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. Understanding the complex interaction not only helps to develop mathematical model, it makes the foundation for analysis, numerical simulation at different scale and experimentation for different types of manufacturing processes. The development of computational models for a manufacturing process relies on mathematical expression of the governing mechanism. It helps to design relevant experiments and drives to find the data to be obtained. Mutual understanding between analytical/numerical and experimental results leads to better insight of the basic manufacturing processes that impact on the improvement of existing process and directs for the development of new process. However, this course is completely different from statistical or data driven modeling approach.

### ABOUT INSTRUCTOR:

### COURSE PLAN:

**Week 1:** Introduction to Manufacturing processes  
**Week 2:** Physics of manufacturing processes  
**Week 3:** Conventional machining  
**Week 4:** Non-conventional machining  
**Week 5:** Metal forming  
**Week 6:** Welding  
**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