Name of Institute: IITE
Name of Faculty: Mr. Monil Salot

Course code: MME0504
Course name: Foundry Technology
Pre-requisites: Material Science, Fuel Furnace and Refractories
Credit points: 04
Offered Semester: 05

Course Coordinator
Full Name: Mr. Monil Salot
Department with siting location: Metallurgical Engineering, Bhanwar Building, Lab-004 (GF)
Telephone: 9428600336
Email: monilsalot.mt@indusuni.ac.in
Consultation times: 3:45-4:20 PM

Course Lecturer
Full Name: Mr. Monil Salot
Department with siting location: Metallurgical Engineering, Bhanwar Building, Lab-004 (GF)
Telephone: 9428600336
Email: monilsalot.mt@indusuni.ac.in
Consultation times: 3:45-4:20 PM

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

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

1. To acquire the knowledge about the fundamentals of the casting, basic terminology related to the casting process.

2. To make students aware about the alternative method for the manufacturing of component for engineering applications

Course Outcomes (CO)
CO1: To identify and tabulate a list of sand properties impacting meal casting. (BT-1)
CO2: to explain and express the sand test variants, it's importance and applications. (BT-2)
CO3: To apply knowledge of gating and risering systems for making castings. (BT-3)
CO4: To illustrate the methoding system for various moulding and casting techniques.

(BT-4)
CO5: To assess casting defects, understand symptoms and to apply remedial measures. (BT-5)
CO6: To design innovative castings via understanding of feeding systems, solidification and methoding. (BT-6)

Course Outline

Proposed course mainly deal with nuances of Foundry Technology and deals with the majority of process pertaining to Foundry Processes and Metal Casting and Solidification for the production of the same, along with this, the subject deals with Quality Control and Defect Analysis for production of sound casting.

Method of delivery

Face to face lectures, Experiments in Laboratory, Model Making

Study time

3 hours of Lectures and 2 hours of Laboratories.

CO-PO Mapping (PO: Program Outcomes)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C0 1	2	1	2	1	2							2
C0 2	2	2	3	3	1	1					1	2
C0 3	2	3	3	2	2							3
C0 4	1	2	3	1	3							
C0 5	1	3	2	3	2						1	3
C0 6	2	2	2	1	2						2	2

1-Lightly Mapped 2- Moderately Mapped 3- Highly Mapped

Bloom's Taxonomy and Knowledge retention

Figure 1: Blooms Taxonomy

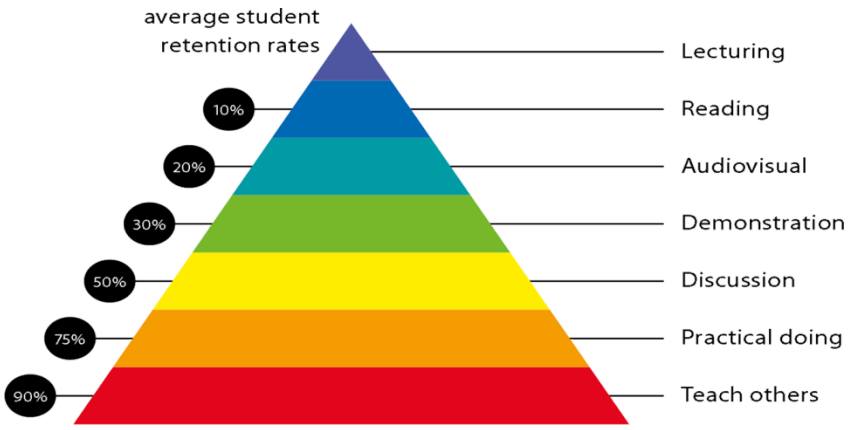

Figure 2: Knowledge retention

Graduate Qualities and Capabilities covered

General Graduate Qualities	Graduate 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	**4 Problem solving skills**

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.	
Effective communicators Articulate ideas and convey them effectively using a range of media. Work collaboratively and engage with people in different settings. Recognize how culture can shape communication.	**5 Written communications** **6 Oral communication** **7 Teamwork**
Responsible Understand how decisions can affect others and make ethically informed choices. Appreciate and respect diversity. Act with integrity as part of local, national, global and professional communities.	**10 Sustainability, societal & environmental impact**

