MS3082 – Design Lab

Course Code	MS3082					
Course Title	Design Lab					
Pre-requisites	NIL					
Co-requisite for	MS3015	Industrial Design				
No of AUs	1					
Contact Hours	Online Lecture	2 hrs	Lab based tutorials	13 hrs		

Course Aims

Objectives of this module:

Familiarize materials science students with concepts and digital tools in virtual design engineering. Specifically:

1. Operate computer aided design (CAD) software towards parts sketching and geometric.
2. Draft part drawings in multiple views towards fabrication of outsourced prototypes.
3. Arrange multiple part assemblies, analyze assembly clearances, and create exploded views.
4. Evaluate and decide materials selections based on applied engineering function and associated loads.
5. Determine stress/strain measurements through simulations on part interfaces.
6. Exploit 'Design Intent' tools to yield multifunctional products that have optimized material properties under defined loads and stresses.

To explain the differences observed in the data between the two grades of PS.

What are the underlying theories/concepts?

1. Geometric Modelling
2. Finite Element Analysis
3. Simulation in Engineering Analysis
4. Material Selection based on design intent
5. Prototype via FDM 3D printing
6. Iterative Virtual/Prototype Testing and Feedback

Intended Learning Outcomes (ILO)

By the end of this course, you (as a student) would be able to:

1. Impart basic skills towards computer aided engineering, geometric modelling, parts mating, and ASTM-based drafting.
2. Establish and evaluate part engineering design with finite element modelling.
3. Prioritize features for prototype design, review, and application-related evaluation.
4. Demonstrate proficiency in a commercial CAD software widely used in engineering and manufacturing companies.
5. Manage and exhibit the design stages required for virtual and physical prototypes.
6. Apply advanced load/displacement simulations on part interfaces.
7. Design stress/strain simulations for refining prototypes to specific applications.
8. Convert virtual prototypes to physical models via 3D-printing.
9. Evaluate deficiencies between virtual prototype vs. physical prototypes.
10. Exhibit a CAD portfolio for resume building and future employment opportunities.

Reading and References

N. A.

Course Policies and Student Responsibilities

(1) General

Students are expected to attend the pre-laboratory lecture briefings, complete the lecture-based assignment, and attend all the experimental trainings.

As this module works on an open laboratory concept, students are expected to take responsibility in planning the experimental work required well in advance and execute.

(2) Absenteeism

This module requires you to contribute to teamwork. Therefore, absence from group discussions and experiment planning is unacceptable without a valid reason/supporting documents. Otherwise, this will affect your overall course grade. Though lecture briefing is recorded, but the students are expected to be present for the physical briefing.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.