Solihull College & University Centre | Stratford-upon-Avon College

Programme Specification

HNC Mechanical Engineering

Awarded by

Solihull College & University Centre

Stratford-upon-Avon College

Programme Specification

Title of Programme: HNC Mechanical Engineering

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

1. Awarding Body	Pearson BTEC
2. Teaching location	Woodlands Campus, Solihull College
3. Accreditation details	N/A
4. Final award	Higher National Certificate
5. Name of award	Pearson BTEC Level 4 Higher National Certificate in Engineering (Mechanical Engineering)
6. Codes	
a. UCAS code	N/A
b. Solihull Qualification Code	ENFFA041
c. Edexcel Programme Code (& approval dates)	61012312 September 2024
7. QAA Subject Benchmark or other external reference such as published by Edexcel if the course is a Higher National	Engineering 2024 Subject Benchmark
8. Date this specification applies from	01.09.2024

Approved Ahmed Hussein

Head of School – Engineering

1. Educational Aims of the Programme

This programme aims to:

- Equip individuals with knowledge, understanding and skills for success in employment in the Mechanical engineering and related sectors.
- Enable progression to an undergraduate degree or further professional qualification in Mechanical engineering or related areas.
- Provide opportunities for specialist study relevant to individual vocations and contexts.
- Develop the individual's ability to make an immediate contribution to employment in the Mechanical engineering sector, through effective use and combination of the knowledge and skills gained in different parts of the programme.
- Develop a range of skills and techniques, personal qualities and attributes essential for successful performance in working life and thereby enabling learners to make an immediate contribution to employment.
- Provide education and training for a range of careers in the Mechanical Engineering sector.
- Provide opportunities for learners to gain a nationally-recognised vocationally-specific qualification to enter employment in the sector or progress to higher education qualifications such as a fulltime degree in a related area.
- Present opportunities for learners to focus on the development of the higher level skills in Mechanical engineering and related areas.
- Provide opportunities for learners to develop a range of skills and techniques and attributes essential for successful performance in working life.
- Assist in the development of learners' knowledge, understanding and skills in the field of Mechanical Engineering.

2. Intended Learning Outcomes

The programme provides opportunities for students to develop and demonstrate generic knowledge, skills, behaviour, qualities and other attributes as shown in Figure 1.

