Course Handbook

MSc Nuclear Safety, Security and Safeguards
PgDip Nuclear Safety, Security and Safeguards
PgCert Nuclear Safety
PgCert Nuclear Security and Safeguards

2019/20

Dr Javad Yazdani
School of Engineering

Please read this Handbook in conjunction with the University's Student Handbook.

Contents

1. Welcome to the course

I'm delighted that you have chosen to enrol on the Nuclear Safety, Security and Safeguards programme. We will endeavour to provide you with an outstanding experience of higher education. Having taken account of student feedback when continuously improving this course and by investing in the upgrade of resources and facilities, we are anticipating your effort and achievement will be matched by valuable learning opportunities.

Whether you have enrolled on the full course, or on one of the postgraduate qualifications that form a part of the full course, we are aware that you have made a decision that affects your future career and we can assure you that we will work hard to meet your aspirations. We also expect that you will commit sufficient time, self-discipline, perseverance and conscientiousness in order to acquire and apply the knowledge and experience required for success in your field of study.

I trust you will find your experience at UCLan both challenging and rewarding. If you have any queries or concerns, please contact your course leader at the earliest possible opportunity.

Enjoy your time studying with us!

Dr Javad Yazdani – Course Leader for MSc Nuclear Safety Security and Safeguards

1.1 Rationale, aims and learning outcomes of the course

The course was first run in the 2011/2012 academic year and has been updated and improved through Periodic Course Review in May 2013. The course is operated within the School of Engineering. Over the last twenty five years and more, UCLan has educated hundreds of scientists and engineers, who now are employed, often in senior positions, in engineering organisations in the UK and throughout the world; including nuclear-focused groups and companies.

The generic aims of the programme are for each student:

- To develop a comprehensive knowledge of the legal framework, regulation, management and means of delivery for Nuclear Safety, Nuclear Security and Safeguards.
- To develop theoretical knowledge and practical skills needed to lead and contribute to the effective delivery of Nuclear Safety, Nuclear Security and Safeguards in the UK nuclear industry and international arena.
- To critically evaluate modern practice and threats to Nuclear Safety, Nuclear Security and protection of nuclear materials, and to critically evaluate and respond to the demands of policy and legal/regulation frameworks.
- To develop an ability to effectively integrate nuclear safety, nuclear security and materials safeguards provisions at an early stage in facility design.
- To become a reflective practitioner and implement postgraduate research skills in independent learning.
- To enhance career potential, personal effectiveness and/or performance in professional employment, and make a valuable contribution to their wider community.
- To enhance and relate students' communication skills to the terminology and needs of the nuclear sub-sector.

Note: Although the content of this degree reflects many of the requirements for a matching section to an accredited honours degree in the formation of a Chartered Engineer, it's aimed at scientists, engineers, technologists and experienced safety/security/safeguards professionals from a wide-range of backgrounds wishing to work in a safety, security or safeguards role in the nuclear industry. The course aims to enhance students' career potential, personal and professional effectiveness and performance in employment, and assist them in making a positive and sustained contribution to their wider community.

Please keep this handbook. It contains information you will need throughout your course. The handbook is intended to be a source of information on the academic and administrative aspects of the course. You will find information on the course operation, management and the assessment regulations. The structure and content of the course is described together with the assessment strategies.

Read this handbook carefully and make sure that you understand what is required of you. Should there be points which you do not understand or wish to discuss further, do not hesitate to contact the Course Leader or any of your module tutors.

1.2 Course Team

Names and contact details of the key members of the team.

Course Leader for MSc Nuclear Safety Security and Safeguards (NSSS) and PG. Cert and PG. Dip provision in NSSS
Dr Javad Yazdani
Computing & Technology Building, room CM138
☎ 01772 892685 (ext. 2685), ✉ jyazdani@uclan.ac.uk

Academic lead and Head of Energy
Dr Jonathan Francis
Computing & Technology Building, room CM023
☎ 01772 893229 (ext. 3229), ✉ Jfrancis1@uclan.ac.uk

Professor of Nuclear Policy and Regulation
Prof Peter. Storey,
Computing & Technology Building, room CM138
☎ 01772 892685 (ext. 2685), ✉ pstorey1@uclan.ac.uk

Professor of Nuclear Materials
Prof Harry. Eccles
Maudland Building, room MB055
☎ 01772 893550 (ext. 3550), ✉ heccles@uclan.ac.uk

MSc dissertations coordinator
Dr Javad Yazdani
Computing & Technology Building, room CM138
☎ 01772 892685 (ext.2685), ✉ jyazdani@uclan.ac.uk

NTEC coordinator
Ms Alison Robinson
Kirkham Building, room KM103

☎ 01772 893520 (ext.3520), ✉ ajrrobinson@uclan.ac.uk
Senior Lecturer in Nuclear Engineering Science / Management

Associate Lecturer in Nuclear Safety and academic advisor

Dr Sandeep Kadam
Kirkham Building, room KM001
☎ 01772 894203 (ext.4203), ✉ skadam1@uclan.ac.uk

1.3 Expertise of staff

Most of the course is delivered by university staff, including those with experience of working in the nuclear industry. Some sessions will be delivered by visiting lecturers who work in the nuclear sector; they will be invited to speak with authority from their own experience and expertise.

1.4 Academic Advisor

An Academic advisor is allocated to each student in their first semester. You will retain the same academic advisor for the duration of your study at UCLan. Your academic advisor is your first point of contact if you have any questions or problems while studying at UCLan.

You should meet with your Academic advisor at least once every semester, but they are also available to help with any problems you may have during the year. Feel free to see them at other times should you want to. Your Academic advisor is there to provide you with support and guidance during your course. They will be unable to do so if you do not take the time and effort to meet with them and discuss your progress.

What will your Academic advisor do?

- offer academic advice throughout the year;
- monitor your progress and attainment through the year;
- advise you on your progress and issues such as option choices;
- in some instances, your academic advisor may refer you to the course leader or module leader for clarification of detailed academic problems;
- offer personal support, referring you to relevant University support services where appropriate;
- support you in the context of any disciplinary matters.

What are you expected to do?

- make use of your academic advisor;
- make sure you know where their office is and how to contact them;
- make sure they know you and have your current email address;
- watch out for emails, notices and memos asking you to make appointments or attend meetings with them;
- turn up for meetings and/or respond to requests for information.

Write the name and contact information of your academic advisor below for future reference.

1.5 Administration details

Course Administration Service provides academic administration support for students and staff and are located in the following hubs which open from 8.45am until 5.15pm Monday to Thursday and until 4.00pm on Fridays. The hub can provide general assistance and advice regarding specific processes such as extenuating circumstances, extensions and appeals.

Course Administration Service is located in the Computer and Technology Building room. Hub contact details are as follows:

Computing and Technology Building
Art, Design and Fashion
Computing
Physical Sciences and Computing
Film, Media and Performance
Engineering
Journalism, Languages and Communication
Telephone: 01772 891994 or 01772 891995,
Email: CandThub@uclan.ac.uk

1.6 Communication

The University expects you to use your UCLan email address and check regularly for messages from staff. If you send us email messages from other addresses they risk being filtered out as potential spam and discarded unread.

There is a Blackboard Course Administration Service as well as individual modules with respect to your course both identified at links below.

https://portal.uclan.ac.uk/webapps/blackboard/content/listContent.jsp?course_id=_59612_1&content_id=_1321792_1

https://portal.uclan.ac.uk/webapps/blackboard/execute/content/blankPage?cmd=view&content_id=_1540022_1&course_id=_55090_1

There you will find documentation relating to your course – for example student handbooks, support and advice regarding student placements and job hunting, along with other useful information.

It is important to keep all your contact details up to date as you may be contacted by post, email, or telephone.

1.7 External Examiner

The University has appointed an External Examiner to your course who helps to ensure that the standards of your course are comparable to those provided at other higher education institutions in the UK. The name of this person, their position and home institution can be found below. If you wish to make contact with your External Examiner, you should do this through your Course Leader and not directly. External Examiner reports will be made available to you electronically. The School will also send a sample of student coursework to the external examiner(s) for external moderation purposes, once it has been marked and internally moderated by the course tutors. The sample will include work awarded the highest and lowest marks and awarded marks in the middle range.

The name of this person, their position and home institution are as follows:

Dr John Roberts, Nuclear Fellow, University of Manchester, UK

External Examiner reports for the Engineering courses can be accessed electronically via the Engineering@UCLan Blackboard pages.

