

UNIT 2 – STUDYING PHYSICS AND THE ATOM

1. The Questionnaire What type of learner are you? (Speaking Extra, CUP 2004)**2. Listening - Best Way to Learn Physics by professor Matt Anderson.**

<https://www.youtube.com/watch?v=4oW3tWAYlpw>

- a) What are the best ways to learn Physics? Use the tips from the questionnaire and relate them to your discipline. What works best for you?
- b) Listen to the talk and answer Qs. What do you think about this method?
- What is “the final”?.....
 - What is the study group?
 - Who are the peers?
 - When students teach each other, there are two possibilities –
 - 1).....
 - 2)

3. Read the text from University College London (UCL) website (Physics)

(<http://www.ucl.ac.uk/prospective-students/undergraduate/degrees/biological-sciences-bsc/>) and think about the meaning of the highlighted words.

When we turn on a light or check the weather forecast, we are reaping the practical benefits of physics research. As well as exploring fundamental science, this BSc goes to the **cutting edge of technologies** that affect everyday life, equipping you with the tools and imagination to address tomorrow's questions. In each year of your **degree** you will take a number of individual **modules**, normally valued at 0.5 or 1.0 credits, adding up to a total of 4.0 credits for the year. Modules are assessed in the academic year in which they are taken. The balance of **compulsory and optional** modules varies from programme to programme and year to year. A 1.0 credit is considered equivalent to 15 credits in the European Credit Transfer System (ECTS). **Core modules** in the first year provide a firm foundation in quantum and classical physics, **underpinned by** mathematics and a practical skills course which includes computing skills training. The second year includes core modules in quantum physics and its application to atoms and molecules, statistical thermodynamics, electromagnetic theory and further mathematics. The quantum and condensed matter elements of the core are completed in the third year. The second and third years also include practical laboratory and project modules, and optional modules to develop further and **enhance knowledge** of a range of physics topics. This programme is offered both as a three-year BSc and a four-year MSci, with common structures and subjects for the first two years. However, the additional fourth year of the MSci programme allows for a greater depth of study and we recommend you apply for an MSci initially, as this keeps more **options** open.

Your learning

Teaching is delivered through **lectures, laboratory** (and as appropriate, observatory) **practical sessions**, and **supervised problem-solving tutorials**. These tutorials are designed to deal with lecture-based questions, enlarge on topics addressed in lectures, and allow clarification and **in-depth discussion** of new concepts.

Assessment

Assessment will normally involve **end-of-year examinations**, and an element of **assessed coursework**. For practical work you will be continuously assessed.

How to apply

Application for **admission** should be made through UCAS (the Universities and Colleges Admissions Service).

Answer the questions about the text above

- a) How long does the study for a Bachelor degree in Physics take at UCL?
- b) How many UCL credits can you earn in one academic year?
- c) How many ECTS credits does 1 UCL credit equal?
- d) Which modules do students take in the first year?
- e) Is it possible to take optional modules as well?
- f) What kind of classes do the students attend?
- g) How are students assessed?
- h) Do students apply directly to the university?

4. GRAMMAR REVISION: PRESENT TENSES

Look at the sentences taken from this lesson, state the name of the tense, and match it with its use.

1. The first year covers a core range of subjects.
2. We offer a breadth of physics education.
3. I've been busy with the linguistics project.
4. ...for the elective module I'm taking this year.
5. Now I've decided to have a go at an MA.
6. How are things going with you.
 - Talking about things in general or about things happening all the time / repeatedly
 - Talking about things happening now, or in a period around now
 - Announcing recent happenings
 - Talking about something that started in the past but is not finished yet

Similarly to examples 1 – 6, try to complete the missing information about yourself related to your studies.

1. I've decided to
2. This year I
3. I've been
4. Every Monday I
5. Right now I'm
6. I study

ATOM

A) Pre-listening

Discuss the questions with your neighbour.

a) What do you know about the structure of the atom?

b) What does the word “atom“ mean?

c) How are these different?

Electron.....

Proton

Neutron

Nucleus.....

d) How old is the concept of the atom and how many models of the atom do you know?

B) Listen to the interview and answer Qs.

<https://www.thenakedscientists.com/articles/interviews/inside-atom>

a) Which models of the atom is the physicist comparing?

b) What is between the orbiting electrons and the nucleus?

c) How big is an atom?

d) What keeps protons and neutrons together?

e) What are protons and neutrons made up of?

C) Models of the atom. Match the corresponding parts – the picture, the name of the model, the author of the model and the year this specific model was developed (findings published).

Niels Bohr

1913

Plum Pudding Model

Billiard Ball Model

Ernest Rutherford

Planetary Model

Erwin Schrödinger

1803

1911

J. J. Thompson

Nuclear Model

Quantum Mechanical Model

1926

John Dalton

1904

1.
2.
3.
4.
5.

D) Work in groups of five. Each of you has a different description of a specific model of the atom. Read your text, then share information with other students in your group. Take notes.

1.
2.
3.
4.
5.

E) Read the passage about the structure of the Atom and fill in the missing determiners and linking words.

that 2x, thus 2x, which 2x, although, while, however, because, its, this

One definition of an atom is that it is the smallest part of an element 1)..... can take part in a chemical reaction. It is also defined as the smallest part of an element 2)..... has all the properties of that element. It follows from this second definition 3)..... atoms of silver differ from atoms of lead, that atoms of lead differ from those of gold, and so on.

4)..... atoms of different elements are different from each other, they all have a similar structure. 5)....., all atoms consist of a comparatively heavy nucleus around 6)..... one or more comparatively light electrons orbit. 7)..... nucleus is composed of one or more neutrons and one are more protons. 8)..... these parts of an atom are smaller than the complete atom, they are called subatomic particles.

Compared to the size of the complete atom, the size of the nucleus is extremely small. If an atom were the size of a football pitch, 9)..... nucleus would be the size of a small insect. In spite of its smallness, 10)....., most of the weight of an atom is concentrated in the nucleus.

There are other important differences between the subatomic particles that make up an atom. Each proton carries a single unit of positive electricity, 11)..... each neutron is electrically neutral, and each orbiting electron carries a single unit of negative electricity. 12)....., since the number of protons in the nucleus of a complete atom is equal to the number of electrons, a complete atom is electrically neutral.

Adapted from Nucleus, English for Science first part and listening adapted from Milada Pavlovová