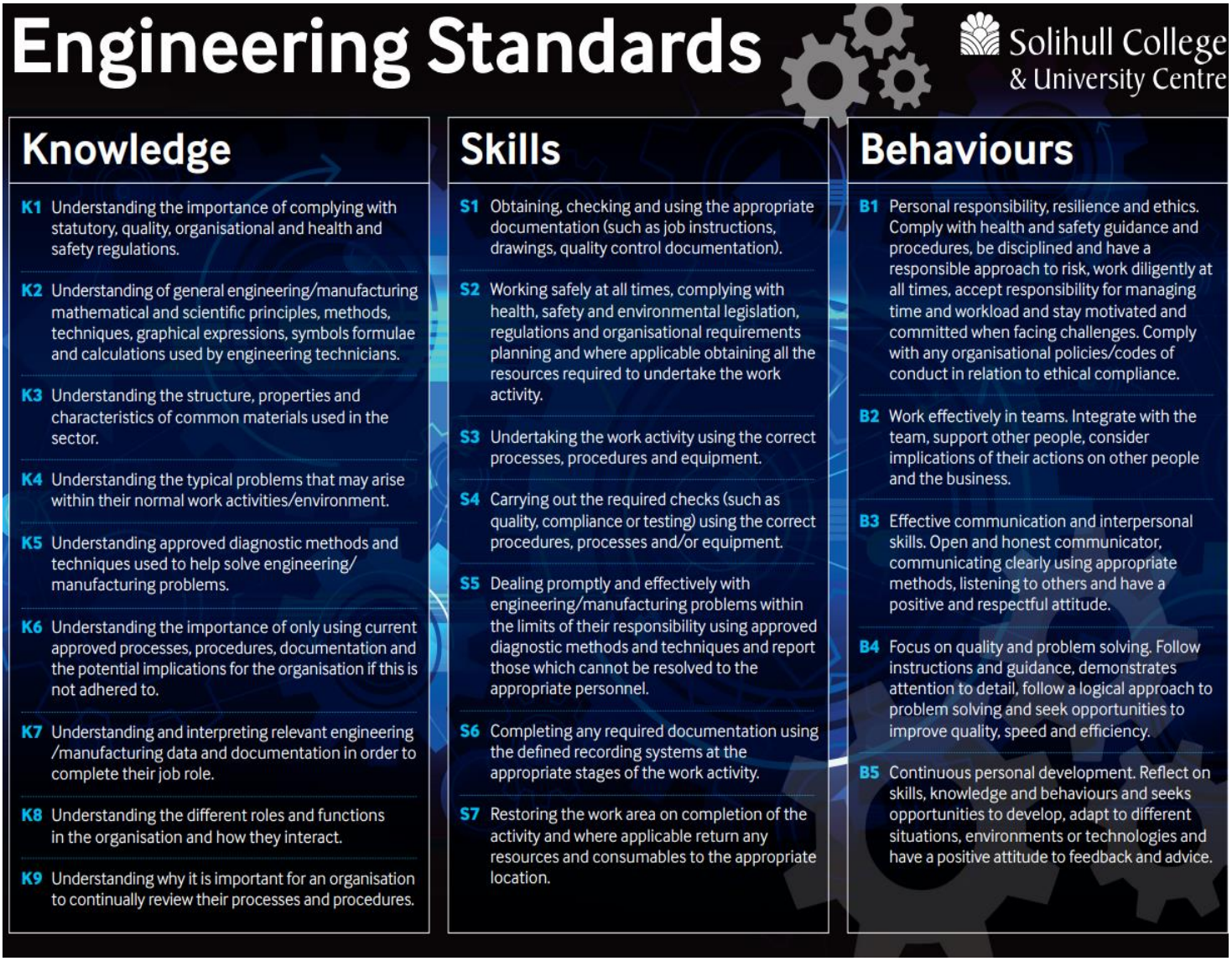

Figure 1 – Engineering Standards

A sound basic knowledge and understanding that includes:

- Mathematics relevant to Engineering.
- Engineering practice (including codes of practice, regulatory frameworks and requirements for safe operation).
- Scientific principles underpinning the specific engineering discipline such as energy transfer systems i.e. heat transfer through lagged pipe work system and power transmission in machinery
- Application of computers for quantitative analysis, simulation and solution of engineering problems and the manipulation and presentation of engineering information, such as the use of PLC, CAD or CAM CNC software.
- General principles and techniques of design and the characteristics of basic engineering materials and components
- Management and business practices

Higher level academic/ intellectual skills including ability to:

- Plan, conduct and report a programme of research
- Analyse and solve engineering problems
- Design a system, component or process to meet a need
- Be creative in the solution of problems and in the development of designs
- Evaluate design, processes and products, and make improvements.
- Integrate and evaluate information and data from a variety of sources.
- Use of commercial software to solve engineering problems

Higher practical and professional skills including the ability to:

- Plan and execute safely a series of experiments.
- Use laboratory equipment and software packages to generate data
- Design a system, component or process to meet a need.
- Be creative in the solution of problems and in the development of designs.
- Evaluate design processes and products and make improvements
- Integrate and evaluate information and data from a variety of sources.
- Produce a design for a system, component or process to meet specified requirements relating to Project Management
- Research and undertake tests for a design solution and report the results effectively, within a Project
- Cognitive skills of critical thinking, analysis and synthesis