2. Structure of the course

2.1 Overall structure

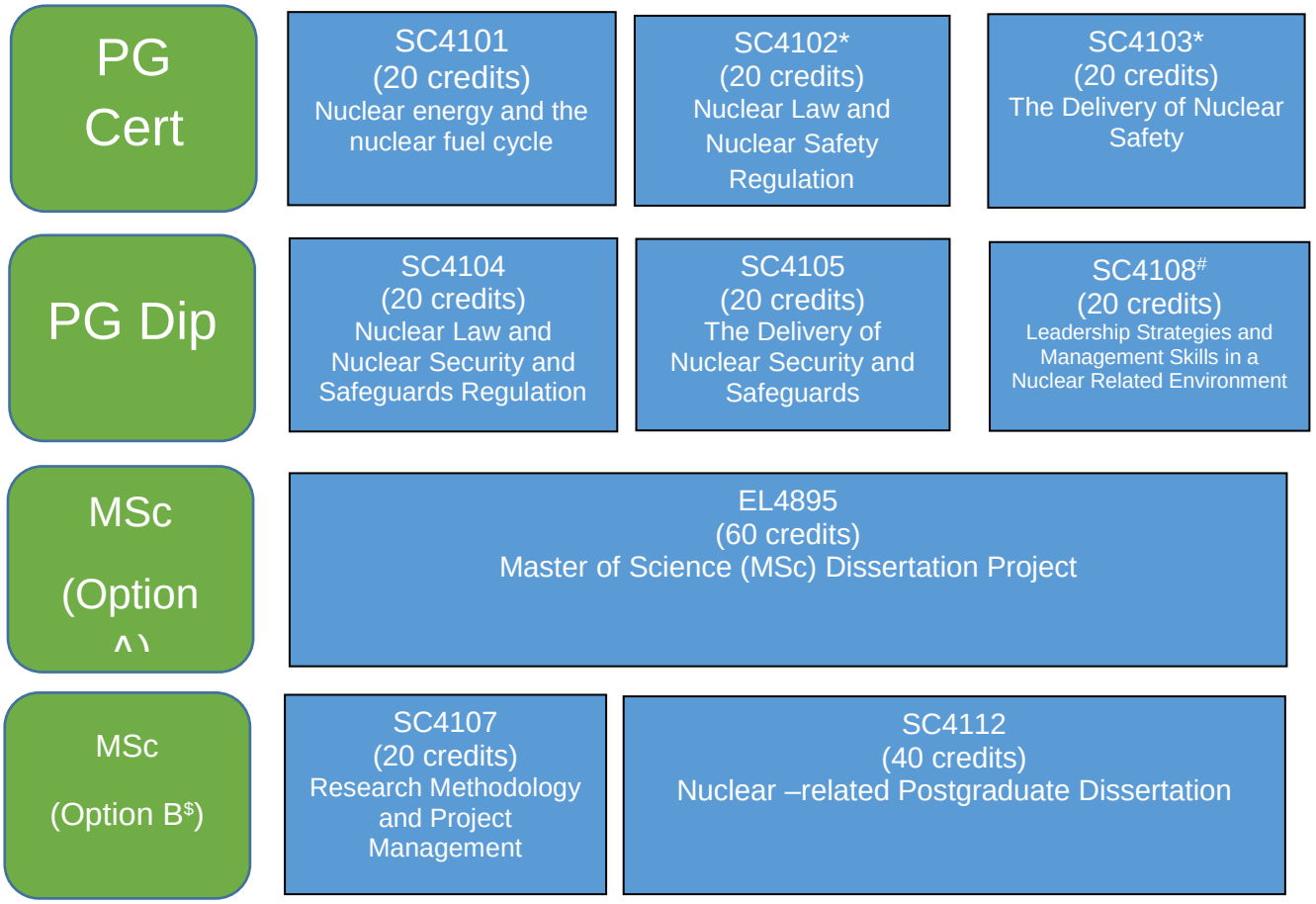
The course is arranged in a modular system called MODCATS (Modular Credit Accumulation and Transfer Scheme). Each module that you pass entitles you to credits that accumulate

Specific credit requirements for the target awards:

Postgraduate Certificate (PgCert) requires 60 at level 7.

Postgraduate Diploma (PgDip) requires 120 at level 7.

Master of Science (MSc) requires 180 at level 7, including at least 40 from a dissertation.



$ Full-time MSc students commence study registered for Option B and may subsequently swap to Option A.

* The PgCert Nuclear Safety requires pass grades in SC4101, SC4102 & SC4103, but the PgCert Nuclear Security and Safeguards requires pass grades in SC4101, SC4104 & SC4105

SC4108 may be replaced by SC4107 for a PgDip exit award

Figure 1 MSc NSSS programme structure

2.2 Modules available

The modules that you will be studying in your course are detailed below

Level	Module Code	Module Title	Credit rating
Level 7	SC4101	Nuclear energy and the nuclear fuel cycle	20
Level 7	SC4102	Nuclear law and nuclear safety regulation	20
Level 7	SC4103	The delivery of nuclear safety	20
Level 7	SC4104	Nuclear law and nuclear security and safeguards regulation	20
Level 7	SC4105	The delivery of nuclear security and safeguards	20
Level 7	EL4895	Master of Science dissertation project	60
Level 7	SC4112	Nuclear-related postgraduate dissertation	40
Level 7	SC4107	Research methodology and project management	20
Level 7	SC4108	Leadership Strategies and Management Skills in a nuclear related environment	20

2.3 Course requirements

The MSc course has seven taught modules of 20 credits and one 40-credit dissertation. Alternatively, a 60-credit dissertation project is available for students who do not wish to study SC4108. The course may be studied as a full-time student or by part-time attendance. The course structure is established to assist working people. This is achieved using intensive delivery of the majority of the teaching sessions on each taught module within a one-week period. This is known as 'pulse' attendance. The teaching during pulse weeks will involve lectures, seminars, tutorials and in some modules, laboratory/computer sessions.

Additional tutorial and discussion sessions are interspersed between attendance weeks, along with occasional guest and professional events or visits to sites. These are not time-tabled but have a mandatory attendance requirement for full time students and are optional for part-time students. A list of tutorial topics will be produced early in the year, but looking at the list of intensive teaching weeks below, obviously all of those before 16th November will either be focused on SC4107 or preparation for SC4101.

Room bookings can be found for each module from the on-line timetable, available to all students. The schedule of individual teaching sessions within pulse weeks will be finalised and emailed in advance of each pulse week to each student registered for that module.

In addition to the on-line timetable, full-time students will be expected to attend all tutorial and additional sessions, plus the un-timetabled teaching team's Semester 1 preparatory sessions. This is very important to bring students up to speed in both academic and practical elements of the nuclear discipline, in preparation for their pulse modules, most of which take place in 2018.

2.4 Module Registration Options

Full-time students should aim to complete the award in a Calendar year (i.e. 12 months) but will not be charged further fees in extending study for an additional Semester. Part-time students are expected to complete at least 60 credits per year. The standard package in the first year of part-time study is SC4101, SC4102 and SC4103. Part time students may also elect to take a 4th module in the first year, but this is not encouraged in all cases. Part-time students are advised to first study SC4101, SC4102 and SC4103 and thereby, become familiar with the course and so, be better placed to decide whether or not the combination of study, home and business life enables a 4th module to be attempted.

Part-time students entering the course may elect to study at a rate of 60 credits per year (completion in 3 years) or 80 credits per year (completion in 2⅓ calendar years).

The standard registration package is 60 credits per year, commencing in the first year with either SC4101, SC4102 and SC4103 or SC4101, SC4104 and SC4105. Acceleration to 80 credits in a year is not advised until students are confident that their balance of academic work, home life and business allow for a fourth 20-credit module to be studied. There is flexibility to drop to fewer modules should unexpected extenuating circumstances occur, but these must be formally submitted and properly attested to avoid a failure mark being recorded.

Full-time students will commence their dissertation module immediately after completion of assessment for SC4107 at the end of the first Semester. However, most focus occurs in Semester 3. You are required to attend all timetabled learning activities for each module. International students from overseas are also be required to meet the requirements of their Tier 4 visa issued by the UK Visa and Immigration. You are obliged at all times to keep the University and your course leader informed of any situation where you may be unable to meet these requirements.

Part-time students must pass the modules for which they are registered to progress automatically to the next year of their course. Graduates of the MSc and some graduates of the PgDip may elect to register for a research degree upon completion of their course.

The Academic Regulations (found on the University website) provide the framework for the award.

2.5 Study Time

2.5.1 Weekly timetable

The modules do not all run in parallel on a weekly timetable. Rather, most are delivered in series. Each module starts with an intensive teaching week of mandatory sessions, followed by a few weeks of mainly student self-study supported by optional tutorials (see Section 2.1) and assessment preparation. The intensive teaching weeks are often called 'pulse' weeks. As you will see from your on-line timetable, they are split about 1 month apart, with coursework set at the end of the pulse (which is expected to be undertaken between the pulse weeks and normally completed before the next pulse. Your course and module leaders will give further details.

SC4107 is scheduled for completion in Semester 1. Modules SC4101, SC4102, SC4103 & SC4104 are scheduled for completion at the examination week in May.

Modules SC4105 & SC4108 are scheduled for completion in Central Exam week in August. SC4112 is scheduled for completion at the end of September (i.e. 12 months from commencing teaching), but may extend into Semester 1 of the next academic year by agreement.

