PROGRAMME SPECIFICATION

Awarding body/institution	Glyndŵr University
Teaching institution (if different from above)	
Details of accreditation by a professional, statutory or regulatory body (including link to relevant website)	N/A.
What type of accreditation does this programme lead to?	N/A.
Is accreditation in some way dependent on choices made by students?	N/A.
Final award/s available eg BSc/DipHe/CertHE	BSc (Hons) Forensic Science BSc Forensic Science Diploma of Higher Education in Forensic Science Certificate of Higher Education in Forensic Science
Award title	BSc (Hons) Forensic Science
JACS 2 code	F410
UCAS code (available from Admissions)	F412
Relevant QAA subject benchmark statement/s	The QAA Forensic Science Benchmark Statement 2012
Other external and internal reference points used to inform the programme outcomes	FHEQ 2008, CQFW, KIS Fields – Teaching, Learning and Assessment. The Framework for Qualifications of the European Higher Education Area. Glyndŵr University Regulations: Taught undergraduate Bachelor's Degree.
Mode/s of study *(p/t, f/t, distance learning)*	Full Time, Part Time
Language of study	English
Date at which the programme specification was written or revised	April 2013

Criteria for admission to the programme

The admissions process adheres to Glyndŵr University's published policies on Equal Opportunities and Student Disabilities, and we encourage and fully support applications from *all* suitably qualified students. Students may make applications through the medium of Welsh if they so wish.

Entrance requirements for the programmes are:

i. 240 points at Level 3 including a science subject (preferably chemistry). In addition passes at GCSE in Maths and English/Welsh Language at grade C or above are normally expected.

OR

ii. Equivalent experiential learning will be considered for applicants with insufficient or no formal qualifications. An example of typical equivalent experiential learning would be 2-3 years working in a relevant scientific position, such as a laboratory technician. Candidates with no formal education must demonstrate evidence of an ability to study at the higher education level. The Admissions Tutor will require candidates to undertake a piece of written work, assessing their literacy and numeracy skills, and basic scientific knowledge, to demonstrate their capacity to study at the appropriate level. Those candidates who satisfactorily complete the written exercise will be invited to attend a formal interview with programme staff to assess their motivation, experience and readiness to study.

Applicants may be able to gain Accredited Prior Learning (APL) and/or Accredited Prior Experimental Learning (APEL) in accordance with Glyndŵr University regulations, dependent upon evidenced qualifications and/or experience.

International and European applicants with equivalent overseas qualifications will be expected to have attained IELTS 6.0 or an equivalent recognised qualification. Potential applicants gaining IELTS 5.5 or equivalent may be given the opportunity to sit a pre-sessional English Language course, organised by Glyndŵr University, to enable them to raise their standard of English to that required.

Students who are unsure if they meet the criteria should contact the Admissions Tutor, Dr Joss Bartlett, for advice.

Aims of the programme

The primary aim is to provide students with an up-to-date Forensic Science programme that meets the component standards for a forensic science degree laid down by the Forensic Science Society, and will produce high quality graduates with excellent further study and employment opportunities. Modules have been designed to cover the specific criteria of the component standards of the Forensic Science Society and the QAA Forensic Science 2012 Benchmarks. The programme is structured so as to provide a logical, coherent progression through these modules.

Specifically, the programme will equip/provide students with:

(i) A good knowledge of sciences, including chemistry, biology, physics, mathematics and statistics, involved in forensic investigation.

(ii) A theoretical understanding of the analytical techniques used in forensic science.

(iii) The practical laboratory skills, procedures and safety appreciation required for employment in a modern science laboratory.

(iv) The ability to critically evaluate, discuss and present scientific data/information.

(v) The practical crime scene investigative skills required for employment in forensic arena.

(vi) A broader understanding of science in both the workplace and society.

(vii) A good knowledge of the various legal and law enforcement environments within which forensic science is practised.

(viii) The generic, transferable skills demanded by employers.

Distinctive features of the programme

The BSc (Hons) degree in Forensic Science was introduced to Glyndŵr University (known as North East Wales Institute of Higher Education, University of Wales) in 2004, with associated exit awards. The programme has proved popular with students since then and has enjoyed steady recruitment. The programme has been designed with particular consideration to the widening participation agenda, which attracts and supports students from non-traditional backgrounds.

The BSc (Hons) Forensic Science degree has been specifically developed for students who have an interest in the application of the sciences to solve a wide range of criminal and civil cases. Students will gain an in-depth knowledge and understanding of crime scene investigation, from fingerprints, footwear and simple blood typing to more specialist techniques such as chemical analysis, DNA profiling and skeletal analysis, to name but a few areas. Students will also gain experience of presenting their results in court, acting as expert witnesses for both the prosecution and defence.

This programme is aimed specifically at students wishing to pursue a career in science (particularly, though not exclusively, forensic science) or to go on to study for a postgraduate qualification in a scientific field. The programme has been designed to provide students with a comprehensive theoretical knowledge of the principles underpinning chemical and physico-chemical trace analysis, and the practical skills required for employment in a forensic science laboratory or as a crime scene investigator. The programme has been structured so that theoretical and experiential learning modules interlink and support each other throughout. Students will first learn the principles that underpin the analytical and investigative methods before gaining hands-on experience.

Particular benefits of the programme are:

(i) Highly experienced, research-active staff.

(ii) Dedicated crime scene investigation lab.

(iii) Work-related learning opportunities.

(iv) Hands-on practical experience of modern laboratory equipment.

(v) Research-led advanced modules on analytical methods.

(vi) Courtroom practice with real barristers.

(vii) Crime scene investigation scenarios set by senior CSIs.

(viii) Opportunities to attend Forensic Science Society meetings.

(ix) Some tutorial support available through the medium of Welsh.

