MATHEMATICAL MODELING OF MANUFACTURING PROCESSES

PROF. SWARUP BAG
Department of Manufacturing Engineering
IIT Guwahathi

TYPE OF COURSE : Rerun I Elective I Both
COURSE DURATION : 12 weeks (20 Jul'20 - 09 Oct'20)
EXAM DATE : 17 Oct 2020

PRE-REQUISITES : There are no pre-requisites in educational qualification.
INTENDED AUDIENCE : Bachelor/Master/PhD students having background in Mechanical/Material Science/Metallurgical engineering/Production Engineering/Manufacturing Technology

COURSE OUTLINE:
The understanding of the basic mechanism such as heat and mass transport with associated fluid flow including metallurgical transformation, distortion and residual stress generation in different manufacturing processes is the focus of this course. his course is completely different from statistical or data driven modeling approach. This course emphasized on the understanding of the most general to advanced manufacturing processes based on scientific principle. The complex mechanism is presented in a simplified way to understand the subject at elementary level. The broad impact is that the students will be able to develop physics based computational model of manufacturing process using standard commercial package (However, this course does not intend to cover the learning of the commercial software)

ABOUT INSTRUCTOR:
Prof. Swarup Bag is presently working as an Associate Professor in the department of Manufacturing Engineering, IIT Guwahati. His area of interests are Fusion welding processes, Finite element method, Laser micro joining, Heat transfer and fluid flow in fusion welding, Residual stress and distortion, Recrystallization in hot metal forming process, Optimization in manufacturing process etc.

COURSE PLAN:
- **Week 1**: Introduction to Manufacturing processes
- **Week 2**: Physics of manufacturing processes
- **Week 3**: Conventional machining
- **Week 4**: Conventional machining
- **Week 5**: Non-conventional machining
- **Week 6**: Metal forming
- **Week 7**: Welding
- **Week 8**: Casting and powder metallurgy
- **Week 9**: Coating and additive manufacturing
- **Week 10**: Heat treatment
- **Week 11**: Micro/nano scale manufacturing
- **Week 12**: Processing of non-metallic materials