Quality Handbook

Programme Specification Template - Postgraduate

SECTION A: CORE INFORMATION

1. Name of programme:

2. Award title:
   MSc in AI and Machine Learning
   Post Graduate Diploma in AI and Machine Learning
   Post Graduate Certificate in AI and Machine Learning

3. Programme linkage:
   Is this part of group of linked programmes between which students can transfer at agreed points? (e.g. a group of programmes with a common set of taught modules)
   No

4. Is the programme a top-up only?   No
5. Level of award: Level 7

6. Awarding body: University of Sunderland

7. Department: **Faculty of Technology**

8. Programme Studies Board: **Computing Postgraduate**

9. Programme Leader: **Dr David Nelson**

10. How and where can I study the programme?

At Sunderland:	
Full-time on campus	X
Part-time on campus	X
As work-based learning full-time	
As work-based learning part-time	
As a full-time sandwich course	
As a part-time sandwich course	
By distance learning	

At the University of Sunderland London campus:	
Full-time on campus	
Part-time on campus	
As work-based learning full-time	
As work-based learning part-time	
As a full-time sandwich course	
As a part-time sandwich course	
By distance learning	

At a partner college:	
Full-time in the UK	
Part-time in the UK	
Full-time overseas	
Part-time overseas	
By distance learning	
As a full-time sandwich course in the UK	
As a part-time sandwich course in the UK	
As a full-time sandwich course overseas	
As a part-time sandwich course overseas	
As work-based learning full-time in the UK	
As work-based learning part-time overseas	
Other (please specify)	

11. How long does the programme take?

	Min number of years / months	Max number of years / months
Full-time	12 months	42 months
Part-time	24 months	72 months
Distance learning		
Work-based learning		

For start-dates please see the current edition of the Prospectus or contact the relevant department at the University. For start-dates for programmes delivered in a partner college, please contact the college.

SECTION B: FURTHER CORE INFORMATION

24. **Learning and teaching strategy**

The general learning, teaching and assessment strategy used within this programme reflects the Faculty standard for postgraduate taught programmes and embraces the Faculty Learning and Teaching Plan. The fact that the MSc in AI and Machine Learning is dealing with graduates and educating them to Masters level means that the students are expected, and have the ability, to carry out a significant quantity of independent study. This may take the form of directed reading of lectures, labs, formative exercises, research papers, research reports and advanced technical material, applied practical work utilising the tools and techniques, algorithms appropriate to AI and Machine Learning problem-based learning.

The programme is designed to enable students to learn about the paradigms, principles, theories, algorithms and procedures associated with AI and Machine Learning and to apply these in a series of practical, exciting and innovative ways. The programme encourages students to learn from leading researchers and practitioners in AI and Machine Learning and as such lectures are underpinned with the opportunity to solve real world AI and Machine Learning. Where possible these will be set from industrial and business contexts and case studies.

The case studies will be derived from collaborative partnerships from public and private sectors, for example from the NHS, Generic AI, IBM, Unified Software, insource, Sunderland Software Centre, Ryelore, Unified Software, Daykin and Storey, IBM and Sunderland Medical School.

The intention is to give students an environment to:
- Develop research skills, scientific writing, critical analysis and understand AI and Machine Learning and related issues;
- Identify opportunities to utilise and apply AI and Machine Learning principles and techniques in the design and implementation of robust AI systems;
- Develop their own views on ethical issues and the underpinning of AI;
- Prepare students for career development in the AI and Machine Learning domain.

Negotiated learning is mainly used within the project module of this programme, but some of the assessment topics for modules are a mix of set and (e.g. "Foundations of AI and Machine Learning") negotiated assessments. In the project module, the negotiation will centre on the terms of reference that the student wishes to propose. A central objective within the terms of reference of PROM02 will be the delivery of the product or artefact required by the client. However, the route by which this is achieved, and the topic and scope of the research that will interlink with it, are decided under negotiation between the student and supervisor (these decisions will be ratified during formal project reviews).

The AI and Machine Learning provision is underpinned by strong collaboration with employers as indicated in the use of case studies above. The provision is further enhanced by the contribution from AI and Machine Learning employers and external experts in a number of ways including, although not limited to, a series of guest lectures, master classes and seminars. The external input provides a range of different perspectives and helps to maintain the currency of the programme.

As indicated in sections 28 and 32 of this document, the MSc in AI and Machine Learning is heavily influenced by the research interests of the academics involved in the delivery of the modules. The MSc

in AI and Machine Learning utilises the "research active curriculum" which enables MSc students to benefit from research in the Faculty and participate as researchers as an integral part of their studies.

The programme has been designed to equip students with the necessary research skills required both for the programme and for future academic or employment in the subject. The programme is heavily informed by research, and is taught throughout the programme. The Foundations of AI module teaches students the key academic skills to be able to carry out research across the programme. The PROM02 project module has a number of project preparation sessions where students' key research skills are taught and developed in order that they can complete a project which contains a substantial research element and where the outcome is an academic research paper.

25. Retention strategy

Support and guidance is offered to students through a comprehensive set of mechanisms in order to address retention. In addition to the details provided in the student support section retention on the MSc AI and Machine Learning programme will be addressed via student support and guidance, access to programme leader, module leaders, and personal tutors, during induction, via programme information (programme handbook), and access to student services and pastoral support.

All students have access to their Programme and Module Leaders as appointments can be made with staff. Students' problems generally will be dealt with through the Programme Leader. The students also have representation on the Boards of Studies and the Staff Student Liaison Committees. Programme Leaders meet regularly with their tutees to take soundings and obtain feedback on various issues, and to talk to students individually to provide important academic guidance.

All students have access to a personal tutor. Students can also request to speak to their personal tutor or programme leader in confidence regarding any personal issues. In the case where a student, for example, would feel uncomfortable speaking with their personal tutor or programme leader (for example a female student may wish to speak with a female member of staff) then the personal tutor or programme leader will attempt to arrange for the student requests to be met as soon as possible.

All on-campus students have access to the University's central support services including Counselling, Disability Service, Health and Well-being, Chaplaincy, financial support and advice, International Office and Careers and Employability Service. The Students' Union provides an independent service which offers advice and support across the full range of personal and academic problems which students may encounter. Students wishing to lodge a complaint or an appeal can seek advice from the Students' Union or from Academic Registry. Full details of all these services can be found on the University's web-site. Where appropriate, academic or support staff in the Faculty will sign-post students to these specialist services.

26. Any other information

The programme has been designed to incorporate the University's principles and expectations of "inclusive programme design" in particular taking into account the requirements and availability of learning materials in hard copy / printed copy and online (taking into account W3C standards) – alternative formats will be signposted. All teaching and learning activities (see below) are designed to be inclusive by anticipating the most common problems that students with wide ranging levels of abilities may face. The teaching on the programme will embrace the principles of inclusive design for

example by making whole module sets of material available in advance for students, use of vocabulary lists, facilitating recording of sessions, etc. The resources to be used on the programme comply with disability access requirements for University buildings – mainly in David Goldman Informatics Centre.

The Faculty of Technology utilises centralised disability support services to assess all students who require support on an individual basis. This is to ensure that appropriate support is identified and that a schedule is implemented to provide that support as necessary.

