

# Learn It PowerPoint Presentation

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| The slide has an orange background with a faint crest on the right. The text 'HERIOT-WATT UNIVERSITY' is in the top left. The main text reads 'History Begins With U' and 'Learn It!'.                                                                                                                                                                                                                                                                                                                                                                                                                                               | (Copy of presentation notes contained in PowerPoint)                                                                                                                                                                                                                                             |
| The slide has an orange background with a faint crest on the right. The text reads: 'I'm really excited that you are taking part in our project "History begins with U". This is a series of activities that will help you learn about past discoveries, try out some current science, and think to the future about how you might make history! I hope you enjoy it, and I look forward to meeting you soon!'. There is a circular video inset of a woman (Emily) on the right.                                                                                                                                                     | Video of Emily reading out what's on the slide. They will be working with the class at the "Try It" workshop, and at the "Make It" campus visit.                                                                                                                                                 |
| The slide has an orange background with a faint crest on the right. The text reads: 'What is a University? On the back of your feedback slip please write a short description of what you think university is. If you're unsure or don't know – that's okay, you can write that too!'. There is a vertical strip of icons on the right.                                                                                                                                                                                                                                                                                              | Please collect your classes responses to this open question and record the results.<br><br>We would like a copy to help us understand what pupils starting assumptions are – there are no wrong answers!                                                                                         |
| The slide has an orange background with a faint crest on the right. The text reads: 'What is a University? University is a school you can choose to go to as an adult, to learn about a subject in lots of detail. It can help you learn skills for different jobs. There are other people who work at university called academics who teach students as well as research answers to big questions.'.                                                                                                                                                                                                                                | An overview of university from a student's perspective. The role of an academic is covered in more detail later in the presentation.                                                                                                                                                             |
| The slide has an orange background with a faint crest on the right. The text reads: 'Why do students go to Uni? Help prepare them for work. Learn more about a subject they enjoy. Make new friends and eat new foods. What does a uni look like? How do you get into uni?'. There are several small images and icons.                                                                                                                                                                                                                                                                                                               | Slides that highlight some key information about university.<br><br>Please do feel encouraged to share your own experiences of university too!                                                                                                                                                   |
| The slide has an orange background with a faint crest on the right. The text reads: 'What are university classes like? Lecture: Students sit and listen to the lecturer tell them information. They may take notes and ask questions, but it's more like an assembly than a class discussion. Tutorial: Class of students led through groupwork with a tutor. Often involves practicing problems or project work. Lab: Practical work in a room with special equipment. Labs can look very different depending on what subject they are for and you work in small groups or pairs.'.                                                 | Brief definition of vocabulary used on the timetable.<br><br>Hand out timetables and comic strip worksheets (if using) and pens/pencils.                                                                                                                                                         |
| The slide has an orange background with a faint crest on the right. The text reads: 'Activity 1: A Week at University University can look very different depending on what subject you're studying, what other activities you choose to take part in, what university you go to... We've borrowed one of our student's timetables to give you an example of their normal week at university. Take time to read it over and draw a comic strip (or write a description) of what one day at university might look like. Include what you think they might be up to in their free time too!'. There is a small crest icon on the right. | <b>Activity 1:</b> Ask pupils to read and understand our example students timetable for the week. They should pick one day and draw a short comic of what the students day looks like. Please if we could have a copy of (some) students work to help our evaluation that would be very helpful. |

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| Time: | Time: | Time: |

Template if additional prints are required or to copy onto scrap paper.

