

Name of Institute: IITE Name of Faculty: Gaurav Awasthi

Course code: MME0703 Course name: Surface Engineering

Pre-requisites: Physics, Chemistry Credit points: 3 Offered Semester: 7 **Course Coordinator (weeks XX - XX)** Full Name: Gaurav Awasthi Department with sitting location: Lab 2 of Ground Floor Telephone:9909709727 Email: gauravavasthi.mt@indusuni.ac.in Consultation times: 4:15 – 5:00

Course Lecturer (weeks xx - XX)

Full Name: Gaurav Awasthi Department with sitting location: Lab 2 of Ground Floor Telephone:9909709727 Email: gauravavasthi.mt@indusuni.ac.in Consultation times: 4:15 – 5:00

Students will be contacted throughout the Session via Mail with important information relating to this Course.

Course Objectives

By participating in and understanding all facets of this Course a student will:

- 1) To provide knowledge about surface engineering and application.
- 2) To understand different methods and tastings.

Course Outcomes (CO)

- 1) To understand the concept and basis of surface engineering.
- 2) To understand the various methods of surface modification techniques.
- 3) Understanding of the various modification phenomena.
- 4) From an application point of view students can co-relate various techniques with desired properties and applications.

Course Outline

The proposed course deals with various surface preparation and coating methods. .



Method of delivery

(Face to face lectures, self study material, Active Learning Techniques)

Study time

4 lectures

CO-PO Mapping (PO: Program Outcomes)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	2	1	3	1	-	-	-	-	-	2	-
CO2	2	2	2	-	1	-	-	-	-	-	2	-
CO3	2	-	2	-	3	3	3	-	-	-	2	-
CO4	2	3	3	3	1	-	-	-	-	-	-	-

1-Lightly Mapped 2- Moderately Mapped

3- Highly Mapped

Blooms Taxonomy And Knowledge retention(For reference) (Blooms taxonomy has been given for reference)



Figure 1: Blooms Taxonomy





Graduate Qualities and Capabilities covered

(Qualities graduates harness crediting this Course)

General Graduate Qualities	Specific Department ofGraduate Capabilities
Informed Have a sound knowledge of an area of study or profession and understand its current issues, locally and internationally. Know how to apply this knowledge. Understand how an area of study has developed and how it relates to other areas.	1 Professional knowledge, grounding & awareness
Independent learners Engage with new ideas and ways of thinking and critically analyze issues. Seek to extend knowledge through ongoing research, enquiry and reflection. Find and evaluate information, using a variety of sources and technologies. Acknowledge the work and ideas of others.	2 Information literacy, gathering & processing
Problem solvers Take on challenges and opportunities. Apply creative, logical and critical thinking skills to respond effectively. Make and implement decisions. Be flexible, thorough, innovative and aim for high standards.	4 Problem solving skills
Effective communicators	5 Written communication
Articulate ideas and convey them	6 Oral communication
effectively using a range of media. Work	7 Teamwork
implement decisions. Be flexible, thorough, innovative and aim for high standards. Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in	5 Written communication 6 Oral communication 7 Teamwork



different settings. Recognize how culture can shape communication.	
Responsible	10 Sustainability, societal &
Understand how decisions can affect	environmental impact
others and make ethically informed	
choices. Appreciate and respect diversity.	
Act with integrity as part of local, national,	
global and professional communities.	

Practical work:

Corrosion rate measurement, Study of Pitting corrosion, Electroplating, Effect of current density on Anodizing

Lecture/tutorial times

(Give lecture times in the format below)

Example:			
Lecture	Tuesday	10:50 – 11:45 am	BB / PPT
Lecture	Wednesday	11:45 – 12: 40 pm	BB / PPT
Lecture	Thursday	01:20 – 02:15 pm	BB / PPT

Attendance Requirements

The University norms states that it is the responsibility of students to attend all lectures, tutorials, seminars and practical work as stipulated in the Course outline. Minimum attendance requirement as per university norms is compulsory for being eligible for mid and end semester examinations.