SECTION C: TEACHING AND LEARNING

27. What is the programme about?

The aims of the programme are to:

> Provide you with advanced knowledge of AI and Machine Learning topics and specialist areas including AI paradigms, cognitive AI, intelligent decision systems, neuroscience, deep learning in areas such as training machine learning systems, natural language processing, vision and image search and chat bot systems. Skills on relevant platforms and development tools are taught. Also, skills in research techniques, scientific writing and critical discussion will be promoted.

> Develop your research skills applicable to a career as an AI and Machine Learning professional in industry or business or academia.

> Stimulate your interest in the numerous applications of AI and Machine Learning, including artificial intelligence / machine learning; and professional and ethical issues in AI and Machine Learning.

28. What will I know or be able to do at the end of the programme?

Learning Outcomes Postgraduate Certificate – Skills
By the end of this part of the programme successful students should know, understand or be able to do the following:
- **S1** Independently and objectively, critically review, consolidate and extend their knowledge to produce a systematic and coherent body of information in the context of AI and Machine Learning
- **S2** Work independently and make objective decisions relating to complex AI and Machine Learning problems and challenges
- **S3** Utilise and exploit the range of opportunities afforded by the application of AI and Machine Learning principles, policies and procedures in specific contexts and settings

Learning Outcomes Postgraduate Certificate – Knowledge
By the end of this part of the programme successful students should know, understand or be able to do the following:
- **K1** undertake a thorough appraisal and understanding of a broad range of principles and practices in AI and Machine Learning
- **K2** develop a thorough and critical understanding of key aspects of AI and Machine Learning as an academic discipline
- **K3** critically apply appropriate research techniques with reference to studying AI and Machine Learning

- **K4** understand at a conceptual level the theoretical underpinnings of AI and Machine Learning

Learning Outcomes Postgraduate Diploma – Skills

By the end of this part of the programme successful students should know, understand or be able to do the following:

- **S4** design, build and evaluate complex ecosystems required in the development and implementation of AI and Machine Learning applications using a wide range of methods, tools, techniques, languages and platforms
- **S5** create robust AI and Machine Learning environments and integrate them with supporting architectures and infrastructures to produce reliable systems, networks, applications and procedures
- **S6** evaluate the issues associated with AI and Machine Learning and the impact on society and ethics
- **S7** apply creativity, innovation and enterprise to AI and Machine Learning problems and opportunities

Learning Outcomes Postgraduate Diploma – Knowledge

By the end of this part of the programme successful students should know, understand or be able to do the following:

- **K5** have a critical awareness of the legal, professional, ethical, social and security issues associated with AI and Machine Learning
- **K6** develop an appreciation of how architectures, infrastructure, operating systems, platforms and software interoperate to support AI and Machine Learning environments, ecosystems and applications
- **K7** critically evaluate a range of processes, procedures and strategies, technologies and techniques utilised in AI and Machine Learning

Learning Outcomes Masters – Skills

By the end of this part of the programme successful students should know, understand or be able to do the following:

- **S8** design and undertake independently, a major research project on a topic which relates to the forefront of the academic discipline of AI and Machine Learning and reflect extensively and objectively on method, process and outcomes
- **S9** independently conduct research or advanced technical or professional activity on a project whose title is in the domain area of AI and Machine Learning demonstrating self-direction and originality in tackling and solving problems, and critically evaluating sources
- **S10** deal with complex issues in AI and Machine Learning both systematically and creatively, make informed judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences

Learning Outcomes Masters – Knowledge

By the end of this part of the programme successful students should know, understand or be able to do the following:

- **K8** critically apply management concepts and techniques, including the use of advanced tools for the management of AI and Machine Learning research projects
- **K9** apply advanced knowledge in a highly specialised area, application or specialism in the discipline of AI and Machine Learning, via an individual project

29. What will the programme consist of?

Taught postgraduate programmes generally consist of a number of taught modules leading to the award of a Postgraduate Certificate (60 credits) or Postgraduate Diploma (120 credits). A Masters qualification (180 credits) usually culminates in a major piece of independent work such as a project or dissertation. All modules are at postgraduate level (level 7 in the UK's national scheme). The summary below describes briefly what is contained in the programme. The programme structure, including a detailed list of modules, can be found in the [programme regulations](#).

The Masters in AI and Machine Learning provides you with a thorough grounding in the creation of AI and Machine Learning solutions for medical informatics, prediction of fraud, summarising documents and translation, automated factories, intelligent decision systems, robotic control systems, preventing cyber-attacks and developing the skills to determine, establish and maintain AI and Machine Learning infrastructures for self-driving vehicles. You will have the opportunity to examine the underlying technologies of AI and Machine Learning systems and develop a critical awareness of the ethical issues in their use. You will have the opportunity to learn how to select the appropriate tools and techniques to develop AI systems for industry and research; and develop the technical and interpersonal skills to explain, apply and evaluate the concepts of trust in contexts of human-robot collaboration.

This programme will develop skills and knowledge to provide graduates with the confidence to apply Machine and tools and techniques; to be innovative in using AI and Machine Learning skills; solve AI and Machine Learning problems in research and industry, create opportunities for new products and services to make the NE & UK highly productive.

CETM41 Fundamentals of AI and Machine Learning. In this 30 credit module students will set the scene of the scene for the MSc AI & Machine learning. It will introduce the main paradigms of AI, research methodologies, foundational algorithms and societal, ethical, professional, legal and philosophical aspects of AI. In this module students will learn how to develop AI systems (in e.g. Python); handle data, and use and implement key algorithms; undertake research and understand AI research methodologies and for their own personal views on societal, ethical, professional, legal and philosophical aspects of AI.

CETM42 Augmented AI Augmented AI systems are intended to aid human users in decision making by supporting their natural cognition. Intelligent Decision Support Systems are able to learn knowledge in order to advise in a wide range of domains. Allied with Intelligent decision support systems are the natural language interfaces (such as chat bots) which enables users dialogue with advice. This module will enable students to understand intelligent decision systems and natural language interfaces as well as develop them. Leading edge systems include: predict and ameliorate hospital patient outcomes, assist with investment decisions, purchasing decisions and monthly cash flow predictions.

CETM43 Cognitive Deep Learning The aim of this module is to introduce and formalize both theoretical and technical principles of cognitive learning, in relation to artificial neural networks and deep neural networks. Beginning with an introduction to simple linear classification and an overview of pertinent considerations such as optimization and backpropagation, students will develop their understanding of how deep learning can be applied across a variety of application domains (for example deep natural language processing and deep machine vision).

CETM47 Machine Learning and Data Analytics This module introduces the trends, tools, and current developments in the area of Machine Learning, Data Mining and Data Analytics and their practical applications. This module will cover Information management, knowledge management, problems with data and Machine learning, support vector machines, ensemble methods, data mining, clustering and classification. The module also covers diagnostic analytics and methodology.

Students who pass 60 credits from the taught modules may be eligible for PG Cert. Students who pass an additional 60 credits from the taught modules are then eligible for a Postgraduate Diploma in AI and Machine Learning.