- Effective problem solving and decision making using appropriate quantitative and qualitative skills including identifying, formulating and solving problems
- Effective communication skills, both oral and written, using a range of media widely used in the sector, e.g. the preparation and presentation of reports
- Numeric and quantitative skills including data analysis, interpretation and extrapolation
- Effective use of communication and information technology for Mechanical related areas.
- Effective self-management in terms of time, planning and behaviour motivation, self-starting and individual initiative.
- Developing an appropriate learning style.
- Effective performance within a team environment including leadership, team building, influencing and project management skills
- Interpersonal skills, e.g. effective listening, negotiating, persuading and presentation

Higher Level transferable skills development including:

- The ability to manage and develop self
- The ability to communicate ideas effectively both orally and in writing
- The ability to apply numeracy in an Mechanical engineering context
- The ability to apply technology in an Mechanical engineering context
- To manage tasks and solve problems
- Apply design and creativity to solving and array of aerospace engineering problems
- The ability to work effectively as an individual and as part of a team
- The ability to be flexible and respond to the change within the Mechanical engineering sector
- Designing, planning, conducting and reporting on the needs of the Mechanical engineering sector.
- The ability to use ICT and Management Information Systems in an Mechanical engineering setting.
- Read and use appropriate literature with a full and critical understanding
- Solve problems applying subject knowledge and understanding to address familiar and unfamiliar problems within a Mechanical engineering context.
- Think scientifically, statistically and logically in relevant contexts.
- Think independently and take responsibility for their own learning whilst recognising their learning style

Teaching and Learning Methods

The following opportunities are provided to enable learners to develop and demonstrate their achievement of learning outcomes:

- Acquisition of core knowledge is through a mixture of lecture/presentations/demonstrations, tutorials, group seminars and directed study
- Analytic thinking skills are developed through discussion and debate in-group and tutorial sessions and question sheets.
- Practical skills are an essential component of the programme and will involve group work, presentations, demonstrations, laboratory experiments,
- Common skills such as oral and written communication are developed by means of course notes, presentations of project work, appropriate reading, and written tutor feedback.
- Design skills and the ability to create simple engineering designs using multi-disciplinary approach is developed by means of sample project work.

Assessment methods:

Summative assessment methods include:

- Written work required in various formats such as reports, essays, blogs, dissertation
- In-class controlled assessments, where applicable.
- Oral presentations to a group audience using teaching aids such as PowerPoint, poster, Electronic Whiteboard, Practical Models.
- Assessment is enhanced by encouraging the students to use technology e.g. digital cameras, flip videos, analysis software to augment their presentational work.
- Project work.
- Small scale research studies
- Work-based learning

As far as possible all assignment work is connected to a vocational relevant scenario. Students receive individual written and oral feedback within 3 weeks of submission date.

Formative assessment for learning and feedback includes:

- Interactive lectures and question & answer sessions can be used to examine student understanding and identify any additional guidance required.
- Group activities involve students actively contributing to, leading and participating in discussions and debates on a wide range of subject areas, undertaking games or group activities allowing immediate assessment and feedback.
- Subject related tutorials are led by the subject tutor and aim to address a particular module or assignment. These tutorials can be linked to workshop sessions where necessary.
- Workshops are for students to develop skills in self-directed study with the support of tutors. These sessions will be supported by staff but not staff led. There will also be self-directed time for students to further develop these skills and spend time reading around topics using a variety of recommended sources.

- Extension activities/quizzes/Discussion forums on Moodle.
- Presentations are used to support research skills, organisation, time-management skill and are also a confidence-building tool.
- The need for IT support in general will be identified and where necessary, IT support will be organised.
- Diagnostic testing identifying Maths and English support where necessary.

Note:

For further details on assessments, grading criteria, submissions and resubmissions of assignments, please refer to btec-hncd-engineering-2024.pdf (pearson.com). Also, please see below a traffic light system on using AI in assignments. This is being used by Oxford Brookes University and a number of Academic institutions.

