

# MAKER SPACE LAB MS101 – SPRING 2023

## INTRODUCTION TO Maker's 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

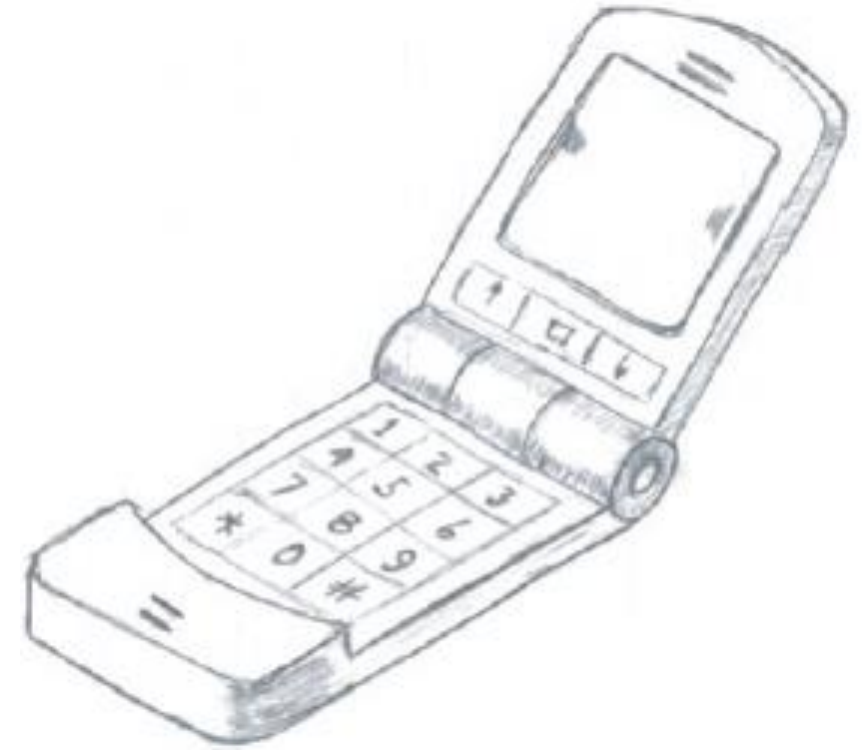
A Simple Pen to a Complex Aero-Engine are all products, to do something for us

- **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 1<sup>st</sup> 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): 8 - 9 weeks – requires ME and EE skills
  - Evaluations: Quizzes, Final Demo (Endsem)



# Timetable of Theory Classes

Day	Time	Venue	Section
Monday	10:35 - 11:30	LA202	P13,P14,P15,P16 B1, B2, B3, B4, B5, B6
Wednesday	11:05 - 12:30	LA202	P19, P20, P21,P22 B7, B8, B9, B10, B11, B12
Tuesday	11.30 – 12.30	F24 (I floor, ME Building)	BP1, BP2, BP3, BP4, BP7, BP8, BP9, BP10