Practical work:

Experiment No	Title
1	Introduction to foundry laboratory.
2	To determine AFS fineness number and distribution coefficient of agiven sand sample
3	To demonstrate the working of sand muller
4	To determine the clay content of given sand sample
5	To prepare standard samples under identical condition for checking important physical properties of foundry sand
6	To determine compression strength of foundry sand
7	To determine permeability number of green sand,core sand and raw sand
8	To find out the green mould hardness of the sand mould
9	To determine the shatter index of the sand sample.
10	To determine moisture content of the prepared sand
11	To prepare core sand
12	To find out the hardness of dried cores made out of core sands
13	To perform peelback test on core sand
14	To perform hot distortion and tensile tests on core sand
15	To study the aluminum melting and casting

Lecture/tutorial times

Lecture	Monday	11:45-12:40 PM	Lab -04 (Ground Floor)
Lecture	Tuesday	11:45-12:40 PM	Lab -04 (Ground Floor)
Lecture	Thursday	09:50- 10:50 PM	Lab -04 (Ground Floor)
Lab	Thursday	1:20 to 3:10 PM	Lab -04 (Ground Floor)

Attendance Requirements

The University norms state 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

Reference Books

1. P. C. Mukherjee, "Fundamentals of Metal Casting Technology", Oxford & IBH, 1st Edition, 1988, ISBN: 9788120403635.
2. P. R. Beeley, "Foundry Technology", Butterworth-Heinemann, 2nd Edition, 2001, ISBN: 9780750645676.
3. H. F. Taylor and M. C. Flemings, "Foundry Engineering", Wiley Eastern, 1st Edition, 1959, ISBN: 9780471848431.
4. D. Kumar and S. K. Jain, "Foundry Technology", CBS Publications, 1st Edition, 2007, ISBN: 9788123902906.

Text books

1. R. W. Heine, C. R. Loper and P. C. Rosenthal, "Principles of Metal Casting", Tata McGraw Hill, 2nd Edition, 2017, ISBN: 9780070993488.
2. P. L. Jain, "Principles of Foundry Technology", Tata McGraw Hill, 2nd Edition, 1987, ISBN: 9780074516980.

Additional Materials

1. NPTEL MOOC Course on "Principles of Casting Technology" (https://onlinecourses.nptel.ac.in/noc17_me11/preview)

ASSESSMENT GUIDELINES

Your final course mark will be calculated from the following:

CIE 60 marks :(40 marks mid semester examination + 20 marks internal evaluation)
Breakup of 20 Marks: (05 marks as attendance bonus for all students having attendance > 80%) + (05 marks for presentation) +(10 marks for assignment or case studies)
ESE: 40 Marks of End Semester Examination

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. , For remedial and repeater remedial - CIE 60 marks (40 marks remedial mid semester examination + 20 marks for assignments or case studies, limited to minimum 04 assignments per course), and end semester repeater and remedial examination would be carried out centrally according to University Policy

Practical Work Report/Laboratory Report:

Upon completion of each experiment, the student has to complete the journal and get it evaluated within a weeks' time before the next experiment is started.

Late Work

Late assignments will not be accepted without supporting documentation. Late submission of the reports will result in a deduction of -% 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

Course schedule (subject to change)