The quality of the programme and the high levels of student support given have been noted by our External Examiners. Comments by the External Examiners include:

On curriculum currency and relevancy:

"The crime scene apartments are a very positive development and will allow students to develop professional crime scene practice through simulations."

"The BSc programme covers a good range of topics and each year builds on previous modules. There is a good balance between analytical science and the application of science in the forensic context, and also a good balance between practical work and assessments and more theoretical aspects."

"I am particularly impressed by the desire to ensure the programme material is underpinned by current research in the field."

On learning, teaching and student support:

"The teaching appears to be of high quality with highly qualified and experienced academic staff and having a practitioner on staff is key to student satisfaction on employability and professional standards."

"The amount of comments is far greater than I have experienced at other institutions and this is clearly a benefit to the student."

"I was very impressed by the methods utilized to ensure that the modules and the assessments of those modules were related to the field of forensic science."

"The methods of assessment across the programme were interesting and innovative, varying from lab work, experimental write ups, posters, essays, short questions and answers, and all of these enabled excellent students to shine."

"The standard of performance I observed was good overall with some examples of excellent coursework on the forensic content modules. It is clear that work submitted had achieved the intended learning outcomes."

"The marking criteria were clear to students. Feedback was provided and clearly great effort has been maintained by staff in providing this level of student-centred support."

Programme structures and requirements, levels, modules, credits and awards

The full-time study takes 3 years as shown in the following modular framework table. The part-time study takes 5 years. The exit awards are listed below:

Certificate of Higher Education in Forensic Science
This qualification is available for students who exit the programme after gaining 120 credits at Level 4 or above.

Diploma of Higher Education in Forensic Science
This qualification is available for students who exit the programme after gaining 240 credits with a minimum of 120 credits at level 5 or above.

BSc Forensic Science (Ordinary Degree)
This qualification is available for students who exit the programme after gaining 300 credits with a minimum of 60 credits (with SCI635 Science in Court being a compulsory module) at level 6.

BSc (Hons) Forensic Science
This qualification is available for students who exit the programme after gaining 360 credits with a minimum of 120 credits at level 6.

Year One Level Four	Trim 1	Introduction to Chemistry SCI414 20 Credits Core Dr Jixin Yang	Forensic Evidence and Criminal Justice SCI417 20 Credits Core Dr Chris Rogers	Cell Biology SCI430 20 Credits Core Dr Joss Bartlett
	Trim 2	Maths and Statistics for Science SCI415 20 Credits Core Dr Jixin Yang	Laboratory Chemical Analysis SCI416 20 Credits Core Dr Amiya Chaudhry	Crime Scene Investigation SCI431 20 Credits Core Dr Chris Rogers

Year Two Level Five	Trim 1	Analytical Methods SCI509 20 Credits Core Dr Jixin Yang	Forensic Strategy and Examination SCI510 20 Credits Core Dr Chris Rogers	Forensic Biology SCI533 20 Credits Core Dr Joss Bartlett
	Trim 2	Forensic Imaging SCI511 20 Credits Core Dr Chris Rogers	Instrumental Analysis SCI512 20 Credits Core Dr Jixin Yang	Laboratory Instrumental Analysis SCI513 20 Credits Core Dr Jixin Yang

Year Three Level Six	Trim 1	Forensic Taphonomy SCI608 20 Credits Core Dr Chris Rogers	Drugs and Toxicology SCI609 20 Credits Core Dr Amiya Chaudhry	Forensic Research Project SCI610 40 Credits Core Dr Jixin Yang
	Trim 2	Science in Court SCI635 20 Credits Core Dr Chris Rogers	Forensic Investigation of Mass Fatalities SCI611 20 Credits Dr Chris Rogers	

Notes:

- The programme includes a number of work-related modules but does not include a compulsory work placement for achievement of the award.
- All the learning and teaching hours, including tutorials are associated with credit.
- The part-time provision will be along with the full-time timetable but the students are given opportunity to complete Level 4 and 5 in 4 years' time, *e.g*. 60 credits per year.

  The choice of modules will be tailored by the student's needs.

Intended learning outcomes of the programme

Forensic science can be described as the application of science in relation to the law, particularly criminal law. The learning outcomes are intended to ensure that students gain an in-depth theoretical knowledge and understanding, and hands-on practical expertise in the three areas of forensic science, namely: crime scene investigation and the recovery of evidence; laboratory analysis of evidence; and the interpretation and dissemination of results. The programme has been designed to meet the Forensic Science Society criteria for accreditation. The standards of FSS accreditation will be closed referenced in defining the learning outcomes and pursuing quality assurance in the programme.

Learning outcomes are also based on the standards written in the QAA Forensic Science benchmark (2012) document. The programme provides opportunities for students to develop through the levels of the programme and demonstrate knowledge and understanding, qualities and skills in the following areas:

A Knowledge and Understanding

		Level 4 Cert. HE	Level 5 Dip. HE	Level 6 Ordinary	Level 6 Honours
A1	**Role of forensic scientist**	An understanding of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	A comprehensive awareness of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	A critical and systematic appreciation of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	A critical and systematic appreciation of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.
A2	**CSI skills**	An awareness of the processes to co-ordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence.	A comprehensive awareness of the processes to co-ordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence.	A critical and comprehensive awareness of the processes to co-ordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence.	A comprehensive awareness and critical analysis of the processes to co-ordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence.
A3	**Forensic evidence**	An understanding of the importance of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.	An understanding and explanation of evidential and intelligence value of information obtained by crime scene investigation and laboratory	A critical explanation and evaluation of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.	A critical explanation and evaluation of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.