A timetable will be available once you have enrolled onto the programme, through the Student Portal.

2.5.2 Expected hours of study

20 credits is a standard module size and equals 200 notional learning hours.

The teaching and learning on the course will consist of a blended approach; which relies on combination of traditional class-room teaching (including university lectures as appropriate), world-wide-web Computer Integrated Learning (www-CIL) and both classroom based and work-based experiential learning. All of which will aim to include key elements of Learning from Experience (LFE) which is paramount in the nuclear industry. The main teaching elements of the course are pulse-mode delivered. This means that the class teaching will take place in pre-arrange weeks with from 9am to 5.30pm (with breaks and lunch) from Monday to Friday, except that classes finish earlier on Friday afternoon, totaling 38 hours of teaching. In addition there are 2 hours of tutorials each week. This adds up to over 350 hours of formal teaching in the year, plus additional and optional opportunity to engage in extra events (e.g. visits or workshops), plus dissertation supervision. Students are expected to engage in independent study and directed reading or exercises between pulse weeks and to complete their assignments.

The normal amount of work involved in achieving a good outcome to your studies is to study for 10 hours per each credit you need to achieve – this includes attendance at UCLan and time spent in private study.

2.5.3 Attendance Requirements

You are required to attend all timetabled learning activities for each module. Notification of illness or exceptional requests for leave of absence must be made to:

☎ 01772 891994 or 01772 891995 |✉ CandThub@uclan.ac.uk

Exceptional absence requests are made to Jonathan Francis (Head of Energy):

☎ 01772 893229 | ✉ jfrancis1@uclan.ac.uk

You are encouraged to seek the advice of your Academic advisor and/or Course Leader if your personal circumstances make it difficult to meet your study obligations.

If you are an international students, you please observe responsibilities under the Visas and Immigration (UKVI) Points Based System (PBS) - you MUST attend your course of study regularly; under PBS, UCLan is obliged to tell UKVI if you withdraw from a course, defer or suspend your studies, or if you fail to attend the course regularly.

3. Approaches to teaching and learning

3.1 Expertise of staff

Dr Javad Yazdani is a Senior Lecturer in Nuclear Engineering and is the course leader. Javad has many years of experience of working in the nuclear industry since 1985 and many years of experience of lecturing and leading courses and programmes in the university sector in particular at Lancaster University and UCLAN since 2009. Dr Yazdani

has developed the course for validation in 2010 along with the team of nuclear industry experts. Javad has experience in teaching Nuclear Energy and fuel Cycle, Delivery of Nuclear Safety, Delivery of Nuclear Security and Safe Guards, Leadership and Management in Nuclear Environment and Nuclear Masters Project (Dissertations)

Dr Jonathan Francis is Principal Lecturer and Head of John Tyndall Nuclear in the school of Engineering at UCLan. He is keenly interested in Fire, Nuclear and Process Mechanical Engineering with emphasis on applications of fluid mechanics, thermal dynamics and industrial ventilation. Jonathan has a long association with the nuclear industry. Since 1997 he has had a continuous applied research activity, some of which has been funded by the nuclear industry and aimed at nuclear process safety. Jonathan has delivered in Nuclear Law and Nuclear regulations, Nuclear Energy.

Professor Harry Eccles is an international expert in separation sciences such as solvent extraction, ion exchange and biosorption for nuclear applications. He has worked in the UK's nuclear industry for more than 35 years holding senior positions in BNFL's R&D Department and then with the NNL. He has worked with the university for more than twenty years and is now employed part-time. Harry has delivered in nuclear decommissioning and Fuel Cycle.

Dr Kadam has a research background in Radioactive Waste Management, Environmental Safety and Material Science on various academic and consultancy research projects. Since 2016, Sandeep took up a fresh interest by attending the ‘Nuclear Security Workshop for Scientists, Technicians and Engineers’ at King’s College London and he has since contributed to the Nuclear Security education and training through his active involvement in BEIS sponsored Nuclear Security Culture programme led by King’s College and EU framework programme, ANNETTE. Sandeep has teaching experience in Nuclear Energy and Fuel Cycle (SC4101), Nuclear law and Nuclear Safety regulation (SC4102), Nuclear law and Nuclear Security and Safeguards regulation (SC4104), and Research methodology and project management (SC4107).

3.2 Learning and teaching methods

Students may have great difficulty in becoming independent learners, but we expect post-graduate students to have acquired this ability already. This may be particularly problematic if students are used to having a highly structured timetable and suddenly find that they have to manage their own time. High dependence on teachers in the past may make them feel totally lost in their new environment. As a result, students may need quite a high level of guidance and support in order to develop the skills required of independent learners. This is particularly relevant for some international students who will experience cultural shock at the beginning of the course. Several mechanisms are in place to cater for specific needs.

Owing to our search for continuous improvement, SC4107 has been expanded from 10 to 20 credits at the Periodic Course Review, so that postgraduate study skills and research project management are now included. In this module you will be introduced to workshops that start to develop your study skills and enable you to seek out further tools/techniques on offer at the university. The module will also make use of research skills in other modules (such as the LIS SMART project, WISER project and additional quantitative methods workshops/sessions).

Students are expected to access through UCLan Blackboard and study reading materials prior to (and after) teaching sessions and adopt pro-active attitude during the given sessions.

There is a wide variety of teaching and learning methods, they include:

- Lectures/classes: offer information, literature review and illustrative application and present and explore core ideas in the subject. A student prepares solutions to questions on an examples sheet, which will be discussed in a class. This provides a student with the opportunity to follow-up the lectures with first self-study and then group discussion to deepen their individual knowledge of the topic.
- Research skills: classes: research skills are taught in classes, principally involving group activities, with some preparation and post class assignments.

  These are in support of general skill development and to support the group and research projects in particular.
- Practical sessions: computational methods are taught as a series of computer-based practical work with short introductory lectures on theory. This enables a student to understand issues in application of computational methods to simulated and real problems and also develop computing skills relevant to the rest of the course including the research project. Practical, computer-based and experimental lab based, provide an opportunity for a student to consolidate the theory they have learned in lectures with practical experience.
- Group project: provides an opportunity to study a real mechanical and energy engineering problem in depth, practice analytic and problem-solving skills, and work in a team.
- Individual project: involves a literature review, problem specification and experiments/analysis written up in a report. This enables a student to demonstrate that they can apply the knowledge they have acquired on different aspects of the course to a mechanical and energy engineering problem in some depth as well as put into practice general research skills.
- Student led presentation: involves a self-directed study and preparation of and participation in student-led project presentations

In addition:

Subject Matter Expert (guest) lectures or seminars: provide a student with the opportunity to hear internal speakers and external speakers from the nuclear industry. This enables a student to gain appreciation of some applications, needs and roles of energy and maintenance engineers as well as career opportunities.

3.3 Study skills

There are a variety of services to support students and these include:

WISER http://www.uclan.ac.uk/students/study/wiser/index.php

3.4 Learning resources

3.4.1 Learning Information Services (LIS)

Extensive resources are available to support your studies provided by LIS – library and IT staff. Take advantage of the free training sessions designed to enable you to gain all the skills you need for your research and study**.**

3.4.2 Electronic Resources

LIS provide access to a huge range of electronic resources – e-journals and

databases, e-books, images and texts.

3.5 Personal development planning

Personal development planning tutorials will be offered as part of this programme and their Academic Advisor will be available to support the students by offering advice and guidance on how to develop their personal development plan.

3.6 Preparing for your career

Your future is important to us, so to make sure that you achieve your full potential whilst at university and beyond, your course has been designed with employability learning integrated into it. This is not extra to your degree, but an important part of it which will help you to show future employers just how valuable your degree is. These "Employability Essentials" take you on a journey of development that will help you to write your own personal story of your time at university:

•To begin with, you will explore your identity, your likes and dislikes, the things that are important to you and what you want to get out of life.

• Later, you will investigate a range of options including jobs and work experience, postgraduate study and self- employment,

•You will then be ready to learn how to successfully tackle the recruitment process.

You will be able to record your journey using Pebblepad, the university's e-portfolio system, which will leave you with a permanent record of all the fantastic things you have achieved during your time at UCLan.

It's your future: take charge of it!

Careers offers a range of support for you including:-

•career and employability advice and guidance appointments

•support to find work placements, internships, voluntary opportunities, part-time employment and live projects

•workshops, seminars, modules, certificates and events to develop your skills

•daily drop in service available from 09:00-17:00 for CV checks and initial careers information. For more information come along and visit the team (in Foster building near the main entrance) or access our careers and employability resources via the Student Portal.

4. Student Support

The following section outlines any course specific support that is available whilst studying at UCLan.

4.1 Academic Advisors

Academic advisors provide help for students with problems and are responsible for overseeing the progress of students, their welfare, academic counselling and guidance. Your Academic advisor is allocated when you enroll. On the postgraduate nuclear courses we have traditionally allocated the Course Leader to be academic advisor. You must see your Academic advisor when requested and meet at least once per semester.

