MAKERSPACE LAB MS101 – Autumn 2025

INTRODUCTION TO MAKERSPACE

WHY, WHAT, HOW, WHERE, WHEN?

Instructors

Prof. V. Kartik, ME
Prof. Amit Agrawal, ME
Prof. Milind V. Rane, ME
Prof. Makarand S. Kulkarni, ME
Prof. Avinash Prabhudesai, ME
Prof. P. K. Baburajan, ME

Prof. Anil K. G., EE
Prof. Shalabh Gupta, EE
Prof. Joseph John, EE
Prof. Srikanth Raj Chetupalli, EE
Prof. Kushal R Tuckley, EE
Prof. Prem C Pandey, EE
Prof. Saravanan Vijayakumaran, EE

Acknowledgements: IIT Bombay Alumni

Instructors: ME

Prof. Milind V. Rane

Prof. Amit Agrawal

Prof. Makarand S. Kulkarni

Prof. V. Kartik

Prof. Avinash Prabhudesai

Prof. P. K. Baburajan

Research Associates of MS101

Chollangi Bhavaniprasad

Lokesh Bhamare

Sajal Thomas

Sahil Sayyad

STAFF ASSOCIATED WITH MS101 (to be updated)

Mr. Sunil Kahalekar,
Technical Superintendent, ME

Mr. Prakash Rokade, ME

Lab Engineer
Mr. Pratik Chahande

Lab Engineer
Mr. Shashank Yadav

Lab Engineer
Mr. Rhythm Gaidhani

Lab Engineer
Mr. Dip Ghodmare

Lab Engineer
Mr. Masum Mahajan

Lab Engineer
Mr. Sameer Hete

IMPORTANCE OF STUDYING MAKERSPACE 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

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

WHAT DO WE STUDY IN MAKERSPACE 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)**

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

HOW DO WE GO ABOUT LEARNING IN MAKERSPACE 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?)

The Goal of Makerspace 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
  - ME (6 lectures + 6 lab experiments)
  - EE (12 lectures + 5 lab experiments)
  - Final project (in groups of 5/6): 5 - 6 weeks – requires ME and EE skills
  - Evaluations: Quizzes, Final Demo (for End sem)

Timetable for ME Lectures

Day	Time	Venue	Section
Monday	10:30 - 11:25(3A)	LA201	P1, P2, P3, P4, D1(Div./Lab group)
Wednesday	09:30 - 10:55(5A)	LA201	P7,P8,P9,P10 D2(Div./Lab group)

OVERALL TEACHING PLAN FOR MECHANICAL PART

WEEK NO.	DATES	DAY	THEORY	DATE	LAB
1	July 28 & 30	Mon, Wed	Sketching and Visualisation	July 31, Aug 1, 4, 5	Sketching & Visualisation (#1)
2	Aug 4 & 6	Mon, Wed	Orthographic Projection - Fusion 360	Aug 7, 8, 11, 12	Orthographic Projection (OP)(#2)
3	Aug 11 & 13	Mon, Wed	3D modelling & modification - Fusion 360	Aug 14, ~~15~~, 18, 19	OP - Fusion 360 (#3)
4	Aug 18 & 20	Mon, Wed	Components & assembly - Fusion 360	Aug 21, 22(#3), 25, 26	3D – Fusion 360 (#4)
5	Aug 25 & 27	Mon, Wed	Manufacturing Theory	Aug 28, 29(#4), Sep 1, 2	Assembly - Fusion 360 (#5)
6	Sep 1 & 3	Mon, Wed	Generative design - Fusion 360	Sep 4, ~~5~~, 8, 9	3D printing, laser cutting & Assembly (#6)
			Th, Fr	Sep 11(m~~)~~, 12 (#5)	Makeup & lab #5
7			MID-SEMESTER EXAMINATION	September 13 (Saturday) to September 21 (Sunday)	
8			Mo, Tu, Th, Fr, Sat	Sep 22, 23, 25(p), 26(#6), 27(m)	Makeup lab
9			Mo, Tu, ~~Th~~, Fr	Sep 29, 30, Oct ~~2~~, 3	PROJECT WORK
10			Mo, Tu, Th, Fr	Oct 6, 7, 9, 10	PROJECT WORK
11			Mo, Tu, Th, Fr, Tu	Oct 13, 14, 16, 17	PROJECT WORK
12			~~Mo~~, Tu, Th, Fr	Oct ~~20~~.21.23, 24	PROJECT WORK
13			Mo, Tu, Th, Fr	Oct 27,28, 30, 31	PROJECT WORK
14			Mo, ~~Tu~~, Th, Fr	Nov 3,4, 6, 7	PROJECT WORK DEMO & VIVA

