



## How is Nanotechnology relevant to the Scottish School Curriculum?

Nanotechnology is about the application of science and technology at the nanoscale, or at the level of atoms and molecules. It is relevant across all fields of science including physics, chemistry, biology, computing and materials science. Where it benefits the curriculum is that it brings a new excitement to many subjects. Students see amazing applications that result from nanoscience, and learn that an understanding of basic science is necessary to make them happen.

**For example, CD's wouldn't exist without nanotechnology; neither would the new colour changing paints on luxury cars and motorbikes; transparent sunscreens and many new cosmetics use nanoparticles; the technology behind stay-clean chinos (and even now school uniforms) is nanotechnology. These developments depend on a fundamental knowledge of chemistry, physics and biology.**

### Higher Biology Aims:

- To gain an understanding of the way in which biological principles can be applied to the issues facing the individual and society.
- To foster in candidates positive attitudes to others and the environment.

Many new nanotechnology products depend on biomimetics, i.e. emulating the way that nature works. A knowledge of biology is vital. The results can be - new products for healthcare, such as clever retinal and cochlear implants, and new ways of delivering drugs. Other biomimetic applications are sensors and filters that can deal with environmental issues including soil remediation, water purification and desalination.

### Higher Chemistry Aims:

- Emphasising the relevance of chemistry to everyday living, raising awareness of the links between the subject and the world of work in general and the chemical industry in particular.

Chemistry is the basis of most nanotechnology as it is applied today, which either uses clever nanoparticles, or smart nanocoatings. Some nanoparticles are used as fuel additives, some are found in cosmetics and sunscreens, some are used for contrast agents in health monitoring. Scratch-resistant nanocoatings can be found on spectacles, and stay-clean nanocoatings are on new windows. The textile industry is also increasingly making use of nanotechnology such as non-iron, stain resistant clothing.

### **Higher Physics Aims:**

- The course seeks to illustrate and emphasise situations where the principles of physics are used and applied, thus promoting the candidate's awareness that physics involves interaction between theory and practice
- The study of Higher Physics should also foster an interest in current developments in, and applications of physics, the willingness to make critical and evaluative comment, and the acceptance that physics is a changing subject.

Nanotechnology is fundamental to creating smaller, faster computers with more and more storage. Computing is becoming ubiquitous, thanks to nanotechnology, soon computers will be integrated into clothes and even wallpaper!

In energy, nanotechnology is leading to flexible, cheap solar cells with applications for the third world; more efficient and increasingly smaller batteries for your mobile phones; and thermoelectric devices which transform waste heat into electricity. The benefits of such advances to society are great as we tackle the problem of a changing climate.

### **Higher Technological Studies Aims:**

- To ensure that the course remains relevant to the industrial and commercial fields, it is important that every opportunity is taken to expose candidates to real applications of technological systems and to reflect actual technological practice.
- Consideration of the social, economic and environmental issues of technologically driven change and their impact of these issues on society.
- Develop an appreciation of selected key issues in technology, such as the environment, the contexts in which these key issues may be viewed and the constraints within which solutions or designs must be achieved.
- Inculcate a receptive attitude towards technological progress and its demands, foster technologically sensitive attitudes.

Nanotechnology will be the next industrial revolution – its applications will be used in almost every imaginable industry from sunscreens to mobile phones. However, consideration must be given, and indeed has been, to the risk involved in such new technologies; studies into the toxicology of nanoparticles, for example, are already under way.

For more information on nanotechnology and its applications please see;

The Institute of Nanotechnology: [www.nano.org.uk](http://www.nano.org.uk)

AZoNano: [www.azonano.com](http://www.azonano.com)

Nanoforum: [www.nanoforum.org](http://www.nanoforum.org)