The final part of the MSc programme consists of a 60-credit project module **PROM02**. In this module the student will develop a practical deliverable as well as investigate an area of academic research that informs the practical aspect of the project. Wherever possible the project will have a real client, who may come from either inside or outside of the institution and has a need for a real practical deliverable in the domain of AI and Machine Learning.

PG Cert, PG Diploma and MSc requirements are summarised in the table below. Full detail of module name and assessment are available in the appendices.

Post Graduate Certificate in AI and Machine Learning	To obtain PG Certificate students need to pass any two modules from CETM41, CETM42, CETM43 and CETM47
Post Graduate Diploma in AI and Machine Learning	To obtain PG Diploma students need to pass CETM41, CETM42, CETM43 and CETM47
MSc in AI and Machine Learning	To obtain MSc students need to pass all modules for PG Diploma and also the 60 credit project module PROM02

30. How will I be taught?

Scheduled teaching activities	X
Independent study	X
Placement	

Students will be given the opportunity to study the range of AI and Machine Learning subjects using a variety of different teaching and learning approaches. The topics in the various modules will normally be introduced through a series of lectures led by academics who are active researchers in the subject matter and supported by guest lecturers from business and industry. The topics in the programme will normally include an examination of the theoretical aspects of the range of AI and Machine Learning topics followed on with applied and practical activities.

Students will have the opportunity to examine and evaluate the environment AI and Machine Learning at individual, organisational and national level and as such the need and rationale for AI and Machine Learning. Students will develop skills in a range of topics including: data preparation, algorithm choice, AI paradigms, tools such Python, brain-like cognitive deep learning, language dialogue, vision, and augmented AI (such as intelligent decision systems), philosophical underpinnings of AI, and the creation of AI and Machine Learning solutions for medical informatics, prediction of fraud, summarising documents and translation, automated factories, intelligent

decision systems, robotic control systems, preventing cyber attacks and developing the skills to determine, establish and maintain AI and Machine Learning infrastructures for self-driving vehicles.

All of the subjects and modules in the programme are aimed at developing professionals who understand the professional requirements and issues of the various roles in AI and Machine Learning, such as: AI developer, Researcher in AI, Machine Learning Specialist, Python Specialist, AI Data Scientist, Data Mining and top jobs are Natural Language Processing, Computer Vision and the area of predictions/insights/recommendations. Graduates will able to evaluate AI and Machine issues, challenges and opportunities taking into account legal, social and ethical considerations.

Students will have the opportunity to apply AI and Machine Learning principles to real world problems. The programme will develop the students' research skills by encouraging them to participate in research into AI and Machine Learning topics, deliver research seminars and present the findings of their research. Students will have the opportunity to explore the subjects in depth through guided independent study. A key approach to teaching and learning utilised in the MSc AI and Machine Learning is Problem Based Learning.

The objective of the students-staff time in lectures is to introduce theories, concepts case studies and scenarios and to set milestones and learning goals, and make new ideas and concepts accessible to the students. These ideas are then followed up in tutorials and in the students' own time. Tutorials / seminars and laboratory activities are used within each module to provide support for lectures – giving students the opportunity to apply theoretical concepts to practical problems. Many of these practical problems will be set in collaboration with industrial and business partners to the University including NHS, Generic AI, IBM, Unified Software, insource, Sunderland Software Centre, Ryelore, Unified Software, Daykin and Storey, IBM. The prime objectives of tutorial time are to allow in-depth study of particular topics that have been introduced and also for practical exercises. As well as requiring a significant amount of individual study, the course also encourages group working. This is in recognition of the fact that a graduate of the course will normally be employed in environments where significant demands will be made upon his or her ability to co-operate and collaborate with others.

In addition students are expected, and have the ability, to carry out a significant quantity of independent study. Students will be supported in developing the skills to do this for example in *CETM43 Cognitive Deep Learning*, and *CETM41 Fundamentals of AI and Machine Learning*. This may take the form of directed reading of research papers and advanced technical material, research activities, or practical work on various software problems and packages. The level of independence increases throughout the programme culminating in the project module, PROM02, where students have the opportunity to demonstrate knowledge and skills from the taught modules and take them to a higher level.

As well as developing skills and abilities in the domain of AI and Machine Learning, students will have the opportunity to develop Masters level skills, including, but not limited to: research skills (across all modules); gathering and using information; synthesising information/data; applying methodologies; applying concepts; creating new concepts/ideas/products; analysing and evaluating (technical aspects of AI and Machine Learning; as well the effectiveness of ethical policies, procedures and strategies); critical reasoning, and information retrieval skills.

In the AI and Machine Learning project students will have the opportunity to apply legal, ethical, social and professional issues (LSEPIs) when designing their project study and use LSEPIs to underpin the approach and all communication with the client. The professional body (British Computer Society) expectations are embedded throughout the programme – which will help with any students seeking to develop their careers by obtaining charted status (CITP or CEng).

Throughout the programme students will have the opportunity to develop the professional skills required for a career in AI and Machine Learning including team working, problem solving, effective communications (written and verbal) and decision making. A common theme in the development of skills is the development of confidence to handle, manage and communicate in the AI and Machine Learning domain. Students will be encouraged to develop their AI and Machine Learning skills in such a way as to utilise the skills whilst maintaining confidentiality and integrity.

A list of the modules in the programme can be found in the Programme Regulations.

A summary of the types of teaching, learning and assessment in each module of the programme can be found in the Matrix of Modes of Teaching.

31. How will I be assessed and given feedback?

Written examinations	
Coursework	X
Practical assessments	X

A summary of the types of teaching, learning and assessment in each module of the programme can be found in the Matrix of Modes of Teaching.

The generic assessment criteria which we use can be found here. Some programmes use subject-specific assessment criteria which are based on the generic ones.

This programme uses the Generic University Assessment Criteria	**YES**	~~NO~~
This programme uses the Subject Specific Assessment Criteria	~~YES~~	**NO**

The University regulations can be found here.

The assessment throughout this programme is a mixture of methods appropriate to the modules under study. Each assessed 30 credit module will typically have two assessments.

The students experience a diverse range of assessment strategies across the programme, enabling them to display various skills associated with Masters level learning. This will include research papers, creation of AI and Machine Learning solutions (design, implementation, evaluation and training), analysis of AI and Machine Learning problems and, application of AI and Machine Learning tools and techniques, formal paper reviews, and presentations. The assessment strategies chosen within each module are appropriate to the content and style of delivery and have been further selected in order to provide a rich mixture of diverse assessment strategies while ensuring that the module aims and objectives can be accurately assessed.

Individual assignments (such as CETM41 Foundations of AI & Machine Learning) include different forms of assessment strategies such as reports, papers and system development.

Every attempt is made to ensure that the assessments are based on real world problems and challenges, with assessment briefs being developed in collaboration with industrial and business partners where appropriate and as such have relevance to employers and help develop employability criteria for students.

The project module PROM02 encompasses a wide range of assessment styles whereby students produce a practical deliverable for a real client, a substantial and methodical research report which informs development of the practical deliverable and which must be relevant to the programme, a thorough evaluation of all stages of the project, and documentation evidencing project management and control of a substantial project.

