

# 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**

[1.1 I can describe the physics involved in rocket flight](#) [5]

[1.2 I can identify and explain limitations on rocket flight created by physical elements](#) [9]

[1.3 I can explain principles of physics which make flight possible](#) [13]

[1.4 I can explain](#)

**2. 2. Applying aspects of construction and development for rockets**

[2.1 I can identify materials used in the construction of rockets and explain why they are useful](#) [6]

[2.2 I can describe the properties of materials that make them suitable for rockets](#) [10]

[2.3 I can describe the forces which enable rocket flight and which determine material selection](#) [14]

[2.4 I can explain](#)

**3. 3. Building, testing and launching a rocket with further development**

[3.1 I can make rough designs, test and evaluate versions of my final rocket](#) [7]

[3.2 I can explain test procedures and potential outcomes](#) [11]

[3.3 I can design and build a rocket for flight](#) [15]

[3.4 I can describe](#)

**4. 4. Investigating further applications and exploratory topics**

[4.1 I can investigate and explain the application of rockets for science and experimentation](#) [8]

[4.2 I understand the basic physics in relation to space exploration](#) [12]

[4.3 I can describe the range of uses for rockets, as well as their limitations](#) [16]

[4.4 I can select](#)

[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](#)

[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 Artificial 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]

[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](#)

[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]

**Source URL:** <https://theingots.org/community/rocketry>

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