# Open Systems and Advanced Manufacturing Technologies L2

## Performance points for 2019



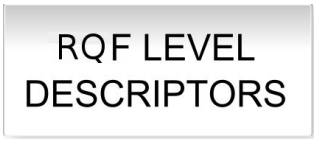
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### Level 2

# Level 2, Unit 1 - The Understanding and Appreciation of Rocket Science (4 credits)

| 1. 1. Understanding the basic physical forces involved with rocket flight | 2. 2. Applying aspects of construction and development for rockets | 3. 3. Building, testing and launching a rocket with further development | 4. 4. Investigating further applications and exploratory topics |
|---|---|---|---|
| 1.1 I can describe the physics involved in rocket flight [5] | 2.1 I can identify materials used in the construction of rockets and explain why they are useful [6] | 3.1 I can make rough designs ,test and evaluate versions of my final rocket [7] | 4.1 I can investigate and explain the application of rockets for science and experimentation [8] |
| 1.2 I can identify and explain limitations on rocket flight created by physical elements [9] | 2.2 I can describe the properties of materials that make them suitable for rockets [10] | 3.2 I can explain test procedures and potential outcomes [11] | 4.2 I understand the basic physics in relation to space exploration [12] |
| 1.3 I can explain principles of physics which make flight possible [13] | 2.3 I can describe the forces which enable rocket flight and which determine material selection [14] | 3.3 I can design and build a rocket for flight [15] | 4.3 I can describe the range of uses for rockets, as well as their limitations [16] |
| 1.4 I can explain | 2.4 I can explain | 3.4 I can describe | 4.4 I can select |

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| environmental factors which will make flight possible [17] | historical construction techniques and developments [18] | the procedure for launch, including safety and legal aspects required [19] | potential subjects from scientific discussions which would be suitable for rocket based projects [20] |
| 1.5 I can explain how to incorporate an understanding of physics into the final designs [21] | 2.5 I can identify the materials needed for my test rocket and explain their suitability for the job [22] | 3.5 I can select an appropriate launch venue, taking into consideration local guidelines and legal requirements [23] | 4.5 I can discuss and describe the importance of scientific discovery for the wider society [24] |
| 1.6 I can use simulation to minimise problems in my final tests [25] | | 3.6 I can carry out a launch and document the findings for further development [26] | |

# Level 2, Unit 2 - The Understanding and Application of Microsatellites (4 credits)

| 1. 1. Understand the current place in the market of microsatellites | 2. 2. Review and define the key issues in making a microsatellite | 3. 3. Understand the key issues in space deployment | 4. 4. Investigate the control, data use and end of life issues related to microsatellites |
|---|---|---|---|
| 1.1 I can review the current status of microsatellites in terms of global production and main countries involved [28] | 2.1 I understand the need for size reduction in satellite technology [29] | 3.1 I can appreciate the cost implications of getting equipment to space [30] | 4.1 I can describe how microsatellites are controlled from earth [31] |
| 1.2 I can list and define the key uses of microsatellites [32] | 2.2 I can describe some of the key materials used in construction and say why they are used [33] | 3.2 I can describe key terms such as "piggyback" in terms of deployment and give examples of how it is used [34] | 4.2 I can describe how microsatellites are controlled while in space [35] |
| 1.3 I can describe the main launch vehicles used for | 2.3 I can describe the main forces acting on satellites | 3.3 I can list and define the main propellants used by | 4.3 I can review the types of data collected by |

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| deployment and their characteristics [36] | in their lifecycle and how this affects their manufacture [37] | microsatellites [38] | microsatellites [39] |
| 1.4 I can define the main versions of microsatellites including nanosatellites, picosatellites and femtosatellites [40] | 2.4 I can describe the main forms of communication used in microsatellites and give examples of their usage [41] | 3.4 I can describe the strengths and weaknesses of the main propellants used in space [42] | 4.4 I can review the dangers of microsatellites that return to earth when they finish their mission [43] |
| 1.5 I can assess the current market in microsatellites [44] | 2.5 I can develop a list of requirements in the manufacture of a microsatellite [45] | 3.5 I can describe the different levels of orbit used in microsatellite systems [46] | 4.5 I can assess the impact of microsatellites and recommend a possible future use for them [47] |
| | 2.6 I can devise my own basic design for a microsatellite and define its purpose [48] | 3.6 I can describe the main legal issues relating to microsatellites [49] | |

