

Office use only

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August 2018 to change module leader for SCI533 Forensic Biology and sequencing change for level 4 modules SCI428 and SCI430
Nov 18 SCI610 replaced with SCI638 with effect from Sept 2019

12 Criteria for admission to the programme

Standard entry criteria

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.

Entrance requirements are 112 UCAS points or equivalent.

Foundation Year / Kickstart:

This programme will also be offered as a four year kick-start degree (an introductory foundation year plus this three year degree programme). The kick-start will be offered where an applicant does not meet the entry requirements for the three year honours degree or where the department / applicants feel they would benefit from an additional year to gain some additional experience before progression to the full three year degree. Upon successful completion of foundation year the student will automatically progress to the BSc (Hons) Forensic Science degree course. Entrance requirements for the four year kick start programmes are 48 UCAS points or equivalent. In addition passes at GCSE in Maths and English/Welsh Language at grade C or above are normally expected. Entry to the four year kickstart programme will be conditional on interview and review of applications to confirm that students are able to satisfactorily complete the programme. Therefore, this route is aimed at:

- Those who do not meet the entry requirements for a full degree.
- Those who have been out of education for a while and feel they would benefit from the extra year of preparation.
- Those looking to undertake a degree in an entirely new subject area and do not have the subject specific experience necessary to go straight to a degree.

Applicants who are unsure if they meet the criteria should contact Admissions.

International entry qualifications

Qualifications outlined on the National Academic Recognition and Information Centre (NARIC) as equivalent to the above UK entry qualification.

Programme specific requirements

None.

Non-standard entry criteria

(e.g. industry experience)

Equivalent experiential learning will be considered for applicants with insufficient or no formal qualifications. An example of typical equivalent experiential learning would be 23 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.

English language requirements

The University's English language requirements are set out at <http://www.glyndwr.ac.uk/en/Howtoapply/Readytoapply/>

Undergraduate

In addition to the academic entry requirements, all applicants whose first language is not English or Welsh must demonstrate English language proficiency.

European students are able to provide this evidence in a number of ways (please see <http://www.glyndwr.ac.uk/en/Europeanstudents/entryrequirements/> for details), including IELTS, with an overall score of 6.0 and no component below 5.5.

International students require a UKVI Approved Secure English Language Test (SELT), achieving an overall score of 6.0 with no component below 5.5 (please see <http://www.glyndwr.ac.uk/en/Internationalstudents/EntryandEnglishLanguageRequirements/> for details). If arranging a test, applicants must ensure they book an 'IELTS for UKVI' test. For further information see: <http://takeielts.britishcouncil.org/ielts-ukvi/bookielts-ukvi>. Applicants are asked to note that only an *IELTS for UKVI* test result will be accepted.

13 Recognition of Prior (Experiential) Learning

Applicants may enter the programme at various levels with Recognition of Prior Learning (RPL) or Recognition of Prior Experiential learning (RPEL) in accordance with the University General Regulations. Any programme specific restrictions are outlined below

Programme specific requirements

None.

14 Aims of the programme

The primary aim is to provide students with an up-to-date Forensic Science programme that meets key component standards for a forensic science degree laid down by the Chartered Society of Forensic Sciences (CSFS), 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 in the interpretation, evaluation and presentation of evidence of the CSFS and the QAA Forensic Science 2012 Benchmarks. The purpose of this is to ensure that students have sufficient knowledge and skills to record evidence, manage data, evaluate and interpret evidence, and effectively present their findings in various legal contexts. 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 and the ability to evaluate and interpret data from appropriate equipment applied to a range of forensic examinations.
- (iii) The essential skills, procedures, health and safety regulations and the function and practice of quality assurance required for employment in a modern science laboratory.
- (iv) The ability to critically evaluate, discuss and present scientific data/information to form balanced, logical and transparent reports which are understandable to the intended recipients.
- (v) The practical crime scene investigative skills required for employment in forensic arena including recording observations in the form of notes in a logical, comprehensive and contemporaneous manner.
- (vi) A broader understanding of science in both the workplace and society.
- (vii) A good knowledge of the various legal and law enforcement environments and how the scope of an investigation, the roles of others and how the methods they employ, may affect the forensic strategy.
- (viii) The generic, transferable skills demanded by employers.

