MS 101 MAKERSPACE COURSE MANUAL

Contents

1 General Instructions

These are general instructions regarding the classes, practicals, and safety. **Please go through them carefully. Any deviation from these will not be tolerated.**

1.1 Things to do BEFORE the start of classes

1. Make sure you are enrolled for the class (MS 101) on ASC (https://asc.iitb.ac.in) and on Moodle (Online platform at https://moodle.iitb.ac.in for assignments and quizzes).
2. All students are divided into TWELVE (B1-B12) batches for scheduling the lectures and labs ('practicals'). Please refer to section 3 or Moodle to know your batch number (B1 - B12), the schedule for your batch (lecture and lab), and the venues for the lecture and labs **(IMPORTANT!)**. **Please note that the venue of lectures and practicals for a given batch will remain fixed throughout the semester unless explicitly mentioned.**
3. Each of you needs to arrange the following items BEFORE the start of the classes:
   - A reliable laptop with enough storage (or charger) and google chrome browser (If your laptop doesn't have a LAN port, arrange an adapter, e.g., USB C to LAN port)
   - A pencil (with a sharpener), eraser, a pen, a good quality steel ruler
   - A writing pad or a notebook
4. You will also need to **purchase some basic electrical tools** (shown in Fig. 1). Specifically, you will need the breadboard, a wire-stripper, tweezer and a line tester BEFORE your first electrical practical. Digital multimeter and Arduino will be required later (announcement will be made via Moodle).

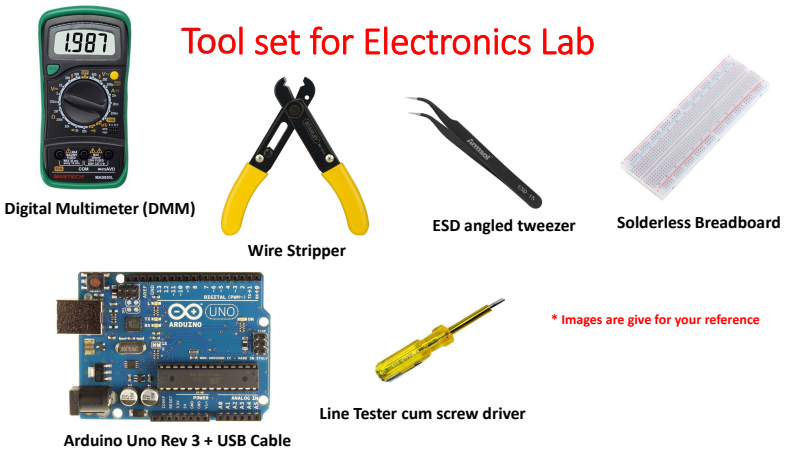

Figure 1: Electrical tools required

1.2 Instructions for the lecture classes

1. The classes will be IN-PERSON as per the schedule and location in the timetable (refer to section 3)
2. You will be required to take notes during the classes
3. Reference slides and extra resources (along with self-study) will be made available via Moodle (https://moodle.iitb.ac.in/)

1.3 Instructions for the practicals

1. **You need to be present for the Practical ON TIME.** Anyone coming after 5 minutes of delay WILL BE MARKED ABSENT (NO EXCEPTIONS!).
2. You MUST bring your own laptops with chargers and appropriate adapters (to connect to wired LAN).
3. You MUST wear full pants and closed-toed shoes for the practicals. This is to ensure your safety during the practicals. In addition, strictly follow all the safety instructions given in section 1.4.
4. You MUST complete all the practical work in the given time and show/submit it to the TA BEFORE leaving.

1.4 SAFETY instructions

1. Always listen carefully to the teacher/TA and follow the instructions.
2. Do not run/rush in the workshop. Know where the emergency stop buttons are positioned for the equipment in the workshop.
3. Always wear full pants and closed-toed shoes. Bags should be stored away during practical sessions in the workshop.
4. When learning how to use a machine, listen very carefully to all the instructions given by the teacher/TA. Ask questions, especially if you do not fully understand.
5. Do not use a machine if you have not been shown how to operate it safely by your teacher/TA. If in doubt, ask the TA. Always use safety guards when operating machines.
6. Keep hands/hair and clothing away from moving/rotating parts of machinery. Use hand tools carefully, keeping both hands behind the cutting edge.
7. Report any damage/faults to machines/equipment.
8. Keep your workbench tidy. When you have finished with a tool/piece of equipment, return it to its storage cupboard/rack.
9. Never distract another student, when they are working on a machine or using tools/equipment.

2 Contact info of the instructors

You may reach out to us either through Moodle or email.

2.1 Mechanical Engineering Instructors

1. Prof. Upendra Bhadarkar [bhandarkar 'at' iitb.ac.in]
2. Prof. Ramesh Singh [rsingh 'at' iitb.ac.in]
3. Prof. Ankit Jain [a_jain 'at' iitb.ac.in]
4. Prof. Soham Mujumdar [sohammujumdar 'at' iitb.ac.in]
5. **Head RA:** Mr. Yagyank Srivastava [194109001 'at' iitb.ac.in]

2.2 Electrical Engineering Instructors

1. Prof. Joseph John [j.john 'at' iitb.ac.in]
2. Prof. Dinesh K Sharma [dinesh@iitb.ac.in]
3. Prof. P C. Pandey [pcpandey 'at' iitb.ac.in]
4. Prof. Kushal Tuckley [i16107 'at' iitb.ac.in]

3 Schedule for classes and practicals

1. ALL students are divided into TWELVE (B1-B12) batches (each batch consists of 60 students). You can see your batch number on the next page (Table 2) or on Moodle.
2. In general, the batch-wise schedule for lectures and practicals is provided in Table 1. **HOWEVER, you MUST refer to Moodle to see your weekly schedule in detail for any ADDITIONAL classes/practicals and their venues.**
3. The practicals will take place in the Transit building (google map) and Energy Science Engineering (ESE) (google map) building. **For a given batch, the venue of the practicals will remain fixed throughout the semester.**
4. **Note there are some lectures and practicals scheduled on some Saturdays/Sundays to make up for the engagement hours missed due to holidays. You MUST refer to Moodle for the schedule and venue for such exceptions.**

Note: There are ADDITIONAL lectures/quizzes scheduled. You MUST follow the detailed BATCHWISE SCHEDULE provided on MOODLE.

