


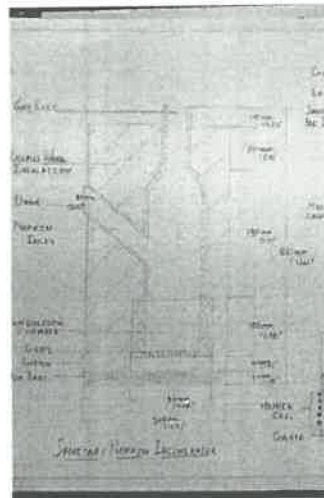
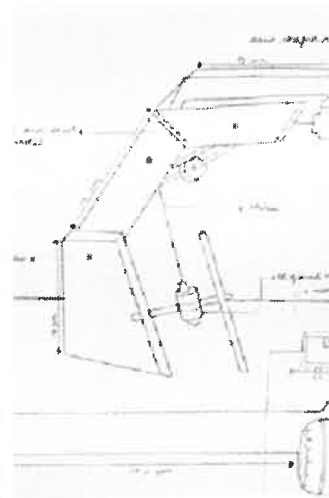
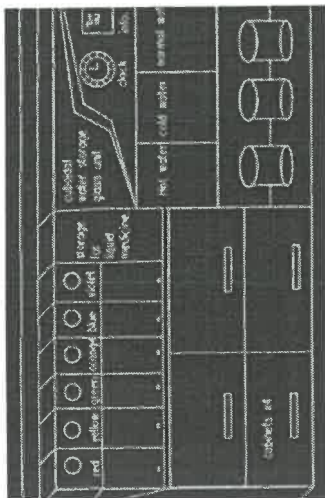
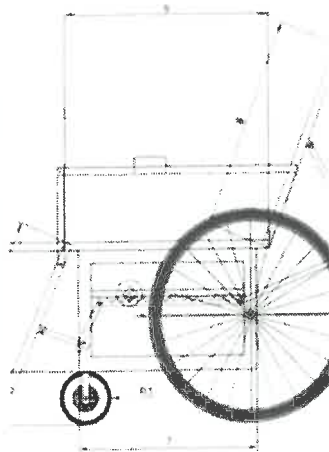
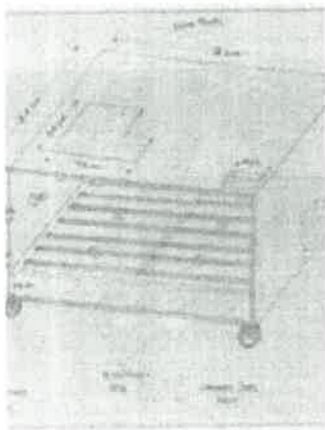
Course Title and Course Code	<b>Design and Prototyping - II (ES1112)</b>	
Hours per Week	<b>L T P: 3 0 0</b>	
Credits	<b>3</b>	
Students who can take	<b>B. Tech Semester-II (Batch: 2020-2024)</b>	
<b>Objective of the course:</b>		
Students will be trained to work with various design and fabrication processes in order to shape materials and will be able to assemble the desired functional prototypes.		
<b>Learning Outcomes:</b>		
On successful completion of this course, the students should be able to:		
<ul style="list-style-type: none"> <li>• Develop 3D model of the product using CAD software.</li> <li>• Identify various hand tools used for fabrication work.</li> <li>• Identify various machine tools used for fabrication work.</li> <li>• Select various tools and processes for manufacturing of any desired component.</li> </ul>		
<b>Evaluation Scheme</b>		
<b>Sr. No</b>	<b>Specifications</b>	<b>Marks</b>
1	Attendance	NIL
2	Assignment	20
3	Class Participation	10
4	Quiz	20
5	Theory Exam-I	NIL
6	Theory Exam-II	NIL
7	Theory Exam-III	NIL
8	Report-I	5
9	Report-II	10
10	Report-III	NIL
11	Project-I	35
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I	NIL
15	Lab Evaluation-II	NIL
16	Course Portfolio	NIL
<b>Total (100)</b>		<b>100</b>

  
 Deepika Mishra, Assistant Professor,  
 Course Coordinator (Design and Prototyping)  
 Department of Mechanical Engineering