15 Distinctive features of the programme

The BSc (Hons) degree in Forensic Science was introduced to Glyndŵr University (then known as North East Wales Institute of Higher Education) 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 nontraditional 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 a courtroom scenario, 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), criminal investigation 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) The first and only body farm in Wales to facilitate the research in forensic taphonomy.
- (iv) Work-related learning opportunities.
- (v) Hands-on practical experience of modern laboratory equipment.
- (vi) Research-led advanced modules on analytical methods.
- (vii) Courtroom practice with real barristers.
- (viii) Opportunities to join a number of professional bodies as a student member, including the Chartered Society of Forensic Sciences.
- (ix) Some tutorial support available through the medium of Welsh.
- (x) A wide range of career options for students upon completion of the programme, including the police force, chemical companies, analytical companies, environmental agents, and FE sector *etc.*

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.” **16**

16 Programme structure narrative

Programme Structure

The BSc (Hons) Forensic Science is studied full-time over three years or part-time over four to six years.

All modules, with the exception of the Forensic Research Project module (40 credits, Level 6), carry 20 credits with the expectation that students study 120 credits in each of the three years of full-time study.

Students are, except for absence with good cause, expected to attend all elements of the programme including lectures, tutorials, laboratory sessions and field trips.

The programme will operate a single entry point of September of each academic year.

For students who are unable or do not wish to continue with their studies possible exit awards are listed below:

Certificate in Higher Education in Forensic Science

This qualification is available to students who achieve 120 credits or more at Level 4 or above.

Diploma in Higher Education in Forensic Science

This qualification is available to students who achieve 240 credits or more with a minimum of 120 credits at Level 5 or above.

BSc Forensic Science (Ordinary Degree)

This qualification is available to students who achieve at least 300 credits with a minimum of 60 credits at Level 6.

BSc (Hons) Forensic Science

This qualification is available to students who achieve 360 credits with a minimum of 120 credits at Level 6.

Placements

There is no compulsory work placement module in this programme. Some additional work placement opportunities (paid or voluntary work) are provided by our regional collaborators (such as North Wales Police and Coleg Cambria *etc.*) to the students in

this programme from time to time. Also some final year student projects are based on the collaboration between the programme team and local stakeholders, which allow students to spend a certain amount of time in the actual employment environment.

17 Programme structure diagram

Level 4						
Semester 1	Mod title	Introduction to Chemistry	Mod title	Forensic Evidence and Criminal Justice	Mod title	Maths and Statistics for Science
	Mod code	SCI426	Mod code	SCI417	Mod code	SCI428
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Jixin Yang	Mod leader	Amy Rattenbury	Mod leader	Jixin Yang
Semester 2	Mod title	Cell Biology	Mod title	Laboratory Chemical Analysis	Mod title	Crime Scene Investigation
	Mod code	SCI430	Mod code	SCI429	Mod code	SCI431
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Josh Bartlett	Mod leader	Amiya Chaudhry	Mod leader	Amy Rattenbury
Level 5						
Semester 1	Mod title	Analytical Methods	Mod title	Research Methods: Theory and Practice	Mod title	Forensic Biology
	Mod code	SCI523	Mod code	SCI525	Mod code	SCI533
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Jixin Yang	Mod leader	Amy Rattenbury	Mod leader	Amy Rattenbury
Semester 2	Mod title	Instrumental Analysis	Mod title	Laboratory Instrumental Analysis	Mod title	Anatomy, Pathology and the Forensic Examination of Human Remains
	Mod code	SCI526	Mod code	SCI527	Mod code	SCI519
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	20
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Jixin Yang	Mod leader	Jixin Yang	Mod leader	Amy Rattenbury

Level 6						
Semester 1	Mod title	Forensic Taphonomy	Mod title	Drugs and Toxicology	Mod title	Research Project
	Mod code	SCI608	Mod code	SCI625	Mod code	SCI638
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	40
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Amy Rattenbury	Mod leader	Amiya Chaudhry	Mod leader	Ian Ratcliffe