✓ Appropriate use	? At risk practices	x Inappropriate use
✓ **Ethical** use where the student is still the author of the assignment	? Relying on AI tools for a significant part of the assignment	x **Unethical** use where the student is no longer the author of the assignment
✓ **Transparent** use where the student makes clear where and how they have used AI in their assignment	? Not making all use of AI tools clear	x **Deceptive, hidden use** where the student uses AI but does not declare it with their assignment
✓ Helping the student **get started** with the assignment with planning or ideas	? Using AI tools to generate a part of the assignment	x Putting **the whole assignment task** into an Artificial Intelligence tool and using what is generated with little or no changes
✓ Helping the student **with small changes** in the development of their assignment such as correcting spelling	? Using AI for a lot of the development of an assignment	x Asking an AI tool to **generate a reference list** instead of the student doing research
✓ Helping the student with **proofreading**/ checking before submission of the assignment	? Using AI to re-write an assignment at the final stage	x Using AI tools to answer **exam questions**
✓ Using AI tools **with instruction or guidance from the tutor**	? Using AI in ways the tutor has not recommended	x Using AI when the assignment instructions state that **AI must not be used**

Mode of Study

The Higher National Certificate (HNC) is a Level 4 qualification made up of 120 credits. It is usually studied full-time over one year, or part-time over two years. Students can study for the Pearson BTEC Higher Nationals, either as a part time or full-time.

A full-time mode of study requires students to attend college two days per week to study all eight units (or approved units) with the intention to complete the programme in a single year.

A part-time mode of study requires students to attend college one day per week with the intention to complete a maximum of four units in a single year. In some cases, a part-time student may choose the minimum number of unit/s to study in a single year; this may extend the length of part-time study in order to successfully achieve the award.

3. Programme Structure

Module code	Module title	CATS Credit value	Level	Year	Option or Mandatory
Unit 4001	Engineering Design	15	4	2	Mandatory
Unit 4002	Engineering Mathematics	15	4	1	Mandatory
Unit 4003	Engineering Science I	15	4	1	Mandatory
Unit 4004	Managing a Professional Engineering Project (Pearson set)	15	4	2	Mandatory
Unit 4008	Mechanical Principles	15	4	2	(Specialist unit) Mandatory
Unit 4012	Engineering Management	15	4	1	Part of programme delivery and unit accreditation
Unit 4013	Fundamentals of Thermodynamics and Heat Engines	15	4	2	(Specialist unit) Mandatory
Unit 4034	Computer Aided Design and Manufacture (CAD/CAM)	15	4	1	Part of programme delivery and unit accreditation

Progression to Year 2

Progression onto the second year of the programme requires completion and achievement of a minimum grade of a pass of all first - year units and after a successful progression interview.

Cases of student/s with approved mitigating circumstance who have outstanding referred assessment/s or unachieved assessment/s would be considered on individual bases by the academic exam board and then a decision would be made whether the student would be recommended to achieve the outstanding and/or unachieved assessment/s during the summer break in order to progress onto the second year.

Alternatively, the academic exam board may recommend the withdrawal of student/s with outstanding assessment and/or unachieved assessment from the programme.

Each case of a student with outstanding assessment/s or unachieved assessment/s would be considered on individual basis where student/s would be required to complete any outstanding/ unachieved assessment at a minimum pass grade in order to progress onto the second year.

After successful completion of all first-year modules, student/s may choose to transfer from Mechanical Engineering pathway to other different level 4 pathways (including Manufacturing, and /or General Engineering, Aircraft Maintenance Engineering and other pathways). The transfer is done after successful interview.

Completion of the Award

For the Mechanical Engineering pathway, students take the four mandatory core units, two specialist units and an additional two optional units. In total, eight units studied must be completed in the correct combination with a minimum grade of a Pass in all units in order to complete and achieve the award.

To achieve the HNC level 4 qualification, students must achieve 120 credits of completed units in the correct combination with a minimum grade of a Pass in all units.

Module Descriptors

Unit 4001: Engineering Design
The aim of this unit is to introduce learners to the methodical steps that engineers use in creating functional products and processes; from a design brief to the work, and the stages involved in identifying and justifying a solution to a given engineering need.