Course Title and Course Code	<b>Design and Prototyping-I (ES1110)</b>	
Hours per week	<b>L T P: 3 0 0</b>	
Credits	<b>3</b>	
Students who can take	<b>B. Tech Semester-I (Batch: 2020-2024)</b>	
<b>Objective of the course:</b>		
The students will be trained to analyze an unknown situation through critical thinking and formulate it into a known problem so that solutions can be found. Once solution found, student will be able to use engineering tools to convert a conceptual idea in to a 3D Drawing.		
<b>Learning Outcomes:</b>		
On successful completion of this course, the students should be able to:		
<ul style="list-style-type: none"> <li>• Approach design challenges from the perspective of the user and offer innovative solutions effectively.</li> <li>• Communicate and work in team towards a common goal.</li> <li>• Think creatively towards a desirable solution.</li> <li>• Develop the projection views of the products with dimensions and scales.</li> <li>• Create the schematic diagram and isometric view of the parts using software.</li> </ul>		
<b>Evaluation Scheme</b>		
<b>Sr. No</b>	<b>Specifications</b>	<b>Marks</b>
1	Attendance	NIL
2	Assignment	20
3	Class Participation	NIL
4	Quiz	20
5	Theory Exam-I	NIL
6	Theory Exam-II	20
7	Theory Exam-III	20
8	Report-I	NIL
9	Report-II	NIL
10	Report-III	NIL
11	Project-I	20
12	Project-II	NIL
13	Project-III	NIL
14	Lab Evaluation-I	NIL
15	Lab Evaluation-II	NIL
16	Course Portfolio	NIL
<b>Total (100)</b>		<b>100</b>



As we all know the world is facing medical emergency during Covid-19 pandemic situation. So we address the similar situation and formulate the problem statement "*Design & fabrication of automated mechanism to facilitate medical care system*".

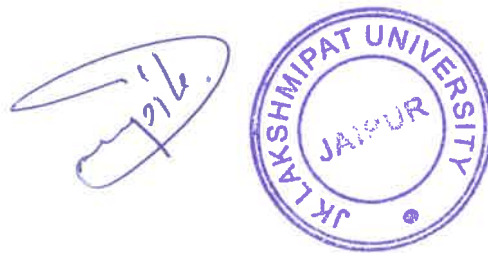
Because of lock down we found lesser availability of facilities, so we distributed our course in two semesters. First semester is dedicated to identify the product/solution/functioning for the given problems whereas in the 2<sup>nd</sup> semester students were expected to involve in fabricating/Developing 3D models of the decided product.

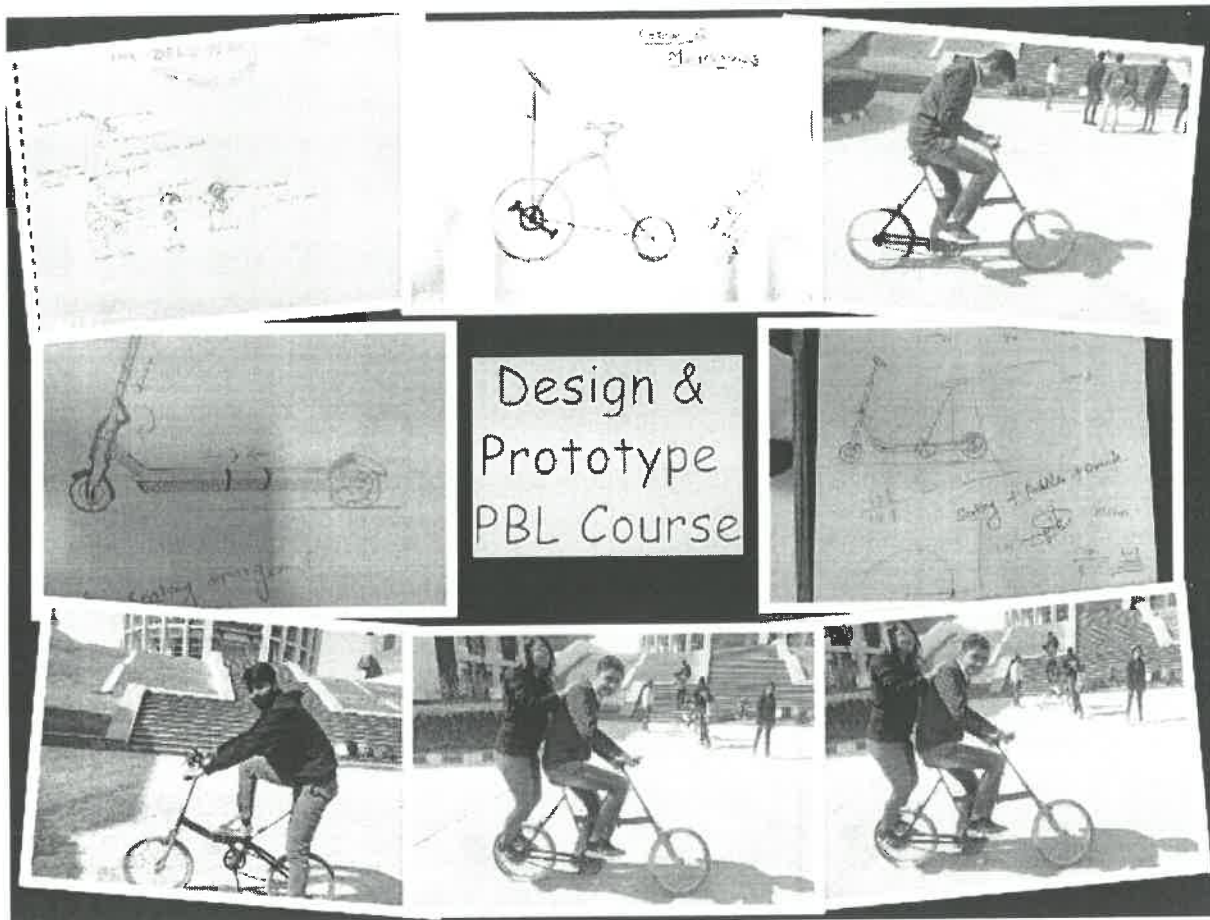
We got amazing ideas from the students to facilitate medical care systems right from food or drug delivery to motorized wheel chair come stretcher for unfit persons.