Semester 2	Mod title	Forensic Investigation of Mass Fatalities	Mod title	Science in Court	Mod title	Research Project
	Mod code	SCI611	Mod code	SCI635	Mod code	SCI638
	New/Existing	Existing	New/Existing	Existing	New/Existing	Existing
	Credit value	20	Credit value	20	Credit value	40
	Core/Option	Core	Core/Option	Core	Core/Option	Core
	Mod leader	Amy Rattenbury	Mod leader	Amy Rattenbury	Mod leader	Ian Ratcliffe

18 Intended learning outcomes of the programme

Knowledge and understanding					
		Level 4	Level 5	Level 6	Level 6 Honours Degree
A1	Role of forensic scientist	Demonstrate an understanding of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	Demonstrate a comprehensive awareness of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	Develop a critical and systematic appreciation of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.	Develop a critical and systematic appreciation of the roles, responsibilities and liabilities of personnel involved in the investigation of crime.
A2	Practical & laboratory skills	Demonstrate an awareness of the processes to co-ordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence. Obtain an awareness of the use of chemical analysis techniques in forensic investigation.	Demonstrate a comprehensive awareness of the processes to coordinate and perform systematic searches of crime scenes, and recognise, collect and record (including photograph) potential evidence. Demonstrate an understanding of the fundamental principles of chromatographic and spectroscopic techniques and their applications in forensic investigation.	Develop 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. Develop a critical understanding of the principles of chromatographic and spectroscopic techniques and their applications in forensic investigation, including drug detection.	Develop 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. Develop a critical understanding of the principles of chromatographic and spectroscopic techniques and their applications in forensic investigation, including drug detection.
A3	Forensic evidence & criminal justice	Obtain an awareness of the criminal justice system in relation to the forensic science and demonstrate an understanding of the importance of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.	Demonstrate an understanding of the criminal justice system in relation to the forensic science and explanation of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.	Develop a critical understanding of the criminal justice system in relation to the forensic science and develop a critical explanation and evaluation of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.	Develop a critical understanding of the criminal justice system in relation to the forensic science and develop a critical explanation and evaluation of evidential and intelligence value of information obtained by crime scene investigation and laboratory analysis.
A4	Forensic analysis	Demonstrate an understanding of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	Demonstrate an understanding and explanation of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	Develop a critical understanding and explanation of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.	Develop a critical understanding and application of the fundamental physical and chemical principles that underpin forensic science, particularly for sample separation and characterisation.
A5	Mathematics and statistics	Demonstrate basic numeracy, algebraic and statistical competence and understanding involved in forensic investigation and ability to	Demonstrate more advanced numerical, mathematical and statistical skills and their	Develop a critical understanding of essential knowledge of mathematics and statistics and their applications in forensic investigation. Apply a	Develop a critical understanding of essential knowledge of mathematics and statistics and their applications in forensic

Knowledge and understanding					
		Level 4	Level 5	Level 6	Level 6 Honours Degree
		manipulate data related to scientific problems.	applications in forensic investigation.	range of more specialist mathematical and statistical skills as appropriate to scientific subject.	investigation. Confidently apply a range of specialist mathematical and statistical skills as appropriate to the specialist subject area.

Intellectual skills					
		Level 4	Level 5	Level 6	Level 6 Honours Degree
B1	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 including the potential complexity of crime scene investigation, and the practical and legal constraints.	Demonstrate increasing ability to organise and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science and describe and assess the potential complexity of crime scene investigation, and the practical and legal constraints.	Organise efficiently and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science and critically assess the potential complexity of crime scene investigation, and the practical and legal constraints.	Organise efficiently and appraise the knowledge and understanding of the essential scientific facts, concepts and theories relating to forensic science with critical thinking and critically assess the potential complexity of crime scene investigation, and the practical and legal constraints.
B2	Information assembly and evaluation	Demonstrate the ability to assemble information from a variety of sources including an awareness of the scientific database and the ability to perform basic academic literature search under the guidance of tutor.	Demonstrate the ability to assemble and evaluate information from a variety of sources including a comprehensive awareness of the scientific database and the ability to perform academic literature search.	Assemble efficiently, evaluate and critically assess information from a variety of sources including the ability to critically evaluate the usefulness of the scientific database and perform independent literature search.	Assemble efficiently, evaluate and critically assess scientific data/information from a variety of sources including the ability to critically evaluate the usefulness of the scientific database and show the strong ability of literature search to locate key information.
B3	Academic communication and presentation	Demonstrate a 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.
B4	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.
B5	Influences of science and technology	Demonstrate a basic understanding of the influences of science and technology to the wider society.	Demonstrate a good understanding of the influences of science and technology to the wider society.	Develop a critical understanding of the influences of science and technology to the wider society with case studies.	Develop a critical understanding of the influences of science and technology to the wider society with case studies.

