

Digital & Technology Solutions Degree Apprenticeship: Software Engineer Knowledge, Skills and Behaviours

This reference document is intended to help you understand the Digital & Technology Solutions (DTS) Professional Degree Apprenticeship Standard and the expected knowledge, skills and behaviours that Apprentices will develop through both the workplace and university teaching.

What is an Apprenticeship Standard?

An Apprenticeship Standard outlines the *knowledge, skills and behaviours* (KSBs) that Apprentices will develop over the course of their Apprenticeship.

All Apprenticeship standards can be found on the Institute for Apprenticeships & Technical Education website and the DTS Professional Degree Apprenticeship Standard can be found [here](#).

However, we have created this document for Employers and Apprentices to help you understand your standard and all of the KSBs you will develop throughout the four years on programme.

KSBs: Why are they important to me?

Apprentices on our DTS Professional Degree Apprenticeship you will develop:

- Core technical knowledge and skills (page 2 and 4)
- Pathway specific knowledge and skills (page 3 and 5)
- Core behaviours (page 6 and 7)

The KSBs for this Apprenticeship programme were defined by employers and industry-experts and Manchester Metropolitan University have carefully planned our programme to ensure that the standard has been fully integrated and is met through our teaching. A detailed view of how the KSBs are mapped to the units taught on this programme can be found on page 8. It is also expected that these KSBs will be developed through workplace activities and projects. Apprentices will complete a Skills Scan at the start of each year to monitor progress towards these KSBs and KSB development will be discussed in review meetings with an Apprentices allocated Skills Coach.

At End Point Assessment, Apprentices will be assessed on the KSBs they have demonstrated through their final Synoptic Assessment.

Core Technical Knowledge (CTK)

A Software Engineer knows and understands:

CTK1

How business exploits technology solutions for competitive advantage.

CTK2

The value of technology investments and how to formulate a business case for a new technology solution, including estimation of both costs and benefits.

CTK3

Contemporary techniques for design, developing, testing, correcting, deploying and documenting software systems from specifications, using agreed standards and tools.

CTK4

How teams work effectively to produce technology solutions.

CTK5

The role of data management systems in managing organisational data and information.

CTK6

Common vulnerabilities in computer networks including unsecure coding and unprotected networks.

CTK7

The various roles, functions and activities related to technology solutions within an organisation.

CTK8

How strategic decisions are made concerning acquiring technology solutions resources and capabilities including the ability to evaluate the different sourcing options.

CTK9

How to deliver a technology solutions project accurately consistent with business needs.

CTK10

The issues of quality, cost and time for projects, including contractual obligations and resource constraints.

Software Engineer Knowledge (SEK)

A Software Engineer knows and understands:

SEK1

How to operate at all stages of the software development cycle.

SEK2

How teams work effectively to develop software solutions embracing agile and other development approaches.

SEK3

How to apply software analysis and design approaches.

SEK4

How to interpret and implement a design, compliant with functional, non-functional and security requirements.

SEK5

How to perform functional unit testing.

SEK6

How to use and apply the range of software tools used in software engineering

Software Engineer: Skills

[Unit Mapping](#)

Core Skills (CSK)

CSK1

Information Systems: is able to critically analyse a business domain in order to identify the role of information systems, highlight issues and identify opportunities for improvement through evaluating information systems in relation to their intended purpose and effectiveness.

CSK2

Systems Development: analyses business and technical requirements to select and specify appropriate technology solutions. Designs, implements, tests, and debugs software to meet requirements using contemporary methods including agile development. Manages the development and assurance of software artefacts applying secure development practises to ensure system resilience. Configures and deploys solutions to end users.

CSK3

Data: identifies organisational information requirements and can model data solutions using conceptual data modelling techniques. Is able to implement a database solution using an industry standard database management system (DBMS). Can perform database administration tasks and is cognisant of the key concepts of data quality and data security. Is able to manage data effectively and undertake data analysis.

CSK4

Cyber Security: can undertake a security risk assessment for a simple IT system and propose resolution advice. Can identify, analyse and evaluate security threats and hazards to planned and installed information systems or services (e.g. Cloud services).

CSK5

Business Organisation: can apply organisational theory, change management, marketing, strategic practice, human resource management and IT service management to technology solutions development. Develops well-reasoned investment proposals and provides business insights.

CSK6

IT Project Management: follows a systematic methodology for initiating, planning, executing, controlling, and closing technology solutions projects. Applies industry standard processes, methods, techniques and tools to execute projects. Is able to manage a project (typically less than six months, no inter-dependency with other projects and no strategic impact) including identifying and resolving deviations and the management of problems and escalation processes.