			analysis.		
A4	**Forensic analysis**	An understanding of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	An understanding and explanation of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	A critical understanding and explanation of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	A critical understanding and application of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.
A5	**Instrumental analysis techniques**	An awareness of the use of chromatographic and spectroscopic techniques in forensic investigation.	An understanding of the fundamental principles of chromatographic and spectroscopic techniques and their applications in forensic investigation.	A critical understanding of the fundamental principles of chromatographic and spectroscopic techniques and their applications in forensic investigation, including drug detection.	A critical understanding of the principles of chromatographic and spectroscopic techniques and their applications in forensic investigation, including drug detection.
A6	**Forensic biology**	An understanding of the molecular biological principles and their applications in forensic investigation.	A comprehensive understanding of the molecular biological principles that underpin forensic biology in general and DNA profiling in particular.	A critical understanding of the molecular biological principles that underpin forensic biology in general and DNA profiling in particular.	A critical understanding of the molecular biological principles that underpin forensic biology in general and DNA profiling in particular.
A7	**Mathematics and statistics**	Demonstrates basic numeracy, algebraic and statistical competence and understanding involved in forensic investigation and ability to manipulate data related to scientific problems.	Demonstrates more advanced numerical, mathematical and statistical skills and their applications in forensic investigation.	A critical understanding of essential knowledge of mathematics and statistics and its applications in forensic investigation. Applies a range of more specialist mathematical and statistical skills as appropriate to scientific subject.	A critical understanding of essential knowledge of mathematics and statistics and its applications in forensic investigation. Confidently applies a range of specialist mathematical and statistical skills as appropriate to the specialist subject area.
A8	**Criminal justice**	An awareness of the criminal justice system in relation to the forensic science.	An understanding of the criminal justice system in relation to the forensic science.	A critical understanding of the criminal justice system in relation to the forensic science.	A critical understanding of the criminal justice system in relation to the forensic science.

B Intellectual Skills

		Level 4 Cert. HE	**Level 5 Dip. HE**	**Level 6 Ordinary**	**Level 6 Honours**
B1	**Complexity of CSI**	Appreciate the potential complexity of crime scene investigation, and	Describe and assess the potential complexity of crime scene investigation, and the practical	Critically assess the potential complexity of crime scene investigation, and the practical and	Critically assess the potential complexity of crime scene investigation, and the practical and

		the practical and legal constraints.	and legal constraints.	legal constraints.	legal constraints.
B2	**Knowledge application**	Demonstrate some ability to organise and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science.	Demonstrate increasing ability to organise and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science.	Organise efficiently and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science.	Organise efficiently and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science with critical thinking.
B3	**Information Assembly and Evaluation**	Demonstrate the ability to assemble information from a variety of sources.	Demonstrate the ability to assemble and evaluate information from a variety of sources.	Assemble efficiently, evaluate and critically assess information from a variety of sources.	Assemble efficiently, evaluate and critically assess scientific data/information from a variety of sources.
B4	**Database and literature**	Demonstrate an awareness of the scientific database and the ability to perform basic academic literature search under the guidance of tutor.	Demonstrate a comprehensive awareness of the scientific database and the ability to perform academic literature search.	Critically evaluate the usefulness of the scientific database and perform independent literature search.	Critically evaluate the usefulness of the scientific database and show the strong ability of literature search to locate key information.
B5	**Academic communication and presentation**	Demonstrate basic academic presentation skills (oral and writing) in the subject of study.	Demonstrate essential academic communication skills (oral and writing) in the subject of study.	Apply extensive academic communication skills (oral and writing) in the subject of study.	Apply professional academic writing and oral presentation skills in the subject of study.
B6	**Methodology and approaches**	Demonstrate an appreciation of methodology in crime scene investigation and laboratory analysis of unknown trace materials.	Demonstrate a comprehensive understanding of methodology in crime scene investigation and laboratory analysis of unknown trace materials.	Critically understand methodology in crime scene investigation and laboratory analysis of unknown trace materials.	Critically understand methodology in crime scene investigation and laboratory analysis of unknown trace materials, with ability to formulate approaches in such scenarios.
B7	**Influences of science and technology**	A basic understanding of the influences of science and technology to the wider society.	A good understanding of the influences of science and technology to the wider society.	A critical understanding of the influences of science and technology to the wider society with case studies.	A critical understanding of the influences of science and technology to the wider society with case studies.

C Subject Skills

		Level 4 Cert. HE	**Level 5 Dip. HE**	**Level 6 Ordinary**	**Level 6 Honours**
C1	**Risk assessment**	Awareness of the health and safety issues of a crime scene and of laboratory	Comprehensive appreciation of the health and safety issues of a crime scene and of	Critically evaluate health and safety issues of a crime scene and of laboratory	Critically evaluate health and safety issues of a crime scene and of laboratory experiments. Be able

		experiments. Perform proper risk assessment under guidance from the tutor.	laboratory experiments. Perform proper risk assessment.	experiments. Perform proper risk assessment.	to work on research project in the laboratory with minimum supervision.
C2	**Analytical techniques**	A basic understanding of the use of possible techniques and tools for the analysis of substance from crime scene.	A comprehensive understanding of the use of possible techniques and advanced instruments for the analysis of substance from crime scene.	Critically appraise the possible techniques and instruments for the analysis of substance from crime scene.	Critically appraise the possible techniques for the analysis of substance from crime scene. Demonstrate certain ability to select, set up and use laboratory equipments.
C3	**Experimental procedure**	A basic knowledge on recording and appraising experimental observations in analytical laboratory and processing data results.	Record and appraise experimental observations in a logical, comprehensive and contemporaneous manner. Interpret data/scientific information in a meaningful, structured manner.	Record and appraise experimental observations in a logical, comprehensive and contemporaneous manner. Critically interpret data/scientific information in a meaningful, structured manner.	Record and appraise experimental observations in a logical, comprehensive and contemporaneous manner. Critically analyse and interpret data/scientific information in a meaningful, structured manner.
C4	**Presentation of analytical results**	Demonstrate a basic skill to present results of forensic investigations and chemical analysis.	Demonstrate a good skill to present results of forensic investigations and chemical analysis in structured, contemporaneous manner.	Apply comprehensive skill to present results of forensic investigations and chemical analysis in structured, contemporaneous manner.	Apply advanced skill to present results of forensic investigations and chemical analysis in structured, contemporaneous manner.
C5	**Research**	Appreciate the importance of research work in scientific area.	Understand and appreciate the general research methodology.	Critically appreciate the general research methodology and strategy.	Critically appreciate the general research methodology and strategy. Plan and conduct research, under supervision, to expand their knowledge base.
C6	**Ethic skills**	Demonstrate awareness of ethical issues in current areas of study and be able to discuss these in relation to personal beliefs and values.	Be aware of the wider social and environmental implications of areas of study and be able to debate issues in relation to more general ethical perspectives.	Be aware of ethical issues in current areas of study and personal responsibility and professional codes of conduct.	Be aware of personal responsibility and professional codes of conduct and can incorporate a critical ethical dimension into a major piece of work.