Ensure the academic advisor knows you and has your current email address.

Please seek help relating to lecture material and practical classes from the module tutor in the first instance. If necessary make an appointment to seek additional support. Please remember that academic staff are busy people and may not be able to give you instant help.

Although Academic advisors and Course Leaders will deal with most of the day-to-day questions which arise, the Head of School is always willing to see students and an appointment can be made through the Student Hub. Advice relating to administrative issues may be obtained from the Student Hub.

4.2 Students with disabilities

Contact the Advisory Service - disability@uclan.ac.uk - or let one of the course team aware about your disability needs. The University will make reasonable adjustments to accommodate your needs and to provide appropriate support for you to complete your study successfully. Where necessary, you will be asked for evidence to help identify appropriate adjustments.

Assessment arrangements for students with a disability

Arrangements are made for students who have a disability/learning difficulty for which valid supporting evidence can be made available. Contact the Disability Adviser for advice and information, disability@uclan.ac.uk

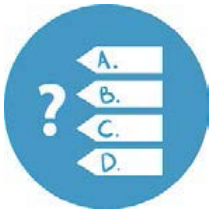
The School of Engineering lead for students with disabilities is Dr Javad Yazdani

4.3 Students' Union

The Students' Union offers thousands of volunteering opportunities ranging from representative to other leadership roles. We also advertise paid work and employ student staff on a variety of roles. You can find out more information on our website: http://www.uclansu.co.uk/

5. Assessment

Please note that all modules will be assessed. You are expected to attempt all required assessments for each module for which you are registered, and to do so at the times scheduled unless authorised extensions, special arrangements for disability, or extenuating circumstances allow you to defer your assessment.



5.1 Assessment Strategy

SC4107 'Research Methodology and Project Management' and SC4101 'Nuclear Energy and the Nuclear Fuel Cycle' are intended to be preparatory modules. Together, they seek to ensure students possess a working knowledge of the nuclear industry and for students who expect to undertake a project or dissertation during their year of study, the research and investigative skills to explore how safety, security and safeguards relates to that industry. It is not essential these modules are studied before the others but it is considered beneficial so to do. These modules are not examined. They are assessed by coursework.

SC4101 includes written essays targeting specific important matters to do with the nuclear industry, but in examination week in place of a written examination there will be an individual presentation and a team organised structured debate on a topical issue about the industry. In SC4107 student ability to critique literature, undertake research and derive research questions is tested using a review exercise and a research proposal, where in the latter an interim report enables students to practice

presentation skills. SC4108 is assessed by assignment only; there is no examination for this module.

SC4102, SC4103, SC4104 and SC4105 are all assessed by both an assignment and a written examination for each module. These modules are the main focus areas of the course. They are about how nuclear safety, security and safeguards are ensured and managed. Examination is necessary to ensure each individual student can meet the learning outcomes relevant to the course focus without undue reliance on any one else but themselves. Assignment is necessary to ensure students can engage in critical thinking about an issue (i.e. an issue that deserves more consideration than can be achieved in a time-limited examination); and then craft a written piece that communicates that thinking in an effective manner.

The dissertation project (SC4112) is not examined by closed-book examination. It is assessed by dissertation submission and other associated coursework. There is an interim pictureboard/poster or presentation to ensure progress and provide opportunity to practice skills of engaging others in one's area of interest. The written dissertation counts for 70% of the mark for the module, but a viva is used to enable the markers (2 for a dissertation) to clarify areas of uncertainty, check understanding of what has been written or to discuss interesting aspects of your work. This viva can be critical where student performance is in doubt, but is usually an opportunity to re-enforce the value of the work.

5.2 Notification of assignments and examination arrangements

You will be notified of assessments by your module tutors. They will advise you of the requirements, the marking criteria and of the respective submission dates or exam arrangements, during one or more of the timetabled sessions. In general the Examination arrangements are available from the University web site. These arrangements are not generally made by the module tutors.

Submission of coursework assignments is made electronically by email to the module leader (copied to the course leader) or through the Blackboard site for the module, using the Turnitin software.

5.3 Referencing

For most of your assignments you will be expected to do some further reading, and you are required to think and produce increasingly original work around the work of others. Do not fall into the 'plagiarism trap' either deliberately or by accident. You need to give suitable credit to those that have produced the work that you are using. Throughout the course you will be provided with series of research methodology tutorial where appropriate referencing will be addressed.

5.4 Confidential material

Students may be engaged in research issues and projects that necessitate strict adherence to the principle of confidentiality and the Data Protection Act. It is your ethical and legal responsibilities to respect confidentiality and maintain the anonymity of individuals and organisations within your assignments/dissertation.

5.5 Cheating, plagiarism, collusion or re-presentation

Please refer to the information included in section 7.6 of the University Student Handbook for full definitions. The University uses an online Assessment Tool called Turnitin. A pseudo-Turnitin assignment will be set up using the School space on Blackboard to allow students to check as many drafts as the system allows before their final submission to the 'official' Turnitin assignment. Students are required to self-submit their own assignment on Turnitin and will be given access to the Originality Reports arising from

each submission. In operating Turnitin, Schools must take steps to ensure that the University's requirement for all summative assessment to be marked anonymously is not undermined and therefore Turnitin reports should either be anonymised or considered separately from marking. Turnitin may also be used to assist with plagiarism detection and collusion, where there is suspicion about individual piece(s) of work.

You are required to sign a declaration indicating that individual work submitted for an assessment is your own.
If you attempt to influence the standard of the award you obtain through cheating, plagiarism or collusion, it will be considered as a serious academic and disciplinary offence as described within the Academic Regulations and the Assessment Handbook.

•Cheating is any deliberate attempt to deceive and covers a range of offences described in the Assessment Handbook.

•Plagiarism describes copying from the works of another person without suitably attributing the published or unpublished works of others. This means that all quotes, ideas, opinions, music and images should be acknowledged and referenced within your assignments.

•Collusion is an attempt to deceive the examiners by disguising the true authorship of an assignment by copying, or imitating in close detail another student's work - this includes with the other student's consent and also when 2 or more students divide the elements of an assignment amongst themselves and copy one another's answers. It does not include the normal situation in which you learn from your peers and share ideas, as this generates the knowledge and understanding necessary for each individual to independently undertake an assignment; nor should it be confused with group work on an assignment which is specifically authorised in the assignment brief.

•Re-presentation is an attempt to gain credit twice for the same piece of work.

The process of investigation and penalties which will be applied can be reviewed in the Assessment Handbook. If an allegation is found to be proven then the appropriate penalty will be implemented:

In the case of a single offence of cheating, plagiarism, collusion or re-presentation:

•the penalty will be 0% for the element of assessment, and an overall fail for the module.
•the plagiarised element of assessment must be resubmitted to the required standard and the mark for the module following resubmission will be restricted to the minimum pass mark.

•when it is detected for the first time on a resubmission for an already failed module, no further resubmission for the module will be permitted, and the appropriate fail grade will be awarded.

In the event of a repeat offence of cheating, plagiarism, collusion or re-presentation (irrespective of whether the repeat offence involves the same form of unfair means) on the same or any other module within the course:

•the appropriate penalty will be 0% for the module with no opportunity for re-assessment. This penalty does not preclude you being able to retake the module in a subsequent year.

The penalties will apply if you transfer from one UCLan course to another during your period of study and module credits gained on the former course are transferred to the current course.

6. Classification of Awards

The University publishes the general principles underpinning the way in which awards and results are decided in Academic Regulations Section H. Decisions about the overall classification of awards are made by Course Assessment Boards through the application of the academic and relevant course regulations.

Taught post-graduate courses are graded as follows:

- **Distinction** (an APL of 70%, together with obtaining at least 70% in the dissertation module)
- **Merit** (an APL of 60%, together with obtaining at least 60% in the dissertation module)
- **Pass** (obtain a pass-grade in all modules including the dissertation)

7. Student Feedback

You can play an important part in the process of improving the quality of this course through the feedback you give. In addition to the on-going discussion with the course team throughout the year, there are a range of mechanisms for you to feedback about your experience of teaching and learning. We aim to respond to your feedback and let you know of our plans for improvement.

The Students' Union can support you in voicing your opinion, provide on-going advice and support, and encourage your involvement in all feedback opportunities.

The Students' Union and University work closely together to ensure that the student voice is heard in all matters of student-life. We encourage students to provide constructive feedback throughout their time at university, through course reps, surveys and any other appropriate means.

7.1 Student Staff Liaison Committee meetings (SSLCs)

Protocol for the operation of SSLCs is included in section 8.2 of the University Student Handbook. The purpose of a SSLC meeting is to provide the opportunity for course representatives to feedback to staff about the course, the overall student experience and to inform developments which will improve future courses. These meetings are normally scheduled once per semester.

