the subject matter, the range of subject
  specialisms of the tutors involved and the existence of integrating, 'issues' or
  case-study based modules and student work.
- the integration of fieldwork, experimental and theoretical investigations. At levels 1 and 2 of this programme, students spend typically around 60% of their time involved in practical work of all types (field or laboratory based work, library or internet investigations) and all year 3 projects involve a high degree of investigation, be they practical or more theoretical (desk-based) in nature.
- quantitative and qualitative approaches to acquiring and interpreting data. These approaches are integrated both in the practical work of the student as highlighted above, and through the lecture and assessment components of the programme, which encourage the students to develop skills in the objective analysis of all types of information and data, in order to recognise, understand and challenge current theories and paradigms. Examples include; the analysis of legal case material; the collection and analysis of the chemical and physical properties of environmental materials; conducting literature searches and summarising bodies of evidence and opinion.

### **Chemistry Benchmarking**

As chemistry only forms part of the programme, only some of the Main Aims of chemistry benchmarking are relevant:

- To develop in students the ability to apply their chemical knowledge and skills to the solution of *(theoretical and)* practical problems in chemistry.
- To develop in students, through an education in chemistry, a range of transferable skills, of value in chemical and non-chemical employment.

The focus of this programme is on the practical application of chemistry to forensic science, and hence does not develop the same depth of theoretical understanding (italicised above) as a full chemistry course.

Likewise this programme covers a sub-set of the Subject Knowledge expected of a chemistry degree:

- Major aspects of chemical terminology, nomenclature, conventions and units.
- The principles and procedures used in chemical analysis and the characterisation of chemical compounds.
- The principal techniques of structural investigations, including spectroscopy.
- The nature and behaviour of functional groups in organic molecules.

Most of the Abilities and Skills, Chemistry-related Practical Skills and Transferable Skills, identified by the Quality Assurance Agency for Higher Education for chemistry are equivalent to the Subject/Professional/Practical and Transferable Skills that define this programme.

#### **Bioscience Benchmarking**

Bioscience benchmarking for Subject Knowledge adopts more inclusive statements implying a broad knowledge across the whole subject, which does not mirror the more focussed and practical approach in this programme. The programme draws on the following statements:

- ... together with specialised in-depth study (often career-related) of some aspects of the discipline or subject area. ........
- understanding of information and data, and their setting within a theoretical framework.......
- Familiarity with the terminology, nomenclature and classification systems as appropriate;
- Methods of acquiring, interpreting and analysing biological information with a critical understanding of the appropriate contexts ......
- Knowledge of a range of practical and presentational techniques and methodologies relevant to the particular discipline, including data analysis and the use of statistics.

The Generic, Intellectual, and Practical Skills, that are not strongly subject-dependent, also map well to the Intellectual Skills and Subject/Professional/Practical Skills of this programme, e.g.

- The capacity to give a clear and accurate account of a subject, marshal arguments in a mature way and engage in debate and dialogue both with specialists and non-specialists;
- The ability to employ a variety of methods of study in investigating, recording and analysing material;

The Bioscience benchmarking of Transferable Skills mirrors the main issues identified in the other subject areas.

# • Requirements of Professional Bodies

The Forensic Science Society is the professional body which operates an accreditation scheme for university courses in forensic science, and this course has been accredited (UWE being one of the first four universities to have been recognised in this way) in all three component standards – (1) Crime Scene Investigation, (2) Laboratory Analysis and (3) Interpretation, Evaluation, and Presentation of Evidence. Students may join The Forensic Science Society as student members.

# • The University's mission statement

The University's mission statement is 'to advance an inclusive, civilised and democratic society and its enrichment through education...' By studying the complexity of living and physical systems, and fostering in students an appreciation of the impact of human activity on these systems, this degree programme aims to produce graduates who are able to make a positive contribution to society, especially through the wise management of environmental resources. Team work projects encourage inclusivity and an appreciation of others' cultures and beliefs, whilst the university's committee structure including student representation at all levels, encourages an appreciation of democracy and a feeling of ownership and responsibility.

# • University teaching and learning policies

In line with the University's teaching and learning policies, this programme takes a student-centred approach to learning by allowing students to take control of aspects of their learning and providing a learning environment that stimulates active participation and engagement with the learning process. The programme seeks to create an environment that will stimulate students to take responsibility for aspects of their learning, while tutors take responsibility for facilitating that learning. Module learning outcomes have been designed to ensure that students meet the overall programme learning outcomes on completion of the programme.

A variety of assessment methods is incorporated within the programme to cater for a diversity of student strengths and abilities. Although this document focuses on summative assessment, the course team recognises the importance of both summative and formative assessment activity, and feedback, as an integral part of the learning and teaching process. All assessments comply with the University Assessment Policy and Academic Regulations.

# Research carried out by staff.

Research and consultancy is undertaken in the following areas of particular relevance to forensic science:

- forensic entomology
- statistical methods and databases for the estimation of evidential value
- design of crime scene related equipment
- genealogy using DNA profiling
- improvements of MSMS methods used in the detection of illicit drugs
- elemental composition of soil
- forensic image analysis
- chemical sensors for drugs and arson accelerants

Some projects are carried out with regional forensic science companies or police forces.

Research specifically in forensic science topics is also supported by a wide range of other research interests across numerous biological and chemical fields. Furthermore, there is on-going and developing research in environmental science which is encouraged and maintained by the Faculty Research Centres, notably the Centre for Research in Environmental Science (CRES) and the Centre for Research in Analytical, Materials and Sensors Science (CRAMSS).

#### Employer feedback/interaction

The faculty has excellent links with the forensic science practitioners in the area. The Avon and Somerset Constabulary are very supportive of the forensic science teaching at UWE, and collaborates for research projects. The Chief Constable launched the BSc (Hons) Forensic Science in 2001 and commented on the value such a degree would have for recruits to his force. Local Home Office Forensic Pathologists have also been involved with the faculty for many years - one is involved in teaching the level 3 Interpretation of Forensic Evidence module.

A local independent laboratory has strong links with the Forensic Science team at UWE – staff assist with statistical evaluations required for court presentations and some students undertake their independent research project with this company.

### Conclusion

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications. These are available on the University website.

Programme monitoring and review may lead to changes to approved programmes. There may be a time lag between approval of such changes/modifications and their incorporation into an authorised programme specification. Enquiries about any recent changes to the programme made since this specification was authorised should be made to the relevant Faculty Administrator.