D Practical, Professional and Employability Skills

		Level 4 Cert. HE	**Level 5 Dip. HE**	**Level 6 Ordinary**	**Level 6 Honours**
D1	**Communication and Presentation Skills**	Communicate in a clear and concise way, in writing and orally, in particular	Communicate in a clear, systematic and concise way, in writing and orally, in more formal	Engage effectively in a variety of roles; debate in writing and orally; produce clear, structured	Engage effectively in independent roles; engage effectively in debate in a professional manner,

		demonstrating some competence in academic writing.	academic and professional styles, and in longer pieces of scientific writing.	scientific reports and other extended pieces of work in a variety of contexts.	in writing and orally; produce detailed critiques and coherent scientific documents and project dissertation.
D2	**IT Skills**	Demonstrate basic use of the elements of Microsoft office; Word, Excel and PowerPoint. Demonstrate good skills in using the Internet and particularly virtual learning environment. Access data and information from University and other resources.	Demonstrate more advanced IT skills; Use online databases effectively to gain information.	Use and access a limited selection of more specialist IT skills related to subject specific software. Conduct effective searches for information using a range of online resources.	Use and access a limited selection of more specialist IT skills related to subject specific software for analysing experimental data. Conduct effective searches for information using a range of online resources.
D3	**Learning Skills and time management**	Study in a systematic, directed way with the aid of appropriate tutor guidance. Finish all the tasks within the time frame set by the tutor.	Learn in an increasingly effective and purposeful way, with beginning of development as an autonomous learner. Demonstrate a responsible, ethical, professional approach to work.	Adopt a broad-ranging and flexible approach to study; identifies learning needs; pursues activities designed to meet these needs in increasingly autonomous ways. Work independently, setting and achieving appropriate goals.	With minimal guidance, manage own learning using a wide range of resources appropriate to the forensic profession; seek and make effective use of feedback. Effectively manage their time, and work within a framework where there are competing priorities and values.
D4	**Interactive and Group Skills**	Interact with tutors and fellow students; participate in clearly defined group situations.	Demonstrate more advanced interactive and group skills, including effective participation in more demanding group tasks, including a group project and meet obligations to others.	Interact effectively within a learning or subject-specific group, giving and receiving information and ideas and modifying responses where appropriate.	Interact effectively within learning or professional groups; recognise, support or be proactive in leadership; and negotiate in a professional context and manage conflict.
D5	**Problem-Solving**	Apply basic theory and methods to a well-defined problem and begin to appreciate the complexity of the issues in the subject.	Identify key areas of problems and choose appropriate tools/methods for their solution in a considered manner.	Be confident and flexible in identifying and defining complex problems and can apply appropriate knowledge and skills to their solution.	Be increasingly independent, confident and flexible in identifying and defining complex scientific problems, and in the application of knowledge and skills appropriate to their solution.

CURRICULUM MATRIX demonstrating how the overall programme outcomes are achieved and where skills are developed and assessed within individual modules.

	Module Title	*Core/ Option*	*Knowledge and understanding, intellectual skills, subject skills, and practical, professional and employability skills*																								
			A								***B***							***C***						***D***				
			1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***1***	***2***	***3***	***4***	***5***	***6***	***1***	***2***	***3***	***4***	***5***
Lev 4	Introduction to Chemistry	*C*				*	*					*	*	*	*		*					*		*	*	*	*	*
	Maths and Statistics for Science	*C*				*			*			*	*	*										*	*	*	*	*
	Laboratory Chemical Analysis	*C*			*	*			*			*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
	Forensic Evidence and Criminal Justice	*C*	*	*	*					*	*	*	*	*	*	*	*					*		*	*	*	*	*
	Cell Biology	*C*						*				*	*	*	*		*	*				*		*	*	*	*	*
	Crime Scene Investigation	*C*	*	*	*			*			*	*	*	*	*	*	*	*			*	*		*	*	*	*	*
Lev 5	Analytical Methods	*C*			*	*	*					*	*	*	*	*	*		*			*		*	*	*	*	*
	Forensic Strategy and Examination	*C*	*	*	*					*	*	*	*	*	*	*	*	*			*	*	*	*	*	*	*	*	*
	Forensic Imaging	*C*	*	*	*						*	*	*	*			*		*			*		*	*	*	*	*
	Instrumental Analysis	*C*			*	*	*					*	*	*		*	*		*			*		*	*	*	*	*
	Laboratory Instrumental Analysis	*C*			*	*	*		*			*	*	*	*	*	*	*	*	*	*	*		*	*	*	*	*
	Forensic Biology	*C*	*	*	*			*				*	*	*	*		*	*	*			*		*	*	*	*	*
Lev 6	Forensic Taphonomy	*C*	*	*	*			*			*	*	*	*	*	*	*	*				*	*	*	*	*	*	*
	Drugs and Toxicology	*C*	*	*	*	*	*					*	*	*	*	*	*		*			*		*	*	*	*	*
	Forensic Research Project	*C*	*	*	*	*	*	*	*		*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*	*
	Forensic Investigation of Mass Fatalities	*C*	*	*	*			*			*	*	*	*	*	*	*					*	*	*	*	*	*	*
	Science in Court	*C*	*	*	*					*	*	*	*	*	*	*	*							*	*	*	*	*

