UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title:	Inorganic Materials Chemistry (Distance Learning)
Module Code:	CFS7017-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	6
Directed Study	194

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

Module Aims

This module aims to:
Develop a systematic knowledge and understanding of inorganic materials

Enable you to identify origins of different kinds of physical and chemical properties of different kinds of inorganic materials.
Apply characterisation techniques to analyse the morphology, structure, surface and properties of inorganic materials
Provide you with knowledge to relate the inorganic materials and their technological applications in real life and R&D

Develop skills to describe and communicate on advanced materials and their properties in scientifically correct and effective way

Outline Syllabus

Introduction to inorganic materials

1 Synthesis of inorganic materials: The formation of bulk material; Chemical deposition

2. Electrical properties of solids: Band theory; Defects; Electrical conductivity in ionic solids: Sodium and lithium ion conductors; d-block metal oxides; Applications

3. Transparent conducting oxides and their applications in devices: Sn-doped In2O3 and F-doped SnO2; Dye sensitized solar cells; Solid state lighting; OLEDs & OLECs

4. Superconductivity: Early examples and basic theory; High temperature superconductors; Applications

5 Ceramics, silicates, carbides and nitrides: white pigments; high purity silicon for superconductor; boron nitride; silicon nitride & carbide; Perovskites

6.Graphene and carbon nanotubes and their applications

7. Porous materials and their applications: Zeolites and metal-organic frameworks (MOFs)

8. Layered materials and their applications: Thin film; Self-assembled monolayers; Liquid crystals

9. Characterization techniques for inorganic materials: Electron microscopy (SEM, TEM); Scanning probe microscopy; Solid state NMR, X-ray photoelectron spectroscopy (XPS), UV photoelectron spectroscopy (UPS), Electron energy loss spectroscopy (EELS), BET surface area analysis

Learning Outcomes

1	Describe basic principles for synthesis of various types of inorganic materials & their applications.
10	Apply your knowledge to relate structural and physical properties of advanced materials and relate these to their applications in real-life and research and development.
11	Manage learning activities, seek information from literature sources and apply reporting skills; use a range of data sources to solve problems.
12	Express, present, and discuss different aspects of materials chemistry in front of peers.
13	Use specialist software packages to prepare a scientific presentation.
14	Work as a team to discuss, decide, and prepare a presentation on a given subject.
2	Describe structure & electrical conductivity in sodium & lithium ion conductors & d-block metal oxides.
3	Relate transparent conducting oxides & their applications in devices including Sn-doped In2O3 & F-doped SnO2; Dye sensitized solar cells; Solid state lighting & OLEDs & OLECs.
4	Describe the basic theory of band theory & superconductivity with examples including high temperature superconductors.
5	Demonstrate different applications of superconductors.

6	Describe synthesis, and basic structural, physical and chemical features of different inorganic bulk materials.
7	Explain different processes for thin film preparation.
8	Describe synthesis, and basic structural, physical and chemical features of different inorganic bulk materials.
9	Explain different processes for thin film preparation.

Learning, Teaching and Assessment Strategy

This module will be taught at distance. The VLE will be used to deliver fundamental knowledge on different types of inorganic materials, their preparations, physical & chemical properties, & applications. 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. Formative feedback will be given at the end of these activities.

Students will be assigned to different groups to make a presentation to the cohort in a teleconference style. Each group will be given different topics related to the content of the module & chosen from contemporary research. Each group will prepare a summary report on the given topic & give a presentation.
Students will be guided throughout the module with directed study to acquire knowledge & understanding of the underlying concepts underlined in the syllabus.

Assessment 1: A presentation on contemp. research areas in inorganic materials will cover LO's: 08, 09, 10, and 11.
Assessment 2: An exam at the end of the module to cover LO's: 1-6 and 08

Mode of Assessment

Type	Method	Description	Length	Weighting
Summative	Presentation	Presentation on contemporary research areas	20 minutes	40%
Summative	Examination - closed book	Summative assessment: closed book exam	2 hours	60%

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.