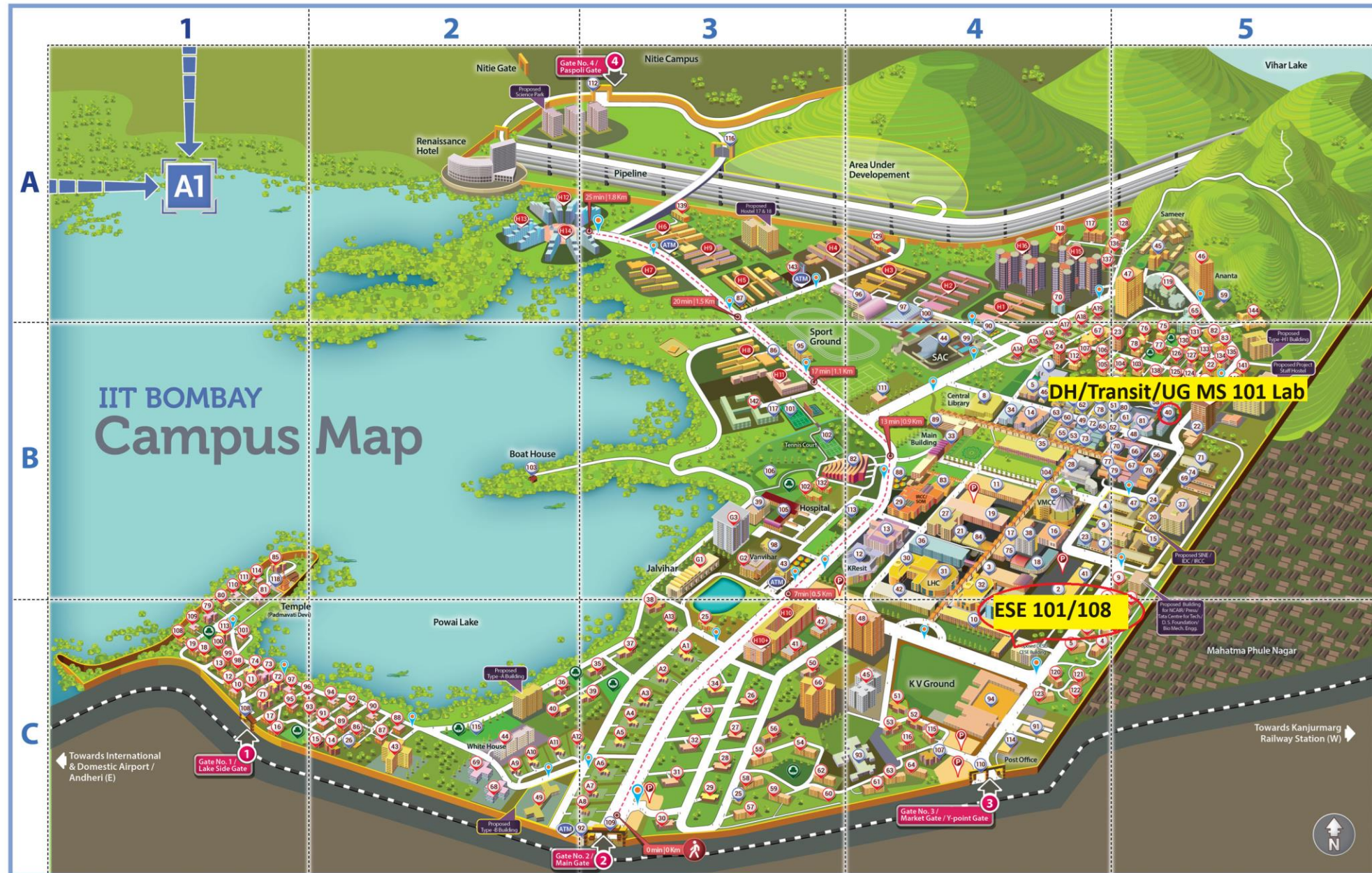
Positioning of Mechanical and Electrical Part Along with Physical Location				
	Morning Session		Afternoon Session	
Monday	Drawing Hall	ESE LAB (101,108)	Drawing Hall	ESE LAB (101,108)
	<b>B7, B8 – 120</b> <b>BP8, BP10 – 19</b> <b>(Mechanical Part)</b>	<b>B9 – 56</b> <b>(Electrical Part)</b>	<b>B1, B2 – 120</b> <b>BP2 – 9</b> <b>(Electrical Part)</b>	<b>B3 – 55</b> <b>BP4 – 2</b> <b>(Mechanical Part)</b>
Tuesday	<b>B10, B11 – 120</b> <b>BP7 - 6</b> <b>(Mechanical Part)</b>	<b>B12 – 55</b> <b>BP9 - 4</b> <b>(Electrical Part)</b>	<b>B4, B5 – 120</b> <b>(Electrical Part)</b>	<b>B6 – 61</b> <b>BP1, BP3 - 15</b> <b>(Mechanical Part)</b>
Thursday	<b>B7, B8 – 120</b> <b>BP8, BP10 – 19</b> <b>(Electrical Part)</b>	<b>B9 – 56</b> <b>(Mechanical Part)</b>	<b>B1, B2 – 120</b> <b>BP2 – 9</b> <b>(Mechanical Part)</b>	<b>B3 – 55</b> <b>BP4 – 2</b> <b>(Electrical Part)</b>
Friday	<b>B10, B11 – 120</b> <b>BP7 - 6</b> <b>(Electrical Part)</b>	<b>B12 – 55</b> <b>BP9 - 4</b> <b>(Mechanical Part)</b>	<b>B4, B5 – 120</b> <b>(Mechanical Part)</b>	<b>B6 – 61</b> <b>BP1, BP3 - 15</b> <b>(Electrical Part)</b>

