WELDING METALLURGY

PROF. PRADEEP K. JHA
Department of Metallurgy and Material Science
IIT Roorkee

TYPE OF COURSE : New | Core | PG/UG

COURSE DURATION : 12 weeks (29 Jul’19 - 18 Oct’19)

EXAM DATE : 17 Nov 2019

PRE-REQUISITES : Introduction to courses such as Welding processes, Materials science etc.

INDUSTRIES APPLICABLE TO : Manufacturing Industries like SAIL, BHEL etc.

COURSE OUTLINE :
The course focuses on understanding the metallurgy and solidification of weldments. The course will make the students aware of the metallurgical aspects of welding. For getting a sound weld, the students are required to be aware of the science behind the welding phenomena, especially in the domain of weld metal solidification, heat transfer, heat treatment processes, strengthening mechanisms etc. The course will be useful for engineering graduates as well as professionals working in the area of welding.

ABOUT INSTRUCTOR :
Prof. Pradeep K. Jha is presently working as Associate Professor in the Department of Mechanical & Industrial Engineering at IIT Roorkee. He has been teaching the courses related to manufacturing technology and theory of production processes to undergraduate and postgraduate students for more than 12 years. He is actively involved in research work related to production processes, especially casting and welding processes.

COURSE PLAN :

Week 1: Introduction to welding metallurgy, phase diagrams
Week 2: Phase transformation, TTT and CCT diagrams
Week 3: Metal strengthening approaches
Week 4: Heat treatment processes for weldments
Week 5: Analysis of heat flow and temperature distribution in welding
Week 6: Concept of solidification in welding, constitutional supercooling
Week 7: Weld metal solidification cracking, cause and prevention of cracks
Week 8: Introduction to heat affected zones, Properties of HAZ
Week 9: Recrystallization and grain growth, HAZ in different materials
Week 10: Partially melted zone, Grain boundary solidification
Week 11: Liquidation cracking, Hydrogen cracking
Week 12: Metallurgical issues in welding