

COURSE DETAILS:

COURSE CONTENT:

ME5692 PRODUCT DESIGN AND PROCESS DEVELOPMENT
COURSE OBJECTIVES:

1. Applying the principles of generic development process; and understanding the organization structure for new product design and development.
2. Identifying opportunity and planning for new product design and development.
3. Conducting customer need analysis; and setting product specification for new product design and development.
4. Generating, selecting, and screening new product design and development concepts.
5. Testing and prototyping the concepts to design and develop new products

Introduction Characteristics of Successful Product Development People involved in Product Design and Development - Duration and Cost of Product Development - The Challenges of Product Development - The Product Development Process - Concept Development: The Front-End Process - Adapting the Generic Product Development Process -Product Development Process Flows - Product Development Organizations.

Opportunity Identification: Definition - Types of Opportunities - Tournament Structure of Opportunity Identification - Effective Opportunity Tournaments Opportunity Identification Process -Product Planning: Four Types of Product Development Projects - The Process of Product Planning

UNIT III IDENTIFYING CUSTOMER NEEDS & PRODUCT SPECIFICATIONS9

Identifying Customer Needs: The Importance of Latent Needs - The Process of Identifying Customer Needs. Product Specifications: Definition - Time of Specifications Establishment -Establishing Target Specifications - Setting the Final Specifications

UNIT IV CONCEPT GENERATION & SELECTION

9

Concept Generation: Activity of Concept Generation - Structured Approach - Five step method of Concept Generation. Concept Selection: Methodology - Concept Screening and Concepts Scoring.

UNIT V CONCEPT TESTING & PROTOTYPING

9

Concept Testing: Seven Step activities of concept testing. Prototyping Principles of Prototyping Prototyping Technologies Planning for Prototypes.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

At the end of the course, students will be able to

CO1: Apply the principles of generic development process; and understand the organization structure for new product design and development

CO2: Identify opportunity and plan for new product design and development.

CO3: Conduct customer need analysis; and set product specification for new product design and development.

CO4: Generate, select, and screen the concepts for new product design and development.

CO5: Test and prototype the concepts to design and develop new products.

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | | | | | 1 | | 1 | | | | 1 |
| CO2 | 3 | | 3 | | | 1 | | | | | | 1 |
| CO3 | 3 | 3 | | 1 | | | 1 | | | | | 1 |
| CO4 | 3 | | | | | 1 | | | | | | 1 |
| CO5 | 3 | 2 | | 1 | | | 1 | | | | | 1 |

TEXT BOOK:

Ulrich K.T., Eppinger S. D. and Anita Goyal, "Product Design and Development"
McGraw Hill Education; 7 edition, 2020.

REFERENCES:

1. Belz A. 36-Hour Course : "Product Development " McGraw Hill 2010
2. Rosenthal s. "Effective Product Design and Development", Business One Orwin, Homewood, 1992, ISBN 1-55623-603-4
3. Stuart Pugh., " Total Design – Integrated Methods for Successful Product Engineering", Addison Wesley, 1991, ISBN 0202416395

COURSE ALIGNED PROGRAMME OUTCOMES (PO) & PROGRAMME SPECIFIC OUTCOMES (PSO)

| PO | Graduate Attribute | Programme Outcome |
|----|--|--|
| 1 | Engineering knowledge | Apply knowledge of mathematics, basic science and engineering science. |
| 2 | Problem analysis | Identify, formulate and solve engineering problems. |
| 3 | Design/development of solutions | Design a system or process to improve its performance, satisfying its constraints. |
| 4 | Conduct investigations of complex problems | Conduct experiments & collect, analyze and interpret the data. |

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|----|--------------------------------|--|
| 5 | Modern tool usage | Apply various tools and techniques to improve the efficiency of the system. |
| 6 | The Engineer and society | Conduct selves to uphold the professional and social obligations. |
| 7 | Environment and sustainability | Design the system with environment consciousness and sustainable development. |
| 8 | Ethics | Interacting industry, business and society in a professional and ethical manner. |
| 9 | Individual and team work | Function in a multidisciplinary team. |
| 10 | Communication | Proficiency in oral and written Communication. |
| 11 | Project management and finance | Implement cost effective and improved system. |
| 12 | Life-long learning | Continue professional development and learning as a life-long activity. |

| PSO | Graduates demonstrate |
|-----|---|
| 1 | Knowledge on Production system: Familiarization of basic and advanced systems and practices. |
| 2 | Knowledge on design, analysis and development: Familiarization of system for Production processes, automation and quality systems. |
| 3 | Foundation of continuous improvement: Knowledge on application of appropriated materials, production processes and production system and development of an optimal solution to achieve continuous improvement to cater the needs of industry and society. |

