

TAMPLAT FOR COURSE SPECIFICATION

HIGHER EDUCATION PERFORMANCE REVIEW: PROGRAMME REVIEW

COURSE SPECIFICATION

This Course Specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he/she takes full advantage of the learning opportunities that are provided. It should be cross-referenced with the programme specification.

1. Teaching Institution	University of Technology
2. University Department/Centre	Chemical Engineering Department
3. Course title/code	Material sc.and Eng./232
4. Programme(s) to which it contributes	CE.232
5. Modes of Attendance offered	Full
6. Semester/Year	2 semester/year
7. Number of hours tuition (total)	3
8. Date of production/revision of this Specification	1.10.2015
9. Aims of the Course	
1-Learn what are engineering materials,their properties,processing and Applications 2-know the structure and characteristics of metals, polymers and ceramics. 3-understand types of equilibrium-phase diagrams. 4-Microstructures of alloys. 5-understand the material's imperfections and atomic movement(diffusion) 6-understand what is meant by mechanical,electrical,and thermal properties of metals,polymers and ceramics	

10• Learning Outcomes, Teaching ,Learning and Assessment Method

A- Knowledge and Understanding

- A1- Differentiate between the different behaviors of engineering materials.
- A2-understanding of crystal structure for materials.
- A3 –understanding of phase diagram for alloy systems.
- A4 –what is meant by mechanical properties of materials.
- A5 –understanding of ceramic and composite materials and their applications.

B. Subject-specific skills

- B1 –Identify materials in engineering parts used in daily life.
- B2- Be familiar with the crystal structure.
- B3- Be familiar with the phase diagrams
- B4 –Identify microstructure and properties of some important alloys
- B5-Understand the basic of material selections.

Teaching and Learning Methods

- Lectures, tutorials ,homework,special discussions for distinguish

Assessment methods

Attendance of lectures and tutorials, homework,quizzes,midterm examination,and final test

C. Thinking Skills

- C1- learning how are parts manufactured.
- C2- Selection of proper materials and process for specific industrial applications
- C3-Ues of materials testing for measuring mechanical properties.

Teaching and Learning Methods

Lectures ,tutorials,homework,special discussions for distinguish,white board, laboratory experiments

Assessment methods

Attendance of lectures and tutorials homework,quiz,midterm examination, and final test.

D. General and Transferable Skills (other skills relevant to employability and personal development)

D1- Material selection and evaluations.

D2-present finding of scientific research in seminars

11. Course Structure

Week	Hours	ILOs	Unit/Module or Topic Title	Teaching Method	Assessment Method
1 st semester					
1	2 hour lecture+1 tutorial	Ability to classify materials according to their behaviors Structure, and properties	Classification of material,classification of material based on structure,advanced materials	Lectures, example classes,	oral questions
2	2 hour lecture+1 tutorial	predict approximate physical and mechanical behavior of material based on the type of bonding present(covalent, ionic ,metallic,and/or van der waals)	the internal structure of atom	Lectures and tutorials,	oral questions
3	2 hour lecture+1 tutorial		Atomic bonding	Lectures	quizzes
4	2 hour lecture+1 hour tutorial		Binding energy and interatomic spacing.	Lectures, example classes	homework
5	2 hour lecture+1 hour tutorial		Types of atomic or ionic arrangements ,crystal structure, lattice, unit cells	Lectures and tutorials	Oral questions
6	2 hour lecture+1 hour tutorial		Metallic crystal structure ,crystal system.	Lectures	Class examination
7	2 hour lecture+1 hour tutorial	Ability to describe and solve problems on atomic arrangement and analyze the structure of materials	Crystal direction and crystal planes	Lectures And example class	homework