Unit 4002: Engineering Mathematics
The aim of this unit is to develop learner' skills in the mathematical principles and theories that underpin the engineering curriculum. Learners will be introduced to mathematical methods and statistical techniques in order to analyse and solve problems within an engineering context.

Unit 4003: Engineering Science
This unit introduces learners to the fundamental laws and applications of the physical sciences within engineering and how to apply this knowledge to find solutions to a variety of engineering problems.

Unit 4004: Managing a Professional Engineering Project (Pearson set)
This unit introduces learners to the techniques and best practices required to successfully create and manage an engineering project designed to identify a solution to an engineering need. While carrying out this project learners will consider the role and function of engineering in our society, the professional duties and responsibilities expected of engineers together with the behaviours that accompany their actions.

Unit 4008: Mechanical Principles
The aim of this unit is to introduce learners to the essential mechanical principles associated with engineering applications.

Unit 4012: Engineering Management
This unit introduces learners to engineering management principles and practices, and their strategic implementation.

Unit 4013: Fundamentals of Thermodynamics and Heat Engines
This unit introduces learners to the principles and concepts of thermodynamics and its application in modern engineering.

Unit 4034: Computer Aided Design and Manufacture (CAD/CAM)
This unit introduces learners to all the stages of the CAD/CAM process and to the process of modelling components using CAD software specifically suitable for transferring to CAM software.

4.Support for Students and Their Learning

Student progression on course is supported both by subject tutors and central College services and includes:

- An induction programme introducing new students to the subject of study, higher level skills that need to be developed, and the college facilities (including the library, IT facilities, staff and other students).
- College and course/ module handbooks available in print and electronic format on Moodle.
- Personal and academic support is integrated in teaching provided by supportive and accessible tutors.
- A modern library equipped with both electronics and non-electronics books, reading materials, and ICT equipment. The library can lend laptops to the students upon request.
- Study skills sessions integrated in programme.
- Computer laboratories with specialist facilities for computer networking and multimedia computing.
- Workshops and laboratories including wind tunnel, flight simulator, automation, and material testing
- Study skills sessions integrated in programme and organised on a regular basis;
- High specification computers with appropriate educational software.
- Planned visits and speakers
- Access to counsellors and support for students with special needs.
- Written assignment / assessment feedback (normally provided with 2 weeks of assessment submission).
- Access to course section and college wide sections on the college's intranet Moodle

5.Criteria for Admission

Entry Requirements:

4 GCSEs grade C/4 or above, to include Maths and English, plus Pearson BTEC Level 3 Diploma in Engineering, or a minimum of 2 A-levels in relevant subjects.

An Access to Higher Education Certificate in Engineering awarded by an approved further education institution may be considered, depending on the gardes.

Applicants with existing level 4/5 qualifications may be eligible for some Accreditation for Prior Learning (APL) which can be discussed on an individual basis.

Mature students, over the age of 21, with a suitable background and experience may be accepted without formal qualifications.

Applicants with an international equivalent of the above entry qualifications.

Offer of a place is conditional on a successful interview for all applicants

Normally, the course enrols students who have reached the minimum age of 18.

6.Progression

After successful completion of the HNC with an overall Merit grade and also commendation form the academic staff, students can progress onto the second year of the Foundation degree Mechanical Engineering programme and/or with the higher/degree apprenticeship at Solihull College and University Centre. It may be possible for a student to progress onto other pathways (including BSc (Hons) Degree in Aircraft Maintenance Engineering, and others) within Solihull College and University Centre and/or other local higher education institutions.

Following successful completion of the Foundation Degree at Solihull College and University Centre, student may progress onto the BSc (Hons) top-up degree in Mechanical Engineering at Solihull College and University Centre.

Alternative routes may be available within Solihull College and University Centre and other local universities or colleges on degree programmes or HND programmes.

