

**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.

<b>COURSE OUTLINE</b>			
<b>COURSE TITLE &amp; CODE</b>	<b>METAL FORMING &amp; MT 706</b>		
<b>Programme &amp; Semester</b>	IM & II <i>M.Tech</i>	<b>No. of Credits</b>	03
<b>Department</b>	MME	<b>Faculty</b>	Mrs. Y.G. Bala
<b>Pre - requisites Course Code</b>	Nil		
<b>Course Coordinator(s) (if, applicable)</b>	Dr. S. Muthukumaran		
<b>Other Course Teacher(s)/Tutor(s) E-mail</b>	ygbala@nitt.edu	<b>Telephone No.</b>	9677548505
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b> <input type="checkbox"/> <b>Elective course</b>		
<b>COURSE OVERVIEW</b>			
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.			
<b>COURSE OBJECTIVES</b>			
To know the concepts of metal forming and associate technologies and apply them to the conventional and advanced materials manufacturing for various structural applications.			
<b>COURSE OUTCOMES (CO)</b>			
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>		
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.			
<b>COURSE TEACHING AND LEARNING ACTIVITIES</b>			
<b>S.No.</b>	<b>Week</b>	<b>Topic</b>	<b>Mode of Delivery</b>
1	1 <sup>st</sup> & 2 <sup>nd</sup> 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	3 <sup>rd</sup>	Methods of load calculation including slab method slip line field theory, FEM, upper and lower bound methods.	Chalk & Talk ,PPT
3	4 <sup>th</sup> , 5 <sup>th</sup> and 6 <sup>th</sup> 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	7 <sup>th</sup> Week	Assessment I	
5	8 <sup>th</sup> & 9 <sup>th</sup> 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	10 <sup>th</sup> & 11 <sup>th</sup> 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	12 <sup>th</sup> Week	Assessment -II	Written Test

8	13 <sup>th</sup> and 14 <sup>th</sup> 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	15 <sup>th</sup> Week	Assessment III	Written Test
10	Between 3 <sup>rd</sup> Week to 14 <sup>th</sup> Week	Seminar presentation will be assigned from the 3 <sup>rd</sup> week of the course started	Oral Presentation
11	16 <sup>th</sup> Week	Assessment IV	Written Test

#### **COURSE ASSESSMENT METHODS**

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

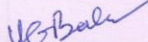
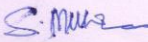

**2.Attendance**

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

**ADDITIONAL COURSE INFORMATION**

Nil

**FOR SENATE'S CONSIDERATION**

 <b>Course Faculty</b> Dr. Y.G. Bala	 <b>CC-Chairperson</b> Dr. S. Muthukumaran	 <b>HOD</b> Dr. S. P. Kumaresh Babu
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