Confirmation that this version of the module specification has been approved by the School Learning and Teaching Committee:

11-3-15………………………………………………….(date)

**MODULE SPECIFICATION**

1. Title of the module: **PS701 Topics in Functional Materials**
2. School or partner institution which will be responsible for management of the module: **School of Physical Sciences**
3. Start date of the module: **Revision of existing module, next delivered September 2015**
4. The number of students expected to take the module

**40 students**

1. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal

**None**

1. The level of the module **M**
2. The number of credits and the ECTS value which the module represents

**15 credits (7.5 ECTS)**

1. Which term(s) the module is to be taught in

**Autumn and Spring**

1. Prerequisite and co-requisite modules **None**
2. The programmes of study to which the module contributes

**BSc, MChem in Chemistry; BSc, MSci in Forensic Chemistry; BSc, MPhys, MSc (Euromasters) in Physics. Not available as a wild module.**

1. The intended subject specific learning outcomes

**On successfully completing the module students will have:**

* 1. **A systematic understanding and a critical awareness of current topics of interest in materials research**
  2. **a comprehensive understanding of techniques applicable for synthesis and purification of materials**
  3. **a comprehensive understanding of techniques applicable for chemical and physical characterisation methods of materials**
  4. **a critical awareness of the applications of materials in industry**
  5. **a systematic understanding of knowledge relating to materials**
  6. **an ability to apply the knowledge to solve problems in materials**
  7. **an understanding of the fundamental phenomena of the electronic structure of materials**
  8. **an appreciation of the key driving forces in nanoscience and knowledge of selected important nanomaterials and phenomena at the forefront of the discipline**

1. The intended generic learning outcomes

**On successfully completing the module students will have:**

* 1. **Problem-solving skills, in the context of both problems with well-defined solutions and open-ended problems, extending to situations where evaluations have to be made on the basis of limited information.**

1. A synopsis of the curriculum

**Chemists and physicists are now playing an important role in the growing field of materials research. More recently there has been a growing interest, driven by technological needs, in materials with specific functions and this requires a combination of physics and chemistry. For example, new materials are needed for the energy industry (batteries and fuel cells), for the optics and electronics industry (semiconductors, lasers and wave-guides), and for the environment (sensors, actuators and ‘smart’ materials). The aim of this module is to introduce students to this area of modern materials and techniques.  
Typical topics would include:  
1.Crystal growth and defects  
2. Liquid crystals  
3. Magnetism and Magnetic Materials  
4. X-ray absorption spectroscopy (XAS)   
5. Nanomaterials  
6. Multiferroics**

1. Indicative Reading List

**Dieter Vollath** “**Nanomaterials”, Wiley, 2013. Anthony R. West “Solid State Chemistry and Its Applications”, Wiley, 2014..**

**Richard J. D. Tilley “Defects in Solids”, Wiley, 2008. Richard M. Martin “Electronic Structure”, Cambridge University Press, 2008**

1. Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended module learning outcomes

**Contact Time:Lectures: 28hrs which provide the opportunity to learn and understand the theory and knowledge required for outcomes 11.1-11.8.**

**Examples classes: 3hrs which provide the opportunity for discussion of the module topics and practice in problem solving and answering examination questions (outcomes 11.1-11.8, 12.1).**

**Private study:**

**60hrs reading lecture notes and books (outcomes 11.1-11.8);**

**15hrs examples class work (outcomes 11.1-11.8, 12.1);**

**44hrs revision (outcomes 11.1-11.8).**

1. Assessment methods and how these relate to testing achievement of the intended module learning outcomes

**Written Examination 80%, Coursework (assignments) 20%. Both forms of assessment test understanding (11.11, 11.2, 11.3, 11.5, 11.7), problem solving (11.6, 12.1) and awareness of applications (11.4, 11.8) involving materials.**

1. Implications for learning resources, including staff, library, IT and space

**None**

1. **The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University’s disability/dyslexia support service, and specialist support will be provided where needed.**
2. **Campus(es) or Centre(s) where module will be delivered:**

Canterbury