CSK7

Computer and Network Infrastructure: can plan, design and manage computer networks with an overall focus on the services and capabilities that network infrastructure solutions enable in an organisational context. Identifies network security risks and their resolution.

Software Engineer: Skills

[Unit Mapping](#)

Software Engineer Skills (SESK)

A Software Engineer is able to:

SESK1

Create effective and secure software solutions using contemporary software development languages to deliver the full range of functional and non-functional requirements using relevant development methodologies.

SESK2

Undertake analysis and design to create artefacts, such as use cases to produce robust software designs.

SESK3

Produce high quality code with sound syntax in at least one language following best practices and standards.

SESK4

Perform code reviews, debugging and refactoring to improve code quality and efficiency.

SESK5

Test code to ensure that the functional and non-functional requirements have been met.

SESK6

Deliver software solutions using industry standard build processes, and tools for configuration management, version control and software build, release and deployment into enterprise environments.

Core Behaviour Skills (CB)

Professional, interpersonal and business skills:

- | | |
|------------|--|
| CB1 | Fluent in written communications and able to articulate complex issues. |
| CB2 | Makes concise, engaging and well-structured verbal presentations, arguments and explanations. |
| CB3 | Able to deal with different, competing interests within and outside the organisation with excellent negotiation skills.. |
| CB4 | Is able to identify the preferences, motivations, strengths and limitations of other people and apply these insights to work more effectively with and to motivate others. |
| CB5 | Competent in active listening and in leading, influencing and persuading others. |
| CB6 | Able to give and receive feedback constructively and incorporate it into his/her own development and life-long learning. |
| CB7 | Applies analytical and critical thinking skills to Technology Solutions development and to systematically analyse and apply structured problem solving techniques to complex systems and situations. |
| CB8 | Able to put forward, demonstrate value and gain commitment to a moderately complex technology-oriented solution, demonstrating understanding of business need, using open questions and summarising skills and basic negotiating skills. |
| CB9 | Able to conduct effective research, using literature and other media, into IT and business related topics. |

Core Behaviour Skills (CB)

Attributes and Behaviours:

CB10

Have demonstrated that they have mastered basic business disciplines, ethics and courtesies, demonstrating timeliness and focus when faced with distractions and the ability to complete tasks to a deadline with high quality.

CB11

Flexible attitude.

CB12

Ability to perform under pressure.

CB13

A thorough approach to work.

CB14

Logical thinking and creative approach to problem solving.

Software Engineer Pathway

Year 1

Introduction to Web Development

CTK3

CSK2

Introduction to Business Systems

CTK1

CTK2

CTK5

CTK7

CTK8

CSK1

CSK2

CSK3

CSK5

CB1

CB2

CB3

CB4

CB8

Introduction to Programming

CTK3

CSK2

CB7

Year 2

Computing Fundamentals

CTK3

CTK6

SEK3

SEK4

SEK6

CSK1

CSK3

CSK4

CSK7

SESK1

CB7

Technology Management

CTK1

CTK2

CTK4

CTK8

CTK9

CTK10

SEK1

SEK2

SEK6

CSK5

CSK6

CB1

CB3

CB4

CB5

CB6

CB8

Advanced Programming

CTK3

SEK1

SEK2

SEK3

SEK4

SEK5

SEK6

CSK2

SESK1

SESK2

SESK3

SESK4

SESK5

CB7

Year 3

Computer Network & Operating Systems

CTK6

CSK7

CSK4

Development Project

CTK1

CTK3

CTK9

CTK10

CSK2

CSK5

CSK6

SESK1

SESK2

SESK3

SESK4

SESK5

SESK6

CB1

CB2

CB3

CB4

CB5

CB6

CB7

CB8

CB9

Enterprise Programming

CTK3

CTK4

SEK1

SEK2

SEK3

SEK4

SEK5

SEK6

CSK2

SESK1

SESK2

SESK3

SESK4

SESK5

SESK6

Year 4

Elective Unit

Mapping for Elective Unit varies each year depending on units offered

Portfolio Unit

CB1

CB2

CB3

CB4

CB5

CB6

CB7

CB8

CB9

CB10

CB11

CB12

CB13

CB14

Synoptic Project

CTK1

CTK3

CTK4

CTK6

CTK9

CSK2

CSK6

SESK1

SESK2

SESK3

SESK4

SESK5

SESK6

CB1

CB2

CB3

CB4

CB5

CB6

CB7

CB8

CB9

CB10

CB12

CB13