7.Evaluating the Quality of Teaching and Learning

Evaluation of the Standards of Teaching and Learning is undertaken using the results of the following documents;

- Student feedback questionnaires, both initial impressions and the spring survey
- Module review forms completed by students at the end of every module and summarised by the course leader.
- Student representations made through the HE Student Council.
- Action areas fed by the above to the course based Annual Monitoring report.
- Findings of the peer teaching observation scheme and recommendations for improvement that are made
- Quality Audit of the programme undertaken by Dean of Higher Education & Curriculum Development and an external observer.
- External Verifiers report and audit of assessed work

Students have the opportunity to comment on the quality of the programme in the following ways

- Submitting module evaluation questionnaires which are shared in team meetings and relevant actions raised are included in the Annual Monitoring Review.
- Student Representatives volunteer from each group to bring forward the views of their colleagues informally.

The ways in which the quality of this programme is checked, both inside and outside the college, are:

- External Examiners, who produce an annual report which is available to view on Moodle and also results in an action plan for the following academic year.
- Annual module review in the form of student evaluations which are discussed in a team meeting
- Periodic programme review to identify best practice and invite employers to contribute to the design of the programmes.

8.Regulation of Assessment

- The programme is the subject of an Annual Monitoring Report (AMR) the last section of which is a Quality Improvement Plan (QIP), written by the course leader with help and input from the teaching and tutoring team this is passed to the Head of School for audit and from them to the quality unit for further audit and acceptance as part of the College plan.
- Assessment rules and regulations and quality standards are those that are laid down in the Quality standards requirements of the College Academic Board.
- Assessment and assessment vehicles are regulated by the internal verification system for each programme which is itself audited by the quality unit within the College and also by the External Verifier appointed by Edexcel.
- External verification of assessment and of the provision and standards of teaching are regulated by Pearson BTEC and their quality unit, the programme has to seek approval for continuance every 5 years. Their requirements are monitored annually by the visit and report of their appointed external verifier (Standards Verifier)

- Also the programme is the subject of periodic review by QAA, ensuring that national benchmarks are met throughout the programme.

Standards Verifiers (External Examiners) are appointed by Pearson

The role of Standards Verifier is that of moderator. In order to do this they check and review:

- action points from previous reports
- Centre assessment policy and boards
- effectiveness of assignments and internal verification
- the maintenance and audit of assessment records
- student registration and certification claims
- student support and review
- areas of good practice

9.Enhancement

- An action plan is provided in each annual programme report and progress in achieving enhancements is reviewed annually.
- Good practice in teaching and learning is developed and disseminated through staff development workshops and through participation in internal verification of completed student work.
- Staff development activities are discussed at annual appraisal interviews and are actively encouraged to develop their professional practice and industrial experience.

10. Programme Resources

The following are the key resources available to support the delivery of the programme:

- Advanced Manufacturing Centre
- Materials Laboratory
- CAD/CAM Software
- PLC Software
- Engineering Workshop
- Mechatronics Workshop
- Electrification Workshop

Student Employability

This programme is part of Solihull College and University Centre's commitment to meeting the needs of local, national and international employers by delivering a diverse range of educational models including part-time and work-based study for learners drawn from non-traditional backgrounds in addition to internal progressions from FE vocational programmes.

As part of this commitment, the HNC Mechanical Engineering programme will:

1. Support students by providing professional, impartial advice and guidance to enable students to make considered career decisions before and during their studies to prepare them for future employment and development by:

    - identifying the skills needed for progression into employment,
    - enhancing their existing employment prospects.

2. Provide subject-related resources and information on local, national and international labour markets;

3. Be responsive to the needs of employers in order to maximise students' employability and career progression prospects;

4. Include study skills which will improve students' academic writing and research capabilities to enable further study and facilitate career progression;

5. Support equality and diversity, and minimise barriers to learning, as described in the college's Equality Policy which can be found on the website under Mission and Policies.

6. Ensure that employers play a key part in module content, course design and assessment criteria by formally seeking their views through individual employer meetings and meetings with industry groups, and the use of a specialist employer service researcher to help to ensure that the course content meets industry expectations and requirements;

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook.

