



FdSc Power Engineering

Faculty of Applied Sciences

Department of Computing, Engineering & Technology

PROGRAMME SPECIFICATION

Date of approval event:	March 9 th 2015
Date Approved by QMSC:	

SECTION A: CORE INFORMATION

1. Name of programme

Power Engineering

2. Award title

FdSc

3. Programme linkage

Is this part of group of linked programmes between which students can transfer at agreed points?

Yes

No

4. Is the programme a top-up only?

Yes

No

5. Does the programme have a Foundation Year (level 3) associated with it so that students enter for a four-year programme and progress directly from the Foundation Year to Stage 1 without having to re-apply?

Yes

No

If yes:

6. Level of award (eg Level 6 for BA/BSc)

Level 3	
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Level 4	
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Level 5	X
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Level 6	
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Level 7	
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7. Awarding body: University of Sunderland

8. Which department is it in?

Computing, Engineering and Technology

9. Programme Studies Board?

Undergraduate Engineering

10. Programme Leader

Dr Mike Knowles

11. How and where can I study the programme?

At a partner college:	
Full-time in the UK	x
Part-time in the UK	x
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)	

The programme is delivered using the part time as full time model. Students attend the partner college for week long blocks throughout the academic year with project work taking place at the students' place of employment.

12. How long does the programme take?

	Min number of years / months	Max number of years / months
Full-time	2 years	6 years
Part-time	2 years	6 years
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

Use Outline Programme Proposal Form for ADC ([AQH-B2-2](#)), for questions 13 to 25

26. Learning and teaching strategy.

Within both levels of the programme students gain experience of a wide range of different approaches to learning and teaching. The modules are delivered using a variety of relevant and appropriate learning experiences, for example, formal lectures, tutorials, case studies, application of software packages, practical work in the laboratory, directed study, independent research and on-line resources including use of the College VLE.

Inclusive learning strategies are at the heart of the teaching and learning techniques employed by the Tyne Metropolitan delivery team. Varying activities and delivery mechanisms encourages full engagement by undergraduate students and this is facilitated by the extensive facilities and the enthusiasm of the teaching team at the College.

All modules will make use of the VLE (Moodle) available at Tyne Metropolitan College. The degree of this utilisation will vary and will be determined by each module team, based upon the nature of the module. In some instances it will principally be used for communication and dissemination of materials, whilst in others fuller use will be made of its E-learning capabilities and may include e.g. quizzes, recommended reading lists, videos of laboratory work, hotlinks to useful external websites. Generally a 'fit for purpose' approach will be adopted when determining the extent of this utilisation. Training in the use of the VLE will be provided during the relevant student induction period. Students will also have access to the library facilities at the University.

The first stage of the programme focuses on the development of a broad base of engineering skills and knowledge to provide a solid working background from which the knowledge and skills relevant to the programme's specialist theme of Power Engineering are developed in Stage 2. The level of challenge increases throughout the programme as the knowledge developed earlier in the programme is built upon to develop the students' ability to the level required for professional engineers working with the Power Generation and Distribution industry.

The programme places considerable emphasis on the importance of employability and professional skills and as such both stages of the programme feature significant elements of project work which is hosted by the sponsoring companies wherever possible.

27. Retention strategy.

Student Retention is supported through regular personal tutoring between the Assistant Programme Leader and the students during each delivery block and through the close links which exist with the employers who sponsor the students on the programme.

28. Any other information.

SECTION C - TEACHING AND LEARNING

29. What is the programme about?

The Foundation Degree in Power Engineering covers a range of topics related to the generation, distribution and control of electrical power. The programme aims to provide students with a broad foundation of engineering knowledge alongside specialist knowledge related to the power engineering sector.

30. What will I know or be able to do at each Stage of the programme?

Learning Outcomes Stage 1 – Skills

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

- S1 Mathematically model simple mechanical, electrical, and electronic engineering systems.
- S2 Utilise appropriate management and engineering principles to specify, manage and execute a simple engineering project using appropriate diagnostic, design, and problem solving skills.
- S3 Work in collaboration with colleagues towards the solution of problems in engineering systems and equipment.
- S4 Demonstrate awareness and understanding of the legal, safety, environmental and social regulations within which engineering and industrial systems operate.
- S5 Communicate the results of investigations and analysis of systems and equipment by means of reports, presentations or other appropriate means of communication.

