

Birla Institute of Technology & Science, Pilani
Hyderabad Campus
SECOND SEMESTER 2022-23
Course Handout (Part II)
MSE G531 Concurrent Engineering

Course Title	CONCURRENT ENGINEERING
Course No(s)	MSE G531
Instructor-In-Charge	PIYUSH CHANDRA VERMA
Version Number	II
Date	2022-23

Course Description:

Introduction of concurrent engineering and need, concurrent engineering tools, advances in design and manufacturing engineering, design for manufacture, design for assembly, rapid prototyping, simulation, concurrent approaches to design, manufacturing and other aspects of engineering.

Course Objectives:

- Teach the students the philosophy, perspectives and methodology of concurrent engineering
- Provides basic functional knowledge of product development and concurrent engineering from a cross functional perspective, to be able to manage quality during all stages of the life-cycle
- Provide the information relevant to implementation of concurrent engineering practices.

Text Book(s):

T1	Kevin Otto and Kristin Wood, Product Design: Techniques in reverse engineering and new product development, 1/e, Pearson Education, New Delhi, 2004.
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Reference Book(s) & other resources:

R1	Dieter Schmidt, Engineering Design, 4 th Edition, McGraw Hill
R2	Product design for manufacture and assembly, Boothroyd, Dewhurst, Knight, Third Edition, CRC
R3	Design for Manufacturability: How to Use Concurrent Engineering to Rapidly Develop Low-Cost, High-Quality Products for Lean Production by David M. Anderson Productivity Press (c) 2014 24x7 online
R4	Syan., C.S. & Menon, U., (Eds), Concurrent Engineering: Concepts, Implementation and Practice, Chapman & Hall, London, 1994
R5	Kusiak, A., (Ed), Concurrent Engineering: Automation, Tools, and Techniques, John Wiley and Sons, New York, 1993
R6	Huang G.Q. (Ed.), Design for X - Concurrent Engineering Imperative, Chapman and Hall, London, 1996

LEARNING OUTCOMES

LO1	Understand the motivation behind concurrent engineering and apply the principles methods to Improve quality
LO2	Analyze the quality requirements for a product and be able to implement the procedures for attainment and control of quality at different stages in the development and service life-cycle
LO3	Analyze and evaluate the design and process from various perspectives –robustness, reliability, manufacturability, assembly, disassembly, serviceability, environment-friendliness and suggest improvements
LO4	Evaluate and assess the economic aspects in concurrent design process
LO5	Work and meaningfully contribute in cross functional teams for concurrent engineering

Content Structure:

S. No.	Contact Hour	List of Topic Title	Sub-Topics	Reference
1	1-2	Introduction to CE	<ul style="list-style-type: none"> ✓ Definition, basic principles, ✓ Benefits and pitfalls ✓ Design maturity, ✓ Integrating Mechanisms 	Lecture 1 Slides
2	3-4	Quality Function Deployment	<ul style="list-style-type: none"> ✓ House of quality ✓ QFD philosophy ✓ Case studies 	T1-Ch.7, Lecture 2 Slides
3	5-6	Robust design	<ul style="list-style-type: none"> ✓ Introduction ✓ Taguchi methods ✓ Examples 	R1-Ch.15 Lecture 3 Slides
4	7-8	DFM and its importance in CE	<ul style="list-style-type: none"> ✓ Introduction to DFM ✓ Manufacturing process selection ✓ Value analysis ✓ DFM guidelines 	T1-Ch.14, R1-Ch.13, Lecture 4 Slides
5	9-10	Poka Yoke and Manufacturability	<ul style="list-style-type: none"> ✓ Introduction ✓ Poka Yoke ✓ Manufacturability Analysis 	T1-Ch.14, R1-Ch.13, Lecture 5 Slides
6	11-12	Design For Assembly	<ul style="list-style-type: none"> ✓ DFA guidelines ✓ Various Techniques: Boothroyd ✓ Various Techniques: Lucas 	T1-Ch.14, R1-Ch.13, R2, Lecture 6 Slides
7	13-14	Rapid Prototyping	<ul style="list-style-type: none"> ✓ Introduction ✓ Role of prototyping in CE ✓ Need and use of RP ✓ RP techniques 	T1-Ch.17, Lecture 7 Slides
8	15-16	Design for Reliability	<ul style="list-style-type: none"> ✓ Introduction to DFR ✓ Reliability fundamentals ✓ Reliability analysis during design ✓ General 'Design for Reliability' principles /FMEA/ Safety 	R1-Ch.14, Lecture 8 Slides



