NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

This course outline template acts as a guide for writing your course outline. As every course is different, please feel free to amend the template/ format to suit your requirements.

COURSE OUTLINE			
COURSE TITLE & CODE	METAL FORMING & MT 706		
Programme & Semester	IM & II M.Tech	No. of Credits	03
Department	MME	Faculty	Mrs. Y.G. Bala
Pre - requisites Course Code	Nil		
Course Coordinator(s) (if, applicable)	Dr. S. Muthukumaran		
Other Course Teacher(s)/Tutor(s) E-mail	ygbala@nitt.edu	Telephone No.	9677548505
Course Type	☑ Core course ☐ Elective course		

COURSE OVERVIEW

This course will introduce to various metal forming technologies like rolling, forging and high energy rate forming. Also includes design criteria, metallurgical aspects during forming processes, defects and remedies of different forming processes and Analysis softwares relating metal forming process.

COURSE OBJECTIVES

To know the concepts of metal forming and associate technologies and apply them to the conventional and advanced materials manufacturing for various structural applications.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Differentiate the various metal forming technology and choose the appropriate one for required engineering applications	1,2
2. Provide the successful solution to the various materials design and selection criteria for demanding engineering applications.	3,5
3. Analyze various operational and materials parameters influencing the metal forming quality.	10,11
4. Classify various metal forming technology (forging, rolling, extrusion etc.) and associated forming equipments	2,3
5. Define various secondary forming procedures like stretch	8,10

	forming, deep drawing blanking and associated equipments.		
COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week**	**Topic**	**Mode of Delivery**
1	1st & 2nd Week	Yielding criteria of von Mises and Tresca. Levy-Von Mises equations and Prantl Reuss equations for ideal plastic and elastic plastic solids respectively. Yield Locus.	Chalk & Talk ,PPT
2	3rd	Methods of load calculation including slab method slip line field theory, FEM, upper and lower bound methods.	Chalk & Talk ,PPT
3	4th , 5th and 6th week	Texture effects. Metallurgical factors affecting recrystallization temperature and grain size. Effect of temperature, strain rate, hydrostatic pressure, Microstructure. Residual stresses, Friction and lubrication mechanisms. Lubricants in rolling, forging, extrusion, wire drawing, sheet metal forming. Tool design	Chalk & Talk ,PPT
4	7th Week	Assessment I	
5	8th & 9th Week	Types of rolling mills, Geometrical factors and forces, Factors affecting rolling load and minimum thickness, Roll pass design, wheel and tyre production. Rolling defects, Processes and equipment,	Chalk & Talk ,PPT
6	10th & 11th week	Forgeability, effect of various factors, definitions. Selection of equipment, die design, parting line, flash, draft, tolerance. Defects, causes and remedies.	Chalk & Talk ,PPT
7	12th Week	Assessment -II	Written Test

8	13th and 14th Week	High velocity forming methods, super plastic forming, hydro forming, isothermal forging. Principles and processes. FLD and LDR, CAD, CAM in forming use of softwares like OPTRIS, DEFORM, etc. Workability.	Chalk & Talk ,PPT
9	15th Week	Assessment III	Written Test
10	Between 3rd Week to 14th Week	Seminar presentation will be assigned from the 3rd week of the course started	Oral Presentation
11	16th Week	Assessment IV	Written Test

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assessment I (Written Test)	7th Week	1 Hr	20%
2	Assessment II (Written Test)	12th Week	1 Hr	20%
3	Assessment III (Retest)	15th Week	1Hr	20%
4	Seminar	3rd to 14th Week	15 to 20 mins	10%
5	Assessment IV (End Semester)	16th Week	3 Hrs	50%

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Dieter, G.E., "Mechanical Metallurgy", McGraw Hill, 2001.
2. ASM "Metals Handbook, Vol. 14, Forming & Forging", ASM, Metals Park, Ohio, USA, 1998.
3. Kurt Lange, "Handbook of Metal Forming", Society of Manufacturing Engineers, Michigan, USA, 1985.
4. Belzalel Avitzur, "Metal Forming- Processes and Analysis", Tata McGraw Hill, 1977.
5. Pat.L.Manganon, "Principles of Materials Selection for Engineering Design", Prentice Hall Int. Inc,1999
6. Knigery,W.D., Ceramic Fabrication Processes, John Urley, 1950.
7. ASM, "Metals Handbook, Vol. I", Properties and selection, McGraw Hill, 2001..

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

1. Students can meet the faculty at any stage in the course duration in case he/she find difficulty in understanding the concepts

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

1.Examination

a) Students who have missed the Assessment I and II or both can register the Assessment III examination which shall be conducted after the completion of the Assessment II and before the end semester examination.

b) Assessment III shall be conducted for 20 marks comprising the syllabus of both first and second Assessment.
c) Students should present a seminar on the assigned topic related to this course. Weightage to the seminar would be zero for the case of the students not presenting the particular seminar.
d) The passing mark and the grading will be assigned as per institute norms.

2.Attendance

The minimum attendance for appearing for the semester examination is 75%

ADDITIONAL COURSE INFORMATION
Nil
FOR SENATE'S CONSIDERATION

Course Faculty	**CC-Chairperson**	**HOD**
Dr. Y.G. Bala	Dr. S. Muthukumaran	Dr. S. P. Kumaresh Babu