Learning Outcomes Stage 1 – Knowledge

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

- K1 Engineering mathematics including calculus.
- K2 Principles of mechanical, electrical and electronic systems.
- K3 The processes involved in carrying out and reporting a simple engineering project.
- K4 Basic legislation and current practice of the business requirements within the power engineering sector.
- K5 Electrical power distribution practice and theory.
- K6 Basic strategies and techniques for project management and appraisal.

Learning Outcomes Stage 2 – Skills

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

- S6 Independently select, evaluate and apply analytical and diagnostic tools and techniques to resolve problems in power engineering.
- S7 Analyse and design electrical and electronic systems.
- S8 Evaluate and select appropriate measurement, instrumentation and control systems.

Learning Outcomes Stage 2 – Knowledge

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

- K7 Electrical power theories and their application to the design of industrial electrical equipment.
- K8 Principles and analysis of electronic system design and analysis.
- K9 Measurement, instrumentation and control.

31. What will the programme consist of?

Each undergraduate programme consists of a number of Stages from a minimum of 1 to a maximum of 4, each of which is equivalent to a year's full-time study. The summary below describes briefly what is contained in each Stage. Most programmes have a mixture of core (ie compulsory) modules and optional ones, often with increasing choice as you move through the programme and gain in experience. In some programmes the choice of optional modules gives you particular 'routes' through the programme. The programme structure including a detailed list of modules can be found in the [programme regulations](#).

The programme consists entirely of core modules addressing various aspects of the Power Engineering industry including both technical, business and professional topics. In addition to the taught modules, all students undertake a group project which gives them an opportunity to apply the knowledge and skills they have learnt as well as develop team working skills. All modules at both levels of study are core.

Stage 1

Stage 1 of the programme focuses on the development of a broad range of engineering knowledge and skills relevant to the Power Engineering industry. The modules covered at this stage are:

TMF100 Mathematics for Engineers (20 Credits)

Introduction to engineering mathematics including algebraic methods, exponential, trigonometric and hyperbolic functions, Arithmetic and geometric: notation for sequences; Sinusoidal functions, trigonometric identities and calculus.

TMF101 Electrical and Electronic Principles (20 Credits)

Electrical and Electronic principles for the power engineering sector including Circuit Theory, transformation theorems, magnetically coupled circuits, R-L-C Tuned Circuits, AC Loads and Basic Electronic Technology such as Semiconductor Devices, Digital logic Systems

TMF102 Engineering Principles (20 Credits)

Engineering Principles for a variety of systems and applications including Static Engineering Systems (Non-concurrent coplanar forces systems, Simply Supported Beams and Loaded Components), Dynamic Engineering Systems (Uniform Acceleration and Energy Transfer), Three Phase Machines and Rotating Magnetic Fields.

TMF103 Power Distribution (20 Credits)

Power distribution analysis including Methods of Power Distribution, Overhead Lines, Cables (types and properties), Three Phase Systems (including the behaviour of fault free and faulted three phase systems) and the sources, effects and mitigation of Harmonics

TMF104 Power Industry – Business and Practice (20 Credits)

Legislation and current practice in the power engineering sector including Project Management, Project Planning, Risk Management, Quality Management, Health and Safety, Financial Management and Regulation.

TMF105 Integrative Group Case Project (20 Credits)

Development of problem analysis and design solution. The projects are generally provided by employers of other companies who will provide a set of requirements. The students must attend regular meetings with staff to report on progress and produce a report summarising what has been achieved.