Students started their journey for the course from design thinking. Initially they decided their target user like children, adults or senior citizens etc. Then they identify the problems of selected users during pandemic situations. Once medical requirements are identified, the students started searching for the product that may fit as a medical assisted tool for the selected group of users.

Students learned very well and come up with the different solutions. Some of the products are:

1. LISTEN ME - Medicine reminder device
2. UV sterilizer outer body
3. Sanitary incinerator with vending machine
4. Portable wheelchair cum stretcher
5. Doctor's kit care
6. Robotic Arm on Wheel





### Iteration 3: Course (Design and Prototyping-I, Design and Prototyping-II)

**Faculty Name(s):** Ms Deepika Mishra, Dr. Ravi Shankar Prasad, Dr. Rajlakshmi Nayak, Dr. Tanmoy Deb, Dr. Bhargav Prajwal Prajapati

**Course Code:** ES1110, ES1112

**As time move forward, the course was further updated for batch 2020-21**

In session 2020-21 we move with the similar objective, "The students will be trained to analyze an unknown situation through critical thinking and formulate it into a known problem so that solutions can be found. Once solution found, student will be able to use engineering tools to convert a conceptual idea in to a 3D Drawing" with different problem statement.



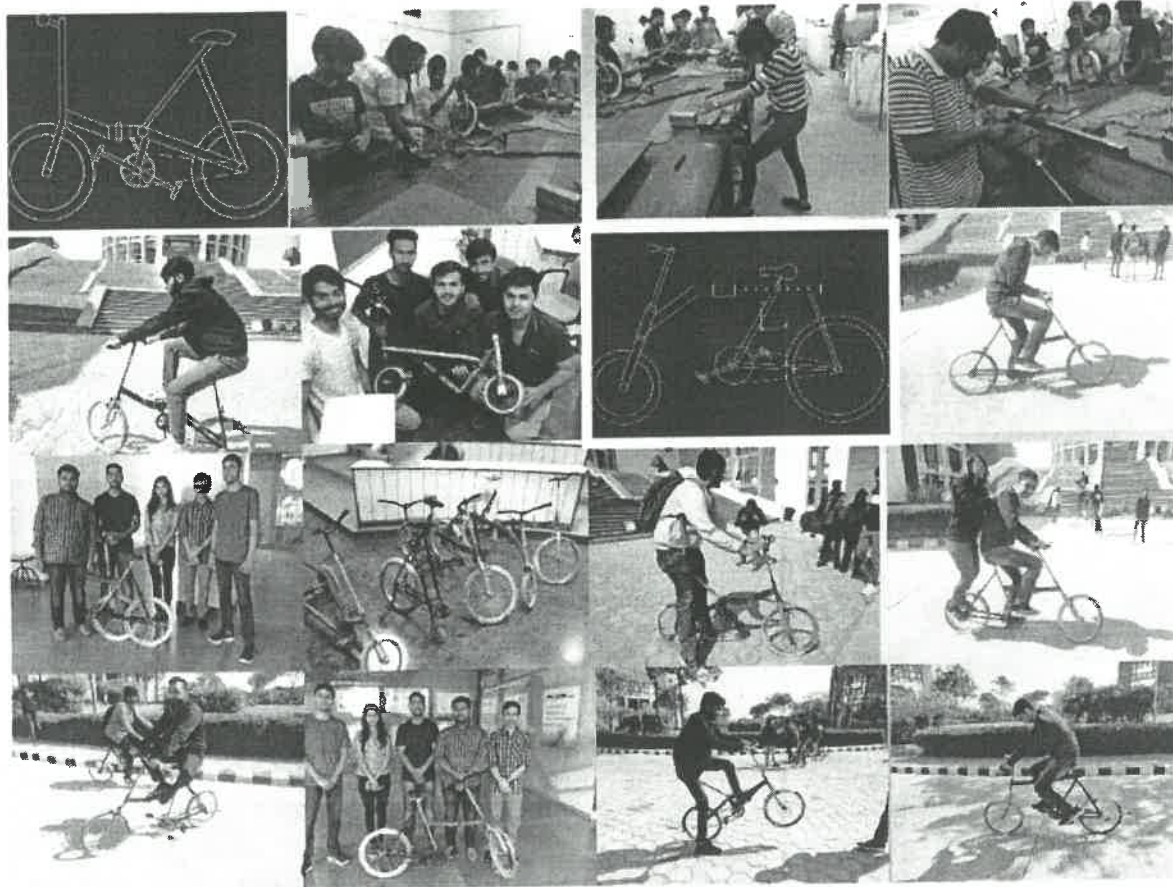
**The learning outcomes for the course are:**

- Approach design challenges from the perspective of the user and offer innovative solutions effectively.
- Communicate and work in team towards a common goal.