#### Activity 1: A Week at University

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| <b>Monday</b><br>08:00: Plant Lecture<br>08:30: Research Methods in Biology Lecture<br>09:00: Plant Lecture<br>10:00: Plant Lecture<br>11:00: Plant Lecture<br>12:00: Plant Lecture<br>13:00: Plant Lecture<br>14:00: Plant Lecture<br>15:00: Plant Lecture<br>16:00: Plant Lecture<br>17:00: Plant Lecture<br>18:00: Plant Lecture<br>19:00: Plant Lecture<br>20:00: Plant Lecture<br>21:00: Plant Lecture<br>22:00: Plant Lecture<br>23:00: Plant Lecture<br>24:00: Plant Lecture |  | <b>Tuesday</b><br>08:00: Plant Lecture<br>08:30: Research Methods in Biology Lecture<br>09:00: Plant Lecture<br>10:00: Plant Lecture<br>11:00: Plant Lecture<br>12:00: Plant Lecture<br>13:00: Plant Lecture<br>14:00: Plant Lecture<br>15:00: Plant Lecture<br>16:00: Plant Lecture<br>17:00: Plant Lecture<br>18:00: Plant Lecture<br>19:00: Plant Lecture<br>20:00: Plant Lecture<br>21:00: Plant Lecture<br>22:00: Plant Lecture<br>23:00: Plant Lecture<br>24:00: Plant Lecture |  | <b>Wednesday</b><br>08:00: Plant Lecture<br>08:30: Research Methods in Biology Lecture<br>09:00: Plant Lecture<br>10:00: Plant Lecture<br>11:00: Plant Lecture<br>12:00: Plant Lecture<br>13:00: Plant Lecture<br>14:00: Plant Lecture<br>15:00: Plant Lecture<br>16:00: Plant Lecture<br>17:00: Plant Lecture<br>18:00: Plant Lecture<br>19:00: Plant Lecture<br>20:00: Plant Lecture<br>21:00: Plant Lecture<br>22:00: Plant Lecture<br>23:00: Plant Lecture<br>24:00: Plant Lecture |  | <b>Thursday</b><br>08:00: Plant Lecture<br>08:30: Research Methods in Biology Lecture<br>09:00: Plant Lecture<br>10:00: Plant Lecture<br>11:00: Plant Lecture<br>12:00: Plant Lecture<br>13:00: Plant Lecture<br>14:00: Plant Lecture<br>15:00: Plant Lecture<br>16:00: Plant Lecture<br>17:00: Plant Lecture<br>18:00: Plant Lecture<br>19:00: Plant Lecture<br>20:00: Plant Lecture<br>21:00: Plant Lecture<br>22:00: Plant Lecture<br>23:00: Plant Lecture<br>24:00: Plant Lecture |  | <b>Friday</b><br>08:00: Plant Lecture<br>08:30: Research Methods in Biology Lecture<br>09:00: Plant Lecture<br>10:00: Plant Lecture<br>11:00: Plant Lecture<br>12:00: Plant Lecture<br>13:00: Plant Lecture<br>14:00: Plant Lecture<br>15:00: Plant Lecture<br>16:00: Plant Lecture<br>17:00: Plant Lecture<br>18:00: Plant Lecture<br>19:00: Plant Lecture<br>20:00: Plant Lecture<br>21:00: Plant Lecture<br>22:00: Plant Lecture<br>23:00: Plant Lecture<br>24:00: Plant Lecture |  |
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Pupils should fill in (comic strip or written) at least 6 boxes/descriptions including what they would do in their free time.

How do students travel to uni? What do they have for breakfast? How do they spend time with friends?

This is Chantelle's Tuesday as a biology student. Ask pupils to think if this is what they thought her day would look like. Is it similar or different to their own day at school?

Collect activity 1 worksheets.



Optional - slides used by uni students during lectures.

If splitting this resource into two sessions, here is the best place to do that.

#### Who works at university?



Ask pupils to suggest who else goes to their school, other than the students. Discuss the similarities to university. Images of receptionist, cook, librarian, cleaners, academic (teaching), academic (researching - civil engineer).

The next slides will introduce more about academics.

#### What is an Academic?

- Academics are experts in their subject working in a university.
- They might teach classes of students, work as part of a research team, or both.
- Academics often research questions we don't have the answers to yet. Sometimes these are linked to a real-world problem, but some research might be more abstract.

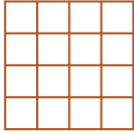


Summary of what an academic is – the job can look very different depending on what subject and what other roles an academic decides to do in the university.

<https://www.youtube.com/watch?v=-bULk048caE>

Video to introduce pupils to some of our academics at the university. Here is Dr Jane Gormley, lecturer in actuarial science, and Professor Paul Dalgarno, lecturer in physics as well as senior manager supporting student life and education in the wider department. A copy of this video is linked on the webpages in case there are issues playing it through PowerPoint.