Learning and teaching strategy used to enable outcomes to be achieved and demonstrated

Learning and Teaching Strategies

Modules will be taught *via* a range of delivery methods, appropriate to the material covered:

- Lectures
- Seminars and workshops
- Laboratory classes
- Simulated crime scenes
- Court room classes
- Tutorials
- Independent study
- IT supported learning
- Work-related learning

Lectures
Lectures will be used to provide students with an introduction to each topic, covering the fundamental factual and theoretical material. This delivery method ensures all students gain a common, firm basis on which to build. During the course of lectures students will also develop key transferable skills such as active listening and note taking.

Seminars and workshops
Seminars and workshops will be used to support lecture material, providing opportunities for more student-centred, interactive learning and the development of problem solving skills. Seminars and workshops deepen students' knowledge and understanding of a particular subject, and their ability to sort and critically evaluate information. Students will also have the opportunity to develop presentation, communication and team working skills.

Laboratory classes
In laboratory classes, students will gain hands-on experience of the various experimental techniques used in chemical and instrumental analysis. Laboratory classes enable students to develop their practical skills in a simulated work environment. Practical and problem solving skills will be strongly developed, as will students' written communication skills.

Simulated crime scenes
Simulated crime scenes will be used to train students in the search and recovery of trace evidence, building on, and extending, material covered *via* other teaching methods. During simulated crime scene investigations students will benefit from real work-like environments, devised by a former scene of crime investigator. Sessions will facilitate student-driven, interactive learning, the development of problem solving, team working and communication skills.

Courtroom classes
Students get the opportunity to act as both prosecution and defence expert witness in mock trials in local courtrooms with real barristers. These trials allow students to gain experience in the imposing settings of the courtroom, while honing their verbal presentational skills.

Tutorials
In addition to serving a very important pastoral role, small group tutorials provide students with the opportunity to explore themes and ideas in an in-depth, self-directed, but staff guided fashion.

Tutorials play a pivotal part in the personal development of students, building confidence and developing communication skills. Some tutorials can be conducted through the medium of Welsh.

Independent study
Independent study is a key element in any degree programme promoting self-discipline and reflective learning at a pace set by the learner, which is essential to their employability skills. Initial staff-directed self-study will, as the student progresses, give way to student-directed self-study, which enables the learner to expand their knowledge and explore the subject matter to the full limit of their abilities. It also facilitates the development of students' peer and self-assessment skills.

IT supported learning
No module is wholly or significantly delivered online. However, the virtual learning environment (VLE) has been extensively used to support the teaching and learning of all the modules in this programme, with the emphasis of student's independent study. Through Moodle VLE, students are able to access all the course materials (including lecture notes, powerpoint slides, e-books, e-journals and softwares *etc*.), try exercises and quizzes, and participate in online forums and discussions boards. The reading of e-journals, available from Science Direct, enhances knowledge and helps students evaluate information critically.

The programme team also aim to add more online elements such as electronic submission and feedback of the courseworks in the near future. The recently purchased chemistry virtual learning software, LabSkills, has also been embedded on Moodle subject area for students to access.

Students will be given an introduction to all of the available learning resources during Induction.

Work-Related Learning

Forensic Science is an applied science and forensic scientists require a high level of practical skills. These practical skills can be taught through formal laboratory and crime scene investigative tasks, but they may also be gained through experiential learning while working in an appropriate field of employment or while on a work placement.

Several modules in the programme (see below) have been designated as ***work-related*** modules. These modules are designed to equip students with all the necessary practical skills required by employers. Some additional work placement opportunities (paid or voluntary work) are provided by our regional collaborators (such as North Wales Police and Yale College *etc*.) to the students in this programme from time to time. Also some final year student projects are based on the collaboration of the programme team and local stakeholders, which allow students to spend a certain amount of time in the actual employment environment.

Work-related modules

SCI431 Crime Scene Investigation
SCI510 Forensic Strategy and Examination
SCI513 Laboratory Instrumental Analysis
SCI610 Forensic Research Project

Student Support
Many students find adjusting to higher education difficult and/or stressful. Support is available to students from a variety of sources, both at programme level and at the institutional/university level. The high levels of support offered have been commented on by external assessors:

"I certainly felt that a great deal of support was available to students…"

"…staff are approachable."

"…highly supportive of students needing help for whatever reason."

Students are allocated a Personal Tutor, who stays with them throughout their programme, and to whom they may turn to for help and support, be it on academic or personal matters. We also operate the "open door" policy to promptly resolve students' queries and difficulties. Academic staff offer a high level of support to students (evidence: SPOMs and SSCCs) and refer those students requiring more specialist support onto university student services as necessary.

The University offers a wide range of support from welfare services, such as accommodation, finance, welfare, disability support, counselling, chaplaincy and healthcare provision, as well as practical services such as photocopying and laptop loaning. The support services teams are based in the Edward Llwyd Centre on the Plas Coch campus, together with the Library, IT Helpdesk and Careers Centre. Childcare facilities are also available to students.

Welsh Medium Provision

The module delivery and all the written assessment works in this programme are carried out in English. However, in the general oral presentations and specifically cross examination session of Science in Court module, the students are allowed to use Welsh language if they prefer and a professional interpreter will be arranged. Also we have got staff in the programme team to provide some form of tutorial in Welsh language as well.

