Smart Tech Qualifications and Information

For this qualification TLM recommend the excellent teaching resources and support offered by Black Country Atelier.

Further information can be found here [1].

Level 1

Level 1, Unit 1 - Product design and visualisation (5 credits)

1. relate opportunities and constraints to a product design.
   
   1.1 identify opportunities for a product or solution. [5]
   
   1.2 identify constraints on a product or solution. [8]

2. visualise product solutions to meet identified needs.
   
   2.1 identify key aspects in a design brief. [6]
   
   2.2 gather information to develop a solution. [9]

3. present evaluations of designs.
   
   3.1 collect evidence for presenting the design. [7]
   
   3.2 present strengths and weaknesses in a visual prototype. [10]

   3.3 use appropriate digital and/or physical models to...

2.4 use appropriate digital and physical media to design a product. [14]

3.4 receive feedback from presenting a design. [15]

2.5 prepare a visual prototype of the solution. [16]

3.5 act on feedback to improve a design. [17]

### Level 1, Unit 2 - Product manufacture (5 credits)

1. relate a product’s design to its manufacture.

   1.1 check quality in a design in preparation for manufacture. [19]

   1.2 use scale and dimensions to associate plans with manufacture. [22]

   1.3 prepare and document files to support the process of moving from design to manufacture. [25]

   1.4 make adjustments to a design as a result of feedback from the manufacturing process. [28]

2. use tools and information to support the manufacturing process.

   2.1 select the tools needed for manufacture. [20]

   2.2 prepare information to manufacture a product. [23]

   2.3 use manufacturing tools with appropriate precision and attention to safety. [26]

   2.4 fabricate a product using appropriate materials and settings. [29]

   2.5 finish or assemble parts and components. [31]

   2.6 identify and correct errors to make improvements to work. [33]

3. present an evaluation of manufacturing processes.

   3.1 collect evidence for presenting the manufacturing process. [21]

   3.2 present strengths and weaknesses in the manufacturing process. [24]

   3.3 use appropriate digital and/or physical drawings or models to support a presentation of the manufacturing process. [27]

   3.4 receive feedback from presenting the manufacturing process. [30]

   3.5 act on feedback to improve work. [32]

### Level 1, Unit 3 - Smart electronics (5 credits)
1. understand analogue circuits.
   1.1 identify circuit components and symbols. [35]
   1.2 identify valid circuits. [38]
   1.3 set up a physical analogue circuit for a purpose. [41]
   1.4 distinguish between analogue and digital products. [44]

2. understand digital control.
   2.1 identify digital circuit components. [36]
   2.2 identify program elements that control physical components. [39]
   2.3 debug a control program to get it working. [42]
   2.4 use switches to control actions. [45]

3. combine analogue and digital systems.
   3.1 identify a trigger point in a changing voltage. [37]
   3.2 follow instructions to build a Smart system. [40]
   3.3 use a program to control a physical system. [43]
   3.4 combine Smart technology in a design to improve the user experience. [46]

Level 2

Level 2, Unit 1 - Product design and visualisation (5 credits)

1. relate opportunities and constraints to a product design.
   1.1 describe opportunities for a product or solution. [48]
   1.2 describe constraints on a product or solution. [51]
   1.3 consider commercial sustainability of a product or solution. [54]

2. visualise product solutions to meet identified needs.
   2.1 explain key aspects in a design brief. [49]
   2.2 gather information to develop a solution. [52]
   2.3 design and test sketches and models to visualise a solution. [55]
   2.4 use appropriate digital and physical media to design a product. [57]

3. present evaluations of designs.
   3.1 organise evidence for presenting the design. [50]
   3.2 explain strengths and weaknesses in a visual prototype. [53]
   3.3 use appropriate digital and/or physical models to support presenting a design. [56]
   3.4 receive feedback from presenting a design. [58]
Level 2, Unit 2 - Product manufacture (5 credits)

1. relate a product's design to its manufacture.
   1.1 check quality in a design in preparation for manufacture. [62]
   1.2 work with scales and dimensions when associating plans with manufacture. [65]
   1.3 prepare and document files to support the process of moving from design to manufacture. [68]
   1.4 make adjustments to a design as a result of feedback from the manufacturing process. [71]

2. use tools and information to support the manufacturing process.
   2.1 select the tools needed for manufacture. [63]
   2.2 prepare and plan information for the manufacturing a process. [66]
   2.3 use manufacturing tools with appropriate precision and safety. [69]
   2.4 fabricate a product using appropriate materials and settings. [72]
   2.5 prepare a visual prototype of the solution. [59]

3. present evaluation of manufacturing processes.
   3.1 organise evidence for presenting the manufacturing process. [64]
   3.2 explain strengths and weaknesses in the manufacturing process including economic and environmental considerations. [67]
   3.3 use appropriate digital and/or physical models to support a presentation of the manufacturing process. [70]
   3.4 receive feedback from presenting the manufacturing process. [73]
   3.5 act on feedback to improve my work. [75]

   2.6 explain how to correct errors to make improvements to work. [76]

Level 2, Unit 3 - Smart electronics (5 credits)

1. understand 2. understand digital 3. combine analogue
### analogue circuits.

1. **1.1 describe the purpose of circuit components and symbols.** [78]

2. **1.2 build valid circuits.** [81]

3. **1.3 set up and debug a physical analogue circuit for a purpose.** [84]

4. **1.4 explain the difference between analogue and digital products.** [87]

### control.

1. **2.1 describe the purpose of digital circuit components.** [79]

2. **2.2 create program elements that control physical components.** [82]

3. **2.3 explain bugs in a control program and get it working.** [85]

4. **2.4 use logic to control actions.** [88]

### and digital systems.

1. **3.1 describe the process of analogue to digital conversion.** [80]

2. **3.2 build a Smart system.** [83]

3. **3.3 explain how to use a program to control a physical system.** [86]

4. **3.4 combine Smart technology in a design to improve the user experience.** [89]

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**Links**


[5] https://theingots.org/community/spl1u1x#1.1

[6] https://theingots.org/community/spl1u1x#2.1

[7] https://theingots.org/community/spl1u1x#3.1

[8] https://theingots.org/community/spl1u1x#1.2

[9] https://theingots.org/community/spl1u1x#2.2

[10] https://theingots.org/community/spl1u1x#3.2

[11] https://theingots.org/community/spl1u1x#1.3

[12] https://theingots.org/community/spl1u1x#2.3

[13] https://theingots.org/community/spl1u1x#3.3

[14] https://theingots.org/community/spl1u1x#2.4

[15] https://theingots.org/community/spl1u1x#3.4

[16] https://theingots.org/community/spl1u1x#2.5

[17] https://theingots.org/community/spl1u1x#3.5

[18] https://theingots.org/community/spl1u1i

[19] https://theingots.org/community/spl1u1x#1.1

[20] https://theingots.org/community/spl1u1x#2.1

[21] https://theingots.org/community/spl1u1x#3.1

[22] https://theingots.org/community/spl1u1x#1.2

[23] https://theingots.org/community/spl1u1x#2.2

[24] https://theingots.org/community/spl1u1x#3.2

[25] https://theingots.org/community/spl1u1x#1.3

[26] https://theingots.org/community/spl1u1x#2.3
Smart Tech Qualifications and Information

[86] https://theingots.org/community/spl2u3x#3.3
[87] https://theingots.org/community/spl2u3x#1.4
[88] https://theingots.org/community/spl2u3x#2.4
[89] https://theingots.org/community/spl2u3x#3.4
[90] https://theingots.org/community/spl2u3i