### Activity 2: Puzzle Time!



Now that you've met some of our lovely academics, Jane has a maths puzzle for you!

- Draw a grid 4 squares across and 4 squares down.
- Draw one continuous line that goes in every box only once – no overlapping.
- How many different solutions can you find?

**Activity 2:** This section aims to show how sometimes research is useful many years after it was completed. Pupils will need scrap paper, rulers, pens/pencils.

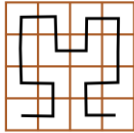
There are many, many ways to solve this puzzle - ask pupils to compare with their neighbours/table to find as many different solutions as they can.

### David Hilbert

David Hilbert was an academic at the University of Königsberg in Germany in the 1890's. He researched and taught mathematics.

He worked on the same puzzle, and this was his solution:

He challenged himself with extra rules to make sure this pattern would work with an **infinite** size of grid!



In 1891, German academic David Hilbert enjoyed working on a similar puzzle. He'd read about others' solutions and thought he'd have a go to improve on the result.

This is, in part, why online images no longer load line by line.

German translation: "I love a good puzzle!", image of David Hilbert and the university of Königsberg both dated ~late 1800's early 1900's.

### ...Why Though?

David was pleased enough with his solution that he wrote it out to show to his other mathematician friends. It did solve the maths problem in a way no one had ever answered before, but in 1891 this piece of maths wasn't very useful.

It was a fun puzzle and that was all. But over 100 years later, the maths behind this "Hilbert Curve" now lets us:

connect to the internet

find the best travel routes

upload / download images quickly

create better digital maps



At the time David was working (1890s) electric streetlights were a recent invention, along with the gramophone, and most people didn't have a telephone in their house. His solution to this puzzle didn't have any useful applications it was very theoretical. Now this piece of maths is used in many modern applications, far beyond anything David could have imagined! German translation: "That's wonderful!". Including how online images load on our computer screens.

New maths and science discoveries can **solve problems that haven't even been invented yet!**



### Current Research

What questions are academics trying to answer right now?

Find out more about scientific research or a new discovery you find interesting.



The following slides give an example of current research from HWU.

If there is another topical science subject or news article that you'd prefer to use as an inspiration for imagined future work please do!

### Current Research

Many academics make use of the **nanofabrication lab** at Heriot-Watt. The lab has a lot of interesting equipment to carry out experiments that are incredibly small – 1/10,000 of a cm!

These experiments are extremely sensitive, so you must wear overalls, hair nets and shoe covers to make sure no dirt contaminates the room.

They can make tiny precise components used in supercomputers, advanced medical devices, and other electronics. They also use the laser equipment to make changing 3D holograms.



Nanofabrication: nano = microscopic size, fabrication = making. This lab makes super small things and uses a variety of very specific machines to do this. The room is yellow in colour as the machines are sensitive to light. This is included just as one example of cutting-edge work at Heriot-Watt, hoping to inspire pupil's imagination.

The equipment Sarah is using has a very good microscope attached so she can see her tiny experiments working.



If pupils have follow-up questions about the lab, please email [outreach@hw.ac.uk](mailto:outreach@hw.ac.uk) or hand them to Emily during their visit. We would be happy to talk more about it when we visit.

### Activity 3: Imagining the Future



You learned how the solution to David Hilbert's maths puzzle has led to all sorts of new technologies a hundred years later.

Try imagine how the future might be changed by the discoveries that are happening today.

What could tiny robots be used for? How might electronics help look after people? What would you like a supercomputer to calculate? How could you use a really powerful solar panel?

**Activity 3:** Ask pupils to try to imagine what this research could be used for in the future. Abstract ideas are welcome, but pupils should be encouraged to try highlight a link from their idea to the underlying science/topic of research.

Work individually, in pairs, in groups or full class discussion as preferred. Paper to draw ideas optional.

### The Role of a University

- It's a place students can go to learn more about a subject/topic that they really like.
- It can help prepare students for different jobs.
- Academics teach students and also research questions we don't have answers to yet.
- A lot of information that was discovered in the past is very helpful when trying to solve modern problems – what exciting discoveries are next?



Summary of key learning points from the lesson(s).