Meetings will be facilitated using guidelines and a record of the meeting will be provided with any decisions and / or responses made and / or actions taken as a result of the discussions held. The meetings include discussion of items forwarded by course representatives, normally related to the following agenda items (dependent on time of year).

The course team encourage student feedback in all areas and recognise that additional items for discussion may also be raised at the meeting
Update on actions completed since the last meeting
Feedback about the previous year – discussion of external examiner's report; outcomes of National /UCLan student surveys.
Review of enrolment / induction experience;
Course organisation and management (from each individual year group, and the course overall);
Experience of modules - teaching, assessment, feedback;
Experience of academic support which may include e.g. Personal Development Planning, academic advisor arrangements;

Other aspects of University life relevant to student experience e.g. learning resources, IT, library;
Any other issues raised by students or staff.

8. Appendices

8.1 Programme Specification(s)

UNIVERSITY OF CENTRAL LANCASHIRE

Programme Specification

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

1. Awarding Institution / Body	University of Central Lancashire
2. Teaching Institution	University of Central Lancashire
3. University Department/Centre	School of Computing, Engineering and Physical Sciences, Preston
4. External Accreditation	None
5. Title of Final Award	MSc Nuclear Safety, Security & Safeguards
6. Modes of Attendance offered	Part time/Full Time
7. UCAS Code	N/A
8. Relevant Subject Benchmarking Group(s)	None
9. Other external influences	IAEA (International Atomic Energy Agency) WINS (World Institute of Nuclear Security) OECD Nuclear Energy Agency
10. Date of production/revision of this form	January 2013 (revised July 2014)
11. Aims of the Programme	
The generic aims of the programme are for each student:	
• To develop a comprehensive knowledge of the legal framework, regulation, management and means of delivery for Nuclear Safety, Nuclear Security and Safeguards.	

• To develop theoretical knowledge and practical skills needed to lead and contribute to the effective delivery of Nuclear Safety, Nuclear Security and Safeguards in the UK nuclear industry and international arena.
• To critically evaluate modern practice and threats to Nuclear Safety, Nuclear Security and protection of nuclear materials, and to critically evaluate and respond to the demands of policy and legal/regulation frameworks.
• To develop an ability to effectively integrate nuclear safety, nuclear security and materials safeguards provisions at an early stage in facility design.
• To become a reflective practitioner and implement postgraduate research skills in independent learning.
• To enhance career potential, personal effectiveness and/or performance in professional employment, and make a valuable contribution to their wider community.
• To enhance and relate students' communication skills to the terminology and needs of the Nuclear sub-sector.

12. Learning Outcomes, Teaching, Learning and Assessment Methods
A. Knowledge and Understanding
A1. Correlate and critically examine the legal and regulatory instruments that dictate how policy is implemented in relation to Nuclear Safety, Nuclear Security and Nuclear Safeguards. A2. Review and discuss the fundamental technologies associated with energy production and the nuclear fuel cycle, from its cradle to its grave. A3. Compare and contrast theoretical approaches to managing risk and critically discuss the essential characteristics of modern practice for evaluating and substantiating Nuclear Safety and dealing with threats to Nuclear Security. A4. Explain or debate how the development of nuclear technology has influenced nuclear safety and nuclear security in the civil nuclear industry. A5. Expound and critically evaluate the means by which Nuclear Safety, Nuclear Security and non-proliferation safeguards arrangements are established, managed, monitored and controlled.
Teaching and Learning Methods
Teaching will be through lectures, discussion, case examples and directed reading, with post-teaching tutorials. Classroom learning is supplemented by independent study of literature and critical thinking (evaluation). A key element of the teaching and learning strategy is to mix formal academic lectures with guest specialist practitioners/speakers.
Assessment methods
Essays target the historical and potential future development of nuclear power and the special nature of the materials required. Assignments requiring the synthesis of taught material and independent study are submitted in the form of a report to demonstrate depth of knowledge and an understanding of the complexity and inter-relationships within a subject. Examination tests a student's knowledge of fundamentals, independent evaluation of the subject, understanding of impact/influences and understanding of the value of differing approaches. Both written discussion and structured formal debate (in forum) are part of the assessment techniques used.
B. Subject-specific skills

B1. Select and apply tools of fault analysis and threat or vulnerability assessment to selected nuclear facilities and their physical environments.

B2. Discuss and critically review the essential characteristics of safety case and security plans when applied throughout the lifecycle of a nuclear facility; and the nature and implications of generic design assessment.

B3. Demonstrate a professional approach to licensing of nuclear facilities and relevant performance evaluation; and implement learning from experience.

B4. Identify and critically evaluate hazards and risks associated with nuclear installations.

B5. Discuss the essential characteristics of the international regime for non-proliferation safeguards and apply tools and techniques for the delivery of an effective nuclear safeguards regime.

Teaching and Learning Methods

As (A) plus field trips

Assessment methods

As (A) but with subject-specific skills application (e.g. in one's own place of work). The reports can be reflective in nature.

C. Thinking Skills

C1. Apply and combine technical and non-technical knowledge to assess practical engineering and management solutions to Nuclear Safety and/or Nuclear Security and Safeguards problems
C2. Synthesis of theoretical and other information (e.g. empirical data, codified/standardised information, primary data, etc) to derive or analyse safety or security plans/strategies; or integrated plans.
C3. Critically evaluate the political, environmental, social and economic context from which are derived national and international safety, security and safeguards concerns.
C4. Critically evaluate Nuclear Safety and Nuclear Security guidance and/or practice

Teaching and Learning Methods

As (B) plus investigative research project.

Assessment methods

As (B) plus literature review, research proposal, dissertation and viva

D. Other skills relevant to employability and personal development

D1. Communicate effectively through writing and presentation in a range of styles to a diverse audience.

D2. Produce reports to a professional standard.

D3. Learn and work independently and become reflective practitioners.

D4. Plan and execute a postgraduate research project using appropriate research skills and produce a dissertation or project report in a professional manner to comply with standards

Teaching and Learning Methods

Independent learning and report writing are developed in the assignment preparation classes and induction. Research methods and associated thinking/logic taught by formal lecture and opportunity for practice. Presentation skills and debating skills are practiced in post-pulse tutorials. Presentation and written communication is also developed in the research methods

module with opportunity for practice. Terminology is taught through all modules and reflection on past collective experience is also used.

Assessment methods

Reports, essays, presentation, debate and examinations, with dissertation and viva.

13. Programme Structures

Level	Module Code	Module Title	Credit rating
Level 7	SC4101	Nuclear energy and the nuclear fuel cycle	20
Level 7	SC4102	Nuclear law, and nuclear safety regulation	20
Level 7	SC4103	The delivery of nuclear safety	20
Level 7	SC4104	Nuclear law, and nuclear security and safeguards regulation	20
Level 7	SC4105	The Delivery of Nuclear Security and Safeguards	20
Level 7	SC4107	Research methodology and project management	20
Level 7	SC4108	Leadership strategies and management skills in a nuclear related environment	20
Level 7	SC4112	Nuclear-related postgraduate dissertation	40
Level 7	EL4895	Masters project (engineering)	60

14. Awards and Credits

MSc Nuclear Safety, Security & Safeguards.

Requires 180 credits

PgDip Nuclear Safety, Security & Safeguards

Requires 120 credits incl. SC4102 & SC4104

PgCert Nuclear Safety

Requires 60 credits incl. SC4102 & SC4103

PgCert Nuclear Security & Safeguards

Requires 60 credits incl. SC4104 & SC4105

PgCert Nuclear Studies

Requires 60 credits

In each case, award with Merit is made with an APM at 60% or greater; or award with Distinction at 70% or greater.

15. Personal Development Planning

Personal tutors will be assigned to all students and will assist them in developing and implementing their own Personal Development Plans. These seek to build on and enhance students' skills of reflection on their academic, personal and professional development, increase self awareness of individual skills, qualities, attitudes and capabilities; improve their learning and performance by encouraging and enabling student to take responsibility for their own development and further develop the necessary skills for independent learning. By the completion of their programme of study, and in the process of achieving this objective, students should be able to identify their own strengths, weaknesses and needs and direction for change; set goals and plan action for developing, monitoring and reviewing their own progress; compile their own records of learning experiences and achievement, including progress reviews, personal reflections and action plans; plan realistically for their career progression and manage their own career development and lifelong learning. This is all facilitated by the course team in UCLan Nuclear within the School of Computing, Engineering and Physical Sciences. Students in permanent employment are encouraged to integrate their PDP within their employer's development planning documentation.

16. Admissions criteria

Programme Specifications include minimum entry requirements, including academic qualifications, together with appropriate experience and skills required for entry to study. These criteria may be expressed as a range rather than a specific grade. Amendments to entry requirements may have been made after these documents were published and you should consult the University's website for the most up to date information.

Students will be informed of their personal minimum entry criteria in their offer letter.