10 November – 22 November 2025, END SEMESTER EXAMINATION

ME lab session & project schedule Summary

Date	Day(lab session #)
July 31, Aug 1, 4, 5	Th(1), Fr(1), Mo(1), Tu(1)
Aug 7, 8, 11 & 12	Th(2), Fr(2), Mo(2), Tu(2)
Aug 14, ~~15~~, 18, 19	Th(3), ~~Fr(3)~~, Mo(3), Tu(3)
Aug 21, 22, 25, 26	Th(4), Fr(3), Mo(4), Tu(4)
Aug 28,29, Sep 1, 2	Th(5), Fr(4), Mo(5), Tu(5)
Sep 4, ~~5~~, 8, 9	Th(6), ~~Fr(6)~~, Mo(6),Tu(6)
Sep 11,12	Th(m), Fr(5)
September 13 (Saturday) to September 21 (Sunday) : midsem	
Sep 22, 23, 25, 26, 27	Mo(m), Tu(m), Th(p), Fr(6), Sa(Fr(m))
Sep 29, 30, Oct ~~2~~, 3	Mo(p), Tu(p), ~~Th(p)~~,Fr(p)
Oct 6,7, 9, 10	Mo(p), Tu(p), Th(p), Fr(p)
Oct 13,14, 16, 17	Mo(p), Tu(p), Th(p), Fr(p)
Oct ~~20~~, 21, 23, 24	~~Mo(p)~~, Tu(p), Th(p), Fr(p)
Oct 27, 28, 30, 31	Mo(p), Tu(p), Th(p), Fr(p)
Nov 3,~~4~~ 6, 7	Mo(p), ~~Tu(p)~~, Th(d), Fr(d)

Date/Day	Holidays
Aug 15 Fri	Independence day
Aug 27 Wed	Ganesh Chaturthi
Sep 5 Fri	Id- e- Milad
Oct 2 Thu	Gandhi Jayandhi & Dussehra
Oct 20 Mon	Diwali
Nov 5 Wed	Guru Nanak Jayanti

Term	abbreviations
Lab session #	1,2,3,4,5,6
Makeup lab	m
Project	p
Day	Mo, Tu, Th, Fr
Demo & viva	d

SCHEDULING OF ME AND EE LABS ALONG WITH PHYSICAL LOCATION (student no. to update)

	Morning Session		Afternoon Session	
	Drawing Hall	ESE LAB (101,108)	Drawing Hall	ESE LAB (101,108)
Monday	P7, P8 – 120 (Mechanical Part) 8:30am-11:30am (1A,2A,3A)	P7 – 53 (Electrical Part) 8:30am-11:30am (1A,2A,3A)	P1, P2 – 120 (Electrical Part) 2:00pm-5:00pm (L1)	P2 – 45 (Mechanical Part) 2:00pm-5:00pm (L1)
Tuesday	P9, P10 – 120 (Mechanical Part) 8:30am-11:30am (4B,1B,2B)	P9– 40 (Electrical Part) 8:30am-11:30am (4B,1B,2B)	P3, P4 – 127 (Electrical Part) 2:00pm-5:00pm (L2)	P4 – 60 (Mechanical Part) 2:00pm-5:00pm (L2)
Thursday	P7, P8 – 120 (Electrical Part) 9:30am-12:30pm (4C,1C,2C)	P7 – 53 (Mechanical Part) 9:30am-12:30pm (4C,1C,2C)	P1, P2 – 120 (Mechanical Part) 2:00pm-5:00pm (L3)	P2 – 45 (Electrical Part) 2:00pm-5:00pm (L3)
Friday	P9,P10– 120 (Electrical Part) 9:30am-12:30pm (5B,6B)	P9 – 40 (Mechanical Part) 9:30am-12:30pm (5B,6B)	P3, P4 – 127 (Mechanical Part) 2:00pm-5:00pm (L4)	P4 – 60 (Electrical Part) 2:00pm-5:00pm (L4)

