NATIONAL INSTITUTE OF TECHNOLOGY – TIRUCHIRAPPALLI
Department of Instrumentation and Control Engineering

COURSE PLAN

COURSE OUTLINE			
Course Title	Product Design and Development (Theory)		
Course Code	ICPC26	Credits	2
Department	I.C.E.	Faculty	Mr. Goldin R. Bennet
Sections	A & B	Session	January 2020

Pre-requisites	None		
Course Coordinator	Mr. Goldin R. Bennet		
Faculty Member's E-mail	bennet@nitt.edu	Telephone No.	------
Course Type	Programme Core Course		

COURSE SYLLABUS

ICPC26 - PRODUCT DESIGN AND DEVELOPMENT (THEORY)

Course type: Programme Core (PC)
Pre-requisites: -
No. of Credits: 2

Course Learning Objectives:

1.
The aim of this course is to inculcate into the student the spirit of innovation and entrepreneurship. This is achieved in this course by making the students to develop a marketable product on their own as a group. At the
end of this two semester course, the students will learn how to know the needs of the society and solve them using the technical knowledge at their disposal.

2.
In this semester the students will learn some of the general concepts needed for new product development and simultaneously learn how to interact with the society outside the campus to learn about its needs. They also learn about how to get prototypes fabricated outside the campus.

Course Content:

TOPICS COVERED BY LECTURES

Introduction to product design – Product planning – Identifying customer needs – Project selection – Concept generation – Concept testing - Concept selection. Product specification – Product architecture – Industrial design – Robust design. Product development economics – Design for manufacturing – Supply chain design – Intellectual property – Design for environment.

PRACTICAL WORK

Interaction with public outside the campus - identifying customer needs - product selection based on customer needs - concept generation - concept testing. Identifying fabrication requirements - Identifying fabricators for the project - costing - financial model for the product development - finding outside finance for product development if possible. patent search for the product.

SUMMER VACATION WORK

Students shall actively get information about fabrication of their product prototype, especially if it involves outside fabrication units. If they have decided on the final design, they may start work on their alpha prototypes.

Course Evaluation:

Only the theoretical component will be evaluated during this semester. The practical component is evaluated at the end of the next semester.

Text Books:

1. Karl T. Ulrich and Steven D. Eppinger, Product Design and Development, 3rd Edition, Tata McGraw Hill.
2. Kevin Otto and Kristin Wood, Product Design, Pearson Education, 2003

Course outcomes:

After this two semester course:

1. The student will know how to make market surveys for new product development
2. The student will know the entire cycle of new product design and development.
3. The student will know how to fabricate prototypes of new products and test them

COURSE OVERVIEW

The ultimate goal of engineering education is to provide the society with useful products and services. Usefulness of a product or service is determined by its marketability and the acceptance of the public to pay for it or purchase it.
Studying only theory or doing experiments alone does not attain the results expected by the society of an engineer or a technologist. To bring the expectations of the society at large to the attention of the under-graduate students, this course is introduced. In this course, the students must interact with the public outside the campus to develop a product prototype which has a potential market.

COURSE OBJECTIVES

1. The aim of this course is to inculcate into the student the spirit of innovation and entrepreneurship. This is achieved in this course by making the students to develop a marketable product on their own as a group. At the end of this two semester course, the students will learn how to know the needs of the society and solve them using the technical knowledge at their disposal.

2. In this semester the students will learn some of the general concepts needed for new product development and simultaneously learn how to interact with the society outside

the campus to learn about its needs. They also learn about how to get prototypes fabricated outside the campus.

COURSE OUTCOMES (CO)	
Course Outcomes	**Aligned Programme Outcomes (PO)**
After this two semester course: 1. The student will know how to make market surveys for new product development 2. The student will know the entire cycle of new product design and development. 3. The student will know how to fabricate prototypes of new products and test them.	1,2,6,7,8,10,11,12

COURSE TEACHING AND LEARNING ACTIVITIES			
Sl. No.	**Week**	**Topic**	**Mode of Delivery**
1	1	Introduction to product design	Lecture and Video clips
2	2	Allotment of group products	
3	3	Product planning	
4	3	Identifying customer needs	
5	4	Project selection	
6	5	Concept generation	
7	6	***Quiz***	
8	6	Concept testing	
9	7	Concept selection.	
10	8	Product specification	
11	8	Product architecture	
12	9	Industrial design	
13	9	***Test - 1***	
14	10	Robust design.	

