3D Digital Design Advanced (11049)

UNIVERSITY OF CANBERRA
FACULTY OF ARTS AND DESIGN
COURSE IN INDUSTRIAL DESIGN

Design Statement

This unit comprises 3 hours contact per week.
The unit consist of a series of in-class demonstrations delivered by the tutor and supplemented by self-learning video tutorials.
The in-class demonstrations present methodologies on how 3D Digital surface modelling can be used to generate design solutions that are suitable for both traditional and digital manufacture that involves:
- the design and surface modelling of products that consist of several parts, have complex three-dimensional forms and require continuous connections between surfaces.
- dimensional accuracy, fit and tolerances so that the design can be manufactured.
- thickening of the complex surfaces into solid parts.
- Knowledge and practical experience on how-to produce realistic digital renders, for presentation to clients.

These demonstrations follow the design process and simulate how 3D Digital surface modelling and rendering software is used in a design office.
The self-learning video tutorials reinforce how to better understand the software interface and use all the tools. These tutorials are designed to be accessed at any time on or off campus via the Canvas site.
The demonstrations and online tutorials enable students to successfully complete the project components.
3D Digital surface modelling and rendering is a fundamental design skill necessary to help solve design problems and communicate design solutions to designers, clients, and manufactures. This knowledge is essential for completing the Industrial Design course, entering the Industrial Design profession, and understanding how all 3D Digital surface modelling and rendering software can be applied.
Learning is acquired by directly using the software as a design tool. From day one students will generate creative and innovative design solutions for their assessment projects that will then be developed and modelled on CAD for verification and manufacturing. The aim is to use creativity and innovation as motivation for learning. To reinforce learning the projects are designed so that the same concepts and procedures need to be repeated several times to produce different outcomes.

Timetable

11049	**Class Exercises and Projects**
1	**Hand out unit outline** **Inform students about the Video tutorials and show how to access them on canvas** ***Launch Project*** **Class demonstration-** Modelling a Sport Shoe (starting with planning the structure and content of your CAD files. (1.5 hours). **Video tutorials- SPORT SHOE NB 1, 2 and 3.** On the Canvas site in Lecture Recordings. There are also various other videos that you can also watch throughout the semester.
2	**Assist students with their Sport Shoe research and concept work in progress** (1.5 hours). Students need to bring their research finding on at least 5 existing sport shoes used in

	their chosen sport, 3 concepts in progress, and their Moodboard(s). **Class demonstration-** Sport Shoe modelling methods continued. **Video tutorials- SPORT SHOE NB 4, 5 and 6.** On the Canvas site in Lecture Recordings.
3	**Assist students with their Sport Shoe research and concept work in progress** (1.5 hours). Students need to bring their research finding on at least 5 existing sport shoes used in their chosen sport, 3 concepts in progress, and their Moodboard(s). **Class demonstration-** Sport Shoe modelling methods continued. **Video tutorials- SPORT SHOE NB 7 and 8.** On the Canvas site in Lecture Recordings.
4	**Submission 1:** Assignment 1- Five PDF slides for Task Clarification (Research), and three Concepts- In class critique & feedback (30%). **Assist students with their Sport Shoe refinement work in progress** (1.5 hours). **Class demonstration-** Sport Shoe modelling methods continued. **Video tutorials- SPORT SHOE NB 9 and 10.** On the Canvas site in Lecture Recordings.
5	**Assist students with their Sport Shoe refinement work in progress** (1.5 hours). **Class demonstration-** Sport Shoe modelling methods continued **Video tutorials- SPORT SHOE NB 11 and 12.** On the Canvas site in Lecture Recordings.
6	**Submission 2:** Assignment 2- Three PDF slides of Sport Shoe refined design (based on own head size)- In class critique & feedback (20%). **Video tutorials- SPORT SHOE NB 13.** On the Canvas site in Lecture Recordings.
7	**Assist students with their Sport Shoe CAD modelling work in progress** (1.5 hours). **Class demonstration-** Sport Shoe modelling methods continued (1.5 hours)
8	Class free-
9	**Assist students with their Sport Shoe CAD modelling work in progress** (3 hours).
10	**Assist students with their Sport Shoe CAD modelling work in progress**
11	**Class demonstration-** Digital Rendering
12	**Assist students with their Sport Shoe CAD modelling work in progress**
13	**Submission 3:** Assignment 3- Final CREO **Sport Shoe** model and 2 slide PDF

	marketing poster (50%).

Lists of required texts/readings /Resources

CREO videos available on the Canvas site

CREO software. Available to students for free from PTC to download on private computers.