- Think creatively towards a fun based, desirable solution.
- Develop the projection views of the products with dimensions and scales.
- Create the schematic diagram and isometric view of the parts using AutoCAD.
- Fabricate prototype by combining the different parts.

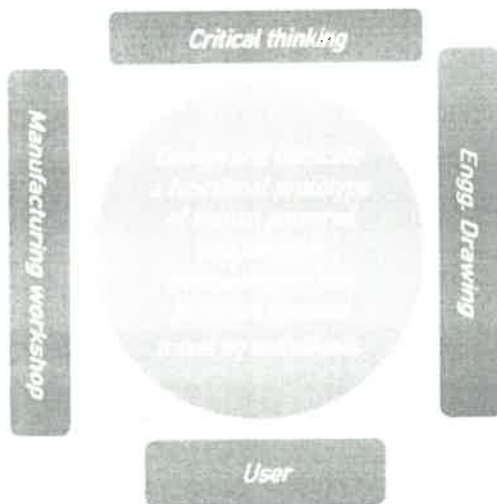


Throughout the semester we found that the students were involved in deep learning, improving fabrication skills valuable in today's life. They also learn how to take initiative, work responsibly, solve problems, collaborate in teams, and communicate ideas. At the end of semesters our students were developed several solutions for human powered and portable transportation tool for traveling shorter distances.





It was found that this course required the knowledge of various domains like design thinking, engineering graphics, workshop practices etc.



A well-defined project statement, "Design and fabricate a functional prototype of human powered and portable transportation tool for short distance travel by individuals" was shared with the students on first day of the class, and it was expected after the completion of the course that students will be able to think creatively towards the

designing and fabricating of the product with considering its aesthetic, ergonomics and cost.



Basic Design cycle, project definition, vision in product designing, base of pyramid model, context mapping, mind mapping, Life cycle analysis, process tree, SWOT analysis, VRIO analysis, perpetual mapping, Fish trap model, SCAMPER, WWWWWH, PreMo, C-Box, vALUE, Design Drawing, TecDoc.