15	10	Product development economics	
16	11	Design for manufacturing	
17	11	Supply chain design	
18	12	Intellectual property	Lecture and Video clips
19	12	Design for environment.	
20	13	***Test – 2***	
21	15	***Compensation Exam***	

COURSE ASSESSMENT METHODS

Students are expected to pass each individual Test. **The pass/fail cut-off for each Test is (mean of the class) /2 subject to a minimum of 25% of the maximum marks for which the question paper is set.** Quiz has no pass/fail criteria

Students who fail in any assessment or are absent in any test, even for valid reasons (other than leave on-duty), will have to appear for the compensation examination before the semester grades are finally assigned. Those who are absent due to any valid leave on-duty, will get an z-score for that assessment that is an average of all z-scores they get for the other assessments. The students can avail a maximum of only one leave on-duty during the assessments.

The **compensation examination** will be conducted after the Test-2 papers are evaluated. This exam will be for three hours and will cover the entire syllabus.
If they pass this special exam, those students who have not passed only one test earlier, will have their marks reset to the pass mark in that test and the grades will be calculated normally. Those students who have failed in more than one test previously will get an 'E' grade if they pass this compensation examination. Those who fail in the compensation examination also, will have to pass this course by registering for further assessments only.
Students who do not pass the course before the semester grades are assigned, will be awarded 'F' grade only. Those who are awarded 'F' grade will have to apply for further assessments only after that.

Sl.No.	Mode of Assessment	Week	Duration	% Weightage (On normalized z-scores)
1	Quiz	6	One Hour	10
2	Test-1	9	Two Hour	40
3	Test-2	13	Two Hour	50

4	Compensation Exam	15	Two Hours	----

ESSENTIAL READINGS

This course involves a lot of internet searches to know and understand about the various aspects of the allotted group product. Also, the students will have to refer to all of the standards related to their allotted products.

Text Books:

1. Karl T. Ulrich and Steven D. Eppinger, ***Product Design and Development***, 4rd Edition, Tata McGraw Hill.
2. Kevin Otto and Kristin Wood, ***Product Design***, Pearson Education, 2003.

COURSE EXIT SURVEY

An anonymous exit survey will be taken from the students at the end of the semester through a questionnaire.
Feedback from the students during the class committee meetings will also be taken.

COURSE POLICY

Academic dishonesty

All students are expected to do their own work and expected to put their best effort in the tests and assessments. The taking of information by means of copying homework assignments, or looking or attempting to look at another student's paper during an examination is considered dishonest. The tendering of information, such as giving your work to another student to be used or copied is also considered dishonest.
Preventing or hampering other students from pursuing their academic activities is considered as academic dishonesty.
Colluding to reduce the pass/fail threshold for any test is also considered to be academic dishonesty. If a large number of students perform badly in any test, the faculty member reserves the right to set a higher pass/fail cut-off threshold higher than the (class mean)/2 threshold to preserve the integrity of the assessment process. This will not be less than 25% of the maximum marks for which the question paper was set.
Any evidence of such academic dishonesty will result in the loss of all marks on that assignment or exam. Additionally, the names of those students so penalized will be reported to the Office of Dean (Students) and the Office of Dean (Academic) for the records if the misdemeanour is serious..

1. Students opting for plagiarism during exams will be summarily awarded zero marks for that exam.
2. Students honestly producing original work will be rewarded with better marks.

Exam hall code

Students must abide by the exam hall code given in the course website.

Attendance requirement

Students who consistently perform well in the tests (above average marks) are treated leniently regarding their attendance requirements. They are considered to have natural

flair for the subject. These students are encouraged to participate in various co-curricular and extra-curricular activities to enrich the campus life. But, even their attendance must not fall below 50%.
Students who do not perform well in the tests (below average marks) or fail, must necessarily attend a minimum of 75% of the classes. Otherwise, they will have to redo the course.
Once students satisfy the requirement of attending a minimum of 75% of the classes, they may voluntarily opt for formative assessment by giving a letter in writing. In that case, they need not appear for the Test-2 exam and the compensation examination. They can directly register for the formative assessment after their semester results are published with an 'F' grade.

ADDITIONAL COURSE INFORMATION

Students may fix appointments for detailed discussions by sending email to ***bennet@nitt.edu*** two days prior to the desired appointment date with the topic to be discussed. The students must come prepared for the scheduled discussion with thorough background preparation.
Minor doubts will be clarified after the contact hours without any prior appointment.

PRACTICAL WORK WHICH INVOLVES PUBLIC
Interaction with public outside the campus – Identifying customer needs – Product selection based on customer needs – Concept generation – Concept testing - Identifying fabrication requirements – Identifying fabricators for the project – Costing – Financial model for the product development – Finding outside finance for product development and joint development if possible.

SUMMER VACATION WORK
Students shall actively get information about fabrication of their product prototypes, especially if it involves outstation fabrication units. If they have decided on the final design, they may start work on their alpha prototypes.

FOR SENATE'S CONSIDERATION

Course Faculty Goldin R. Bennet

CC-Chairperson R. Pil 6/1/2020

HOD _____ **Date: 6-1-2020**