8	2 hour lecture+1 hour tutorial		Diffraction techniques for crystal structure analysis.	Lectures and tutorials	Quizzes
9	2 hour lecture+1 hour tutorial		Point defects	Lectures, example classes,	Oral questions
10	2 hour lecture+1 hour tutorial	ability to describe geometry of imperfections	line defects	Lectures	Oral questions
11	2 hour lecture+1 hour tutorial		Interfacial imperfections	Lectures,	Oral questions
12	2 hour lecture+1 hour tutorial		Stability of atoms and ions, mechanisms for diffusion.	Lectures, example classes	Quizzes
13	2 hour lecture +1 hour tutorial	Calculate the extent of the diffusion-driven composition changes based upon	Rate of diffusion(fick's first law)	Lectures and tutorial	homework
14	2 hour lecture +1 hour tutorial	composition, times and temperature	Factors affecting diffusion	Lectures	Oral questions
15	2 hour lecture +1 hour tutorial		Nonsteady-state diffusion(fick's second law)	Lectures	Class examination
2nd semester					
16	2 hour lecture +1 hour tutorial +2 hour laboratory	Ability to determine elastic modules,	Stress-strain behavior	Lectures, example classes, laboratory	oral questions
17	2 hour lecture +1 hour tutorial +2 hour laboratory	Ultimate strength, and strain to fracture from experimental	Ductility, brittleness	Lectures, tutorials, Laboratory experiment	oral questions
18	2 hour lecture +1 hour tutorial +2 hour laboratory	Stress-strain diagram	Modulus of resilience, Poisson's ratio	Lectures, Laboratory experiment	Quizzes

19	2 hour lecture +1 hour tutorial +2 hour laboratory		Hardness, effect of temperature	Lectures, Examples class Laboratory experiment	Homework
20	2 hour lecture +1 hour tutorial +2 hour laboratory	Ability to describe and solve problems on thermal and electrical behavior Of materials	Heat capacity, thermal expansion, thermal conductivity, thermal stress	Lectures and tutorials	oral questions
21	2 hour lecture +1 hour tutorial +2 hour laboratory		Electrical conductivity, electron mobility, electrical resistivity of metals	Lectures Laboratory experiment	Class examination
22	2 hour lecture +1 hour tutorial +2 hour laboratory		Basic concepts, solubility and solid solution	Lectures and example class	Homework
23	2 hour lecture +1 hour tutorial +2 hour laboratory	Ability to determine equilibrium phase, there	Phase and phase diagram, unary phase diagram	Lectures, tutorials, Laboratory experiment	Quizzes
24	2 hour lecture +1 hour tutorial +2 hour laboratory	compositions, and quantities as a function of temperature from a binary phase diagram	Binary isomorphous system	Lectures, Example classes	Oral questions
25	2 hour lecture +1 hour tutorial +2 hour laboratory		Binary eutectic system	Lectures	Oral questions
26	2 hour lecture +1 hour tutorial +2 hour laboratory		The iron-carbon system	Lectures, Laboratory experiment	Oral questions
27	2 hour lecture +1 hour tutorial +2 hour laboratory		Crystal structure, mechanical properties of ceramic	Lectures, Example classes Laboratory experiment	Quizzes
28	2 hour lecture +1 hour tutorial +2	Ability to select materials for different applications based	Classification of ceramic materials on the basis of application	Lectures, And tutorials,	Homework

	hour laboratory	on the constraints of the given Applications			
29	2 hour lecture +1 hour tutorial +2 hour laboratory		Materials combinations	Lectures	Oral questions
30	2 hour lecture +1 hour tutorial +2 hour laboratory		Reinforced composites, structural composites	Lectures	Class

12. Infrastructure	
Required reading: · CORE TEXTS · COURSE MATERIALS · OTHER	<ul style="list-style-type: none"> ○ Lecturers in materials science ○ Book :- <ul style="list-style-type: none"> - Van valck elements of materials science and engineering 5th edition. Addison Wesley 1984 ○ Other support book:- <ul style="list-style-type: none"> -william d.callister,materials sciences and engineering-an introduction Jhon wily &sons inc.2000 -the science and engineering of materials,4th ed,Donald r askeland-pradeep p.phule,©2003
Special requirements (include for example workshops, periodicals, IT software, websites)	<ul style="list-style-type: none"> ○ Materials laboratory ○ Workshop ○ Websites
Community-based facilities (include for example, guest Lectures, internship, field studies)	field trips
13. Admissions	
Pre-requisites	Chemistry and physics

Minimum number of students	Central admission
Maximum number of students	Central admission