COURSE TENTATIVE SCHEDULE / PLAN

| Week | Day | Date | Hrs. | Unit | Topics | Text / Ref. |
|------|-----|------------|------|------|---|-------------|
| 1 | THU | 25-01-2024 | 5 | 1 | Introduction ,Course outline, CO, PO | T1,R1 |
| | FRI | 26-01-2024 | 3,4 | 1 | Characteristics of Successful Product Development People involved in Product Design and Development - Duration and Cost of Product Development | T1,R1 |
| 2 | THU | 01-02-2024 | 5 | 1 | The Challenges of Product Development - The Product Development Process | T1,R1 |
| | FRI | 02-02-2024 | 3,4 | 1 | Concept Development: The Front-End Process - Adapting the Generic Product Development Process | T1,R1 |
| 3 | THU | 08-02-2024 | 5 | 1 | Product Development Process Flows - Product Development Organizations. | T1,R1 |
| | FRI | 09-02-2024 | 3,4 | 1 | Case Study – Product Development Process, Assignment | T1 |
| 4 | THU | 15-02-2024 | 5 | 2 | Definition - Types of Opportunities - Tournament Structure of Opportunity Identification | T1,R1 |
| | FRI | 16-02-2024 | 3,4 | 2 | Opportunity Identification Process | T1,R1 |
| 5 | THU | 22-02-2024 | 5 | 2 | Effective Opportunity Tournaments | T1,R1 |
| | FRI | 23-02-2024 | 3,4 | 2 | The Process of Product Planning | T1,R1 |
| 6 | THU | 29-02-2024 | 5 | 2 | Four Types of Product Development Projects | T1,R1 |
| | FRI | 01-03-2024 | 3,4 | 2 | Group activity for opportunity identification process | T1 |
| 7 | THU | 07-03-2024 | 5 | 2 | Identifying Customer Needs and the Importance of Latent Needs | T1,R1 |
| | FRI | 08-03-2024 | 3,4 | 3 | The Process of Identifying Customer Needs | T1,R1 |
| 8 | THU | 14-03-2024 | 5 | 3 | Definition Product Specifications | T1,R1 |
| | FRI | 15-03-2024 | 3,4 | 3 | Time of Specifications Establishment , Establishing Target Specifications | T1,R1 |

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|----|-----|------------|-----|---|--|-------|
| 9 | THU | 21-03-2024 | 5 | 3 | Setting the Final Specifications | T1,R1 |
| | FRI | 22-03-2024 | 3,4 | 3 | Group activity for Identifying Customer Needs and Product Specifications | T1 |
| 10 | THU | 28-03-2024 | 5 | 4 | Concept Generation: Activity of Concept Generation | T1,R1 |
| | FRI | 29-03-2024 | 3,4 | 4 | Structured Approach, Five step method of Concept Generation | T1,R1 |
| 11 | THU | 04-04-2024 | 5 | 4 | Five step method of Concept Generation | T1,R1 |
| | FRI | 05-04-2024 | 3,4 | 4 | Programming For Machining Centre | T1,R1 |
| 12 | THU | 11-04-2024 | 5 | 4 | Concept Selection: Methodology | T1,R1 |
| | FRI | 12-04-2024 | 3,4 | 4 | Concept Screening and Concepts Scoring | T1,R1 |
| 13 | THU | 18-04-2024 | 5 | 4 | Group activity for Concept Generation | T1,R1 |
| | FRI | 19-04-2024 | 3,4 | 5 | Concept Testing: Seven Step activities of concept testing | T1,R1 |
| 14 | THU | 25-04-2024 | 5 | 5 | Principles of Prototyping | T1,R1 |
| | FRI | 26-04-2024 | 3,4 | 5 | Prototyping Technologies | T1,R1 |
| 15 | THU | 02-05-2024 | 5 | 5 | Planning for Prototypes | T1,R1 |
| | FRI | 03-05-2024 | 3,4 | 5 | Group activity –Presentation, Compilation | T1 |
| 16 | THU | 09-05-2024 | 5 | 5 | Group activity –Presentation, Compilation | T1 |