The University aims to return marked assessments and feedback within 4 working weeks of the assignment submission date after internal moderation process have been completed. If this is not possible, students will be notified by the Module Leaders when the feedback is available and how it can be obtained.

The Academic Misconduct Regulations and associated guidance can be found here. It is the responsibility of students to ensure they are familiar with their responsibilities in regards to assessment and the implications of an allegation of academic misconduct.

Students should refer to the University Regulations for information on degree classifications.

32. Teaching, learning and assessment matrix

Matrix of modes of teaching, learning and assessment - MSc

NB. Not all option modules may be offered in any one academic year and will depend on the availability of staff and the priorities of the school. In addition, modules will usually need to be selected by a minimum number of students. Option modules may be available on more than one programme and the Programme Leaders will liaise with the Faculty Management Team to ensure there is a reasonable amount of choice in any given year.

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO S1	LO S2	LO S3	LO S4	LO S5	LO S6	LO S7	LO S8	LO S9	LOS10
Fundamentals of AI and Machine Learning	CETM41	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed	Taught Developed Assessed
Cognitive Deep Learning	CETM43	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Developed Assessed	Developed	Developed
Augmented AI	CETM42	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Developed	Developed	Developed
Machine Learning and Data Analytics	CETM47	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed	Taught Developed Assessed			
Computing Master's Project	PROM02	Core	Lectures, Tutorials, Self Study	Coursework	Developed	Developed	Developed	Developed Assessed	Developed Assessed	Developed	Taught Developed	Taught Developed	Taught Developed	Taught Developed

					LO K1	LO K2	LO K3	LO K4	LO K5	LO K6	LO K7	LO K8	LO K9
										Assessed	Assessed	Assessed	Assessed

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO K1	LO K2	LO K3	LO K4	LO K5	LO K6	LO K7	LO K8	LO K9
Fundamentals of AI and Machine Learning	CETM41	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed	Developed
Cognitive Deep Learning	CETM43	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Developed
Augmented AI	CETM42	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Developed
Machine Learning and Data Analytics	CETM47	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Developed
Computing Master's Project	PROM02	Core	Lectures, Tutorials, Self Study	Coursework	Assessed	Developed	Taught Developed	Developed	Taught Developed Assessed		Developed Assessed	Taught Developed Assessed	Taught Developed Assessed

Matrix of modes of teaching, learning and assessment – PG Diploma

NB. Not all option modules may be offered in any one academic year and will depend on the availability of staff and the priorities of the school. In addition, modules will usually need to be selected by a minimum number of students. Option modules may be available on more than one programme and the Programme Leaders will liaise with the Faculty Management Team to ensure there is a reasonable amount of choice in any given year.

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO S1	LO S2	LO S3	LO S4	LO S5	LO S6	LO S7
Fundamentals of AI and Machine Learning	CETM41	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Cognitive Deep Learning	CETM43	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed
Augmented AI	CETM42	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Machine Learning and Data Analytics	CETM47	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed	Taught Developed Assessed

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO K1	LO K2	LO K3	LO K4	LO K5	LO K6	LO K7
Fundamentals of AI and Machine Learning	CETM41	Core	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed
Cognitive Deep Learning	CETM43	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed
Augmented AI	CETM42	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed	Taught Developed Assessed
Machine Learning and Data Analytics	CETM47	Core	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed

Matrix of modes of teaching, learning and assessment – PG Certificate

NB. Not all option modules may be offered in any one academic year and will depend on the availability of staff and the priorities of the school. In addition, modules will usually need to be selected by a minimum number of students. Option modules may be available on more than one programme and the Programme Leaders will liaise with the Faculty Management Team to ensure there is a reasonable amount of choice in any given year.

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO S1	LO S2	LO S3
Fundamentals of AI and Machine Learning	CETM41	Option	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Cognitive Deep Learning	CETM43	Option	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Augmented AI	CETM42	Option	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed	Taught Developed Assessed
Machine Learning and Data Analytics	CETM47	Option	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed

Module	Code	Core / optional	Modes of T&L	Modes of Assessment	LO K1	LO K2	LO K3	LO K4
Fundamentals of AI and Machine Learning	CETM41	Option	Lectures, Labs, Independent research, formative ex., Self-study	Coursework	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Cognitive Deep Learning	CETM43	Option	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed
Augmented AI	CETM42	Option	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed Assessed	Taught Developed Assessed	Taught Developed	Taught Developed Assessed
Machine Learning and Data Analytics	CETM47	Option	Lectures, Labs, Independent research, formative ex., Self-study		Taught Developed	Taught Developed Assessed	Taught Developed Assessed	Taught Developed Assessed

*Indicates a compulsory module which must be successfully passed for progression to further modules or to the next academic year of study

33. How does research influence the programme?

The Faculty of Technology is committed to the close coupling of research and teaching activities so that our research underpins the teaching we deliver. Research active staff are involved in the delivery of teaching across the complete range of our programmes. We actively map teaching teams to modules based on the relevance of their current activities and previous experience. The resulting cross-fertilisation of research and teaching means that our modules remain current in the rapidly developing field of AI and Machine Learning.

The MSc programme in AI and Machine Learning is heavily influenced by the research interests of the academics involved in the delivery of the modules. All of the academics involved in developing this programme were returned in the REF 2014. Academic expertise in artificial intelligence, machine learning, data analytics and big data are embedded throughout the modules on the programme and underpin the learning outcomes of the MSc. Current research projects will be utilised to provide case studies and examples in the research active curriculum. Research specialisms and interests from colleagues in the faculty teaching on the programme include (but are not limited to): using AI to thwart cyber-attacks, detecting fraud in real-time transactions, plagiarism, learning from noisy data, evolutionary algorithms, intelligent medical informatics and deep natural language, and novel techniques for creating new human readable knowledge. Examples of current projects include: IBM Watson, deep learning for summarisation, generating code to plug vulnerabilities with GAs.

The MSc in AI and Machine Learning is heavily influenced by research both in terms of inclusion of research interests of academic staff and collaborative projects with industrial partners. The Faculty has a strong track record of Knowledge Transfer Partnerships as a means of formalising applied research, e.g. fraud detection with AI and big data.

AI and Machine Learning is one of the key research strands in the Faculty of Technology (along with Data Science, Cybersecurity, HCI/UXD and pedagogy in Computer Science) and as such has an active research group which includes 3 professors and 6 active researchers. Colleagues in the Faculty are involved in a number of collaborative projects with public and private business and industry. Students will have the opportunity to engage with the research projects.

Colleagues in the Faculty are involved in a number of external AI and Machine Learning activities and organisations including work with NHS, Generic AI, IBM, Unified Software, insource, Sunderland Software Centre, Ryelore, Unified Software, Daykin and Storey, IBM. Experience from participation and collaboration with these groups will be integrated into the curriculum providing examples and case studies as well as informing the curriculum.

We have a proud history of direct involvement from our students within our research activities. Masters projects are actively sourced from research areas in the Faculty and the University and recent publications have featured project work undertaken by students who have been included as named authors. Students have the opportunity to develop their research skills in a number of ways including as researchers through student led seminars, applying research (PROM02) and becoming part of the research community in the Faculty. Students will have the opportunity to participate in the Faculty's Research Seminar Series where one of the most active strands of the series focuses on AI and machine learning.

