Discipline Electives for 2nd Semester 2016-17

The list of discipline electives for the 2nd semester 2016-17 with eligibility criteria and course content.

Elective Course	**Eligibility**
ME F412 Production Planning and Control	Dual Degree 2013 batch Single Degree 2014 batch
ME F415 Gas Dynamics	
EEE F242/ INSTR F242 Control Systems	

Elective Course	**Eligibility**
MATH F313 Numerical Analysis	Dual Degree 2013 batch (M.Sc. Mathematics is not included) Single Degree 2014 batch Single Degree 2015 batch

Elective Course	**Eligibility**
DE G514 Fracture Mechanics	Single Degree 2013 batch

ME F412 Production Planning and Control

INSTRUCTOR: Varinder Singh

This course production planning and control should be of particular interest to students aspiring for a career in designing and managing core business processes in manufacturing and services. The course is designed to equip the students with comprehensive tools to solve real industrial problems in areas such as:

- Product and process design
- Facility location and layout planning
- Quality control
- Aggregate planning
- Scheduling, inventory control and resource management
- Strategic decision-making in the management of a production system
- Lean manufacturing
- Capacity planning
- Maintenance planning

Prerequisite: No prerequisite

ME F415 Gas Dynamics

INSTRUCTOR: DR. SHIBU CLEMENT

This course covers the subject of gas dynamics which deals with the behaviour of fluid flows where compressibility and temperature changes play a significant role. There is practically no limit to the variety of problems that need the principles of gas dynamics for their solution, ranging from high speed aerodynamics to the transport of gases along considerable distances. This course is designed for those who want to learn the fundamentals of gas dynamics.

Prerequisite: Thermodynamics BITS F111 and Fluid Mechanics ME F212

EEE F242 / INSTR F242 Control Systems

INSTRUCTOR: Prof. K E Raman

Course Description:

Feedback automatic control systems are an essential feature of numerous industrial processes, scientific instruments and even commercial, social and management situations. A thorough understanding of the elementary principles of this all embracing technology is of great relevance for all engineers and scientists. This course tries to bring out the basic principles of

Feedback Control Systems. The course is organized as follows: Introduction, modeling of dynamical systems, time-domain analysis, frequency domain analysis, stability and performance analysis, controller design.

Scope and objective of the course: The course aims at:

- Understanding the dynamics of a system and modeling it mathematically
- Stability and performance analysis of the system
- Understanding the performance specifications in the time-domain and frequency-domain
- Synthesis of controller for stability and/or performance.

Prerequisites: EEE F111 and MATH F111

MATH F313 Numerical Analysis

INSTRUCTOR: Dr. P. Dhanumjaya

This course enables one to devise algorithms for numerical solutions of different mathematical problems and also discuss the error analysis of different algorithms. In fact, different mathematical equations provide a natural mathematical description of phenomena in physical, natural, biological and engineering branches. While their solutions exhibit rich and complex structures, the closed form analytical solutions can be found only in a few special cases and these are mostly of limited theoretical and practical interest. Therefore, it is natural to seek techniques for approximation of solutions.

In this course, we explain how to find approximate solutions to different problems. MATLAB Software will be used to perform numerical experiments.

Prerequisite: MATHEMATICS-III

DE G514 Fracture Mechanics

INSTRUCTOR: DR. VIKAS CHAUDHARI

Course Description:

Types of failure, Types of fracture, Modes of fracture, Fracture criteria, Energy release rate, Stress intensity factor (SIF), SIF of more complex cases, Anelastic deformation at the crack tip, Elastic plastic analysis through *J*-integral, Crack tip opening displacement, Test methods, Fatigue failure, Numerical analysis, Mixed mode crack initiation and growth.

Scope and objective of the course:

The conventional design is based on yield point. However, it has been found that often a structural component fails even when the worst loaded point is well within the yield stress. Thus the design based entirely on avoiding yielding is not adequate for certain cases. Fracture mechanics is based on implicit assumption that there exists a crack in the structural component.

Students will have an opportunity to perform case studies on historical great structural failures like comet aircraft, Titanic ship, Liberty ship, Tacoma Bridge etc. Students will be given exposure to ABAQUS software. ABAQUS software is analysis software which has strong modeling capabilities as well.

Prerequisites: Mechanics of Solids