

MAKER SPACE LAB MS101 – Autumn 2024

INTRODUCTION TO Maker Space

WHY, WHAT, HOW, WHERE, WHEN?

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IMPORTANCE OF STUDYING MAKER SPACE LAB - WHY

- **Engineer – Use tools and materials, developed by scientists or available in nature, to make products**
- **Products that enhance our functioning in ways that were not possible before**
- **Invent/Design, Develop, Analyze, Standardize, Communicate, Scale-up, etc., are some important aspects of Engineering**

Maker space lab is developed to provide a simple journey through this process of Engineering a Product

WHAT DO WE STUDY IN MAKER SPACE LAB

A Simple Pen to a Complex Aero-Engine are all products, to do something for us

- **Designed** – with a purpose including functionality, aesthetics, usability, cost, etc.
- **Developed** – realized into a physical form that can be tested
- **Analyzed** – does it work or not? Are there any flaws, current and future?
- **Verified/validated** – to meet desired performance
- **Marketed** – generate value e.g., through perception, comparison, etc. (economics)

Maker space lab is developed to provide a simple journey through this process of Engineering a Product

HOW DO WE GO ABOUT LEARNING IN MAKER SPACE LAB

1. **SKETCH** – Putting your thought on paper (e.g., cartoon)
2. **DRAW/MODEL** – Formalize and Communicate with drawings (specifications) to realize the product (iterate 1-2)
3. **ANALYSIS** – Evaluate performance (can it do what you envisioned), identify issues, iterate on 1-2-3, finalize the specifications
4. **MANUFACTURE** – Make the product, validate and iterate 1-2-3-4 (e.g., Can you make it to your specifications?)



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The Goal of Maker Space Lab is to Design and Develop an Electro-Mechanical Machine with a Purpose

MS101 – (L-T-P-C: 1-0-6-8)

- **Institute Core Course for UG 1st year**
 - Replacement course for the Engineering Drawing and Workshop courses
 - Currently run jointly by ME and EE – both semesters
- **Summary**
 - Per week – One lecture + two 3-hour lab sessions.
 - ME (8 lectures + 7 lab experiments)
 - EE (12 lectures + 5 lab experiments)
 - Final project (in groups of 6): 6 - 7 weeks – requires ME and EE skills
 - Evaluations: Quizzes, Final Demo (Endsem)

Timetable of Theory Classes

Day	Time	Venue	Section
Monday	10:35 - 11:30(3A)	LA201	P1,P2,P3,P4,P15 D1,D3 (Div./Lab group)
Wednesday	11:05 - 12:30(6A)	LA201	P7, P8, P9,P10 D2 (Div./Lab group)

OVERALL TEACHING PLAN FOR MECHANICAL PART

WEEK NO	DATES	DAY	THEORY	DATE (DAY)	LAB
1	5 th , and 7 th Aug	Mon, Wed	Sketching and Visualisation	5 th - 6 th Aug (Mon, Tue) 8 th - 9 th Aug (Thu, Fri)	No Lab Sketching and Visualisation
2	12 th , and 14 th Aug	Mon, Wed 15 th : Holiday	Orthographic Projection	12 th - 13 th Aug (Mon, Tue) 15 th - 16 th Aug (Thu, Fri) Compensation: 17 th (Sat)?	Sketching and Visualisation Orthographic Projection
3	19 th , and 21 th Aug	Mon, Wed	Fusion 360 (2D)	19 th - 20 th Aug (Mon, Tue) 22 nd - 23 rd Aug (Thu, Fri)	Orthographic Projection Fusion 360 (2D)
4	26 th , and 28 th Aug	Mon, Wed	Fusion 360 (3D)	26 th - 27 th Aug (Mon, Tue) 29 th - 30 th Aug (Thu, Fri)	Fusion 360 (2D) Fusion 360 (3D)
5	2 nd and 4 th Sep	Mon, Wed	Fusion 360 (Assembly)	2 nd - 3 rd Sep (Mon, Tue) 5 th - 6 th Sep (Thu, Fri)	Fusion 360 (3D) Fusion 360 (Assembly)
6	9 th , and 11 th Sep	Mon, Wed	Manufacturing Theory	9 th - 10 rd Sep (Mon, Tue) 12 th - 13 th Sep (Thu, Fri)	Fusion 360 (Assembly) Lathe, drill, Dremel, quiz