All candidates will be judged on an individual basis. In addition to the basic English Language and Mathematics qualifications, the standard entry criteria are one of the following:

● Honours degree in Nuclear Engineering, Nuclear Science or similar subject (or equivalent) at grade 2:2 or above

● EC Accredited Honours degree (to IEng at UK-Spec) in any engineering subject relevant to design, construction, operation, decommissioning or waste treatment/storage in the nuclear industry at grade 2:2 or above

● Honours degree in any scientific, engineering, technology, safety or environmental subject at grade 2:2 or above.

● Honours degree in any law, business, management, or nuclear-relevant inexact or social science (e.g. Psychology) at grade 2:1 or above (or equivalent)

● Any first class honours degree (or equivalent)

Notes: 1. The basic English Language qualifications required are grade C at traditional 'O' level / GCSE, IELTS 6.5 or equivalent. This can be demonstrated though a prior degree where the International Office accepts the previous institution as suitable. 2. The basic Mathematics qualifications required are grade C at traditional 'O' level / GCSE or any Level 2 award in mathematics (or better). This can be demonstrated through a prior degree where that degree is accepted as 'numerate'. 3. Students without honours (or equivalent) may be accepted onto the course if they either (i) possess HND or FD and have substantial post qualification experience in a graduate role in a high-reliability or manufacturing industry, or (ii) have professional status or possess professional awards for access to a professional grade

that normally requires an honours degree (e.g. Chartered status awarded through 'Grandfather Rights' or successful completion of EC exams).
17. Key sources of information about the programme
• University web site (www.uclan.ac.uk)
• UCLan Nuclear website http://www.uclan.ac.uk/information/uclan/nuclear/nuclear.php
• Course Leader and Admissions Tutor: Geoff Vaughan
• Director of UCLan Nuclear: Professor Laurence Williams
• Academic Lead & Head UCLan Nuclear Research: Dr Ian Butchart & Dr Jonathan Francis

18. Curriculum Skills Map

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O)	Programme Learning Outcomes																
				Knowledge and understanding					Subject-specific Skills					Thinking Skills				Other skills		
				A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3	D4
LEVEL 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	Comp		✓		✓			✓						✓			✓		
	SC4102	Nuclear Law, and Nuclear Safety Regulation	Comp	✓		✓		✓		✓	✓						✓		✓	✓	
	SC4103	The Delivery of Nuclear Safety	Comp			✓		✓	✓	✓	✓	✓		✓	✓		✓		✓	✓	
	SC4104	Nuclear Law, and Nuclear Security and Safeguards Regulation	Comp	✓		✓	✓	✓		✓	✓		✓				✓		✓	✓	
	SC4105	The Delivery of Nuclear Security and Safeguards	Comp			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓		✓	✓	
	SC4107	Research Methodology and Project Management	Comp			✓		✓		✓	✓		✓	✓		✓		✓		✓	✓
	SC4108	Leadership Strategies and Management Skills in a Nuclear Related Environment	O	✓	✓	✓	✓	✓		✓	✓		✓			✓		✓			
	SC4112	Nuclear-Related Postgraduate Dissertation	C*	P	P	P	P	P	✓	P	✓	✓	✓	✓	✓	✓	✓	P	✓		✓	✓
	EL4895	Engineering project (engineering)		P	✓	✓	P	P	✓	P	✓	✓	✓	✓	✓	✓	✓	P	✓	✓	✓	✓

			C*																			

Note: ‘P’ indicates that whilst it is not a requirement, the dissertation may examine these issues and hence contribute to demonstrating that learning outcomes are met.

*Either SC4112 or EL4895 the core modules can be selected but not both

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Programme Specification

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

1. Awarding Institution / Body	University of Central Lancashire
2. Teaching Institution	University of Central Lancashire
3. University Department/Centre	School of Engineering
4. External Accreditation	None
5. Title of Final Award	PGDip Nuclear Safety, Security & Safeguards
6. Modes of Attendance offered	Part time/Full Time
7. UCAS Code	N/A
8. Relevant Subject Benchmarking Group(s)	None – UK-SPEC is relevant but is not suitable as a adjunct specification for this course (see Appendix)
9. Other external influences	IAEA (International Atomic Energy Agency) WINS (World Institute of Nuclear Security) OECD Nuclear Energy Agency
10. Date of production/revision of this form	January 2013

11. Aims of the Programme

The generic aims of the programme are for each student to develop career-enhancing skills in the nuclear 'triple S', with broad knowledge of the legal framework, regulation, management and means for delivery of nuclear safety, nuclear security and nuclear

safeguards in both a national and international setting and insight into the challenges and opportunities for joint regulation, thereby empowering that person to evaluate nuclear safety, security and safeguards requirements and modern practice, enabling that person to take a leadership role to provide a valuable contribution in one or more of the nuclear 'triple S' communities; and encouraging the application of reflective practice and postgraduate thinking skills.

12. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1. Correlate and critically examine the legal and regulatory instruments that dictate how policy is implemented in relation to Nuclear Safety, Nuclear Security and Nuclear Safeguards.

A2. Review and discuss the fundamental technologies associated with energy production and the nuclear fuel cycle, from its cradle to its grave.

A3. Compare and contrast theoretical approaches to managing risk and critically discuss the essential characteristics of modern practice for evaluating and substantiating Nuclear Safety and dealing with threats to Nuclear Security.

A4. Explain and debate how the development of nuclear technology has influenced nuclear safety and nuclear security in the civil nuclear industry.

A5. Expound and critically evaluate the means by which Nuclear Safety, Nuclear Security and non-proliferation safeguards arrangements are established, managed, monitored and controlled.

Teaching and Learning Methods

Teaching will be through lectures, discussion, case examples and directed reading, with post-teaching tutorials. Learning is supplemented by independent study of literature and critical thinking (evaluation). A key element of the teaching and learning strategy is to mix formal academic lectures with guest specialist practitioners/speakers.

Assessment methods

Essays target the historical and potential future development of nuclear power and the special nature of the materials required. Assignments requiring the synthesis of taught material with independent study and evaluation are submitted in the form of a report to demonstrate depth of knowledge and an understanding of the complexity and inter-relationships within a subject. Examination tests a student's knowledge of fundamentals, independent evaluation of the subject, understanding of impact/influences and understanding of the value of differing approaches. Both written discussion and structured formal debate (in forum) are part of the assessment techniques used

B. Subject-specific skills

B1. Select and apply tools of fault analysis and threat or vulnerability assessment to selected nuclear facilities and their physical environments.

B2. Discuss and critically review the essential characteristics of safety case and security plans when applied throughout the lifecycle of a nuclear facility; and the nature and implications of generic design assessment.

B3. Demonstrate a professional approach to licensing of nuclear facilities and relevant performance evaluation; and implement learning from experience.

B4. Identify and critically evaluate hazards and risks associated with nuclear installations.

B5. Discuss the essential characteristics of the international regime for non-proliferation safeguards and apply tools and techniques for the delivery of an effective nuclear safeguards regime.

Teaching and Learning Methods

As (A) plus field trips

Assessment methods

As (A) but with subject-specific skills application (e.g. in one's own place of work). The reports can be reflective in nature.

C. Thinking Skills

C1. Apply and combine technical and non-technical knowledge to assess practical engineering and management solutions to Nuclear Safety and/or Nuclear Security and Safeguards problems
C2. Synthesis of information (e.g. empirical data, codified/standardised information, primary data, etc) to derive or analyse safety and/or security problems.
C3. Critically evaluate the political, environmental, social and economic context from which are derived national and international safety, security and safeguards concerns.
C4. Critically evaluate Nuclear Safety and Nuclear Security guidance and/or practice

Teaching and Learning Methods

As (B)

Assessment methods

As (B)

D. Other skills relevant to employability and personal development

D1. Communicate effectively through writing and presentation in a range of styles to a diverse audience.

D2. Develop an ability to effectively coordinate nuclear safety, nuclear security and materials safeguards provisions and thereby, enhance career potential, personal effectiveness and/or performance in professional employment.

D3. Use reflection to evaluate personal practice and respond to the demands of best practice guidance and policy/legal regulation frameworks affecting nuclear 'triple S'.

Teaching and Learning Methods

Independent learning and report writing are developed in the assignment preparation classes and induction. Presentation skills and debating skills are practiced in post-pulse

tutorials. Terminology is taught through all modules and reflection on past collective experience is also used.

Assessment methods

Presentation, debate, essays, reports and examinations.

13. Programme Structures

14. Awards and Credits

Level	Module Code	Module Title	Credit rating
Level 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	20
Level 7	SC4102	Nuclear Law, and Nuclear Safety Regulation	20
Level 7	SC4103	The Delivery of Nuclear Safety	20
Level 7	SC4104	Nuclear Law, and Nuclear Security and Safeguards Regulation	20
Level 7	SC4105	The Delivery of Nuclear Security and Safeguards	20
Level 7	SC4108	Leadership Strategies and Management Skills in a Nuclear Environment	20

PgDip Nuclear Safety, Security & Safeguards

Requires 120 credits

PgCert Nuclear Safety

Requires 60 credits incl. SC4102 & SC4103

PgCert Nuclear Security & Safeguards

Requires 60 credits incl. SC4104 & SC4105

PgCert Nuclear Studies

Requires 60 credits

In each case, award with Merit is made with an APM at 60% or greater; or award with Distinction at 70% or greater.