Assessment strategy used to enable outcomes to be achieved and demonstrated

Any assessment has three primary aims:

(i) To provide a framework for the assessment of students' competence, knowledge and understanding and a method for evaluating a student's abilities for the purposes of progression and certification.

(ii) To provide a vehicle for the promotion of student learning, during the stages of both preparing for the assessment and reading feedbacks from the tutors afterward.

(iii) To provide information to teaching staff and external examiners on the quality of the provision and to ensure equity of standards across the HE sector.

The most appropriate methods of assessment vary between modules. The methods of assessment used will reflect the content and learning objectives of each module, ensuring that students get different opportunities to showcase their ability, knowledge, understanding and transferable skills. Students will be made fully aware of the methods of assessment and the weighting of individual components to be used in each module from the outset, as well as the marking criteria *etc*.

The following methods of assessment will be used:

(i) Unseen written examination
(ii) Problem solving (open-book)
(iii) Short question assignments

(iv) Written reports/research essay
(v) Oral presentations
(vi) Poster presentations
(vii) Dissertation

Unseen written examinations

Unseen written examinations test a student's knowledge and understanding of the subject matter, along with their ability to develop lines of argument, solve problems and work independently. Assessment by unseen written examinations is expected by professional bodies, such as the Royal Society of Chemistry, and will be used as part of the assessment process in modules with a substantial lecture component.

Problem solving (open-book)

Problem solving is a key skill in forensic analysis and crime scene investigation. In open-book problem solving assessments students will be asked to apply their knowledge and understanding to solving new problems, testing their critical thinking, their application of knowledge and their analysis of data, rather than their ability to recall information. Problem solving exercises also promote learning and understanding.

Written reports/assignments

Report writing is another key skill for scientists. Data must be correctly noted, and presented in a logical, coherent fashion, understandable to both fellow scientists and lay persons. Written assignments enable a student to develop a fuller understanding and explore ideas in more depth. Written reports and assignments test a student's critical thinking, information collection, management skills and communication skills. Group assignments also develop team working and interpersonal skills.

Practical tests

Employers demand science graduates with a high degree of practical skill. Practical tests enable these skills to be assessed. In addition to testing a student's ability to perform specific tasks, practical tests also assess a student's ability to evaluate a problem and form a plan of action, collect and process data/information, manage their time effectively and learn independently.

Oral presentations

Oral presentations promote self-confidence, and develop verbal and visual communication skills. Other skills developed/assessed include time management, critical thinking, planning, research, and, of group projects, team working and interpersonal skills.

Poster presentations

Scientific information is often disseminated in the form of a poster presentation. It is therefore important that students are able to compile information and present it in a cogent fashion *via* this medium. A student's critical thinking and judgement, time management, information management and communication skills are also challenged by this form of assessment.

All assessments are peer reviewed for consistency of standard and layout before issuing to students. The end of module exam assessment for levels 5 and 6 will be approved by the programme leader,

academic head and sent to the external examiner in line with university regulations, to ensure that each assessment is explicit in its intent, and that it is valid and reliable. Samples of student assessments for each module are double marked by a tutor in the same subject area in order to ensure the correct standard of marking. Samples of marked assessments are then sent to the External Examiner for further scrutiny. All stages of peer review and double marking are recorded on a proforma for each module.

Students will receive formative assessment, particularly during the practical and self-study elements of the programme to ensure they can keep track of their progress and development. This will also be a key factor in ensuring student engagement and retention on the programme of study. In the case of practical assessment, this may be a final summative assessment, so more frequent formative assessment provides academic rigour and increases student awareness and confidence in the subject.

Module leaders will collate work and are responsible for presenting this at assessment boards, to enable ratification of results. External examiners will attend assessment boards and contribute to the process, to ensure external validity of assessment. Students will be informed of provisional results prior to an assessment board, and in writing following ratification of the results, with re-submission dates if needed.

An overview of module assessments throughout the programme, with an indication of submission dates in a typical academic year is summarised in the table below.

Module code	Module title	Assessment type	Submission date
SCI414	Introduction to Chemistry	Coursework	December
SCI414	Introduction to Chemistry	In-class test	January
SCI415	Maths and Statistics for Science	Coursework	April
SCI415	Maths and Statistics for Science	In-class test	May
SCI416	Laboratory Chemical Analysis	Portfolio	April
SCI417	Forensic Evidence and Criminal Justice	Essay	December
SCI417	Forensic Evidence and Criminal Justice	Examination	January
SCI430	Cell Biology	Coursework	December
SCI430	Cell Biology	Examination	January
SCI431	Crime Scene Investigation	Coursework	May
SCI509	Analytical Methods	Coursework	November
SCI509	Analytical Methods	Examination	January
SCI510	Forensic Strategy and Examination	Coursework	December
SCI511	Forensic Imaging	Coursework	April
SCI511	Forensic Imaging	Examination	May
SCI512	Instrumental Analysis	In-class test	April
SCI512	Instrumental Analysis	Examination	May
SCI513	Laboratory Instrumental Analysis	Portfolio	April
SCI533	Forensic Biology	Coursework	December
SCI608	Forensic Taphonomy	Essay	December
SCI609	Drugs and Toxicology	In-class Test	January
SCI609	Drugs and Toxicology	Poster Presentation	December
SCI610	Forensic Research Project	Presentation	April
SCI610	Forensic Research Project	Dissertation	May
SCI611	Forensic Investigation of Mass Fatalities	Essay	April
SCI635	Science in Court	Presentation	April
SCI635	Science in Court	Examination	May

In the future the programme team will seek more opportunities to run online assessment, such as multiple-choice questions and essay submission *via* Turnitin *etc*. In such practice, the tutor's feedback will also be provided electronically.