OVERALL TEACHING PLAN FOR MECHANICAL PART

WEEK NO.	DATES	DAY	THEORY	DATE (DAY)	LAB
MID-SEMESTER EXAMINATION 14 rd Sep (Sat) to 22 nd Sep (Sunday)					
7	23 rd , and 25 th Sep	Mon, Wed	Manufacturing Theory	23 rd - 24 th Sep (Mon, Tue) 26 th - 27 th Sep (Thu, Fri)	Lathe, drill, Dremel, quiz Laser, 3d printer, quiz
8	30 th Sep, and 2 nd Oct	Mon, Wed 2 nd : Holiday	Fusion 360 (Generative design)	30 th Sep - 1 st Oct (Mon, Tue) 3 rd - 4 th Oct (Thu, Fri)	Laser, 3d printer, quiz Makeup
9	9 th Oct	Wed	Fusion 360 (Generative design)	7 th Sep - 8 th Oct (Mon, Tue) 10 th - 11 th Oct (Thu, Fri)	PROJECT WORK(soldering, PROJECT WORK
10				14 th Oct - 18 th Oct (Mon, Tue & Thu, Fri)	PROJECT WORK
11				21 st Oct - 25 th Oct (Mon, Tue & Thu, Fri)	PROJECT WORK
12			31 st : Holiday (Diwali)	28 st Oct - 1 st Nov (Mon, Tue & Thu, Fri)	PROJECT WORK
13				4 th Nov - 8 th Nov (Mon, Tue & Thu, Fri)	EVALUATION
11th November 2024 – END SEMESTER EXAMINATION BEGINS					

POSITIONING OF MECHANICAL AND ELECTRICAL PART ALONG WITH PHYSICAL LOCATION

	Morning Session		Afternoon Session	
	Drawing Hall	ESE LAB (101,108)	Drawing Hall	ESE LAB (101,108)
Monday	P7, P8 – 97 (Mechanical Part) 8:30am-11:30am (1A,2A,3A)	P7 – 60 (Electrical Part) 8:30am-11:30am (1A,2A,3A)	P1, P2 – 103 (Electrical Part) 2:00pm-5:00pm (L1)	P2 – 60 (Mechanical Part) 2:00pm-5:00pm (L1)
Tuesday	P9, P10 – 94 (Mechanical Part) 8:30am-11:30am (4B,1B,2B)	P9 – 61 (Electrical Part) 8:30am-11:30am (4B,1B,2B)	P3, P4 – 111 (Electrical Part) 2:00pm-5:00pm (L2)	P4 – 60 (Mechanical Part) 2:00pm-5:00pm (L2)
Thursday	P7, P8 – 97 (Electrical Part) 8:30am-11:30am (3C,4C,1C)	P7 – 60 (Mechanical Part) 8:30am-11:30am (3C,4C,1C)	P1, P2 – 103 (Mechanical Part) 2:00pm-5:00pm (L3)	P2 – 60 (Electrical Part) 2:00pm-5:00pm (L3)
Friday	P9,P10– 94 (Electrical Part) 9:30am-12:30am (5B,6B)	P9 – 61 (Mechanical Part) 9:30am-12:30pm (5B,6B)	P3, P4 – 111 (Mechanical Part) 2:00pm-5:00pm (L4)	P4 – 60 (Electrical Part) 2:00pm-5:00pm (L4)

LAB TIME SLOT FOR FACULTY

	Morning Session		Afternoon Session	
	Drawing Hall		ESE LAB (101,108)	
Monday	P7, P8 – 97 (Prof. Puranik)		P2 – 60 (Prof. Tandaiya)	
Tuesday	P9, P10 – 94 (Prof. Puranik)		P4 – 60 (Prof. Tandaiya)	
Thursday	ESE LAB (101,108) P7 – 60 (Prof. Chandy)		Drawing Hall P1, P2 – 103 (Prof. Karagadde)	
Friday	P9 – 61 (Prof. Chandy)		P3, P4 – 111 (Prof. Karagadde)	

Where?