15. Personal Development Planning

Personal tutors will be assigned to all students and will assist them in developing and implementing their own Personal Development Plans. These seek to build on and enhance students' skills of reflection on their academic, personal and professional development,

increase self awareness of individual skills, qualities, attitudes and capabilities; improve their learning and performance by encouraging and enabling student to take responsibility for their own development and further develop the necessary skills for independent learning. By the completion of their programme of study, and in the process of achieving this objective, students should be able to identify their own strengths, weaknesses and needs and direction for change; set goals and plan action for developing, monitoring and reviewing their own progress; compile their own records of learning experiences and achievement, including progress reviews, personal reflections and action plans; plan realistically for their career progression and manage their own career development and lifelong learning. This is all facilitated by the course team in UCLan Nuclear within the School of Computing, Engineering and Physical Sciences. Students in permanent employment are encouraged to integrate their PDP within their employer's development planning documentation.

16. Admissions criteria

Programme Specifications include minimum entry requirements, including academic qualifications, together with appropriate experience and skills required for entry to study. These criteria may be expressed as a range rather than a specific grade. Amendments to entry requirements may have been made after these documents were published and you should consult the University's website for the most up to date information.

Students will be informed of their personal minimum entry criteria in their offer letter.

All candidates will be judged on an individual basis. In addition to the basic English Language and Mathematics qualifications, the standard entry criteria are one of the following:

● Honours degree in Nuclear Engineering, Nuclear Science or similar subject (or equivalent) at grade 2:2 or above

● EC Accredited Honours degree (to IEng at UK-Spec) in any engineering subject relevant to design, construction, operation, decommissioning or waste treatment/storage in the nuclear industry at grade 2:2 or above

● Honours degree in any scientific, engineering, technology, safety or environmental subject at grade 2:2 or above.

● Honours degree in any law, business, management, or nuclear-relevant inexact or social science (e.g. Psychology) at grade 2:1 or above (or equivalent)

● Any first class honours degree (or equivalent)

Notes: 1. The basic English Language qualifications required are grade C at traditional 'O' level / GCSE, IELTS 6.5 or equivalent. This can be demonstrated though a prior degree where the International Office accepts the previous institution as suitable. 2. The basic Mathematics qualifications required are grade C at traditional 'O' level / GCSE or any Level 2 award in mathematics (or better). This can be demonstrated through a prior degree where that degree is accepted as 'numerate'. 3. Students without honours (or equivalent) may be accepted onto the course if they either (i) possess HND or FD and have substantial post qualification experience in a graduate role in a high-reliability or manufacturing industry, or (ii) have professional status or possess professional awards for access to a professional grade that normally requires an honours degree (e.g. Chartered status awarded through 'Grandfather Rights' or successful completion of EC exams).

17. Key sources of information about the programme

- University web site (www.uclan.ac.uk)
- UCLan Nuclear website http://www.uclan.ac.uk/information/uclan/nuclear/nuclear.php
- Course Leader and Admissions Tutor: Geoff Vaughan
- Director of UCLan Nuclear: Professor Laurence Williams
- Academic Lead & Head UCLan Nuclear Research: Dr Ian Butchart & Dr Jonathan Francis

18. Curriculum Skills Map

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O)	Programme Learning Outcomes			
				Knowledge and understanding	Subject-specific Skills	Thinking Skills	Other skills

				A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3
LEVEL 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	Comp		✓		✓									✓		✓	✓	
	SC4102	Nuclear Law, and Nuclear Safety Regulation	Comp	✓		✓		✓		✓	✓						✓	✓	✓	✓
	SC4103	The Delivery of Nuclear Safety	Comp			✓		✓	✓	✓	✓	✓		✓	✓		✓	✓	✓	✓
	SC40104	Nuclear Law, and Nuclear Security and Safeguards Regulation	Comp	✓		✓	✓	✓		✓	✓		✓				✓	✓	✓	✓
	SC4105	The Delivery of Nuclear Security and Safeguards	Comp			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	SC4108	Leadership Strategies and Management Skills in a Nuclear Environment	Comp	✓	✓	✓	✓	✓		✓	✓		✓			✓	✓	✓		✓
	Note: ‘D1’ is inherently being assessed and developed in all modules, since communication skills are an inescapable requirement for all forms of assessment used.																			

UNIVERSITY OF CENTRAL LANCASHIRE

Programme Specification

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

13. Awarding Institution / Body	University of Central Lancashire
14. Teaching Institution	University of Central Lancashire
15. University Department/Centre	School of Engineering
16. External Accreditation	None
17. Title of Final Award	PGCert Nuclear Safety
18. Modes of Attendance offered	Part time
19. UCAS Code	N/A
20. Relevant Subject Benchmarking Group(s)	None - UK-SPEC is relevant but is not suitable as a adjunct specification for this course (see Appendix)
21. Other external influences	IAEA (International Atomic Energy Agency) OECD Nuclear Energy Agency
22. Date of production/revision of this form	January 2013
23. Aims of the Programme	
The generic aims of the programme are for each student to develop career-enhancing skills in nuclear safety, with broad knowledge of the legal framework, regulation, management and means for its delivery in both a national and international setting, thereby empowering that person to evaluate nuclear safety requirements and modern practice and enabling that person to take a leadership role to provide a valuable contribution to nuclear safety; and encouraging the application of reflective practice and postgraduate thinking skills.	
24. Learning Outcomes, Teaching, Learning and Assessment Methods	

A. Knowledge and Understanding

A1. Critically examine the legal and regulatory instruments that dictate how policy is implemented in relation to Nuclear Safety.

A2. Review and discuss the fundamental technologies associated with energy production and the nuclear fuel cycle, from its cradle to its grave.

A3. Compare and contrast theoretical approaches to managing risk and critically discuss the essential characteristics of modern practice for evaluating and substantiating Nuclear Safety.

A4. Explain and debate how the development of nuclear technology has influenced nuclear safety in the civil nuclear industry.

A5. Expound and critically evaluate the means by which Nuclear Safety arrangements are established, managed, monitored and controlled.

Teaching and Learning Methods

Teaching will be through lectures, discussion, case examples and directed reading, with post-teaching tutorials. Learning is supplemented by independent study of literature and critical thinking (evaluation). A key element of the teaching and learning strategy is to mix formal academic lectures with guest specialist practitioners/speakers.

Assessment methods

Essays target the historical and potential future development of nuclear power and the special nature of the materials required. Assignments requiring the synthesis of taught material and independent study are submitted in the form of a report to demonstrate depth of knowledge and an understanding of the complexity and inter-relationships within a subject. Examination tests a student's knowledge of fundamentals, independent evaluation of the subject, understanding of impact/influences and understanding of the value of differing approaches. Both written discussion and structured formal debate (in forum) are part of the assessment techniques used.

B. Subject-specific skills

B1. Select and apply tools of fault analysis to selected nuclear facilities and their physical environments.

B2. Discuss and critically review the essential characteristics of safety case when applied throughout the lifecycle of a nuclear facility; and the nature and implications of generic design assessment.

B3. Demonstrate a professional approach to licensing of nuclear facilities and relevant performance evaluation; and implement learning from experience.

B4. Identify and critically evaluate hazards and risks associated with nuclear installations.

Teaching and Learning Methods

As (A) plus field trips

Assessment methods

As (A) but with subject-specific skills application (e.g. in one's own place of work). The reports can be reflective in nature.

C. Thinking Skills

C1. Apply and combine technical and non-technical knowledge to assess practical engineering and management solutions to Nuclear Safety problems
C2. Synthesis of information (e.g. empirical data, codified/standardised information, primary data, etc) to derive or analyse safety problems.
C3. Critically evaluate the political, environmental, social and economic context from which are derived national and international safety concerns.
C4. Critically evaluate Nuclear Safety guidance and/or practice

Teaching and Learning Methods

As (B)

Assessment methods

As (B)

D. Other skills relevant to employability and personal development

D1. Communicate effectively through writing and presentation to a diverse audience.

D2. Use reflection to evaluate personal practice and respond to the demands of best practice guidance and policy/legal regulation frameworks affecting nuclear safety.

Teaching and Learning Methods

Independent learning and report writing are developed in the assignment preparation classes and induction. Presentation skills and debating skills are practiced in post-pulse tutorials. Terminology is taught through all modules and reflection on past collective experience is also used.

Assessment methods

Reports, essays, presentation, debate and examinations.

13. Programme Structures

Level	Module Code	Module Title	Credit rating
Level 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	20
Level 7	SC4102	Nuclear Law, and Nuclear Safety Regulation	20

14. Awards and Credits

PgCert Nuclear Safety

Requires 60 credits

Award with Merit is made with an APM at 60% or greater; or award with Distinction at 70% or greater.