Subject skills					
		Level 4	Level 5	Level 6	Level 6 Honours Degree
C1	Health, safety & ethics	Be awareness of the health and safety issues of a crime scene and of laboratory experiments. Perform proper risk assessment under guidance from the tutor. Demonstrate awareness of ethical issues in current areas of study and be able to discuss these in relation to personal beliefs and values.	Comprehensively appreciate the health and safety issues of a crime scene and of laboratory experiments. Perform proper risk assessment. 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.	Critically evaluate health and safety issues of a crime scene and of laboratory experiments. Perform proper risk assessment. Be aware of ethical issues in current areas of study and personal responsibility and professional codes of conduct.	Critically evaluate health and safety issues of a crime scene and of laboratory experiments. Be able to work on research project in the laboratory with minimum supervision. Be aware of personal responsibility and professional codes of conduct and can incorporate a critical ethical dimension into a major piece of work.
C2	Analytical techniques	Demonstrate a basic understanding of the use of possible techniques and tools for the analysis of substance from crime scene.	Comprehensively understand 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 equipment.
C3	Experimental procedure	Demonstrate 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 an essential 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.

Practical, professional and employability skills					
		Level 4	Level 5	Level 6	Level 6 Honours Degree
D1	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	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.	Use and access a limited selection of more specialist IT skills related to subject specific software for analysing experimental data.

		learning environment. Access data and information from University and other resources.		Conduct effective searches for information using a range of online resources.	Conduct effective searches for information using a range of online resources.
D2	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; identify learning needs; pursue 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.
D3	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.
D4	Problem-solving	Apply basic theory and methods to a well-defined problem and 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.

20 Learning and teaching strategy

The programme will be delivered using a range of learning and teaching approaches, placing the learner at the centre and promoting equality, diversity and respect for the individual.

The programme commences with an induction week, which enables students to get to know each other, the staff and the programmes. Students are issued with programme handbooks and guides which provide detail on modules and assessment tasks. Students are introduced to colleagues from across the University, who provide a wider range of support networks.

The programme team value and endeavour to draw upon students' past and current experiences and provide the chance to enhance those experiences in the light of new learning. To facilitate this, module delivery includes a range of 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
- Field trips
- 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 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. The Department has a wide range of instrumentation such as Fourier Transform Infrared Spectrometers, Fluorescence Spectrometer, High Performance Liquid Chromatography, Gas Chromatography, Ion Exchange Chromatography, Atomic Absorption Spectrophotometer, Ultraviolet/Visible Spectrometers, Particle Sizers, Particle Image Analysers, Constant Stress Rheometers, Extensional Rheometer, Controlled Strain Rheometer, Scanning Electron Microscope, Electron Spin Resonance Spectrometer, Matrix Assisted Laser Desorption Ionisation Time of Flight (MALDITOF) Mass Spectrometer, Differential Scanning Calorimetry and Isothermal Titration Calorimetry.

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. Sessions will facilitate student-driven, interactive learning, as well as the development of problem solving, team working and communication skills.

Field trips

There will be field trips to a number of local historical sites related to the study of forensic taphonomy.

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

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 learners 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

Virtual learning environment (VLE) will be 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 will be able to access all the course materials (including module specifications, lecture notes, Powerpoint slides, e-books, e-journals *etc.*), try exercises and quizzes, use the virtual learning chemistry software LabSkills and participate in online forums and discussion boards. The reading of ejournals, available from Science Direct, enhances knowledge and helps students evaluate information critically.

Students will be given an introduction to all of the available learning resources during induction. The programme handbook is available electronically, updated annually and

supplemented with other materials about the programme such as module handbooks that contain detailed assessment tasks and grading criteria (including penalties for late submission and plagiarism). The advice about writing assessments and scholarly requirements for the presentation of work and the code of ethics which students will be expected to adhere to are all available through Moodle.