# OVERALL TEACHING PLAN FOR MECHANICAL PART

WEEK NO.	DATES	DAY	THEORY	DATE	LAB
1	6 <sup>th</sup> Jan (both batches)	Saturday	Sketching and Visualisation		
2	8 <sup>th</sup> , 9 <sup>th</sup> and 10 <sup>th</sup> Jan	Mon, Tues, Wed	Orthographic Projection	8 <sup>th</sup> Jan – 12 <sup>th</sup> Jan	Sketching and Visualisation
3	15 <sup>th</sup> , 16 <sup>th</sup> and 17 <sup>th</sup> Jan	Mon, Tues, Wed	Fusion 360	15 <sup>th</sup> Jan – 19 <sup>th</sup> Jan	Orthographic Projection
4	22 <sup>nd</sup> , 23 <sup>rd</sup> and 24 <sup>th</sup> Jan	Mon, Tues, Wed	Fusion 360	22 <sup>nd</sup> Jan – 26 <sup>th</sup> Jan 26 <sup>th</sup> Jan (Fri) needs to be compensated – 27 <sup>th</sup> (Sat)	Fusion 360
5	29 <sup>th</sup> , 30 <sup>th</sup> and 31 <sup>st</sup> Jan	Mon, Tues, Wed	Fusion 360	29 <sup>th</sup> Jan – 2 <sup>nd</sup> Feb	Fusion 360
6	5 <sup>th</sup> , 6 <sup>th</sup> and 7 <sup>th</sup> Feb	Mon, Tues, Wed	Manufacturing Theory	5 <sup>th</sup> Feb – 9 <sup>th</sup> Feb	Fusion 360
7	12 <sup>th</sup> , 13 <sup>th</sup> and 14 <sup>th</sup> Feb	Mon, Tues, Wed	Manufacturing Theory	12 <sup>th</sup> Feb – 16 <sup>th</sup> Feb	Lathe, drilling and 3d printing practice
8	19 <sup>th</sup> , 20 <sup>th</sup> and 21 <sup>st</sup> Feb	Mon, Tues, Wed	Design optimisation	19 <sup>th</sup> Feb – 22 <sup>nd</sup> Feb	Makeup lab
MID-SEMESTER EXAMINATION 23 <sup>rd</sup> February (Friday) to 2 <sup>nd</sup> March (Saturday)					
9			Aerodynamics of Drones	4 <sup>th</sup> Mar – 8 <sup>th</sup> Mar	Lathe, drilling and 3d printing practice
10				11 <sup>th</sup> Mar – 15 <sup>th</sup> Mar	PROJECT WORK
11				18 <sup>th</sup> Mar – 22 <sup>nd</sup> Mar	PROJECT WORK
12				25 <sup>th</sup> Mar – 29 <sup>th</sup> Mar	PROJECT WORK
13				1 <sup>st</sup> Apr – 5 <sup>th</sup> Apr	PROJECT WORK
14				8 <sup>th</sup> Apr – 12 <sup>th</sup> Apr	PROJECT WORK
15				15 <sup>th</sup> Apr – 19 <sup>th</sup> Apr	EVALUATION
22 <sup>ND</sup> APRIL 2023 – END SEMESTER EXAMINATION BEGINS					



# Where?





# **MS101 Mechanical Engineering Syllabus**

- **Engineering Drawing Basics**
- **Projections, Sections**
- **3D Modeling Interfaced with AutoCAD 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

- There will be eight (6-8) 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 eight 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**



