UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Fundamentals of Nano and Supramolecular Materials (Distance Learning)
Module Code:	CFS7015-B
Academic Year:	2019-20
Credit Rating:	20
School:	School of Chemistry and Biosciences
Subject Area:	Chemistry
FHEQ Level:	FHEQ Level 7 (Masters)
Pre-requisites:	
Co-requisites:	

Contact Hours	
Type	**Hours**
Tutorials	2
Directed Study	198

Availability	
Occurrence	**Location / Period**
BDA	University of Bradford / Semester 1 (Sep - Jan)

Module Aims

Nanoscience and nanotechnology has revolutionised various techniques in a broad range of fields. This course aims to enable students to develop a fundamental understanding of the field of nanoscience and nanotechnology and train students to apply this knowledge to solve practical problems. This course also aims to introduce the students to different applications of supramolecular chemistry in designing new materials and the presence of different kinds of supramolecular interactions in nature (photosynthesis, membrane proteins etc.).

Outline Syllabus

1. Different types of nanomaterials including semiconductor quantum dots, metal nanoparticles, polymer nanoparticles, carbon based nanomaterials, inorganic nanomaterials, organic nanomaterials, 0D, 1D, 2D, and 3D nanomaterials.

1.7 - Identify supramolecular chemistry in natural processes
1.8 - Describe the principle of cation and anion binding by supramolecular hosts with examples
1.9 - Describe solid-state inclusion compounds and give examples
1.10 - Appraise the use of supramolecular self-assembly in designing and interpreting molecular devices
2. Characterisation techniques for the morphology, structure and property analysis of nanomaterials.
3. The applications of different nanomaterials in diverse fields such as electronics, energy, environment, and healthcare.
4. Key supramolecular interactions based on intermolecular interactions: Cation binding: The crown ethers; The Lariat ethers and podands; The cryptands; The spherands; Selectivity in cation complexation; The template effect and high dilution; The calixarenes; The siderophores.
5. Supramolecular chemistry of life: Membrane potentials; Membrane transport
6. Molecular devices: Introduction; Supramolecular photochemistry; Molecule based electronics; sensors; nonlinear optical materials

Learning Outcomes	
1	Discuss the concepts of nanomaterials & nanotechnology.
10	Be competent at self-study, data mining, and be able to quickly assimilate information.
11	Be able to think across your own discipline and explore other fields.
12	Write scientific reports and use references properly.
2	Identify the physical & chemical properties of nanomaterials as compared to their bulk counterparts.
3	Know different types of nanomaterials including semiconductor quantum dots, metal nanoparticles, polymer nanoparticles, carbon based nanomaterials, inorganic nanomaterials, organic nanomaterials, 0D, 1D, 2D, & 3D nanomaterials.
4	Describe the synthesis and processing of a diversity of nanomaterials & their mechanisms.
5	Explain the applications of different nanomaterials in diverse fields such as electronics, energy, environment, and healthcare.
6	Describe underlying principles of supramolecular chemistry.
7	Analyse the morphology, structure and properties of nanomaterials using a wide variety of experimental techniques.
8	Apply nanomaterials and nanotechnology to solve problems and perform applications.
9	Apply the knowledge in designing molecular machines for electronics, sensors, etc.

Learning, Teaching and Assessment Strategy

This module will be taught at distance. The VLE will be used to deliver core content; providing you with the opportunity to acquire the information to enhance your knowledge and understanding of the basic concepts of nanoscience and nanotechnology. This material will be made available at the start of the course. Recordings of lectures will be made available on the VLE as they are delivered.
The VLE will also be used to provide access to online resources and external links to websites of interest. Course tutors will be available to answer your queries on course materials at times to

be specified in the module handbook. On-line tutorial sessions will be arranged where you will have the opportunity to discuss course content with your peers and course tutors.
Directed study provides you with the opportunity to undertake guided reading and to develop your own portfolio of learning to enhance transferable skills and knowledge relating to evaluation of own role and subject provision.

Assessment 1: Group of students will be given contemporary research topics to prepare a short report (term paper) and give a virtual poster presentation.
Assessment 2: Summative examination to cover the whole module.

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Examination - closed book	Summative assessment: closed book exam	2 hours	60%
Summative	Coursework	Term paper and poster (2000 words)	0 hours	40%

Reading List

To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html.

Please note:

This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.