Stage 2

Stage 2 of the programme builds on the foundation laid in stage 1 and develops specialist knowledge and skills relevant to the programmes key topic – Power Engineering. In addition to taught modules delivering the technical and professional knowledge and skills, students undertake a major individual project which allows them to apply and demonstrate these attributes building upon the group activity carried out at stage 1. The modules at this stage are:

TMF201 Electrical Machines and Power Systems (20 Credits)

Machine fundamentals including DC Machines, Synchronous Machines and Induction Motors, and power systems including generation, transmission, economics protection and system disturbances

TMF202 Measurement and Control (20 Credits)

Structure and modelling of instrumentation measurement and control systems including characteristics of signals, modelling and representation, System diagrams, Sensors and Transducers, Signal Transmission, Conversion and Conditioning, Test Equipment and Data Acquisition Systems.

TMF203 Electronics Systems (20 Credits)

Electronic system design and performance analysis including Semiconductor devices and circuits, Amplifier Circuits and their characteristics and Logic devices and circuits including combinatorial and sequential logic circuit design and application.

TMF204 Power Plant Systems (20 Credits)

Communication, substation and switch gear requirements. This module includes substation types, function and earthing, Transformers including banking and parallel operation, Cooling and Tap Changers, and Circuit Breakers and Switchgear including system configuration and protection, High-, Medium-, and Low- Voltage Breakers and Switchgear.

TMF205 Individual Project (40 Credits)

Work related project – students must, working individually, undertake a project for a client applying the knowledge and skills developed throughout the entire project. The project is

supported by a tutor and the student must plan and manage the work as appropriate and produce a detailed report on what has been achieved.

32. How will I be taught?

Scheduled teaching activities	x
Independent study	x
Placement	

The programme involves a range of modes of delivery. During the delivery blocks the focus is on theoretical and practical classroom sessions where the bulk of the technical material is delivered. Classroom sessions are reinforced by independent research and guided study supported by a range of resources including the VLE.

The Programme team places great emphasis upon the benefits of ‘work related’ experience within this Foundation Degree. At levels 1 and 2 students undertake modules which involve an extended and subject unifying project. The focus of each of these modules is to encourage students to develop independent research and time management skills and the ability to work independently. To this end students liaise with the client to identify and document the scope of the project and then organise and manage the projects themselves to achieve a satisfactory outcome. The modules encourage students to apply all, or a range, of the knowledge and skills acquired at each level in a meaningful situation which replicates the workplace.

The Level 1 module is a group project which provides the students with additional support and at the same time develops communication skills; at Level 2 the project is undertaken on an individual basis. The timetabling of the programme ensures that students will have studied all of the taught modules at the respective stage before they start the project modules.

A list of the modules in each Stage of 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](#).

33. How will I be assessed and given feedback?

Written examinations	X
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	
This programme uses the Subject Specific Assessment Criteria		NO

The University regulations can be found [here](#).

The assessment techniques used within this programme are characterised by:

- providing a multi-faceted approach to assessment and monitoring student achievement;
- the encouragement of assessment honesty among students;
- collaboration with other students in class-based group tutorials, but with individual assessment forming the assessment regime;
- assessment methods which include a feedback regime consistent with Department standards, which will enable students to monitor their own progress and which aid future learning.

Based on the University's engineering teaching team's experience of Stage 1 and Stage 2 students on other engineering programmes, the overriding assessment strategy has been one of 'little and often', at each stage. The reason for this is to promote retention and progression through encouraging and maintaining student focus, attention and interest throughout the teaching year. As students progress from Stage 1 to Stage 2 the aim is to encourage a deeper approach to learning and promote a higher level of understanding of the subject area. This is demonstrated by the terms used in the Learning Outcomes at each stage. For example, at Stage 1 the emphasis is on providing a 'broad understanding' typically through assessing 'awareness and understanding' whereas at Stage 2 the focus is assessing students' ability to analyse and evaluate. Whenever possible and where appropriate the assessment strategy includes practical laboratory work in order to demonstrate application of the theory delivered in the lectures and to develop thinking and analysis skills.

The final individual project (TMF205) is the culmination of the assessment for the programme and offers students to demonstrate both the technical knowledge and skills they have developed during the programme and also their ability to work as individuals in a professional manner.

34. [Teaching, learning and assessment matrix](#)

35. How does research influence the programme?

Many members of the delivery team have extensive industrial knowledge which is used to develop case studies to enrich the delivery of technical materials and to ensure assessments are relevant at all levels.