SECTION D EMPLOYABILITY

34. How will the programme prepare me for employment?

The programme gives you the opportunity to develop advanced skills and knowledge which you can use in the future. Some postgraduate programmes are associated with a particular career path but most skills can be applied to a range of employment situations. The skills which this programme is designed to develop are listed below.

Work with companies (e.g. NHS, Generic AI, IBM, Unified Software, insource, Sunderland Software Centre, Ryelore, Unified Software, Daykin and Storey, IBM) indicate there are local, national and international skills gaps in AI and Machine Learning, and demand is likely to grow.

Recent report findings in AI graduates and currently there are a number of employability issues including;
- The low skills base in the north of England means new will skills provide retraining and bring in new talent in NE
- Government publications since 2012 recognise AI and robotics as two key technologies for the UK
- 2 million robotics jobs are expected to be created from 2017 by 2020
- UK government has created a 20 million fund for robotics and AI as well as £17 million for university research
- UK Business secretary has also emphasises the need to use AI to increase the competitiveness of the UK economy
- March 2017 Accenture report predicts that by 2035 AI will lead to £645 billion boost to the UK as well as a 40% uplift in productivity.

The programme is a blend of theory, research informed curriculum, applied practice and problem based learning which go together to address the employability needs and skills gap issues.

There is strong employer input to the curriculum design and the delivery of the modules – with employers being consulted on curriculum content and skills required for AI and Machine Learning employment. Employers provide a valuable resource in terms of guest lectures, master classes and problem setting for the programme.

The MSc AI and Machine Learning programme has been designed in collaboration with employers regionally and nationally, including (e.g. NHS, Generic AI, IBM, Unified Software, insource, Sunderland Software Centre, Ryelore, Unified Software, Daykin and Storey, IBM. One of the primary motivations for developing the AI and Machine Learning programme was to address the skills gap in ML/AI in the region and in the UK. The programme learning outcomes, the content of the programme and the content and curriculum for each module has been designed in order to address the subject specific needs of employers. Each module has included a definition of the transferrable skills that are specifically developed in the individual modules. The transferable skills have been designed to enhance the employability of students.

Market intelligence
Feedback from Sunderland Software City, CET's Industrial Advisory Board and current national and international reports all suggest a skills gap and as such opportunities for MSc graduates in the area of AI and Machine Learning.

Employment opportunities
There is a dearth of AI capable developers in large and small businesses with the skills to develop such products. This programme will provide the up to date skills, techniques and knowledge, to re-shape the product and services offered in the NE England and beyond from programmable systems to those that are infused with cognitive intelligence.

Employment opportunities from local and national recruiters have indicated that there is a demand for AI graduates. Typical jobs are: AI developer, Researcher in AI, Machine Learning Specialist, Python Specialist, AI Data Scientist, Data Miner, (www.technojobs.co.uk, https://uk.linkedin.com/jobs/artificial-intelligence-jobs, https://www.glassdoor.co.uk/Job/uk-artificial-intelligence-graduate-jobs-SRCH_IL.0,2_IN2_KO3,35.htm). Top jobs are Natural Language Processing, Computer Vision and Predictions/Insights/Recommendations.

The IEEE reported in June 2017 that thousands of AI jobs are not being filled. UK median salaries are £40 – 70K. The adzuna.co.uk website reports 344 new jobs in 24 hours (16/2/17). The average machine learning salary is £56,844 97 which is 71.7% above the national average advertised salary of £33,105. In February 2017 there were 2000 unfilled machine learning jobs (mostly in the south of England but with 168 in the north of England). Recently (September 2018) there were 78 unfilled jobs in the NE England. There is therefore ample demand for AI related jobs.

The UK government Industry Strategy prioritises AI on big datasets in its 2018 AI sector deal which seeks to improve productivity and economic growth in the economy. This is particularly important in the NE because a lack of higher level skills are necessary to power the digital economy. We see a real need to supply a steady supply AI and machine learning graduates to develop the new products and services made in the NE.

The Faculty of Technology works closely with the University's central Careers and Employability Service to ensure that students have access to career opportunities, specialist talks and support and guidance for career development. For full time students there is a commitment to supporting students in their progression from education to work. For part time students support is given to help with career development and career progression. The Careers and Employability Service is located in the Gateway, an impressive, newly-renovated facility in the centre of the City Campus.

There are also opportunities for on-campus students outside your programme of study, for example through participation in the faculty's research seminar series.

For information about other opportunities available to our students who study on campus, click here.

Additional opportunities to develop your experiences more widely will vary if you study at one of our partner colleges. For information about the extra-curricular activities available in any of our colleges please contact the college direct.

35. Particular features of the qualification. (optional)

The following companies are interested in hosting paid or unpaid opportunities for the students including sponsoring projects: IBM, Daykin and Storey, UnifiedSoftware, Lexicon, Proforecast.

36. Professional statutory or regulatory body (PSRB) accreditation.

PSRB accreditation is not relevant to this programme	
PSRB accreditation is currently being sought for this programme	Yes
This programme currently has PSRB accreditation	

The programme is currently accredited until:

The implications of the accreditation not being renewed are:

Please see [PSRB Renewal Process](#) for information on the renewal process.

The relevant PSRB(s) is/are:

British Computer Society

The terms of the accreditation are as follows:

The programme is recognised as:

The programme is accredited dependent on

This depends upon successful completion of the programme.

Is membership of the PSRB dependent on further requirements? No

There are no programme-specific regulations relating to this award.

The modules to be studied	n/a
Pass-marks for some or all modules and/or parts (elements) of modules	n/a
Placement requirements	n/a
Attendance requirements	n/a
Professional practice requirements	n/a
Final or overall mark for the award	n/a
Other	n/a

Interim or exit awards are not accredited.

Free text for description which is not covered by the options above.

SECTION E: PROGRAMME STRUCTURE AND REGULATIONS

See Appendix 1.

SECTION F: ADMISSIONS, LEARNING ENVIRONMENT AND SUPPORT

40. What are the admissions requirements?

Entry point (delete those not required)	Standard entry requirements[1]	Entry with advanced standing[2]	Other[3]
Level 7 (Masters awards) – start of programme	An honours degree (2:2 or above) or equivalent in a computing or related non-computing discipline (which must be in mathematics,	Not applicable	Students who have 5 years relevant business or industry experience in software development, formal computing, statistics,

	statistics or engineering subject areas)		data science, AI or machine learning
Level 7 (Masters awards) – after Certificate	Not applicable	Not applicable	
Level 7 (Masters awards) – after Diploma	Not applicable	Not applicable	

Applicants whose first language is other than English must fulfil the University's minimum language skills requirement through one of the accepted mechanisms.

The University's standard admissions requirements can be found in the university regulations. Programme-specific requirements which are in addition to those regulations are given below.

Can students enter with advanced standing?	~~Yes~~	No

The University has a process by which applicants whose experience to date already covers one or more modules of the programme they are applying for may seek Accreditation of Prior Learning (APL). Full details can be found here but if you think that this may be relevant to you, please contact the department which offers the programme you are interested in.

