## Open Systems and Advanced Manufacturing Technologies L2

Performance points for 2019

[1]

Teacher Resources
Advanced
Manufacturing
Technologies
[2]
(Ofqual Register Link)
[3]

Level 2

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


#### Abstract

1. 1.

Understanding the basic physical forces involved with rocket flight


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

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

4.3 I can describe the range of uses for rockets, as well as their limitations [16]
2.4 I can explain
4.4 I can select
environmental factors which will make flight possible [17]
1.5 I can explain how to incorporate an understanding of physics into the final designs [21]
1.6 I can use
simulation to minimise problems in my final tests [25]
historical construction techniques and developments [18]
2.5 I can identify the materials needed for my test rocket and explain their suitability for the job [22]
the procedure for launch, including safety and legal aspects required [19]
3.5 I can select an appropriate launch venue, taking into consideration local guidelines and legal requirements [23]
potential subjects from scientific discussions which would be suitable for rocket based projects [20]
4.5 I can discuss and describe the importance of scientific discovery for the wider society [24]
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. <br> Understand the current place in the market of microsatellites

### 1.1 I can review

 the current status of microsatellites in terms of global production and main countries involved [28]1.2 I can list and define the key uses of microsatellites [32]

2. 2. Review and define the key issues in making a microsatellite

2.1 I understand the need for size reduction in satellite technology [29]

> 2.2 I can describe some of the key materials used in construction and say why they are used [33]
2.3 I can describe the main forces acting on satellites

## 3. 3. Understand the key issues in space deployment

> 3.1 I can appreciate the cost implications of getting equipment to space [30]
3.21 can describe key terms such as "piggyback" in terms of deployment and give examples of how it is used [34]
1.3 I can describe the main launch vehicles used for
3.3 I can list and define the main propellants used by

## 4. 4. Investigate the control, data use and end of life issues related to microsatellites

4.1 I can describe how microsatellites are controlled from earth [31]
4.2 I can describe how microsatellites are controlled while in space [35]

> 4.3 I can review the types of data collected by

[^0]deployment and their characteristics [36]
1.4 I can define the main versions of microsatellites including nanosatellites, picosatellites and femtosatellites [40]
1.5 I can assess the current market in microsatellites [44]
in their lifecycle and how this affects their manufacture [37]
2.4 I can describe the main forms of communication used in microsatellites and give examples of their usage [41]
2.5 I can develop a list of requirements in the manufacture of a microsatellite [45]
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]
3.4 I can describe the strengths and weaknesses of the main propellants used in space [42]
3.5 I can describe the different levels of orbit used in microsatellite systems [46]
4.4 I can review the dangers of microsatellites that return to earth when they finish their mission [43]
4.5 I can assess the impact of microsatellites and recommend a possible future use for them [47]
microsatellites [39]
microsatellites [38]

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

## 1. 1. <br> Understand what Artificial Intelligence is and how it works

1.1 I can list the main features of an artificial intelligence [51]

1.2 I can describe, with examples, the main uses of artificial intelligence [55]

## 2. 2. Review and define examples of where robotics is used

2.1 I can describe
instances of
robotics in industrial
places [52]

### 2.2 I can review

 how robotics is used in medical applications [56]
## 3. 3. Understand the processes of making a basic robot work

> 3.1 I can review the equipment required to design and create robotic devices [53]

### 3.2 I can assess

 the design tools used to create robots and use these in a basic way [57]
## 4. 4. <br> Appreciate and test the issues and challenges of robotics

4.1 I can test the build quality of an assembled robot against the specification [54]
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]
3.4 I can build a basic robot for testing [65]
4.3 I can make adjustments to a robot build or control system to improve its functioning [62]
4.4 I can recommend additional features to existing designs based on usage [66]
2.5 I can assess and comment on the dangers associated with the reliance on robotics in society [68]
2.4 I can assess the wider use of robotics in society [64]
1.5 I can assess
the strengths and weaknesses of using artificial intelligence [67]
1.6 I can describe any legal and ethical issues associated with using robots [69]
1.4 I can review the intended uses of artificial intelligence [63]

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

## 1. 1. <br> Understand the history and range of uses of UVs

1.1 I can research the history of UVs and list the key milestones [71]
1.2 I can list the primary uses of UVs currently in operation [75]

## 2. 2. <br> Appreciate the design and development issues related to UVs

2.1 I can describe the range of designs currently in use [72]
2.21 can assess the designs in terms of their use [76]

3. 3. Explore the problems and solutions of UV usage

3.1 I can describe the main control methods used with UVs [73]
> 4. 4.

> Understand the legal, moral and ethical issues related to UV use
4.1 I can describe the legal issues relating to UVs [74]
4.2 I can assess the main laws and regulations that affect UVs use [78]

[^1]3.21 can assess the development constraints that apply in building UVs [77]

### 3.3 I can describe

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

Source URL: https://theingots.org/community/rocketry

## Links

[1] https://theingots.org/community/sites/default/files/uploads/user4107/AMT2\ 2018.pdf
[2] http://theingots.org/community/rocket_resources
[3] http://register.ofqual.gov.uk/Detail/Index/38418?category=qualifications\&query=TLM\ L2 \%20Certificate\%20in\%20Open\%20Systems\%20and\%20Advanced\%20Manufacturing\%20Technologie S
[4] https://theingots.org/community/RQF_Levels
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[^0]:    $\overline{(f u n c t i o n(i, s, o, g, r, a, m)\{i[' G o o g l e A n a l y t i c s O b j e c t ']=r ; i[r]=i[r]| | f u n c t i o n() ~\{~(i[r] . q=i[r] . q| |[]]) . p u s h(a r g u m e n t s)\}, i[r] . I=1 * n e w ~}$ Date();a=s.createElement(o), $m=s$. getElementsByTagName(o)[0];a.async=1;a.src=g;m.parentNode.insertBeerfor \})(window,document,'script','//www.google-analytics.com/analytics.js','ga'); ga('create', 'UA-46896377-2', 'auto'); ga('send', 'pageview');

[^1]:    1.3 I can explore