In depth analysis of various Electrical Power systems and techniques is a core theme in many of the technical modules. Students are given the opportunity to apply their analysis skills and technical knowledge as part of the project modules, which offer the students the opportunity to carry out research-based learning through an in-depth investigation of a particular topic. The engagement of employers in this process ensures that students are fully aware of the significance of research within an industrial context.

SECTION D EMPLOYABILITY

36. How will the programme prepare me for employment?

The programme gives you the opportunity to develop skills which you can use in the future. Some skills are more specific than others to the subject area, or to a particular type of activity, but all skills can be applied in a range of employment situations, sometimes in quite unexpected ways. The skills which this programme is designed to develop are listed below.

The Foundation Degree in Power Engineering aims to produce graduates who are capable of progressing to skilled technical and graduate level roles in Electrical Power engineering by providing the skills and knowledge to address the extensive skills shortage which the power engineering sector is currently experiencing. In doing so the programme also aims to nurture capacities for independent thought, research, team working, and continual personal and professional development.

The programme will offer admission to students who, while meeting the University's general entrance requirements, will not necessarily bring prior experience of this subject field. In doing so it aims to empower those with the appropriate interest, motivation and potential such that they may successfully pursue their personal aspirations and in doing so contribute to fulfilling the social and economic requirement for a professional workforce in the field of electrical power engineering.

Where possible, works visits will be arranged to provide students with an insight into the current practices in the sector. External speakers will be invited to talk about their subject specialism on occasion, again utilising the strong industrial links this programme has with employers and their core engineering team.

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.

37. Particular features of the qualification (optional)

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

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

Enquiries have been made to the Institution of Engineering and Technology (IET) re. Accreditation. The result of these enquiries is that accreditation is only possible if the associated BEng Top-Up award is accredited which is currently not the case. Thus this will be revisited if and only if the Top-Up Programme is accredited.

SECTION E PROGRAMME STRUCTURE AND REGULATIONS

Use [Programme Regulations Form](#), for questions 39 and 40

SECTION F ADMISSIONS, LEARNING ENVIRONMENT AND SUPPORT

41. What are the admissions requirements?

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.

Applicants without formal qualifications may qualify for entry through relevant work based experience. Applicants may be asked to attend an interview and present a portfolio of evidence

Entry from a University of Sunderland Foundation Year is also possible. Students who have completed the first stage of any of the Extended Engineering programmes will meet the entry requirements.

Can students enter with advanced standing?	Yes	No
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If yes, to which Stages?

Stage 1	
Stage 2	x
Stage 3	
Stage 4	

If yes, with what qualifications?

Direct entry to Stage 2 of the programme is possible. This would usually be possible for students with a suitable HNC or equivalent.

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.

42. What kind of support and help will there be?

Support and guidance is offered to all students through a comprehensive set of mechanisms. All new students are given an induction programme during which time they are exposed to various aspects of student academic life at both the College and the University where they are provided with information on both the College and the University, their Services, the Department and their chosen programme of study. The students are provided with programme information, talks by programme and module staff, library visits, talks by representatives from Student Services, the Student's Union and the Careers Office. They will have introductory World Wide Web sessions where they learn to access both institutions' home pages, programme notice boards, Department and College standards and other documents. They also attend study skills sessions and meet with their Programme Leader who will attend induction sessions at the collaborating institution to respond to any questions and queries relating to the University of Sunderland.

All students have individual access to their Programme Leader at the University and Assistant Programme Leader at the College, and other staff, via an appointment system. Many staff supplement this with an 'open door policy.' There is also the option for email interaction to provide flexible and efficient communication on day-to-day issues.

The University provides a range of professional support services including [health and well-being](#), [counselling](#), [disability support](#), and a [Chaplaincy](#). Click on the links for further information.

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.

43. What resources will I have access to?

On campus		In a partner college	x	By distance learning	
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The Learning Resource Centre for the College provides a wide range of facilities including document scanning, laser printing, photocopying, self-study space for the consultation of reference sources and the sale of low-cost course materials and stationery items. The library at Tyne Metropolitan College is open Monday 9am – 6pm, Tuesday – Thursday 9am – 7pm and Friday 9am – 4pm.