MS101 Mechanical Engineering Syllabus

- **Engineering Drawing Basics**
- **Projections, Sections**
- **3D Modeling Interfaced with Fusion360 Software**
- **Product Assembly and Tolerances**
- **Manufacturing Practices (conventional and Advanced)**

MODE OF CONDUCT OF LAB SESSIONS (ME PORTION)

- **Lab sessions are almost of self-help in nature**
- **Teaching assistant or the teacher will not help you, that essentially means you need to come prepared for the lab**
- **In case, if you seek help, marks would be deducted accordingly**
- **Usually, lab sessions are easy, provided**
 - **You attend corresponding theory lectures**
 - **Come prepared to the lab about the lab session material which would be provided apriori (few days before the lab session)**

MS 101 Project (to be updated)

- There will be 7 (6-7) Project Lab sessions.
- Projects to be carried out in groups of 6
- **PROJECT DEMO AND VIVA** will be held on the last two lab days in the lab itself (in Transit Building)
- **PROJECT EVALUATION:**
 - In-semester evaluation by ME and EE separately during the seven project sessions (evaluation of submissions –short videos detailing project progress and individual contributions)
 - Project Demo cum Viva : during the last two days (during the Lab sessions). Jointly done by ME and EE faculty in two groups

GRADING POLICY

- **Senate requirement of 80% attendance; else DX grade.**
- **Makeup labs to be done for missed Labs with valid institute permitted reasons (no attendance will be given for makeup labs)**
- **Makeup exams – in case missed due to medical or genuine reasons**

GRADING POLICY for ME PORTION

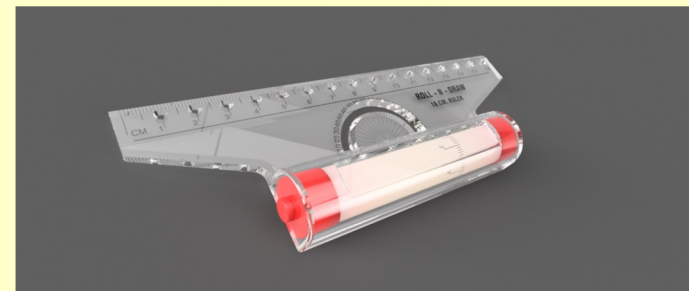
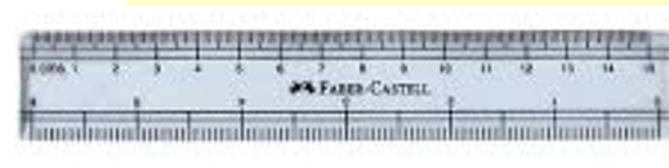
- **Lab quizzes:**
 - **30%**
 - **5% / lab session**
 - **7 lab sessions in total**
 - **Best of 6 lab sessions marks will be chosen for final grade.**
- **Project: 40% (COMBINED ME AND EE)**
 - **Design and progress:**
 - **Final Project demo and Viva:**

THEME OF THIS COURSE

Fun and joy of learning and doing

ITEMS that would be given in the lab and to be returned on daily basis

1. Pencils – HB and H
2. Eraser
3. Simple Scale – 30 cm and 15 cm
4. Rolling Scale (preferred)
5. Pencil sharpener
6. Compass



1st Lab session: Bring pencil, eraser & sharpener



Expectations from Students

- **Come to the class and lab on time – Discipline (10% penalty for late entry beyond 10 mins)**
- **No mobile usage is allowed in the theory class and laboratory class**
- **Attire – no shorts ALLOWED and come with full pants, sleeve shirts/tops and shoes (10% penalty for violation). This is in view of the safety requirement.**
- **Work on lab sheets independently. IT IS CONDUCTED LIKE A QUIZ. Do not copy from others.**
- **Best way is to**
 - **Study the material taught in the theory class – NOTES**
- **In case, if you are stuck and cannot make headway at all, your teaching assistant will help you but few marks would be deducted.**

Expectations from Students

- **Students can attend only their assigned slots. If they miss their assigned slots for any reason (including valid reasons like illness, etc.) and show up for another slot, it will be considered as absence.**
- **Institute rules regarding academic honesty will be applicable. Cases of academic misconduct/malpractice will be processed as per rules.**

Expectations from Students

For the execution of the project

- **Work in groups while doing projects. Team spirit and mutual learning key to the success of the project**
- **Using resources from internet is fine for learning but, do not copy**
- **Also, if you don't know, refer to books and ask one of us (Teachers, RAs, Lab Staff)**
- **You cannot take the project material to your hostel. Need to keep the project material within the lab and leave.**

Thank you