**Reference / Text Books**

1. "The Design of Everyday Things" by Donald A. Norman

**Iteration 2: Course (Design and Prototyping)**

**Design and Prototyping further modified in session 2019-20 for BTech 1<sup>st</sup> semester students of all branches.**

**Faculty Name(s):** Ms Deepika Mishra, Dr. Ravi Shankar Prasad, Dr. Rajlakshmi Nayak, Dr. Tanmoy Deb, Dr. Bhargav Prajwal Prajapati, Mr. Amit

**Course Code:** ES1102

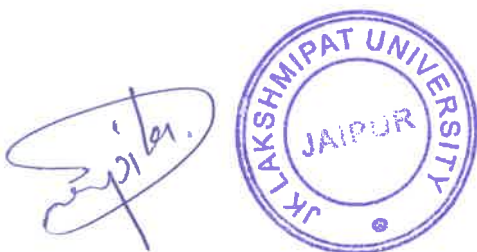
**Objective of the course:**

The students will be trained to analyze an unknown situation through critical thinking and formulate it into a known problem so that solutions can be found. Once solution found, student will be able to use engineering tools to convert a conceptual product into a real product.

**Learning Outcomes:**

On successful completion of this course, the students should be able to:

- Approach design challenges from the perspective of the user and offer innovative solutions effectively.
- Communicate and work in team towards a common goal.
- Think creatively towards a fun based, desirable solution.
- Develop the projection views of the products with dimensions and scales.
- Create the schematic diagram and isometric view of the parts using AutoCAD.
- Fabricate prototype by combining the different parts.





includes, various class activities such as assignment, quizzes, report writing, presentation, prototype fabrication etc. Once project work evaluation completes the students are expected to attain the predefined course outcomes.

<b>Course Title and Code: Design and Prototyping (BES102)</b>	
<b>Course Description</b>	
The objective of this course is to open the students to learn free and lateral thinking and initiate creative problem-solving. The course will encourage students to learn through hands-on experience and break away from traditional learning methods. This course will initiate by introducing the role of design thinking in process of designing a product and it will emphasize the role of research in the design process. The course will run by providing the operational skills to conduct design research and how to use the research insights for creating a product. Students will also get the exposure to manufacturing techniques such as casting, forging, joining, laser cutting, 3D printing etc. In a nutshell, the course will move around the user-centric approach of design research and methods for working out an appropriate solution for a problem space.	
Prerequisites	None
Hours per Week	L-T-P: 6-2-0 /In Class-Out Class: 6-12
Credits	6
Sr. No	Specifications
01	Attendance
02	Assignment
03	Class Participation
04	Quiz
05	Theory Exam
06	Theory Exam
07	Theory Exam
08	Report-1
09	Report-2
10	Report-3
11	Project -1
12	Project -2
13	Project -3
14	Lab Evaluation
15	Lab Evaluation
16	Course portfolio
	<b>Total (100)</b>

### Syllabus

Basics engineering drawing with AutoCAD, Fundamental manufacturing processes including metal joining, metal cutting, additive manufacturing, laser cutting, casting, sheet metal working etc.



**What is PBL?**

True learning is based on discovery rather than transmission of knowledge, with this thought we opted PBL pedagogy. PBL (Project Based Learning) is a teaching method in which students learn by actively engaging in providing solution to real-world problems.

**Iteration 1: Course (Design and Prototyping)**

**Design and Prototyping introduced first time in session 2018-19 for BTech 1<sup>st</sup> semester students of all branches.**

**Faculty Name(s):** Mr. Aditya Joshi, Dr. Priyaranjan, Dr. Rajlakshmi Nayak

**Course Code:** BES102

**Objective of the course:**

The objective of this course is to open the students to learn free and lateral thinking and initiate creative problem-solving.

Design and prototyping course was started at JKLU in 2018 with an objective, to open the students to learn free and lateral thinking and initiate creative problem-solving. The course encourages students to learn through hands-on experience and break away from traditional learning methods. This course initiated by introducing the role of design thinking in process of ideation of a product and emphasizes the role of research in the design process. The course provides the operational skills to conduct design research and how to use the research insights for creating a product. Students also get the exposure to manufacturing techniques such as casting, forging, joining, laser cutting, 3D printing etc. so that required components of the product can be manufactured. Selection of material remains an important criterion for the selection of manufacturing process. In a nutshell, the course moves around the user-centric approach of design research and product development to provide an appropriate solution for a problem space.

Students work on a project in a team throughout a semester. That engages them in solving a real-world problem or answering a complex question. They demonstrate their knowledge and skills by creating a public product or presentation for a project. As a result, students develop communication skills, team work, critical thinking, and deep knowledge of the subject.

In order to observe the project based learning process, a continuous evaluation system was adopted so that performance of each student can be observed. The component of the continuous process