APL and APEL are not normally applied in this programme.

41. What kind of support and help will there be?
    a. in the department:

The overall strategy for support and guidance is three-pronged: accessibility to staff and resources; provision of relevant and reliable information; and operation of a responsive system for managing problems as they arise.

Support and guidance is offered to students through a comprehensive set of mechanisms. All new students are given a week-long induction programme during which time they are exposed to various aspects of student academic life and much information on the University and its Services, the Faculty of Technology and their chosen programme of study. They are provided with programme information, talks by programme and module staff, library visits, talks by representatives from a number of important student services such as the International Office and the University language Scheme including English for Academic Purposes for students whose first language is not English.

All students have access to their Programme and Module Leaders as appointments can be made with staff. Students' problems generally will be dealt with through the Programme Leader. The students also have representation on the Boards of Studies and the Staff Student Consultative Committees. Programme Leaders meet regularly with their tutees to take soundings and obtain feedback on various issues, and to talk to students individually to provide important academic guidance.

Library facilities for students are provided across both campuses and offer an innovative learning environment, an electronic environment which offers access to online resources, the campus network and the Internet, and areas for group and individual study. A summary of the major features of the Web provision, which will be available to the students, is given below:

- complete staff list, telephone numbers, Email addresses and module responsibilities;
- complete list of Faculty of Technology programmes, modules with links to programme structures and module descriptors;
- generic student handbook including links to Faculty home pages, University sites e.g. Student Services, Careers, Information Services, Campus maps and various Faculty and University policy documents e.g. rules on infringement, the Modular Credit Scheme and Teaching & Learning policies;
- health & Safety advice;
- the use of Canvas (on-line learning environment) to act as a student support and feedback mechanism.

All students have access to a personal tutor. At postgraduate level the students' personal tutor is normally their programme leader. Students can request to speak to their programme leader in confidence regarding any personal issues. In the case where a student for example would feel uncomfortable speaking with their programme leader (for example a female student may wish to speak with a female member of staff) then the programme leader will attempt to arrange for the student requests to be met as soon as possible.

b. *in the university as a whole:*
   The University provides a range of professional support services including wellbeing, counselling, disability support, and a Chaplaincy. Click on the links for further information.

c. *in a partner college:*
   Please see the relevant college prospectus or website for details of student support if you are planning to study in one of our partner colleges.

42. What resources will I have access to?

On campus	X	In a partner college		By distance learning	

On campus
Tick all that apply

General Teaching and Learning Space	X
IT	X
Library	X
VLE	X
Laboratory	X
Studio	
Performance space	
Other specialist	
Technical resources	X

In terms of our teaching staff, the module leaders have been chosen with regard to their expertise in the subject area and in many cases they, and their teaching team, are working on relevant research and/or external engagement projects. This enables staff to practice research informed teaching thus providing students with an appreciation of relevant research themes, an idea of where and how the subject is developing in the future and, in many cases, "real world" case studies. External speakers are solicited from collaborating companies and our own recent graduates in order to provide students with access to relevant practitioners who can provide industrial context.

The list of module leaders involved in the delivery of this programme can be seen in Appendix 2.

The Faculty makes full use of the University's Virtual Learning Environment (Canvas) and our strategy is for every module and programme to have an online presence. Key features of our current Canvas provision include:

- complete staff list, telephone numbers, Email addresses and module responsibilities;
- complete list of Faculty modules with links to detailed module descriptors and, in many cases on-line learning resources;
- general student handbook including links to Faculty home pages, University sites e.g. Student Services, Careers and Employability Service, Information Services, Campus maps and various Faculty and University policy documents e.g. rules on cheating and collusion, the Modular Credit Scheme and Teaching & Learning policies;
- Faculty Programme/Module timetables;
- Faculty Standards;
- A Code of Conduct for Use of the Computing Terraces;
- Health and safety advice;
- Information about the Faculty's research activities.

Library facilities available at St Peters include a dedicated computing subject collection, a comprehensive range of electronic resources, open access areas for group and individual study, and dissertations / research working papers from the Faculty are also housed in the library.

Specialist Resources

All students in the Faculty are provided with access to one of the most modern and best equipped computing environments in the UK. The David Goldman Informatics Centre features an open plan area made up of terraces which contain nearly 250 PC workstations. The computers on the terraces are installed with all the necessary software packages required and are normally available to the students on an open access basis 7:00am until 9:00pm weekdays. 24 hour computing facilities are available at the Murray Library.

In support of independent study, students are provided access to the Internet for their smartphones, tablets and laptops via a university wide wireless network. A range of free software is also made available to students through volume licensing with partners such as Adobe, Symantec, Microsoft and Cisco.

The programme makes use of specialist hardware (including a 40 core grid computer, Dell R920 60 core processor, 1 G RAM & high capacity storage) and software resources for the MSc AI and Machine Learning programme. These will enable students to understand the relationship between hardware and software in AI and Machine Learning and the development of AI and Machine Learning solutions. The AI and Machine Learning programme and modules will utilise the specialist network security laboratories on floor two of DGIC and RV208 laboratory.

The Enterprise Place is supported by the Sunderland Software City initiative and provides dedicated rooming and facilities to host entrepreneurial activities in AI and Machine Learning. Students with business ideas can become resident in Enterprise Place as they attempt to grow from ideas on how to exploit AI and Machine Learning opportunities to fully formed businesses.

Information about the University's facilities can be found here.

Please see the relevant college prospectus or website for details of college learning resources if you are planning to study in one of our partner colleges.

43. Are there any additional costs on top of the fees?

No, but all students buy some study materials such as books and provide their own basic study materials.	*X*
Yes (optional) All students buy some study materials such as books and provide their own basic study materials. In addition there are some are additional costs for optional activities associated with the programme (see below)	
Yes (essential) All students buy some study materials such as books and provide their own basic study materials. In addition there are some are essential additional costs associated with the programme (see below)	

44. How are student views represented?

All taught programmes in the University have student representatives for each programme who meet in a Student-Staff Liaison Committee (SSLC) where they can raise students' views and concerns. The Students' Union and the faculties together provide training for student representatives. SSLCs and focus groups are also used to obtain student feedback on plans for developing existing programmes and designing new ones. Feedback on your programme is obtained every year through module questionnaires and informs the annual review of your programme. Student representatives are also invited to attend Programme and Module Studies Boards which manage the delivery and development of programmes and modules. Faculty Academic Committee, also has student representation. This allows students to be involved in higher-level plans for teaching and learning. At university level on Students are represented on University level Committed by sabbatical officers who are the elected leaders of the Students' Union.

The University's student representation and feedback policy can be found here.

Every year we participate in the national Postgraduate Taught Experience Survey (PTES).

If you are studying in one of our partner colleges the college will have its own mechanisms for obtaining student feedback. Some of these may be the same as those on-campus at the University but others may be different. You should ask your college for further information.

If you are studying by distance learning you will have slightly different arrangements from those used on campus. In particular you are likely to have virtual rather than physical meetings and discussions. However these arrangements should provide comparable opportunities for you to give feedback. Details are given below.