# Level 2, Unit 3 - Working with Robotics and Artifical Intelligence (4 credits)

| 1. 1. Understand what Artificial Intelligence is and how it works | 2. 2. Review and define examples of where robotics is used | 3. 3. Understand the processes of making a basic robot work | 4. 4. Appreciate and test the issues and challenges of robotics |
|---|---|---|---|
| 1.1 I can list the main features of an artificial intelligence [51] | 2.1 I can describe instances of robotics in industrial places [52] | 3.1 I can review the equipment required to design and create robotic devices [53] | 4.1 I can test the build quality of an assembled robot against the specification [54] |
| 1.2 I can describe, with examples, the main uses of artificial intelligence [55] | 2.2 I can review how robotics is used in medical applications [56] | 3.2 I can assess the design tools used to create robots and use these in a basic way [57] | 4.2 I can test the main features of a built robot in terms of hardware and software [58] |

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| 1.3 I can review some of the expectations of artificial intelligence [59] | 2.3 I can describe how robotics is used in agricultural environments [60] | 3.3 I can work with various components of robot design and appreciate their features [61] | 4.3 I can make adjustments to a robot build or control system to improve its functioning [62] |
| 1.4 I can review the intended uses of artificial intelligence [63] | 2.4 I can assess the wider use of robotics in society [64] | 3.4 I can build a basic robot for testing [65] | 4.4 I can recommend additional features to existing designs based on usage [66] |
| 1.5 I can assess the strengths and weaknesses of using artificial intelligence [67] | 2.5 I can assess and comment on the dangers associated with the reliance on robotics in society [68] | | |
| 1.6 I can describe any legal and ethical issues associated with using robots [69] | | | |

# Level 2, Unit 4 - The Development and Deployment of Unmanned Vehicles (4 credits)

| 1. 1. Understand the history and range of uses of UVs | 2. 2. Appreciate the design and development issues related to UVs | 3. 3. Explore the problems and solutions of UV usage | 4. 4. Understand the legal, moral and ethical issues related to UV use |
|---|---|---|---|
| 1.1 I can research the history of UVs and list the key milestones [71] | 2.1 I can describe the range of designs currently in use [72] | 3.1 I can describe the main control methods used with UVs [73] | 4.1 I can describe the legal issues relating to UVs [74] |
| 1.2 I can list the primary uses of UVs currently in operation [75] | 2.2 I can assess the designs in terms of their use [76] | 3.2 I can assess the development constraints that apply in building UVs [77] | 4.2 I can assess the main laws and regulations that affect UVs use [78] |
| 1.3 I can explore | 2.3 I can assess | 3.3 I can describe | 4.3 I can review |

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| the extended range of uses of UVs [79] | the main materials used in the construction of UVs and list their strengths and weaknesses [80] | the key requirements of endurance and reliability of UVs [81] | the ethical concerns relating to UVs in a commercial setting [82] |
| 1.4 I can describe the use of UVs in civil and military situations and give examples of each [83] | 2.4 I can describe the main forms of UVs based on their use and required characteristics such as range, height, speed, payload [84] | 3.4 I can design my own basic UV based on my understanding [85] | 4.4 I can review the ethical and legal concerns relating to UVs in a military setting [86] |
| | 2.5 I can describe the software and hardware used in UVs [87] | 3.5 I can describe the features and use of my UV [88] | |

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**Links**
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[3] http://register.ofqual.gov.uk/Detail/Index/38418?category=qualifications&query=TLM%20L2%20Certificate%20in%20Open%20Systems%20and%20Advanced%20Manufacturing%20Technologies
[4] https://theingots.org/community/RQF_Levels
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[26] https://theingots.org/community/osamtl2u1x#3.6
[27] https://theingots.org/community/osamtl2u1i

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