Table mapping HNC Mechanical Engineering Programme learning outcomes across the modules:

Modules	Unit (4001)- Engineering Design	Unit (4002) - Engineering Maths	Unit (4003) - Engineering Science	Unit (4004) – Managing a Professional Engineering Project	Unit (4008) - Mechanical Principles	Unit (4012) - Engineering Management	Unit (4013) - Fundamentals of Thermodynamics and Heat Engines	Unit (4023) - Computer Aided Design and Manufacture (CAD/CAM)
3.1 Academic Literacy								
1.1	x	x	x	x	x	x	x	x
1.2	x	x	x	x	x	x	x	x
1.3	x	x	x	x	x	x	x	x
3.2 Research Literacy								
2.1	x	x	x	x	x	x	x	x
2.2	x			x	x	x	x	
2.3	x	x	x	x	x	x	x	x
2.4	x		x	x		x		x
2.5	x	x	x	x	x	x	x	
2.6	x			x	x	x	x	
3.3 Critical self-awareness and personal literacy								
3.1				x	x	x	x	
3.2				x	x	x	x	
3.3				x		x		
3.4	x			x		x		
3.4 Digital and Information Literacy								
4.1	x			x	x	x	x	x
4.2	x	x	x	x	x	x	x	x
4.3	x	x	x	x	x	x	x	
4.4	x		x	x	x	x	x	x
3.5 Active Citizenship								
5.1	x	x	x	x	x	x	x	x
5.2	x			x	x	x	x	x
5.3	x			x	x	x	x	x
5.4	x			x	x	x	x	
5.5	x	x	x	x	x	x	x	x
5.6	x	x	x	x	x	x	x	x

The UK-Spec Learning Outcomes are covered in the programme as follows (definition of UK-Spec Learning Outcomes can be found, for example, in the IET handbook of Learning outcomes http://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC%20third%20edition%20%281%29.pdf)

1. Academic literacy

Learners are expected to have academic literacy of:

1.1. Mechanical and Manufacturing Engineering, so that they are able to demonstrate the knowledge and understanding to deal with well-established, and with some depth, facts, concepts, principles & theories relevant to Mechanical and Manufacturing Engineering, within a broad engineering subject base (UK-SPEC A1, A2: Output[1] US1i, S1i, P6i).

1.2. Complexity within Mechanical and Manufacturing Engineering systems, informed by literature & resources which are largely prescribed (UK-SPEC A1, A2: Output P4i, P5i).

1.3. The inter-relationships of health & safety, design, engineering science & applications, analytical & mathematical techniques, environmental considerations & sustainability,

[1] The definition of UK-Spec Outputs can be found, for example, in the IET handbook of Learning outcomes http://www.theiet.org/academics/accreditation/policy-guidance/handbook_lo.cfm

systems, management and economic factors in relation to Mechanical and Manufacturing Engineering (Output US2i, D1i, S1i, S2i, S3i, S4i, P6i).

2. Research literacy

Learners are expected to have research literacy so that they can:

2.1. Apply aspects of relevant facts, concepts, principles & theories relevant to Mechanical and Manufacturing Engineering issues to their subject and / or professional work areas (UK-SPEC A1, A2: Output US1i, US2i, S1i, P6i).
2.2. Make and justify decisions relevant to design, manufacture, use and decommissioning of mechanical equipment and / or plant including preventative measures which are specified and predictable; and produce an action plan, where appropriate, supported by pertinent evidence (UK-SPEC A2, B2: Output E1i, E3i, D3i, D4i, D5i).
2.3. With guidance, in relation to the field of Mechanical and Manufacturing Engineering and within specified parameters, explain key engineering principles and identify their relevance and significance to Mechanical and Manufacturing Engineering and justify their application to specific problems which are specified and produc e a coherent line of argument supported by relevant evidence (UK-SPEC B1: Output E1i, E2i, E3i, P4i).
2.4. Identify, explain and use appropriate practical and laboratory skills with the appropriate selection of experimental and investigative techniques (Output P1i, P2i).
2.5. Identify, access, use, explain and evaluate information / data which is relevant from a range of sources (Output P4i).
2.6. Set milestones within a given plan and implement plan to achieve several objectives (UK-SPEC C1: Output S2i).