21 Work based/placement learning statement

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 Coleg Cambria *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

SCI429 Laboratory Chemical Analysis
SCI431 Crime Scene Investigation
SCI527 Laboratory Instrumental Analysis
SCI638 Research Project
SCI635 Science in Court

22 Welsh medium provision

The programmes will be delivered through the medium of English. Students are entitled to submit assessments in the medium of Welsh.

23 Assessment strategy

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) in-class test
- (iii) Short question assignments
- (iv) Written reports/research essays
- (v) Practical tests
- (vi) Oral presentations
- (vii) Poster presentations
- (viii) 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) in-class test

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.

Short question assignments

Short question assignments allow students to apply their knowledge obtained from lectures to tackle more problems with enhanced scope. It will help students to deepen their understanding to the module contents and appreciate the usefulness of the theory in solving the real life problems. Mathematical skills are often tested in this type of assessment.

Written reports/research essays

Report writing is another key academic skill for scientists. Data must be correctly noted, and presented in a logical, coherent fashion, understandable to both fellow scientists and lay persons. It enables a student to develop a fuller understanding and explore ideas in more depth. Written reports and research essays 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.

Dissertation

Dissertation on the final year research project is a large piece of academic writing test. The students are expected to perform a thorough literature review in the chosen field, raise sensible research questions and compose a logically structured written work to present the discovery in the project with comparison and contrast to previous publications.

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 and academic head of school before being 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 selfstudy 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 & title	Assessment type and weighting	Assessment loading	Indicative submission date
SCI426 Introduction to Chemistry	25% Multiple choice questions 25% Essay	30 mins 2 hours 1000 words	December January
SCI428 Maths and Statistics for Science	50% Coursework 50% In-class test	1500 words 2 hours	December January
SCI429 Laboratory Chemical Analysis	100% Portfolio	4000 words	April April
SCI417 Forensic Evidence and Criminal Justice	50% Essay 50% Exam	1500 words 2 hours	December January
SCI430 Cell Biology	50% Coursework 50% Exam	1500 words 1½ hours	April May
SCI431 Crime Scene Investigation	100% coursework	3000 words	May
SCI523 Analytical Methods	50% Coursework 50% Exam	1500 words 2 hours	December January
SCI526 Instrumental Analysis	50% In-class test 50% Exam	2 hours 2 hours	April May
SCI527 Laboratory Instrumental Analysis	100% Portfolio	3500 words	May
SCI519 Anatomy, Pathology and the Forensic Examination of Human Remains	50% Presentation 50% Exam	15 mins 2 hours	April May
SCI525 Research Methods: Theory and Practice	100% Portfolio	4000 words	January
SCI533 Forensic Biology	100% coursework	3000 words	December
SCI608 Forensic Taphonomy	50% Essay 50% Exam	2000 words 2 hours	December January
SCI625 Drugs and Toxicology	50% Presentation 50% Exam	20 mins 2 hours	December January
SCI638 Research Project	20% Presentation 80% Dissertation	15 mins 7-9000 words	April May
SCI611 Forensic Investigation of Mass Fatalities	100% Essay	3000 words	April
SCI635 Science in Court	50% Presentation 50% Essay	15 mins 2000 words	May 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.

24 Assessment regulations

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.

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

Derogations

N/A.

Non-credit bearing assessment

N/A.

Borderline classifications (for undergraduate programmes only)

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 SCI638 Research Project must be in the higher classification.

Restrictions for trailing modules (for taught masters programmes only)

N/A.

25 Programme Management

Programme leader

Dr Jixin Yang (senior lecturer in chemistry and programme leader)

Programme team

Dr Joss Bartlett (senior lecturer in science)

Dr Amiya Chaudhry (senior lecturer in science)

Dr Ian Ratcliffe (senior lecturer in science)

Amy Rattenbury (lecturer in forensic science)

Support Staff:

Dr Chandra Senan (senior research officer)

A brief introduction to the members in the programme team is given below. The **Programme Leader, Dr Jixin Yang** received his BSc in Nanjing University (Nanjing, China) in 1996 and MSc in Chinese Academy of Sciences (Beijing, China) 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 graduation 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 teaching and research in material chemistry, semiconductor materials, polymer nanocomposites, vibrational spectroscopy, supercritical fluids and green chemistry. He has published 28 research papers so far in peer-reviewed journals. Dr Yang is Chartered 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.