9	17-18	Design for serviceability, maintainability, and reparability	<ul style="list-style-type: none"> ✓ Design for serviceability ✓ Factors affecting serviceability ✓ Service modes ✓ Serviceability evaluation 	Lecture 9 Slides
10	19-20	Design for disassembly	<ul style="list-style-type: none"> ✓ Introduction ✓ Design for disassembly methodologies 	T1-Ch.15, Lecture 10 Slides
11	21-24	Design for Environment	<ul style="list-style-type: none"> ✓ Introduction ✓ Environmental issues in design ✓ LCA ✓ Eco-Design 	T1-Ch.15, Lecture 11 Slides
12	25-27	Economic aspects in CE	<ul style="list-style-type: none"> ✓ Introduction ✓ BEP ✓ NPV ✓ Examples 	R1-Ch.16 Lecture 12 Slides
13	28-30	Product Development scope	<ul style="list-style-type: none"> ✓ Introduction ✓ Mission Statement ✓ Customer Needs and satisfaction 	T1-Ch. 3,4 Lecture 13 Slides
14	31-33	Decomposition in CE	<ul style="list-style-type: none"> ✓ Introduction ✓ Functional Decomposition ✓ Function trees and Function Structures 	T1-Ch. 5, Lecture 14 Slides
15	34-36	Product Architecture	<ul style="list-style-type: none"> ✓ Introduction ✓ Types of architecture ✓ Types of modularity 	T1-Ch. 9, Lecture 15 Slides
16	37-40	Concept Generation and Evaluation	<ul style="list-style-type: none"> ✓ Introduction ✓ Concept generation methods ✓ Concept evaluation methods 	T1-Ch. 10,11, Lecture 15 Slides

Evaluation Scheme:

Legend: EC = Evaluation Component; AN = After Noon Session; FN = Fore Noon Session

Evaluation Component	Name (Quiz, Lab, Project, Mid-term exam, End semester exam, etc.)	Type (Open book, Closed book, etc.)	Weight	Duration	Day, Date, Session, Time
1. (EC-1)	Quiz-I	Open Book	5%	60 mins	February 1 to 15, 2023
	Quiz-II	Open Book	5%	60 mins	April 1 to 15, 2023
	Literature Survey/ Research Summaries.	Open Book	10%	120 mins	23 rd Jan – 30 th April 2023 (Every two Weeks)
	Laboratory Component/ Seminar and Presentation.	Open Book	20%	120 mins	23 rd Jan – 30 th April 2023 (Every Week)
2. (EC-2)	Mid-Semester Test	Closed Book	25%	90 mins	15/03 11.30 - 1.00PM
3. (EC-3)	Comprehensive Exam	Closed Book	35%	180 mins	12/05 AN

Syllabus for Mid-Semester Test (Closed Book): To be announced

Syllabus for Comprehensive Exam (Open Book): To be announced

Important links and information:

Contact sessions: Students should attend the lectures as per the schedule provided on the erp portal.

Evaluation Guidelines:

1. EC-1 consists of either two quizzes. Announcements will be made on the portal, in a timely manner.
2. For Open Book exams: Use of books and any printed / written reference material (filed or bound) is permitted. However, loose sheets of paper will not be allowed. Use of calculators is permitted in all exams. Laptops/Mobiles of any kind are not allowed. Exchange of any material is not allowed.
3. For Closed Book tests: No books or reference material of any kind will be permitted.

It shall be the responsibility of the individual student to be regular in maintaining the self-study schedule as given in the course handout, attend the lectures, and take all the prescribed evaluation components such as Assignment/Quiz, Mid-Semester Test and Comprehensive Exam according to the evaluation scheme provided in the handout.

Academic Honesty and Integrity Policy: Academic honesty and Integrity are to be maintained by all the student's throughout the semester and no type of academic dishonesty is acceptable.

Instructor-in-charge

(MSE G531)