	Week #	Topic & contents	CO Addressed	Teaching Learning Activity (TLA)
	Weeks 1	**General:** Introduction to metal casting and foundry industry in modern industrial scenario. Advantages and limitations of casting methods.	1-6	BB, PPT
	Weeks 2	Classification of foundries. Different sections in a foundry and their functions. Important cast metals and alloys-their composition, properties and uses.	1-6	BB, PPT
	Week 3	**Patternmaking:** Patterns. Types. Pattern making materials and their selection, Color code, Pattern allowances, Core-boxes and their types.	1-6	BB, PPT
	Week 4	**Moulding and Core-making Materials:** Ingredients of common type of moulding and core-making sands, their properties and behavior, testing of sands and clay.	1-6	BB, PPT
	Week 5	**Moulding Processes:** Classification, Brief description of processes such as green sand, dry sand, loam, floor, Pit and machine molding	1-6	BB, PPT
	Week 6	**Casting Processes:** Shell molding and casting process, Investment casting process, Permanent molding process. Gravity and Pressure Die-casting, Centrifugal casting process. Low Pressure Die-casting (LDPC) process.	1-6	BB, PPT
	Week 7	**Melting:** Melting of cast iron, Constructional features of Cupola, Principles and operation of Cupola furnace.	1-6	BB, PPT
	Week 8	Advances in cupola melting operation, Melting of aluminum and	1-6	BB, PPT

		Copper-based alloys. Furnaces used, Melt-treatments such as degassing, Grain refining and modification		
	Week 9	**Gating System:** Elements of gating system. Classification. Gating design considerations, Gating ratio. Gating practice for ferrous and non-ferrous alloys, Pouring equipments.	1-6	BB, PPT
	Week 10	**Gating System:** Elements of gating system. Classification. Gating design considerations, Gating ratio. Gating practice for ferrous and non-ferrous alloys, Pouring equipments.	1-6	BB, PPT
	Week 11	**Risering System:** Risering practice, Functions of riser, Directional and progressive solidification. Centerline feeding resistance. Riser efficiency. Riser design considerations. .	1-6	BB, PPT
	Week 12	**Risering System:** Risering practice, Functions of riser, Directional and progressive solidification. Centerline feeding resistance. Riser efficiency. Riser design considerations	1-6	BB, PPT
	Week 13	Risering curves. Cain's, N.R.L. and Modulus methods, Feeding distance and feeding aids, Blind and atmospheric risers	1-6	BB, PPT
	Week 14	Risering curves. Cain's, N.R.L. and Modulus methods, Feeding distance and feeding aids, Blind and atmospheric risers	1-6	BB, PPT
	Week 15	**Quality Control in Foundry:** Casting defects, their causes and remedies. Shop floor quality control tests such as composition control, Wedge test, fluidity, temperature measurement etc	1-6	BB, PPT
	Week 16	**Quality Control in Foundry:** Casting defects, their causes and remedies. Shop floor quality control tests such as composition control, Wedge test, fluidity, temperature measurement etc	1-6	BB, PPT

Program Mapping (Metallurgy Engineering Department)

Sem	Subjects
1st	DELA; Engineering Chemistry; Workshop; Material Science; Environmental Science; Material Science (OE); Technical English 1
2nd	Calculus; Engineering Physics; Metallurgy for Non Metallurgists (OE); Structural Properties and Physics of Materials; Engineering Graphics; Advanced Material and Application (OE); Technical English 2
3rd	Probability, Statistics and Numerical Methods; Management for Engineers; Human Values and Professional Ethics; Mineral Processing; Metallurgical Thermodynamics; Internship-I; Physical Metallurgy
4th	Iron Making; Transport Phenomena; Metal Casting and Solidification (OE); Recycled Materials (OE); Heat Treatment Principles and Practices; Soft Skill and Interpersonal Comm.; Personality Credit-1
5th	Foundry Technology; Steel Making; Fuel Furnace and Refractories (EL); Environmental Pollution and its Control in Met. Ind. (EL); Non Ferrous Extractive Metallurgy; Plastic Deformation of Metals; Energy Economy and Waste Management- (OE); Internship-2
6th	Metal Forming; Phase Transformation; Powder Metallurgy (Elective-1); Modelling of Metallurgical Processes (Elective-1); Electrometallurgy and Corrosion; Ind. Ceramics and Polymers (El-2); Composite Materials (EL-2); Nano Technology (OE); Metal Joining Processes; Personality Credit-2
7th	Metal Testing and Characterization; Alloy Design (EL); Advanced Ferrous Metallurgy (EL); Surface (EL); Internship-3; Non Destructive Testing (EL) and (OE); Material Testing and Standards; Selection of Material & Failure analysis (EL) & (OE); Advanced Foundry Technology (EL)
8th	Project