LAB TIME SLOT FOR ME FACULTY (student no. to be updated)

	Morning Session	Afternoon Session 2:00 pm – 5:00 pm
Monday 8:30 am – 11:30 am	Drawing Hall: (P7,P8-120) (Prof. Kartik)	ESE LAB (101,108): (P2 – 45) (Prof. M.S. Kulkarni)
Tuesday 8:30 am – 11:30 am	Drawing Hall:(P9,P10-120) (Prof. Amit Agrawal)	ESE LAB (101,108): (P4-60) (Prof. M.S. Kulkarni)
Thursday 9:30 am – 12:30 pm	ESE LAB (101,108): (P7-53) (Prof. Amit Agrawal)	Drawing Hall: (P1, P2 – 120) (Prof. M.V. Rane)
Friday 9:30 am – 12:30 pm	ESE LAB (101,108):(P9-40) (Prof. Kartik)	Drawing Hall: (P3, P4 –127) (Prof. M.V. Rane)

LAB TIME SLOT FOR RESEARCH ASSOCIATES

LAB SESSION	SLOTS	RA
MONDAY	BN (8:30-11:30)	Chollangi Bhavaniprasad
	AN (2:00-5:00)	Chollangi Bhavaniprasad
TUESDAY	BN (8:30-11:30)	Lokesh Bhamare
	AN (2:00-5:00)	Lokesh Bhamare
THURSDAY	BN (9:30-12:30)	Sajal Thomas
	AN (2:00-5:00)	Sahil Sayyad
FRIDAY	BN (9:30-12:30)	Sajal Thomas
	AN (2:00-5:00)	Sahil Sayyad

Where?

Map Design
Shishir Bhagade. IDC, IITB

Project Guide
Prof. Mandar Rane. IDC, IITB

© 2014
Version: 20th Feb 2015

Map is not to scale

Parking | Bus Stop | Garden

MS101 Mechanical Engineering Syllabus

1. Engineering Drawing Basics
2. Projections, Sections with Fusion 360
3. 3D Modeling with Fusion 360
4. Assembly of components with Fusion 360
5. Manufacturing Practices (conventional and Advanced)
6. Generative design with Fusion 360

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 (after midsem)

- There will be 5-6 weeks (10-12 lab sessions / student) Project Lab sessions.
- Projects to be carried out in groups of 4
- 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 project sessions
  - Submissions before final demo: Two minutes videos detailing project objective, progress, individual contributions and lesson learned.
  - Project Demo & 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 may be allocated.
- Makeup labs to be done for missed Labs with valid institute permitted reasons (no attendance will be given for makeup labs)
- Only one makeup is allowed out of the 6 ME labs.

GRADING POLICY for ME PORTION

- **Lab Assignment/quiz:**
  - **30%**
  - **6% for each lab session**
  - **6 lab sessions in total**
  - **Best of 5 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

Lab Details	Items to be given or required
Lab 1	Pencil, Eraser, Sharper (Free hand drawing)   
Lab 2	Drawing kit to be given (Return after the end of Lab to TAs) 
Lab 3 onwards	Activate Autodesk account. Fusion 360 installed on laptop. AUTODESK® FUSION 360™

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)**

Moodle

There could be change in the schedule due to uncertain circumstances

- **Check Moodle routinely for:**
  1. **Announcement: information, instructions**
  2. **Study Materials & assignment**
  3. **Mark update**

Resources:

https://makerspace.iitb.ac.in/me-lectuers-2024-25-spring

Thank you