Level 7	SC4103	The Delivery of Nuclear Safety	20	

15. Personal Development Planning

Personal tutors will be assigned to all students and will assist them in developing and implementing their own Personal Development Plans. These seek to build on and enhance students' skills of reflection on their academic, personal and professional development, increase self awareness of individual skills, qualities, attitudes and capabilities; improve their learning and performance by encouraging and enabling student to take responsibility for their own development and further develop the necessary skills for independent learning. By the completion of their programme of study, and in the process of achieving this objective, students should be able to identify their own strengths, weaknesses and needs and direction for change; set goals and plan action for developing, monitoring and reviewing their own progress; compile their own records of learning experiences and achievement, including progress reviews, personal reflections and action plans; plan realistically for their career progression and manage their own career development and lifelong learning. This is all facilitated by the course team in UCLan Nuclear within the School of Computing, Engineering and Physical Sciences. Students in permanent employment are encouraged to integrate their PDP within their employer's development planning documentation.

16. Admissions criteria

Programme Specifications include minimum entry requirements, including academic qualifications, together with appropriate experience and skills required for entry to study. These criteria may be expressed as a range rather than a specific grade. Amendments to entry requirements may have been made after these documents were published and you should consult the University's website for the most up to date information.

Students will be informed of their personal minimum entry criteria in their offer letter.

All candidates will be judged on an individual basis. In addition to the basic English Language and Mathematics qualifications, the standard entry criteria are one of the following:

● Honours degree in Nuclear Engineering, Nuclear Science or similar subject (or equivalent)

● EC Accredited Honours degree (to IEng at UK-Spec) in any engineering subject relevant to design, construction, operation, decommissioning or waste treatment/storage in the nuclear industry.

● Honours degree in any scientific, engineering, technology, safety or environmental subject.

● Honours degree in any law, business, management, or nuclear-relevant inexact or social science (e.g. Psychology) at grade 2:2 or above (or equivalent)

● Any upper second class or first class honours degree (or equivalent)

Notes: 1. The basic English Language qualifications required are grade C at traditional 'O' level / GCSE, IELTS 6.5 or equivalent. This can be demonstrated though a prior degree

where the International Office accepts the previous institution as suitable. 2. The basic Mathematics qualifications required are grade C at traditional 'O' level / GCSE or any Level 2 award in mathematics (or better). This can be demonstrated through a prior degree where that degree is accepted as 'numerate'. 3. Students without honours (or equivalent) may be accepted onto the course if they either (i) possess HND or FD and have substantial post qualification experience in a graduate role in a high-reliability or manufacturing industry, or (ii) have professional status or possess professional awards for access to a professional grade that normally requires an honours degree (e.g. Chartered status awarded through 'Grandfather Rights' or successful completion of EC exams).
17. Key sources of information about the programme
• University web site (www.uclan.ac.uk)
• UCLan Nuclear website http://www.uclan.ac.uk/information/uclan/nuclear/nuclear.php
• Course Leader and Admissions Tutor: Geoff Vaughan
• Director of UCLan Nuclear: Professor Laurence Williams
• Academic Lead & Head UCLan Nuclear Research: Dr Ian Butchart & Dr Jonathan Francis

18. Curriculum Skills Map

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O)	Programme Learning Outcomes														
				Knowledge and understanding					Subject-specific Skills				Thinking Skills				Other skills	
				A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	C4	D1	D2
LEVEL 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	Comp		✓		✓								✓		✓	
	SC4102	Nuclear Law, and Nuclear Safety Regulation	Comp	✓		✓		✓		✓	✓					✓	✓	✓
	SC4103	The Delivery of Nuclear Safety	Comp			✓		✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

UNIVERSITY OF CENTRAL LANCASHIRE

Programme Specification

This Programme Specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

25. Awarding Institution / Body	University of Central Lancashire
26. Teaching Institution	University of Central Lancashire
27. University Department/Centre	School of Engineering
28. External Accreditation	None
29. Title of Final Award	PGCert Nuclear Security & Safeguards
30. Modes of Attendance offered	Part time
31. UCAS Code	N/A
32. Relevant Subject Benchmarking Group(s)	None - UK-SPEC is relevant but is not suitable as a adjunct specification for this course (see Appendix)
33. Other external influences	IAEA (International Atomic Energy Agency) WINS (World Institute of Nuclear Security) OECD Nuclear Energy Agency
34. Date of production/revision of this form	January 2013
35. Aims of the Programme	
The generic aims of the programme are for each student to develop career-enhancing skills in nuclear security & safeguards, with broad knowledge of the legal framework, regulation, management and means for their delivery in both a national and international setting, thereby empowering that person to evaluate nuclear security & safeguards requirements and modern practice and enabling that person to take a leadership role to provide a valuable contribution to	

nuclear and materials security; and encouraging the application of reflective practice and postgraduate thinking skills.

36. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1. Correlate and critically examine the legal and regulatory instruments that dictate how policy is implemented in relation to Nuclear Security and Nuclear Safeguards.

A2. Review and discuss the fundamental technologies associated with energy production and the nuclear fuel cycle, from its cradle to its grave.

A3. Compare and contrast theoretical approaches to managing risk and critically discuss the essential characteristics of modern practice for evaluating and dealing with threats to Nuclear Security.

A4. Explain and debate how the development of nuclear technology has influenced nuclear security in the civil nuclear industry.

A5. Expound and critically evaluate the means by which Nuclear Security and non-proliferation safeguards arrangements are established, managed, monitored and controlled.

Teaching and Learning Methods

Teaching will be through lectures, discussion, case examples and directed reading, with post-teaching tutorials. Learning is supplemented by independent study of literature and critical thinking (evaluation). A key element of the teaching and learning strategy is to mix formal academic lectures with guest specialist practitioners/speakers.

Assessment methods

Essays target the historical and potential future development of nuclear power and the special nature of the materials required. Assignments requiring the synthesis of taught material and independent study are submitted in the form of a report to demonstrate depth of knowledge and an understanding of the complexity and inter-relationships within a subject. Examination tests a student's knowledge of fundamentals, independent evaluation of the subject, understanding of impact/influences and understanding of the value of differing approaches. Both written discussion and structured formal debate (in forum) are part of the assessment techniques used

B. Subject-specific skills

B1. Apply threat or vulnerability assessment to selected nuclear facilities and their physical environments.

B2. Discuss and critically review the essential characteristics of and security plans when applied throughout the lifecycle of a nuclear facility

B3. Demonstrate a professional approach to licensing of nuclear facilities and relevant performance evaluation; and implement learning from experience.

B4. Discuss the essential characteristics of the international regime for non-proliferation safeguards and apply tools and techniques for the delivery of an effective nuclear safeguards regime.

Teaching and Learning Methods

As (A) plus field trips

Assessment methods

As (A) but with subject-specific skills application (e.g. in one's own place of work). The reports can be reflective in nature.

C. Thinking Skills

C1. Apply and combine technical and non-technical knowledge to assess practical engineering and management solutions to Nuclear Security and Safeguards problems
C2. Synthesis of information (e.g. empirical data, codified/standardised information, primary data, etc) to derive or analyse security matters.
C3. Critically evaluate the political, environmental, social and economic context from which are derived national and international security and safeguards concerns.
C4. Critically evaluate Nuclear Security guidance and/or practice

Teaching and Learning Methods

As (B)

Assessment methods

As (B)

D. Other skills relevant to employability and personal development

D1. Communicate effectively through writing and presentation to a diverse audience.

D2. Use reflection to evaluate personal practice and respond to the demands of best practice guidance and policy/legal regulation frameworks affecting nuclear security and materials safeguards.

Teaching and Learning Methods

Independent learning and report writing are developed in the assignment preparation classes and induction. Presentation skills and debating skills are practiced in post-pulse tutorials. Terminology is taught through all modules and reflection on past collective experience is also used.

Assessment methods

Reports, essays, presentation, debate and examinations.

13. Programme Structures				**14. Awards and Credits**
Level	**Module Code**	**Module Title**	**Credit rating**	

Level 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	20	**PgCert Nuclear Security & Safeguards** Requires 60 credits Award with Merit is made with an APM at 60% or greater; or award with Distinction at 70% or greater.
Level 7	SC4104	Nuclear Law, and Nuclear Security and Safeguards Regulation	20	
Level 7	SC4105	The Delivery of Nuclear Security and Safeguards	20	

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17. Key sources of information about the programme

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LEVEL 7	SC4101	Nuclear Energy and the Nuclear Fuel Cycle	Comp		✓		✓								✓		✓	
	SC40104	Nuclear Law, and Nuclear Security and Safeguards Regulation	Comp	✓		✓	✓	✓		✓	✓					✓	✓	✓
	SC4105	The Delivery of Nuclear Security and Safeguards	Comp			✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