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. 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.

Amy Rattenbury holds a BSc (Hons) in Forensic Biology from Staffordshire University and an MSc in Forensic Archaeology and Crime Scene Investigation from Bradford University. Her previous research has looked in to 'How time and pressure can cause distortion in overlapping fingerprints', 'Modified weapons trafficking' and 'An investigation in to identification from light air crashes on the Russian-Finnish boarder'. Prior to joining Glyndŵr University in 2016 she was a Programme Leader on a BSc (Hons) in Criminology & Forensic Investigation at the University Centre Southend as well as having previously worked in a number of other colleges and UKAS accredited laboratories. Amy's specialism is in technique of search, recovery and identification and she has substantive experience working with human skeletal remains. She is an active member of the Chartered Society of Forensic Sciences, the Chartered Institute for Archaeologist, the British Association of Forensic Anthropologists and the British Association of Human Identification. Her current focus is in the area of forensic taphonomy and more specifically the impact of decomposition on identification techniques but she also has broader interests in cold case review, buried and concealed evidence and forensic pathology.

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 degree 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.

The programme will be managed under the auspices of the School of Applied Science, Computing and Engineering and operated in close collaboration with the Student & Programmes Centre Office of the university. 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.

Quality management

Internal quality assurance

We have regular programme board meetings attended by all the teaching staff in the department. 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 coursework will be internally moderated for quality assurance. In November each year the Annual Monitoring Report (AMR) for this programme will be discussed at both programme board and school board meetings with action plans identified. There is an additional checkpoint about the implementation of these action points in March each year. The running of this programme will also be looked into during the three school board meetings each year.

Feedback from students

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) Student Voice Forum (SVF)
- (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 Student Voice Forum (SVF) meeting. SVFs, chaired by a member of academic staff from outside the programme, will be held at least twice per year. The administrator from the Student & Programmes Centre Office will minute student feedback for action/response by the programme team. Minutes of the SVFs and the responses from the programme team will be posted on the departmental 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 Coleg Cambria *etc.* We have also developed relationship with regional companies such as NU Instrument *Inc.*, KK Fine Food *Ltd.* 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 the Department of Planning to 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. We have also set a Facebook group page for the alumni from this programme, which proved to be extremely popular.

Research and scholarship activity

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.

One research paper based on a final year student project has been published in the *Journal of Forensic Research* in 2015. We also plan carry more in-depth research in forensic taphonomy based on our newly developed body farm.

26 Learning support

Institutional level support for students

The University has a range of departments that offer the support for students as:

- Library & IT Resources
- The Assessment Centre
- DisAbility Support Team
- Irlen Centre
- Careers Centre and Job Shop
- Zone Enterprise hub
- Chaplaincy
- Counselling & Wellbeing

- Student Funding and Welfare
- International Welfare
- Student Programmes Centre
- Glyndŵr Students' Union

School support for students

The Academic School holds the central budget to purchase new equipment and consumables used in this programme. The AMRs and IPPFs (initial programme proposal forms) of this programme need to be approved by the school boards. Good practice in teaching and learning is shared across all the departments. Any problem will be flagged up in the School Senior Management Team meetings.

Programme specific support for students

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. There is

a designated Moodle page for each academic staff member to manage their tutees. 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 Head/Associate Heads of School 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 Student & Programmes Centre 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, body farm and well equipped chemistry and biology laboratories to run the practical work in this programme.

Students' 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. Every year there is new purchase of academic books through library to support this programme.

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

27 Equality and Diversity

Glyndŵr University is committed to providing access to all students and promotes equal opportunities in compliance with the Equality Act 2010 legislation. This programme complies fully with the University's Equal Opportunities Policy

(<http://www.glyndwr.ac.uk/en/AboutGlyndwrUniversity/Governance/TheFile,64499,en.pdf>), ensuring that everyone who has the potential to achieve in higher education is given the chance to do so.

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.