The College has progressively expanded its use of Moodle-based information resources to exploit the rapid publication and flexibility of access which this medium affords. Key features of current Moodle provision for students includes:

- A complete staff list, telephone numbers, email addresses and module responsibilities;
- A complete list of modules with links to detailed module descriptors and, in many cases, extensive on-line learning resources and web links;
- General student handbook including links to all College Departments' home pages, College sites e.g. Student Services, Careers, Information Services, Campus maps and various policy documents e.g. rules on plagiarism and collusion, the Modular Credit Scheme and Teaching & Learning policies;
- Programme timetable
- Department Standards
- A Code Of Conduct
- Health & Safety advice

Within the TyneMetropolitan College Engineering Department there exists multi-faceted facilities across the broad spectrum of Engineering. The department has at its disposal;

- 8 general classrooms – all with universal PC access.
- 2 specialised mechatronics suites.
- Dedicated CNC and CAD/CAM facility.
- Electronics and instrumentation laboratory
- CAD suite.
- Fabrication workshop
- Mechanical Engineering workshop
- Bench fitting workshop

There are 16 rooms available to the Department with resources both mobile and fixed. The electronics and instrumentation laboratory is appropriately and adequately resourced to cover delivery of the Stage 1 and Stage 2 electronics modules. Alongside this there are three Instrumentation and Control modules – manufactured by 'Feedback'. Dedicated software for these units exists within the lab. Networked throughout the department and college is the engineering software image, which facilitates the access to particular packages for all engineering students. This contains such applications as Solidworks 2011, MathCAD AutoCAD, Livewire, Matlab, Fluidsim, MultiSim, PCB Wizard and Labview

The workshop facilities at Tyne Metropolitan offer the opportunity for access to 12 lathes, 6 milling machines, surface and centreless grinding. Also the fabrication workshop accommodates sheet metal work capability up to 3mm as well as oxy acetylene, MIG and TIG welding.

44. 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.	<input checked="" type="checkbox"/>
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)	

45. How are student views represented?

All taught programmes in the University have student representatives for each Stage (year-group) of 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. Various Faculty committees, particularly Faculty Academic Experience Committee, Academic Development Committee and Quality Management Sub-Committee also have student representation. This allows students to be involved in higher-level plans for teaching and learning. There is a parallel structure at university level on which students are represented by sabbatical officers who are the elected leaders of the Students' Union.

The University's student representation and feedback policy can be found [here](#).

Final-year students are also invited to complete a National Student Survey (NSS) which asks a standard set of questions across the whole country. The results of this are discussed at Programme Studies Boards and at Faculty Academic Experience Committee to identify good practice which can be shared and problems which need to be addressed. We rely heavily on student input to interpret the results of the NSS and ensure that we make the most appropriate changes.

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.

All members of the delivery team operate an 'open-door' policy allowing students access to information regarding the modules and the programme as and when it is needed. Students meet with the Assistant Programme Leader at the end of each delivery block. Furthermore the Programme/Centre Leader visits the partner college to speak to each group of students once

during each term to discuss any issues and ensure students are aware of contact mechanisms for University based support services. Furthermore student representatives are given the opportunity to meet with the external examiner and feedback any issues they feel appropriate relating to the operation of the course.

SECTION G QUALITY MANAGEMENT

46. 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. These can be found [here](#).

Are there any benchmark statements for this programme?	YES	NO
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The subject benchmark(s) for this programme is/are:

Engineering (2010 – new version currently under consultation)

<http://www.qaa.ac.uk/en/Publications/Documents/Subject-benchmark-statement-Engineering-.pdf>

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](#).

47. 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 from one Stage to another, 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 between Stages of the programme and degree classification, is kept under review. The programme review report is sent to the Faculty Quality Management Sub-Committee which in turn reports issues to the University's Quality Management Sub-Committee (QMSC) and Academic Experience Committee (AEC).

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.

The University is subject to external review by the Quality Assurance Agency for Higher Education on a six-year cycle. Their review reports for Sunderland can be found [here](#).

Further information about our quality processes can be found [here](#).

Please also complete the [SITS form](#).