

COURSE CONTENT

Course Code	DR2005
Course Title	Computer Aided Design I
Pre-requisites	NIL
No of AUs	3
Contact Hours	39 hours lab contact

Course Aims

This course will introduce you to principles, concepts, and techniques related to computer-aided design for concept development, presentation and technical documentation, which you will then apply to design projects. This learning forms the foundation for further studies in computer aided design.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Identify and discuss two and three-dimensional modeling, rendering and presentation principles and concepts.
2. Use techniques in 2D illustration, 3D modeling, rendering and technical documentation in order to develop skills and projects.
3. Apply a workflow from sketch to final output for product design projects.
4. Clearly present and discuss computer aided design work in class, presentations and assignments.
5. Contribute to class discussions and peer problem solving of computer aided design challenges in a constructive way.

Course Content

Computer Aided Design

New and developing digital visualization and design technologies are not only changing the way that products are designed but also, by virtue of the new visual languages that they enable, leaving their mark on the form of the design itself. This course is a practical exploration of the introductory principles and techniques for the design, visualization and presentation of product designs such as consumer products, environments and furniture. You will be taught using commercially available design software packages, with emphasis on imparting principles, concepts and techniques which are portable across other software packages used by the profession.

Two and Three Dimensional Modelling

Introduction to two and three-dimensional modeling principles and techniques.

Rendering

Introduction to three-dimensional computer rendering techniques with camera, shader, and lighting effects using rendering engines.

Technical Documentation

Introduction to technical documentation through the creation of two-dimensional drawings of three-dimensional computer models and output to print media.

Workflow

Workflows for various modeling and visualization tasks will also be covered, such as working from sketches, orthographic views, development of primary curves and surfaces, and part detailing.

Class assignments

You will produce a series of increasingly complex assignments and develop a foundation of computer-aided design principles and techniques. Developed through lectures, tutorials, class exercises and peer/instructor feedback sessions.

Assessment (includes both continuous and summative assessment)

Component	ILO Tested	Programme LO	Weighting	Team/ Individual
Continuous Assessment 2D Drawing and illustration Assignment Rendering Assignment 3D Modelling Assignment	1,2,3,4	--	40	Individual
Final Project: Select and document an existing object for 3D modelling, rendering & technical documentation.	1,2,3,4	--	40	Individual
Continuous Assessment: Participation	5	--	20	Individual
Total			100%	

Reading and References**REQUIRED TEXT**

Robert McNeel & Associates. *Rhinoceros Level 1 Training Manual v5.0*, 2013.
PDF copy of Training Manual will be provided in class.

RECOMMENDED TEXTS

Cheng, Ron KC. *Inside Rhinoceros 4*, Delmar Learning, 2008.
Cheng, Ron KC. *Inside Rhinoceros 5*. Cengage Learning, 2013.

Calmettes JK. *Best Of 3D: Virtual Product Design*, Monsa, 2005.

Birn, Jeremy. *Digital lighting & rendering*. Pearson Education, 2014.

Danaher, Simon. *The complete guide to digital 3D design*. The Ilex Press Ltd, 2004.

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

(2) Punctuality

You are expected to be punctual for all classes. If you are more than 30 minutes late, you will be deemed as absent and will not be able to sign on the attendance register.

(3) Absenteeism

In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your participation grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

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.

Planned Weekly Schedule*

*Subject to adjustment by instructor according to the teaching situation, students' progress, public holidays and unforeseeable circumstances. A revised schedule will be issued to students at the start of the semester.

Week	Topic	Course LO	Readings/ Activities
1	<p>Introduction</p> <p>Introduction to course, and 3D software by creating curves for 2D illustrations.</p>	1, 5	<p>Lecture & Tutorial</p> <p>Basic interface Selection methods Drawing Aids Sketch integration Curve Tools Basic editing& transforms 2D illustration</p> <p>ASSIGNMENT 1 issue</p>
2	<p>Additive Design 1</p> <p>Creating Two-Dimensional curves and surfaces.</p>	1, 2, 5	<p>Lecture & Tutorial</p> <p>Coordinate Systems Units Basic Surfacing Extrusion Basic Rendering</p>
3	<p>Additive Design 2</p> <p>Creating Three-Dimensional surfaces with curves</p>	1, 2, 3, 5	<p>Lecture & Tutorial</p> <p>Modelling with curves Model Organisation Intermediate Rendering</p> <p>ASSIGNMENT 2 issue</p>
4	<p>Additive Design 3</p> <p>Creating 3D surfaces with curves</p>	1, 2, 3, 5	<p>Lecture & Tutorial</p> <p>Modelling with curves Advanced Editing tools</p> <p>ASSIGNMENT 1 due at start of class</p>
5	<p>Rendering</p> <p>Materials, textures Application and Output</p>	1, 2, 3, 5	<p>Lecture & Tutorial</p> <p>Material and Shader Texture & bump mapping Decals/labels Camera effects Render output. Backplates. Image Editing integration.</p> <p>ASSIGNMENT 2 due at start of class</p>

			ASSIGNMENT 3 issue
6	Subtractive Design Principles of Subtractive Modelling	1, 2, 3, 5	Lecture & Tutorial Modelling with curves Advanced Editing tools Work Critique & Feedback
7	Advanced Editing and Transforms Editing and Transformation Methods	1, 2, 3, 5	Lecture & Tutorial Advanced Transform
8	File Transfer and Technical Documentation Data Transfer and Technical Drawing Creation	1, 2, 3, 4, 5	Lecture & Tutorial Importing and Exporting Importing Vector Files Dimensions Printing ASSIGNMENT 3 due at start of class ASSIGNMENT 4 issue – Main Project
9	CAD Main Project	1, 2, 3, 4, 5	Tutorial & Consultation Chosen objects measured, documented Commence modelling
10	CAD Main Project	1, 2, 3, 4, 5	Tutorial & Consultation Modelling Work Critique & Feedback
11	CAD Main Project	1, 2, 3, 4, 5	Tutorial & Consultation Modelling Rendering Setup
12	CAD Main Project	1, 2, 3, 4, 5	Tutorial & Consultation Modelling Technical Documentation
13	Portfolio Submission	1, 2, 3, 4, 5	Digital Folio due at start of class Softcopy Submission