Assessment regulations that apply to the programme

The Taught Bachelor Degrees, Diplomas, Certificates and Foundation Degrees Regulations apply to this programme. The assessment strategy will also be closely adhered to in the delivery of the programme and is guided by the QAA Forensic Science benchmark statement (2012) section 6 Teaching, learning and assessment.

In considering borderline cases the Assessment Board shall raise the classification to the next level if the following criteria are met:

- At least 50% of the credits at level 6 fall within the higher classification.
- All level 6 modules must have been passed at the first attempt.
- For the borderline cases, the SCI610 Forensic Research Project must be in the higher classification.

All the assessments in this programme are associated with the gaining of credits.

Programme Management

Programme management

The programme team includes:
Dr Jixin Yang (senior lecturer in chemistry and programme leader)
Dr Joss Bartlett (senior lecturer in science)
Dr Amiya Chaudhry (senior lecturer in science)
Dr Ian Ratcliffe (lecturer in science)
Dr Chris Rogers (lecturer in forensic science)

Support Staff:
Dr Chandra Senan Senior Research Officer

The Programme will be managed under the auspices of the Department of Chemistry and the programme will operate in close collaboration with the School for Undergraduate Studies Office. A designated Programme Leader for this programme will be responsible for the day-to-day running of it. Responsibilities and duties include the following:

- The management and development of curriculum and the course portfolio;
- Student tracking and student records;
- Management/co-ordination of overall assessment activities across the programme;
- Collation of results, presentation of data at assessment boards;
- Liaison with external bodies and agencies;
- Quality assurance and annual monitoring, including compilation of the Annual Monitoring Report;
- Co-ordination of admissions activities, including student induction.
- Co-ordination of other recruitment activities, including relevant publicity activities.

At module level there is devolved responsibility (module leader) for the following:

- The maintenance and development of teaching and learning materials for all students enrolled on the module;
- The publishing and updating of module timetables, which shall include a weekly schedule of module sessions and required reading, to be distributed to students at the start of all modules;
- The setting, marking and collation of marks for all module assessments and examination papers, including resit assessments, and submission of student results to the Programme Leader;
- Tutorial support for students taking the module which they are responsible for;
- Quality monitoring, including processing of annual student feedback questionnaires and, where appropriate, student feedback for individual modules;
- Liaison with part-time members of staff involved in module teaching.

Research and Scholarship underpinning the curriculum:

The programme team is actively involved in novel lines of research and scholarly activities that have informed and underpinned both the module content and the structures of the proposed programme. Several modules in the programme (such as instrumental analysis and crime scene investigation) are strongly research-led or employer-informed. The student will benefit from the expert knowledge of tutors to expand their scope of learning, quality of their final year research project and the choice of exit routes from this programme. A brief introduction to the member in the programme team is given below.

The **Programme Leader, Dr Jixin Yang** received his BSc in Nanjing University (China) in 1996 and MSc in Chinese Academy of Sciences (Beijing) in 1999. Since then he studied his PhD at University of Nottingham on transient species in conventional and supercritical fluid solutions by time-resolved infrared spectroscopy. After graduating in 2003, he worked as a postdoctoral research fellow at Nottingham, focusing on the area of materials chemistry. Dr Yang took the academic position at Glyndŵr University in 2009. Now he is actively involved in undergraduate/postgraduate teaching and research in material chemistry, semiconductor materials, polymer nanocomposites, vibrational spectroscopy, supercritical fluids and green chemistry. He has published 25 research papers so far in peer-reviewed journals. Dr Yang is Charted Chemist (CChem), member of Royal Society of Chemistry (MRSC) and fellow of Higher Education Academy (FHEA). He is acting as a peer reviewer for a number of RSC journals.

Dr Joss Bartlett received his BSc Zoology in 1983 from the University of Cambridge and PhD Ecology at the University of Edinburgh in 1987. Dr Bartlett joined the university in 1993 as a lecturer and became programme leader for BSc Environmental Science in 2006. Joss has had work published in a variety of journals from Behavioural Ecology & Sociobiology to Ecological Entomology. Some of the topics of these articles have included: Male mating success and paternal care in Nicrophorus vespilloides and Filial cannibalism in the burying beetle Nicrophorus vespilloides as well as 'A Conservative Welchman': Simon Yorke III and the Erddig estate. Past presentations have included: Reading vegetation: plant community analysis and its applications for the British Ecological Society. Joss is also a PhD supervisor.

Dr Amiya Chaudhry received her BSc (Hons) (1998) in Environmental Science and a PhD (2004) in Polymer Chemistry from the University of Sussex. Her PhD, funded by the Atomic Weapons Establishment UK was based on the characterisation and degradation of a typical room temperature vulcanized (RTV) filled foamed poly(dimethyl)siloxane rubber. Her research interests lie in the broad area of polymer degradation and biopolymers which supports the Environmental Science discipline of the curriculum. In 2004 she was appointed as an associate lecturer at the Open University on a number of technology and science courses. In 2005 she joined the Materials Science Research Centre at Glyndŵr University as a knowledge transfer associate on a two-year research project

funded by the Department of Trade and Industry and Almetron Ltd.In 2007 she took a permanent academic position teaching on the BSc Environmental Science and Forensic Science degree programmes.

Dr Ian Ratcliffe has over 10 years industrial experience in product formulation across sectors including coatings, lubricants, cleaning products, personal care and pharmaceuticals. Subsequently he has gained over 13 years experience within the Centre for Water Soluble Polymers, mostly in research oriented positions, working on projects concerning controlled release, rheology, polymer synthesis, and latterly biopolymer modification and analysis. He is a member of the RSC Formulation Special Interest Group and committee member of the RSC North Wales Section. His research interests are within the 'green chemistry' field, particularly in the areas of biopolymers and their modification and characterisation. Ian was appointed as a lecturer in science in 2011 and also programme leader for postgraduate courses in Chemistry.