Details of referencing system to be used in written work

Text Book(s)

- 1) J. R. Davis-Surface Engineering for Corrosion and Wear Resistance.
- 2) George J. Rudzki -Surface Finishing Systems. metal and non-metal
- 3) finishing handbook-guide, Metals Park : ASM, 1983
- 4) James A. Murphy- Surface Preparation and Finishes for Metal, McGraw-Hill, New York 1971

Reference Books

- 1) P. G. Sheasby and R. Pinner Surface treatment and finishing of
- 2) Aluminium and its alloy, Volume-2, 5th ed., ASM, Metals Park, 1987
- 3) K. E. Thelning -Steel and its Heat Treatment Bofors Handbook, London Butterworths, 1975

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- 4) Surface Engineering Hand Book, edited by Keith Austin, London
- 5) Kogan Page, 1998
- 6) ASM Handbook
- 7) Rajiv Mishra on Friction Stir Surfacing & Friction stir Processing

Digital Learning Resources

www.nptel.ac.in

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

Mid Semester(closed book) 40% Internal evaluation 20% (Attendance, Presentation, Assignments and Case studies)

Final exam (*closed book*) 40%

SUPPLEMENTARY ASSESSMENT

Students who receive an overall mark less than 40% in mid semester or end semester will be considered for supplementary assessment in the respective components (i.e mid semester or end semester) of semester concerned. Students must make themselves available during the supplementary examination period to take up the respective components (mid semester or end semester) and need to obtain the required minimum 40% marks to clear the concerned components.

Practical Work Report/Laboratory Report: (NA)

A report on the practical work is due the subsequent week after completion of the class by each group.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -1% of the maximum mark per calendar day

Format

All assignments must be presented in a neat, legible format with all information sources correctly referenced. Assignment material handed in throughout the session that is not neat and legible will not be marked and will be returned to the student.



Retention of Written Work

Written assessment work will be retained by the Course coordinator/lecturer for two weeks after marking to be collected by the students.

University and Faculty Policies

Students should make themselves aware of the University and/or Faculty Policies regarding plagiarism, special consideration, supplementary examinations and other educational issues and student matters.

Plagiarism - Plagiarism is not acceptable and may result in the imposition of severe penalties. Plagiarism is the use of another person's work, or idea, as if it is his or her own - if you have any doubts at all on what constitutes plagiarism, please consult your Course coordinator or lecturer. Plagiarism will be penalized severely.

Do not copy the work of other students.

Do not share your work with other students (except where required for a group activity or assessment)



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Course schedule(subject to change) (Mention quiz, assignment submission, breaksetcas well in the table under the Teaching Learning Activity Column)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	Introduction of subject. Scope of surface engineering in metals	1	BB, PPT
	Weeks 2	ceramics, polymers and composites,. Surface Preparation methods such as Chemical, Electrochemical cleaning	2	BB, PPT
	Week 3	Mechanical cleaning - Sand Blasting, Shot peening, Shot blasting,	1	BB, PPT
	Week 4	Hydroblasting, Vapor Phase Degreasing etc., Properties of Various Coating, Coating Methods	1	BB, PPT
	Week 5	Chromating, Phosphating,	2	BB, PPT
	Week 6	Anodizing, Thermochemical processes, industrial practice, economy and energy considerations.	1	BB, PPT
	Week 7	Electrolytic and Electroless plating of important metals and alloys	3	BB, PPT
	Week 8	Surface pretreatments, Hot Dipping, galvanizing,	3	BB, PPT
	Week 9	testing/evaluation of surface properties.	4	BB, PPT
	Week 10	PVD Various Methods used, mechanisms, important reactions involved and applications	4	BB, PPT
	Week 11	CVD Various Methods used, mechanisms, important reactions involved and applications	4	BB, PPT
	Week 12	Sputtering, Plasma Spray	4	BB, PPT
	Week 13	Ion Implantation Methods, mechanisms & applications. Surface modification by directed energy beams like ion, electron	1	BB, PPT

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	and laser beams, novelty of composition and microstructures.		
Week 14	Diffusion Coating Various Techniques For Single And Multiple Element Coating, High Temperature Coating- Carburising, Carbonitriding, Silicanizing,.	2	BB, PPT
Week 15	Chromizing, Aluminizing, Boronizing, Boronitriding	3	BB, PPT



Program Mapping (Metallurgy Engineering Department)