Batch Numbers	Lectures	Practicals
B1, B2, B3	Mondays 10:30 AM - 11:25 AM	Mondays 2:00 PM - 5:00 PM
		Thursdays 2:00 PM - 5:00 PM
B4, B5, B6	Mondays 10:30 AM - 11:25 AM	Tuesdays 2:00 PM - 5:00 PM
		Fridays 2:00 PM - 5:00 PM
B7, B8, B9	Wednesdays 09:30 AM - 10:25 AM	Mondays 9:30 AM - 12:30 PM
		Thursdays 8:30 AM - 11:30 AM
B10, B11, B12	Wednesdays 09:30 AM - 10:25 AM	Tuesdays 8:30 AM - 11:30 AM
		Fridays 9:30 AM - 12:30 PM

Table 1: General Schedule (Also see the detailed schedule for your batch on Moodle)

Please Note Your MS101 Batch Here				
P-section (Institute division)	Batch Number (MS 101)	Roll numbers		Batch Size
		From	To	
P13-14	B1	22B0301	22B0360	60
	B2	22B0361	22B0420	60
	B3	22B0421	22B0458	38+22 = 60
		22B3301	22B3322	
P15-16	B4	22B0901	22B0960	60
	B5	22B0961	22B1020	60
	B6	22B3323	22B3326	4+54 = 58
		22B1021	22B1074	
P19-20	B7	22B0001	22B0060	60
	B8	22B0061	22B0078	18+36 = 54
		22B0601	22B0636	
	B9	22B0637	22B0690	54
P21-22	B10	22B0691	22B0750	60
	B11	22B0751	22B0771	21 +33 = 54
		22B1501	22B1533	
	B12	22B1534	22B1547	14+42 = 56
		22B2701	22B2742	

Table 2: MS101 Batch (See the detailed schedule for your batch on Moodle)

4 Course content

Credit structure: Lecture of 1 hour/week, Practical of 6 hours/week, E-learning of 1 hr/week, Total 8 Credits)

4.1 Tentative syllabus

- Visualization, Basics of Engineering Drawing
- Part modeling
- Component Assembly of components, analysis, drawings
- Introduction of conventional and advanced manufacturing practices
- Familiarization with basic measuring instruments and other lab equipment (DMM, DSO, AFG, DC Power Supply); measurement of the frequency response of an RC high-pass filter.
- DC power supply
- Op-amp based inverting amplifier: input impedance and frequency response measurements
- Difference amplifier; Opto-coupler using trans-impedance amplifier
- Microcontroller board with sensor and actuator

4.2 Reference books

- Visualization, Modeling, and Graphics for Engineering Design, D.K. Lieu, S.A. Sorby, Cengage Learning; 2nd edition
- Engineering Drawing, N. D. Bhatt (revised and enlarged by V. M. Panchal and Pramod R. Ingle), 50th Ed., Charotar Publishers, Anand, 2010
- W H Hayt, J E Kemmerly, and S M Durbin, Engineering Circuit Analysis, 8th ed., Mc Graw-Hill, (Indian Edition), 2013
- A.S. Sedra and K.C. Smith, Microelectronic Circuits, Oxford University Press, 7th ed. (Indian edition), 2017
- Mazidi, Naimi, Naimi, AVR Microcontroller and Embedded Systems: Using Assembly and C, Pearson India, 1st edition 2013

5 Grading policy

5.1 Grading scheme

The final course grade will be based on the practical work (20% weightage), quiz scores (20% weightage), midsemester exam score (20% weightage), and project work (40% weightage). Go through the following sections to know what is expected in each of these components.

5.2 Practicals

1. You will be given some assignments/tasks in each practical, which you MUST complete during the practical hours and submit to the TA BEFORE leaving.
2. This will constitute 20% of the final grade for this course (includes attendance also).
3. NO late submission will be entertained under ANY circumstances.

5.3 Quiz

1. For Mechanical practicals, the quizzes will be conducted toward the end of the practical sessions via Moodle. For Electrical practicals, pre-announced quizzes will be held separately (announcements will be made in Moodle).
2. All quizzes are mandatory. You must pay attention to the Moodle announcements for quiz schedules.
3. Quizzes constitute 20% of the final grade for this course.

5.4 Project

1. You will be doing group projects toward the end of the semester. The project topics and other guidelines will be announced via Moodle.

5.5 Attendance policy and honor code (IMPORTANT!)

1. Minimum 80% attendance across the lectures and practicals is required.
2. A maximum of ONE practical each associated with ME & EE portions will be compensated later. The make-up practical will take place only on the specific day marked in the schedule provided on Moodle.
3. This class has a **ZERO tolerance policy toward plagiarism.** Any student/group found to have committed or aided and abetted the offense of plagiarism will receive ZERO marks for the relevant assignment/quiz without any exceptions.