Course Outline

MATS6108

Functional Properties of Materials

Materials Science and Engineering

Science

T2, 2019

2.2 Course aims

The objective of this course is to develop a sound understanding in the relationships between materials structure, processing, properties and applications of various materials for electronic and magneto-electronic applications.

2.3 Course learning outcomes (CLO)

At the successful completion of this course you (the student) should be able to:

1. Understand the principles, processing, structure and functional properties (including mechanical) of composite and functional materials.
2. Relate the behaviour of functional materials to their composition and architecture.
3. Appreciate the complexity and precision required in the fabrication of composite and functional materials and describe relationships between materials structures, properties and processes
4. Make informed decisions in materials selection for engineering design.

2.4 Relationship between course and program learning outcomes and assessments

Course Learning Outcome (CLO)	LO Statement	Program Learning Outcome (PLO)	Related Tasks & Assessment

Students are expected to be challenged by the course content and to challenge their own preconceptions, knowledge, and understanding by questioning information, concepts, and approaches during class and study.

- Learning is more effective when students' prior experience an

4. Course schedule and structure

This course consists of 38 hours of class contact hours. You are expected to take an additional 112 hours of non-class contact hours to complete assessments, readings and exam preparation.

Week	Topics	Activity
1	Overview of semiconductor materials and physics Theories of semiconducting behaviour	
2	Basic semiconductor devices Methods of single crystal growth and purification	
3	Methods of single crystal growth and purification Device fabrication: Oxidation and epitaxy Device fabrication: Lithographic methods, diffusion and ion implantation	Formative in-class quiz
4	Device fabrication: Lithographic methods, diffusion and ion implantation	
5	Band theory of solids applied to electronic and magnetic materials Materials synthesis (solid-state synthesis, thin films deposition)	Individual assignment
6		

5. Assessment

5.1 Assessment tasks

Assessment task	Description	Weight	Due date

Unless otherwise specified in the task criteria, all assignments must be uploaded via Moodle prior to the due date for submission.

Assignments submitted after the due date for submission will receive a 10% of ma

The Science and Engineering of Materials (Sixth Edition), Donald R. Askeland, Pradeep P. Fulay, Wendelin J. Wright, Cengage Learning, 2010.

Processing of Semiconductors, ed. K.A. Jackson et al. VCH, 1996.

The Science and Engineering of Microelectronic Fabrication, S. A. Campbell, OUP, 1996.

Nanoelectronics, Nanowires, Molecular Electronics and Nanodevices, Edited by Krzysztof Iniewski, McGraw Hill, 2011

Semiconductor Devices, N.M. Morris, McMillan, 1976.

Nanoelectronics and Information Technology-Advanced Electronic Materials and Novel Devices, Edited By RaQ48and Novel