SECTION G: QUALITY MANAGEMENT

45. National subject benchmarks

The Quality Assurance Agency for Higher Education publishes benchmark statements which give guidance as to the skills and knowledge which graduates in various subjects and in certain types of degree are expected to have. They do not cover all subjects at postgraduate level but those which exist can be found at here.

Are there any benchmark statements for this programme?	**YES**	~~NO~~

The subject benchmark(s) for this programme is/are:

Masters Computing Benchmark

The programme development has also drawn on Requirements for Masters programmes in AI and Machine Learning, available at http://www.bcs.org/category/7065. Whilst the programme will seek accreditation from the BCS as the professional body for computing.

The QAA also publishes a Framework for Higher Education Qualifications (FHEQ) which defines the generic skills and abilities expected of students who have achieved awards at a given level and with which our programmes align. The FHEQ can be found here.

A table mapping the programme learning outcomes against the QAA benchmark for Computing Master's courses can be found in Appendix 4.

46. How are the quality and standards of the programme assured?

The programme is managed and quality assured through the University's standard processes. Programmes are overseen by Module and Programme Studies Boards which include student representatives. Each year each module leader provides a brief report on the delivery of the module, identifying strengths and areas for development, and the programme team reviews the programme as a whole. The purpose of this is to ensure that the programme is coherent and up-to-date, with suitable progression through the programme, and a good fit (alignment) between what is taught and how students learn and are assessed - the learning outcomes, content and types of teaching, learning and assessment. Student achievement, including progress through the programme and the way in which the final award is made, is kept under review. The programme review report is sent to the Programme Studies Board and the Faculty in turn reports issues to the University's Quality Management Sub-Committee (QMSC).

External examiners are appointed to oversee and advise on the assessment of the programme. They ensure that the standards of the programme are comparable with those of similar programmes elsewhere in the UK and are also involved in the assessment process to make sure that it is fair. They are invited to comment on proposed developments to the programme. Their reports are sent to the Deputy Vice-Chancellor (Academic) as well as to the Faculty so that issues of concern can be addressed.

All programmes are reviewed by the University on a six-yearly cycle to identify good practice and areas for enhancement. Programmes are revalidated through this review process. These reviews include at least one academic specialist in the subject area concerned from another UK university. Quality Assurance Agency (QAA) review reports for Sunderland can be found here.

Further information about our quality processes can be found here.

See Appendix 2.

Appendix 1

PART B - PROGRAMME REGULATION/S

Name of programme: *AI and Machine Learning*
Title of final award: *MSc AI and Machine Learning*
Interim awards[1]: *Postgraduate Certificate in AI and Machine Learning, Postgraduate Diploma in AI and Machine Learning.*

Students who pass 60 taught credits are eligible for a Postgraduate Certificate in *AI and Machine Learning*. Students who pass all the taught modules on the programme are eligible for a Postgraduate Diploma in *AI and Machine Learning*.

Accreditation: *BCS Accreditation for the Masters will be sought. The other awards are not accredited.*

University Regulation (please state the relevant University Regulation)**:** *4.2.1. The overall pass mark for each module is 40%. To pass a module a student must also have submitted work for each element of assessment.*

Regulations apply to students commencing their studies from (please state the date / intake that these regulations will apply to students for each Stage)**:**

Regulations apply to students	Date the regulations apply	Intakes affected
Stage 1		
Stage 2		
Stage 3		
Stage 4	September 2018	September 2018 onwards

Stage 4

Core modules:

	Code	Title	Credits
CERT/DIP PHASE	*CETM41*	*Fundamentals of AI*	*30*
	CETM42	*Augmented AI*	*30*
	CETM43	*Cognitive Deep Learning*	*30*
	CETM47	*Machine Learning and Data Analytics*	*30*
MASTERS PHASE	*PROM02*	*Computing Masters Project*	*60*

Optional Modules

None

Elective Modules

None

Progression Regulations
There are no programme-specific progression regulations[2]

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[1] Same as main award unless agreed otherwise at validation – eg to meet PSRB requirements
[2] This will be the norm – university regulations apply

University of Sunderland

Quality Handbook

SITS SUMMARY PROGRAMME/SHORT COURSE DETAILS

(Form to be completed electronically by the Faculty and forwarded to the Quality Support Officer supporting the Approval event, or sent to Planning & MI for faculty devolved processes before sending to Quality Support (with the exception of Short Courses and GRS))

This form is to be completed when a new programme has been validated and approved so that the programme codes and progression and awards rules can be set up in SITS. This also needs to be completed at periodic course review when there have been significant modifications to the course.

Please note that all details entered onto this form will go onto every student's record that is attached to this programme and it is therefore imperative that the information is correct.

1 Programme Details		
New/ Modification/Review: Please ensure the minor modification document is included	**New**	
Full Programme Title:	**MSc AI and Machine Learning**	
If replacement for existing course, specify title and course code:		
Qualification Aim: e.g. Foundation degree of Science, Bachelor of Arts (Honours)	Masters	
Qualification Level (NQF level):	7	
JACS 3.0 code JACS code = e.g. (V100) History, (I100) Computing Science, etc. See HESA Website https://www.hesa.ac.uk/jacs3	I100	
Is the programme Open or Closed: A course is defined as closed when specifically designed for a certain group of people and not also available to other suitably qualified candidates. It may be designed for a particular company however if the same course is also run for other suitably qualified candidates, not employed by the company, then the course is not closed.	Open	
Faculty and School:	Technology	Computer Science
Location of study: e.g. SAGE, Sunderland in London, Sunderland	Sunderland	
Last Date Registration (PBI) Number of days: The number of days after the start date of the course that it is possible for students to register onto it. It is also referred to as the migration date.	15	
Programme Leader:	Dr David Nelson	
Academic Team for the programme:	Postgraduate computing team	
Date of Approval/Modification/Review:		
Date of next review (*QS to complete*):		

Accrediting Body or PSRB If yes please attach a completed PSRB form	Yes/~~No~~
Programme Specific Regulations If yes, please attach a completed Programme Specific Regulations form	~~Yes~~/No/~~Pending~~
Does this programme come under the Key Information Set return? If yes, please attach a completed KIS form	No
Is this an undergraduate programme whose primary (but not necessarily only) purpose is to improve the effectiveness of practitioners registered with a professional body? If yes, please specify which body: http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/2016/201622/HEFCE2016_22.pdf (Page 88, paragraph f) e.g. a short course aimed at registered nurses	~~Yes~~/No Professional Body:

Interim Awards

If a student does not achieve their qualification aim, what lower awards might they be entitled to, assuming they have the credits? The subject title for any lower level award should be given where this is different from the subject of the qualification aim.