Dr Christopher Rogers holds a BSc (Hons) in forensic science, an MSc in forensic and biological anthropology, and a PhD in forensic anthropology/taphonomy. His PhD investigated the postmortem decomposition of hair, cartilage, and bone in a burial environment and utilised macroscopic, microscopic, molecular, microbiological, and chemical techniques. Prior to joining Glyndŵr University, he was a histologist within the NHS, a visiting fellow at the Institute for Forensic Research in Kraków, Poland, and a physical anthropologist at the Natural History Museum, London. Furthermore, he participates in forensic casework. He is a professional member of the Forensic Science Society and a fellow of the Royal Anthropological Institute of Great Britain and Ireland. His interests are broad and include: forensic and biological anthropology, forensic taphonomy, forensic ecology, pathology, and crime scene investigation.

Dr Chandra Senan completed a bachelor's degree in Chemistry and subsequently a Master's degree, including a dissertation concerning synthesis of various copolymers (hydrogels) – suitable for use as contact lens materials - by means of solution polymerisation. He then worked as research polymer chemist in Luxembourg for the International Synthetic Rubber Company for 4 years, carrying out numerous projects on both natural and synthetic rubbers. On returning to England, he did a Master's degree in Business Systems Analysis, his dissertation being the design of a materials database and its user interface. He then joined the Chemistry department of the University and undertook his PhD on a part-time basis, obtaining his PhD in Physical Chemistry in 1999. His thesis involved the synthesis of a number of hydrophobically modified sodium polyacrylates and the characterisation of their solution and adsorption properties by rheology and electron spin resonance spectroscopy.

<u>Feedback from students</u>

There are four mechanisms for obtaining student feedback in our programme.

(i) End of module (student evaluation of the module) SEM forms
(ii) National Student Survey
(iii) Staff-student consultative committees (SSCC)
(iv) Informal feedback

Due to the small student cohorts, we encourage all the students to fill SEM feedback forms (in-class or online distribution and collection). The SEM is particularly useful to the individual modules. A summary of the analysis of the SEMs, along with any other feedback (*e.g*. informal conversation), will be passed to the Programme Leader for action/response.

The student representatives of each year of this programme are elected and invited to comment on the programme in the SSCC meeting. SSCCs, chaired by a member of academic staff from outside the programme, will be held at least twice per year. The administrator from the School for

Undergraduate Studies Office will minute student feedback for action/response by the programme team. Minutes of the SSCCs and the response from the Programme Leader will be posted on the programme page of Moodle.

All the final year students are encouraged to participate the National Student Survey (NSS) to reflect their learning journey in the whole programme. The results will be made available to the programme team and all the students' comments will be properly sought and responded with identified action points.

As many students feel at ease coming directly to members of staff to express their views, we will continue to take the informal feedback from students seriously to identify valuable information.

Feedback from stakeholders

Apart from other work placement opportunities, we have been working with the regional stakeholders such as North Wales Police and Yale College *etc*. We have also developed relationship with regional companies such as NU Instrument *Inc*. and Matom *Ltd*. *etc*. The unofficial communication has helped us identify the employers' needs from our graduated students. In the future we will work more closely with the university career service and seek the best way to obtain the employer feedback on our graduate students. For example, we have invited the university career advisor to run employability workshops every year for all levels of students. We will continue to run the similar workshops in the coming years.

Internal quality assurance

We have regular programme board meetings attended by all the teaching staff in the department and minuted by the administrator in the School for Undergraduate Studies Office. A broad scope of issues related to the teaching, learning and management of this programme will be thoroughly discussed. We also have peer observation system to allow staff to attend and observe colleagues' lectures. As mentioned above, the exam papers and sample courseworks will be internally moderated for quality assurance.

Particular support for learning

All students are allocated a personal tutor at the beginning of the programme to whom they can turn to for help and support in both academic and pastoral contexts. The personal tutor or programme leader is typically the first person to be approached by a student experiencing difficulties. If the problem cannot be resolved by the team, they may then be referred to the Academic Head of Department or to Student Services, as necessary.

Students' attendance is monitored at all classes using electronic registers, which enables us to quickly identify any students with a poor attendance record in that module. Additionally, registers from different modules are cross-referenced to ascertain if students are missing from Individual modules or from the programme as a whole, which is monitored by the administrator from the School for Undergraduate Studies Office. Students whose attendance gives cause for concern are contacted by the Programme Leader in order to discuss the situation.

Students' academic progress is monitored constantly throughout each module, through in-class quizzes and assessments. Students struggling academically are thus quickly highlighted, enabling appropriate remedial support to be offered.

An induction week takes place prior to the commencement of the programme where the team sets out to ensure that the students are informed and understand the programme requirements, the processes in place, such as student handbooks and personal tutor roles.

Each Level 6 student is provided with a supervisor with projects matched to the academic and research expertise of the supervisor in order to provide relevant support for the students.

We have dedicated crime scene investigation suite and well equipped chemistry and biology laboratories to run the practical work in this programme.

Student' learning activities will be strongly supported by the use of Moodle. The electronic resources available are an important part of the programme. A number of electronic books and journals are available for students as well as the lecture material which is available on Moodle. The functions of Moodle, such as news, forum, texting, Turnitin *etc*. are fully utilised to assist the programme delivery. We have also chemistry virtual learning software embedded in Moodle for student to use.

The Student Support Services provide additional assistance for students with learning differences and any counselling, financial or careers advice needed.

Equality and Diversity

The programme team is committed to the needs of university stakeholders and to the recruitment of non-traditional students. Thus the student intake is likely to contain students who have a range of diverse needs either in terms of disabilities, illness, language, their family circumstances or work commitments. In accordance with our legislative obligations every effort is made to facilitate students with disabilities by arranging extra time or special facilities for assessments.