COURSE DELIVERY/INSTRUCTIONAL METHODOLOGIES:

| | | |
|--|---|---|
| <input checked="" type="checkbox"/> Chalk & Talk | <input checked="" type="checkbox"/> Stud. Assignments | <input checked="" type="checkbox"/> Web Resources |
| <input checked="" type="checkbox"/> LCD/Smart boards | <input checked="" type="checkbox"/> Stud. Seminars | <input type="checkbox"/> Add-On Courses |

COURSE ASSESSMENT METHODOLOGIES-DIRECT

| | | | |
|---|---|--|---------------------------------|
| ✓ University (End Semester) Examination | | ✓ Internal Assessment Tests | |
| ✓ Assignments | <input type="checkbox"/> Laboratory Practices | <input type="checkbox"/> Mini/Major Projects | ✓ Stud. Seminars |
| <input type="checkbox"/> Viva Voce | <input type="checkbox"/> Certifications | <input type="checkbox"/> Add-On Courses | <input type="checkbox"/> Others |

COURSE ASSESSMENT METHODS

| S.N. | Mode of Assessment | Date | Duration | % Weight |
|--|-----------------------------|------|----------|----------|
| 1 | Internal Assessment Tests 1 | | 1½ hr. | 30% |
| 2 | Internal Assessment Tests 2 | | 1½ hr. | 30 % |
| 3. | University Examination | | 3 hr. | 40 % |
| Additional marks may be given for Assignments / Group / Team Seminar Presentation) | | | | |

COURSE (EXTRA) ESSENTIAL READINGS:

1. MIT OpenCourseWare, 15.783J | Spring 2006 | Graduate, Product Design And Development
2. NPTEL Course, Product Design and Development, By Prof. Inderdeep Singh | IIT Roorkee

COURSE ASSESSMENT METHODOLOGIES-INDIRECT

| | |
|--|--|
| <input checked="" type="checkbox"/> Assessment of CO (By Feedback, Once) | <input checked="" type="checkbox"/> Student Feedback On Faculty (Once) |
| <input type="checkbox"/> Assessment of Mini/Major projects by Ext. Experts | <input type="checkbox"/> Others |

COURSE EXIT SURVEY (will be collected at end of the course)

The purpose of this survey is to find out from students about their learning experiences and their thoughts about the course.

| COURSE OUTCOMES | STUDENTS RATING Low (1) /Medium (2)/ High (3) |
|------------------------|---|
| CO1: | |
| CO2: | |
| CO3: | |
| CO4: | |
| CO5: | |

| PROGRAMME OUTCOMES | STUDENTS RATING Low (1) /Medium (2)/ High (3) |
|---------------------------|---|
| PO1 | |
| PO2 | |
| PO3 | |
| PO4 | |
| PO5 | |
| PO6 | |
| PO7 | |
| PO8 | |
| PO9 | |
| PO10 | |
| PO11 | |
| PO12 | |
| Average | |

| PROGRAMME SPECIFIC OUTCOMES | STUDENTS RATING Low (1) /Medium(2)/ High(3) |
|------------------------------------|---|
| PSO1 | |
| PSO2 | |
| PSO3 | |

COURSE POLICY (Compensation Assessment)

1. Attending all the assessment is mandatory for every student
2. Course policy will be followed as per the academic course regulation

COURSE ACADEMIC DISHONESTY AND PLAGIARISM

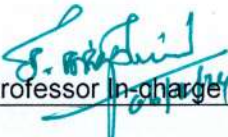
1. All rules and regulation prescribed by the ACOE, University Departments, are applicable in the Internal Assessment Tests and University (End Semester) Examinations. (https://acoe.annauniv.edu/download_forms/student_forms/Guidelines.pdf)
2. In general, possessing a mobile phone, carrying bits of paper with materials, talking to other students, copying from other students during Internal Assessment Tests and University (End Semester) Examinations will be treated as Malpractice and punishable as per the rules and regulations. The misuse of Assignment / Project / Seminar works from others is considered as academic dishonesty and will be treated with the rules and regulations of the University.

COURSE ADDITIONAL INFORMATION

Queries / clarifications / discussion (if required) may be e-mailed to / contact the course instructors during their Office Hours.

For Approval


Course Faculty


Professor in-charge

HOD (PT)