3. Critical self-awareness and personal literacy

Learners are expected to have critical self-awareness and personal literacy so that they can:

3.1. Undertake prescribed independent study techniques and their application to work-based learning including the setting of goals, managing time appropriately and prioritising tasks, and review personal performance to ensure that work is completed in a timely manner.
3.2. In relation to the professional work area, operate effectively in situations that are largely straightforward and predictable within practical / employment / work contexts requiring the exercise of personal responsibility and/or decision-making as evidenced by work-based learning in the application of underlying concepts and principles of Mechanical and Manufacturing Engineering in routine and novel situations (UK-SPEC C1, C2, E2: Output D3i, P3i, P4i).
3.3. In relation to the learner's professional area and with clear guidance / support, participate effectively in appropriate collaboration with people from other disciplines / professions (UK-SPEC C3, D3: Output P3i).
3.4. For a given situation and audience, communicate knowledge and understanding appropriate to the level in an appropriate written, verbal or visual format in a way that is appropriate for the purpose, topic and situation and in such a way as to demonstrate understanding to academic, specialist and non-specialist audiences (UK-SPEC D1: Generic Output).

4. Digital and information literacy

Learners are expected to have digital and information literacy so that they can:

4.1. With guidance, in relation to academic and practical work, convey information which has some complexity in written/spoken English which is accurate and clear in terms of grammar / syntax / vocabulary-choice / style and use academic conventions appropriately for the purpose, topic, situation and audience and also reference a range of different types of sources accurately in line with guidance provided (Generic Output).
4.2. Select and use specified IT applications and strategies as appropriate for guided purposes and tasks and the retrieval of information (Output E2i, P1i).
4.3. Solve straightforward contextual, qualitative and numerical problems by identifying, explaining and selecting appropriate approaches to use and also evaluate both the approaches and solutions to the problem (Output E2i, E3i).
4.4. Critically evaluate the validity and implications of information relevant to Mechanical and Manufacturing Engineering and their work practice (Generic Output).

5. Active citizenship

Learners are expected to have active citizenship so that they can:

5.1. With guidance, in relation to the field of Mechanical and Manufacturing Engineering and within specified parameters, identify and explain issues related to health and safety, design, engineering science & applications, analytical & mathematical techniques, environmental considerations & sustainability, systems, management and economic factors (UK-SPEC E2, E3: Output E4i, D1i, D2i, D5i, S4i).

5.2. With guidance, in relation to the field of Mechanical and Manufacturing Engineering and within specified parameters, evaluate and critically analyse mechanical equipment and systems and make suggestions to improve the design life, performance and efficiency and justify decisions about the management of mechanical equipment and systems and also related technologies (UK-SPEC B3, C4: Output E1i, E2i, E3i, E4i, D4i, D5i, P7i).

5.3. Demonstrate respect for the perspective of other disciplines / professions and be able to identify the potential contribution of own and other professions / disciplines to the area of practice and describe the purpose of these disciplines / professions and their role within a multidisciplinary team (UK-SPEC C3, D3: Output P3i).

5.4. In relation to Engineering, with clear guidance & support, appropriately work effectively within the boundaries imposed by ethical and legal issues (including standards & codes) and demonstrate respect for the ethical and legal boundaries of other disciplines (UK-SPEC E1, E2: Output S4i, S5i, P3i, P5i).

5.5. Demonstrate the learning ability needed to undertake further training, develop existing skills, and acquire new competences that will enable them to assume significant responsibility within organisations (UK-SPEC A1, E4: Generic Output).

5.6. Reflect, selecting from a range of suggested approaches and techniques, and seek and use feedback to inform reflection on and analysis of own strengths, limitations & performance and identify their implications (UK-SPEC D3: Generic Output).