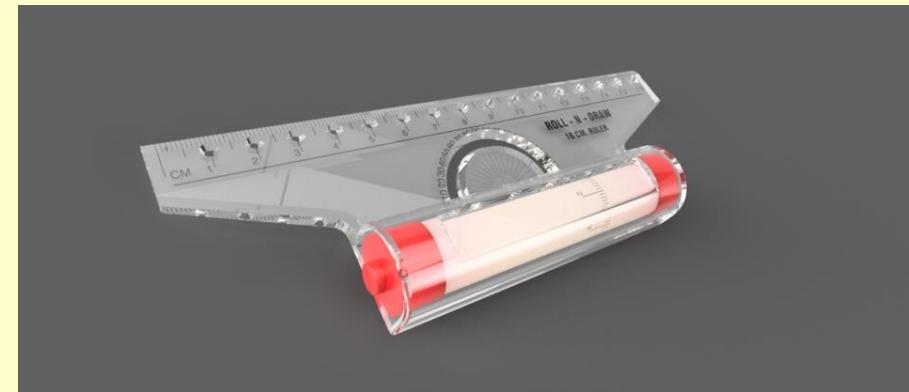
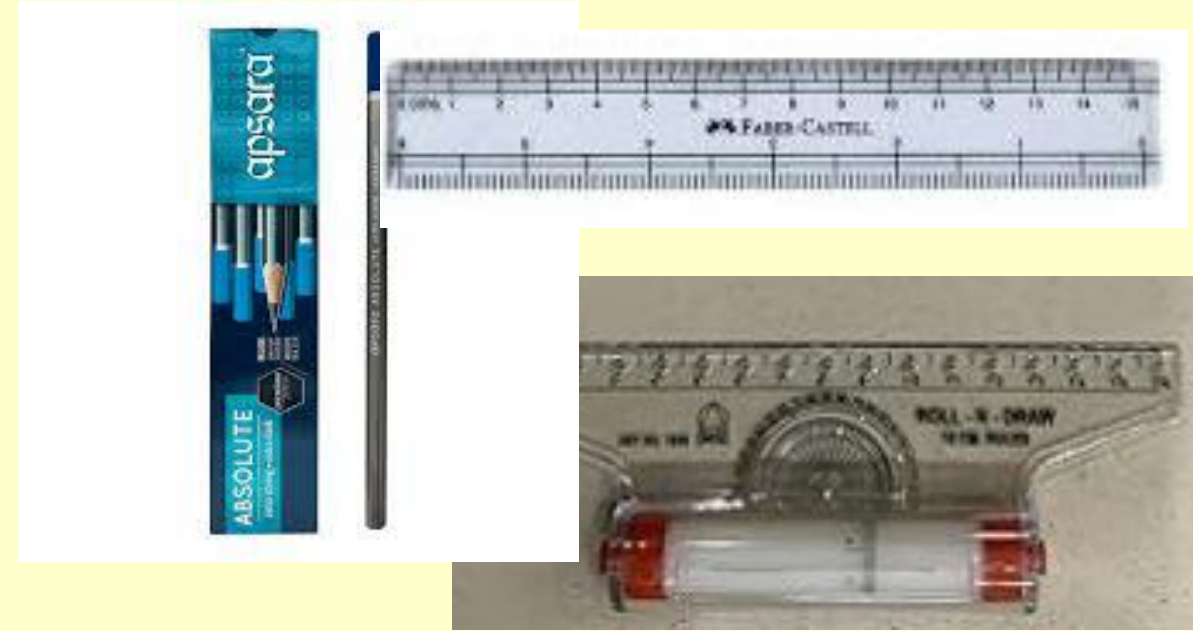
# GRADING POLICY for ME PORTION

- Lab quizzes:
  - 20%
- Midsem Exam:
  - 10%
- 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



# Expectations from Students

- Come to the class and lab on time – Discipline (10% penalty for late entry beyond 5 mins)
- No mobile usage is allowed in the theory class and laboratory class
- Attire – no shorts ALLOWED and come with full pants and shirts
- 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**
  - **Solve** the laboratory **sheet before** coming to the **lab** class.
- In case, if you are stuck and cannot make headway at all, your teaching assistant will help you but few marks would be deducted
- You need to come with full pants and shoes for every lab session. You will be sent back if you do not follow rules.

## 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 the project material within the lab and leave**