	Interim Award Title	Credits Required	Interim Structure Please show mandatory requirements if applicable e.g. core module codes
1	PG Certificate in AI and Machine Learning	60	Two from CETM41, CETM42, CETM43, CETM57
2	PG Diploma in AI and Machine Learning	120	CETM41, CETM42, CETM43 and CETM47
3			

Combined Subjects Programmes only	
Will the subject run as Major/Minor/Dual:	
Any subject(s) not permitted to be combined with this subject:	

2 Mode Of Attendance			
01	Full-time *Full-time students are those expected to study for more than 24 weeks per year, for a minimum of 21 hours per week and are paying the full-time fee.*	Yes
02	Other Full-time *Students who attend full-time for a period less than 24 weeks per year*	
31	Part-time *Students who are expected to study for less than 21 hours per week.*	Yes
31	Part-time at Full-time Rate *Students who are studying full-time credits over part-time attendance*	

3 Admissions An admissions or MCR code will be created to allow student applications.	Tick appropriate

U	UCAS Universities and Colleges Admission Services *Required for full-time undergraduate programmes only.*		
D	Direct Entry *Required for FT, PT, PG and PGR, only where students will be admitted though the admissions teams or where the programme needs to be advertised on the web*	Yes	
G	GTTR Graduate Teacher Training Registry *Education only, where applicable*		

4 Collaborative Provision	UK	
	Overseas	

Institution	Collaborative Model	Funding Arrangements

5a Course Block	
Full-time - Overall length of the programme in months:	12 months
Part-time - Overall length of the programme in months:	24 months
Does this course offer a sandwich placement? If **yes**, please indicate which programme year this placement is to take place.	~~Yes~~/No Programme Year:
Is this compulsory or optional?	Compulsory/Optional
Does this course offer a study abroad year out? If **yes**, please indicate which programme year this placement is to take place.	~~Yes~~/No Programme Year:
Is this compulsory or optional?	Compulsory/Optional

6 Major Source of Funding	
Please note this relates to funding for the programme and **not** individual students	
HEFCE Higher Education Funding Council for England	Yes
Skills Funding Agency/EFA/Degree Apprenticeship	
NCTL National College for Teaching and Leadership	
Wholly NHS Funded Partially NHS Funded Departments of Health/NHS/Social Care. ***For all Health funded programmes please indicate whether the programme is eligible for an NHS Bursary*** - Eligible for NHS Bursary Y/N	
Standard Fee If no then the Learning Resources Form should be attached	Yes/~~No~~
Other Funding:	

– Please Specify:

7 Education Programmes Only	
This section must be completed for any programmes marked above as 'NCTL' funded	
Teacher Training Identifier:	
Teacher Training Scope:	
Qualification Aim: QTS and academic award, QTS only, QTS by assessment only	

DETAILS SUPPLIED BY: …Dr David Nelson……………………..……   DATE: 19/03/2018
        ………………………..

Module List

Award, Route (if applicable) and Level	New/Existing/ Modified Module (N/E/MM)	Module Title	Module Code	Module Credit Value	Whether core or option	Must choose (i.e. designated option):	Assessment weighting – give % weight for *each assessment item*	Pre-/co-requisites	Module leader	Other comment (if required)	Date of Entry on SITS. N/MM only (After event)	JACS Code	Academic Team
Taught (Cert/Dip)	N	**Foundations of AI and Machine Learning**	**CETM41**	**30**	**Core**		**001 Coursework 50%** **002 Coursework 50%**		**Prof. Chris Bowerman**			**I100**	**Prof. Chris Bowerman, Dr. Valentina Plekhanova**
	N	**Augmented AI**	**CETM42**	**30**	**Core**		**001 Coursework 50%** **002 Coursework 50%**		**Prof. Chris Bowerman**			**I400**	**Prof. Chris Bowerman, Dr. Kathy Clawson**
	N	**Cognitive Deep Learning**	**CETM43**	**30**	**Core**		**001 Coursework 50%** **002 Coursework 50%**		**Dr. Kathy Clawson**			**I400**	**Prof. Chris Bowerman, Dr. Kathy Clawson**
	N	**Machine Learning and Data Analytics**	**CETM47**	**30**	**Core**		**001 Coursework 50%** **002 Coursework 50%**		**Dr. Valentina Plekhanova**			**I100**	**Dr. Valentina Plekhanova, Prof. Yonghong Peng**

Masters	N	Computing Master's Project	PROM02	60	Core		001 Coursework 10%	Dr. David Nelson			I100	Dr David Nelson, Dr Sharon McDonald
							002 Coursework 60%					
							003 Viva + Coursework 30%					

APPENDIX 3 – Delivery Schedule

Full-Time Programme

Semester 1
CETM41 Foundations of AI
CETM42 Augmented AI

Semester 2
CETM43 Cognitive Deep Learning
CETM47 Machine Learning and Data Analytics

Semester 3
PROM02 Computing Master's Project

Part-Time Schedule

Year 1 Semester 1
CETM41 Foundations of AI

Year 1 Semester 2
CETM43 Cognitive Deep Learning

Year 2 Semester1
CETM42 Augmented AI

Year 2 Semester 2
CETM47 Machine Learning and Data Analytics

Year 2 Semester 2&3
PROM02 Computing Master's Project

APPENDIX 4 - Benchmark mapping – MSc AI

The QAA benchmark specifies the threshold standard of achievement, i.e. the standard expected to be achieved by a student graduating with the award of a master's degree in computing. The threshold level specifies:

7.2 All students graduating with a master's degree in computing are expected to be able to have demonstrated:
1. a systematic understanding of the knowledge of the domain of their programme of study, with depth being achieved in particular areas, including both foundations and issues at the forefront of the discipline and/or professional practice in the discipline; this should include an understanding of the role of these in contributing to the effective design, implementation and usability of relevant computer-based systems
2. a comprehensive understanding, and a critical awareness of: the essential principles and practices of the domain of the programme of study as well as current research and/or advanced scholarship; current standards, processes, principles of quality and the most appropriate software technologies to support the specialism; the relevance of these to the discipline and/or professional practice in the discipline; and an ability to apply these
3. consistently produced work which applies to and is informed by research and/or practice at the forefront of the developments in the domain of the programme of study; this should demonstrate critical evaluation of aspects of the domain, including appropriate software support, the ability to recognise opportunities for software or hardware tool use as well as possible tool improvement, an understanding of the importance of usability and effectiveness in computer systems development, and generally the acquisition of well-developed concepts
4. understanding of the professional, legal, social and ethical framework within which they would have to operate as professionals in their area of study; this includes being familiar with and being able to explain significant applications associated with their programme of study and being able to undertake continuing professional development as a self-directed lifelong learner across the elements of the discipline
5. the ability to apply the principles and practices of the particular programme's domain in tackling a significant domain related activity; the solution should demonstrate a sound justification for the approach adopted as well as originality (including exploration and investigation) and a self-critical evaluation of effectiveness but also critical awareness of current problems and new insights, and a sense of vision about the direction of developments in aspects of the domain of the programme.

The tables below provide a mapping of the benchmark against the programme learning outcomes:

	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10
1	Y			Y	Y			Y		Y
2			Y	Y	Y	Y		Y	Y	
3	Y			Y			Y	Y	Y	
4		Y	Y			Y				
5			Y				Y	Y	Y	Y

	K1	K2	K3	K4	K5	K6	K7	K8	K9
1	Y	Y	Y	Y	Y	Y	Y		Y

2			Y	Y		Y	Y	Y	Y
3	Y	Y	Y					Y	Y
4					Y		Y		
5			Y					Y	Y