Nanoscale engineering – T366

Presentation pattern *October to June*

Module description

T366 is a specialism module for the Q65 Bachelor of Engineering (Honours) degree and M04 Master of Engineering (Honours) degree and Q78 Top-up Bachelor of Engineering (Hons) in the School of Engineering and Innovation. The module is compulsory for students on the Electronics, Energy & Sustainability, and Mechanical Engineering pathways. T366 is an option for students undertaking the Engineering Management pathway, and for Q78 students, who may come from a wide range of backgrounds..

T366 provides students with an up-to-date understanding of a range of nanoscale engineering concepts for them to utilise that knowledge in a variety of ways, including further study and professional development. Nanotechnology is ubiquitous in daily life, and the role of nanotechnology in modern society has grown quickly in the last decade, influencing industries such as micromechanics, electronics, and biotechnology. As a result there are a rapidly increasing number of emerging technologies which contribute solutions to previously inaccessible challenges.

T366 explains some of the challenges and opportunities to which nanotechnology offers solutions, and provides examples of the needs which can be addressed by nanoscale engineering. Three themed areas are explored: structured technologies, which introduces nanofabrication; energy and electronics, which is concerned with applications in these areas; and health, which outlines some of the medical applications addressable through nanoscale engineering.

Topics are introduced with references to applications and human need, posing questions about engineering problems and possible solutions. There are regular references made to the ethical, environmental, and legislative concepts associated with this rapidly developing field. Underpinning scientific theory is included where appropriate.

The module is driven by multiple opportunities for students to engage in the design, simulation, and characterisation of nanoscale devices. These activities are crucial to developing an understanding of the associated concepts and terminology. The use of industry-standard tools offered in this module presents an excellent opportunity for students to acquire and develop skills which are highly sought-after by employers.

The key learning outcomes of T366 include:

1. Articulate the fundamental scientific principles underlying complex concepts in micro- and nanoengineering to a variety of cross-disciplinary audiences, including peers and subject specialists.

2. Select and use appropriate mathematical, computational, and analytical techniques to determine the composition, structure, identity, and properties of nanomaterials.

3. Specify the characteristics of engineered nanomaterials required to achieve behaviour or responses suitable for their incorporation in a device or application.

4.Define process specifications for the ethical and commercial manufacture of engineered nanomaterials, considering their quality, reliability, and scale of production.

Assessment is through three interactive Computer Marked Assignments (iCMAs), three Tutor Marked Assignments (TMAs), and a final End of Module Assignment (EMA). Practice quizzes are provided throughout the module to support students' learning.

Person Specification

The person specification for this module should be read in conjunction with the generic person specification for an associate lecturer at The Open University.

As well as meeting all the requirements set out in the generic person specification, you should be able to demonstrate:

- knowledge in the area of nanoscience and/or nanomaterials;
- ability to support learners with mathematical calculations relevant to nanoscale systems, including light/matter interactions and analytical expressions describing system behaviour;
- an interest in teaching nanotechnological concepts such as nanoparticles, thin films, and self-assembly;
- willingness to learn effective use of Multiphysics simulations;
- a willingness and ability to plan and deliver engaging tuition activities in both engineering and scientific concepts both face-to-face and online;
- the ability to provide high quality feedback.

It would be an advantage to have:

- recent experience of working in an engineering environment;
- experience of teaching nanoscience and related science to engineering students;
- experience of teaching adults in further education, higher education and/or distance learning;
- a teaching qualification, or professional recognition with a teaching institution such as the Higher Education Academy;
- membership of an engineering institution;
- experience of supporting students with personal and professional development planning.

Additional information

- Tuition will be provided through a mix of face-to-face and online tutorials, forums and other online tools, including the industry standard COMSOL Multiphysics simulation package and the OU's OpenEngineering Laboratory

Module related details - a full explanation can be found on the website.

Please add any details you have available

CATS points	30
No. of TMAs	3 TMAs and 1 EMA
TMA submission category	2 (eTMA only)
ICT level	2 (web focused)
Student: tutor ratio	20
Pay band	3
Workload	3.3 hours per week

The teaching and assessment strategy for this module has not yet been approved and therefore the information is subject to change.