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<b>DEPARTMENT</b>	Department of Metallurgy and Material Science
<b>INSTITUTE</b>	Indian Institute Of Technology Kanpur
<b>COURSE OUTLINE</b>	<p>The aim of the course is to acquaint students with the fundamentals involved in the processing of materials. Various materials processes are used in variety of industries to create and form materials for wide range of applications. There are some commonalities behind all these processes and the aim of this course is to go through these fundamental physics and materials science behind these processes so as to be able to understand, design and predict the outcome of these methods. At the end of this course, students should be able to answer the following questions:</p> <p>(a) What are the various fundamental material processing techniques and the science behind it;</p> <p>(b) What processing method to use for a given material and a given application.</p> <p>This course is offered in two parts of 20 hours each. First part of the course deals with Solidification and Powder Metallurgy, while the second part deals with Metal processing and Thin film deposition.</p>

### COURSE DETAILS

S. No	Module ID/ Lecture ID	Lecture Title/Topic
1.	Module1_L1	Introduction to Metal Working
2.	Module1_L2	Continuum Mechanics
3.	Module1_L3	Stress Invariants
4.	Module1_L4	Strain Tensors and Mohr circle for Strains
5.	Module1_L5	Yield Stress Criterion

6.	Module2_L6	Effective Stress and Strain
7.	Module2_L7	Work Hardening and Flow Behaviour
8.	Module2_L8	Effect of Strain Rate
9.	Module2_L9	Combined Effect of Strain, Strain Rate and Temperature
10.	Module2_L10	Effect of Temperature
11.	Module3_L11	Cold, Warm and Hot Working
12.	Module3_L12	Mechanics of Metal Working
13.	Module3_L13	Wire Drawing
14.	Module3_L14	Wire Drawing: Contd...
15.	Module3_L15	Hodographs
16.	Module4_L16	Upper-Bound Analysis
17.	Module4_L17	Plane Strain Indentation
18.	Module4_L18	Strain Calculation Models and Friction
19.	Module4_L19	Types of Friction
20.	Module4_L20	Effect of Friction in Rolling
21.	Module5_L21	Introduction, Vacuum
22.	Module5_L22	Vacuum Technology
23.	Module5_L23	Thermal Evaporation
24.	Module5_L24	Thermal Evaporation continued...
25.	Module5_L25	Thermal Evaporation continued...
26.	Module6_L26	Plasma Physics
27.	Module6_L27	Plasma Physics continued...
28.	Module6_L28	Sputtering
29.	Module6_L29	Sputtering continued....
30.	Module6_L30	Sputtering continued....
31.	Module7_L31	Chemical Vapor Deposition - I
32.	Module7_L32	Chemical Vapor Deposition - II
33.	Module7_L33	Chemical Vapor Deposition - III

<b>34.</b>	<b>Module7_L34</b>	Chemical Vapor Deposition continued...
<b>35.</b>	<b>Module7_L35</b>	Epitaxy, MBE and ALD
<b>36.</b>	<b>Module8_L36</b>	Adsorption and Nucleation
<b>37.</b>	<b>Module8_L37</b>	Thin Film Growth
<b>38.</b>	<b>Module8_L38</b>	Kinetics of Thin Film Growth
<b>39.</b>	<b>Module8_L39</b>	Thin Film Morphology- Zone Structure Model
<b>40.</b>	<b>Module8_L40A</b>	Thin Film Characterization
<b>41.</b>	<b>Module8_L40B</b>	Thin Film Characterization

**List of reference material/ books:**

**Name and contact details of two referees for the course:**