NANYANG TECHNOLOGICAL UNIVERSITY

Teaching, Learning and Pedagogy Division

Reg. No. 200604393R

COURSE OUTLINE FOR STUDENTS AT NTU

Academic Year	2018/19	**Semester**	1 & 2
Course Coordinator	Associate Professor Lim Choon Seng		
Course Code	MA2005		
Course Title	Engineering Graphics		
Pre-requisites	Nil		
No of AUs	3		
Contact Hours	Lectures: 26 hours Practicals: 36 hours		
Proposal Date	17 May 2018		

Course Aims

This course aims to provide you with a general understanding of engineering drawing and geometric dimensioning & tolerancing. It provides you with the knowledge on various methods of describing and analysing geometric shapes and components in orthogonal, pictorial, auxiliary projections or sectional views. You will learn about the different dimensioning and tolerancing methods and systems and how to dimension engineering features and finishes. You will learn to define, specify and explain surface texture, geometric tolerancing symbols and the classes of fits and fit systems.

Intended Learning Outcomes (ILO)

Upon the successful completion of the course, you will be able to:

1) visualize and draw the geometric relationships of component in engineering drawings
2) read, define and specify dimensioning and tolerancing in engineering drawings

Course Content

Part A – Engineering Graphics
(Lectures: 18 hours; Manual Practicals: 18 hours; CAD Practicals: 12 hours)

	Topic	Hours
1.	**Orthographic Projections** Fundamental principles of projection, first angle projection, third angle projection.	3
2.	**Drawing Standards and Practices** Singapore and International Standards for engineering drawing practice, symbols for machine elements, screws, nuts, bolts and studs.	2
3.	**Sectional Views and Machine Drawings** Sectional views, direction of sight, types of sectional views, Machine & assembly drawings and applications.	3
4.	**Pictorial Views and Technical Sketching** Isometric drawing, auxiliary projection and industrial illustrations. Visualisation, sketching techniques, sketching in isometric view.	5

5.	**Development of Surfaces** Parallel line development, radial line development, triangulation development, true line diagram, notches, bends, free form surface.	5

Part B – Dimensioning & Tolerancing
(Lectures: 8 hours; D & T Practicals: 6 hours)

	Topic	Hours
6.	**Dimensioning Standards, Systems and Conventions** Basic Dimensioning; Dimensioning Terms, Symbols and Notes; Dimensioning Rules and Conventions; SI and ANSI Dimensioning Standards; Dimensioning Systems; Dimensioning Methods.	2
7.	**Dimensioning Features and Finishes** Geometric Feature Dimensioning; Linear and Circular Features; More Complex Features; Datum Specifications; Surface Texture Features, Surface Finish Symbols; Applications.	2
8.	**Tolerance Dimensioning and Limits** Tolerance Specifications and Principles; Size and Fit Designations; American National Standard Limits and Fits; Metric System Limits and Fits; Tolerance Accumulation; Machine Process Tolerances.	2
9.	**Geometric Tolerancing** GT Symbols, Principles and Rules; Tolerancing Methods; Form Tolerances; Orientation Tolerances; Location Tolerances; Profile Tolerances; Runout Tolerances; Gauging, Inspection and Applications.	2

Assessment (includes both continuous and summative assessment)

Component	Course LO Tested	Related Programme LO or Graduate Attributes	Weighting	Team/ Individual	Assessment rubrics
1. Continuous Assessment 1 to 5 (Manual Drawings)	LO 1	*EAB SLO a, b, c, e*	25%	Individual	
2. Continuous Assessment 6 to 8 (CAD)	LO 1	*EAB SLO a, b, c, e*	15%	Individual	
3. Continuous Assessment 9 & 10 (D & T)	LO 2	*EAB SLO a, b, c, e*	10%	Individual	
4. Final Examination – Closed Book; 2.5hrs	LO 1 & LO 2	*EAB SLO a, b, c*	50%	Individual	
Total			100%		

* EAB SLO stands for the Engineering Accreditation Board Student Learning Outcomes. The list is below:

a) **Engineering knowledge:** Apply the knowledge of mathematics, natural science, engineering fundamentals, and an engineering specialisation to the solution of complex engineering problems

b) **Problem Analysis:** Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

c) **Design/development of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

d) **Investigation:** Conduct investigations of complex problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

e) **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

f) **The engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

g) **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for the sustainable development.

h) **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

i) **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.

j) **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

k) **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and economic decision-making, and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

l) **Life-long Learning:** Recognise the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

Formative feedback

Describe how you would be giving feedback to students on how they are learning in this course.

Marked, graded and comments are given in the CA.

Learning and Teaching approach

Approach	How does this approach support students in achieving the learning outcomes?
Lecture	Provides important fundamental knowledge and information, and include videos and worked examples to help you to achieve LO 1 & 2
Practical	Provides opportunities for you to put theory into practice and gain experience using engineering drawing technologies. The practical will be graded and feedback will be given to help you develop your skills so that you are better able to achieve LO 1 & 2.

Reading and References

Textbook

1. Jensen C, Helsel J.D and Short D.R [2008], Engineering Drawing & Design, Seventh Edition, McGraw-Hill, New York, 2008.

Course Policies and Student Responsibilities

As a student of the course, you are required to abide by both the University Code of Conduct and the Student Code of Conduct. The Codes provide information on the responsibilities of all NTU students, as well as examples of misconduct and details about how students can report suspected misconduct.

The university also has the Student Mental Health Policy. The Policy states the University's commitment to providing a supportive environment for the holistic development of students, including the improvement of mental health and wellbeing. These policies and codes concerning students can be found in the following link.
http://www.ntu.edu.sg/SAO/Pages/Policies-concerning-students.aspx

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.

Course Instructors

Instructor	Office Location	Phone	Email
Lim Choon Seng	N3-02b-48	6790 5538	mcslim@ntu.edu.sg
Tor Shu Beng	N3-02c-69	6790 4939	msbtor@ntu.edu.sg

Planned Weekly Schedule

Week	Topic	Course LO	Readings/ Activities
1, 2	1, 2, 3	LO1	
3	3	LO1	CA1
4	4	LO1	CA2
5	4	LO1	CA3
6	5	LO1	CA4
7	5	LO1	CA5
8	6	LO1 & LO2	CA6
9	7	LO1 & LO2	CA7
10	8	LO1 & LO2	CA8
11	9	LO2	CA9
12	4	LO1 & LO2	CA10
13	Revision		