Assessment overview

Assessment item (including exams held in the exam period)	Due date of assignments	Weighting (total to equal 100%)
Assignment 1: SPORT SHOE Task Clarification (Research) & Concepts	Wk 3	30%
Assignment 2: SPORT SHOE - Refinement	Wk 5	20%
Assignment 3: SPORT SHOE - CREO Model & Rendered Images	Wk 13	50%

PROJECT BRIEF

Title : **SPORT SHOE**
Handout : Week 1
Submission : Week13
Duration : 13 Weeks
Value : 100%

LEARNING OUTCOMES

- To apply the design process, with CAD as a design tool, to generate a solution to a design problem.
- To understand how and when CAD is used in the design process.
- To develop knowledge, skills, and methods to design a product with complex surfaces using CREO parametric CAD modelling software.
- To further develop knowledge, skills, and methods for working with advanced parts that fit together accurately in a complex assembly modelled using CREO parametric CAD software.
- To use a skeleton file to drive an assembly.
- To design and model a product requiring ergonomic considerations.
- To further strengthen 3D virtual design, visualisation, evaluation and communication skills and methods.
- To gain knowledge and experience in designing parts for manufacturing.

- To strengthen digital rendering methods and skills to promote your design.

PROJECT DESCRIPTION AND REQUIREMENTS

For this project you will be collaborating with a group of designers from MIT (Massachusetts Institute of Technology) in the USA to design a new Sport Shoe that will be called the **TNT**. The MIT group studied women's professional soccer matches to see if they could find a way to reduce ACL tears. As a result, they designed a new cleat for sport shoes to play field sports such as soccer, football, hockey, etc. which they named the TNT.

Your task is to design the upper part of the sport shoe to incorporate the new cleat system in the sole of your new shoe. ***The design of your shoe upper must provide sufficient structural support*** for the foot to enable the actions and forces generated by the user to be directly transfer to the soles, cleats, and the playing surface.

Therefore, for this project, you will need to choose a market/user and field sport that you will target the design your new sport shoe to accommodate. For the Sport Shoe size, you need to model the Sport Shoe to ergonomically fit your own feet.

Your new Sport Shoe design must demonstrate a level of originality, novel features and aesthetic appeal that will entice your target market to wear/use the shoes. Your CADD model must be fully detailed so that the Sport Shoe can be manufactured. The final renderings should be able to promote your design.

For this project, the design process will be applied to design the new Sport Shoe. This is the same process used in industry where CAD is typically introduced after the refinement stage. Below are the steps that will be followed:

1. **Task Clarification-** You will conduct research on the needs of your selected market and sport to prepare some ***design guidelines*** for your new Sport Shoe including an expected retail price. To achieve this, you will need to research existing sport shoes (aimed for your target market) to identify their strengths and weaknesses, novel features, how their structural integrity is achieved, materials, etc. Also do a literature search to see what you can find regarding sport shoes and related products, standards, testing protocols, emerging technologies, etc. You are to prepare a Moodboard that reflects your target market and sport.

2. **Concepts-** You will hand generate quality sketched of 3 different and novel ideas of your new Sport Shoe based on your research and design guidelines. You are also required to design the TNT logo which must appear on the shoes. On the sketches, you must identify the novel features, materials, and the appropriate structural support needed for your sport shoes to fulfill the requirements of your target sport.

3. **Refinement**- Based on the feedback you received at the concept presentation stage, from your tutor and peers, here you will narrow your 3 ideas down to one idea and refine it so that it is ready to be developed in the next CAD step to verify its ergonomics/dimensions, function (structural integrity to suit the intended sport), materials, manufacturing, and aesthetics. At this stage it is crucial that you include perspective and orthographic views of your sport shoe (side, front, top and a bottom view of your sport shoe). **The orthographic views must be to scale** to ensure the proportions, material thicknesses etc are correct to ensure your feet will fit into the shoes before proceeding to the next CAD step.

4. **CAD Model-** You need to generate a 3-dimensional CREO CAD assembly model of your new Sport Shoe with the following requirements:

- All the files need to have the correct working units (mm, Newtons, seconds).
- Must use a Skeleton file that contains no solid features.
- The parts files in the assembly and their features should ideally only be referenced to the skeleton file.

- There should be no circular references in the assemble between all the files (Assembly file, skeleton file and all the part files).
- All the files in the assembly must fit together accurately so that there are no overlapping parts and that there are appropriate clearances between parts where needed.
- The model must contain all the necessary parts so that the product is functional.
- All the parts need to be constructed and resolved to a level that they can be assembled and manufactured. Parts need to include appropriate draft angles (where required) and wall thicknesses.
- Each part file must contain only one component.
- Need to use layers and rename features to manage the information and to help reduce clutter.

5. **Marketing-** You are required to produce a 3 slide PDF marketing poster to promote your new Sport Shoe. The poster must include at least 3 realistic digitally rendered images of your new Sport Shoe. One of the images must include a typical target user wearing your new Sport Shoe in an appropriate environment. The TNT name must appear on the shoe(s) and on the poster. The sport the shoe is intended for including its novel features must also be clearly communicated on the poster along with all the parts and materials. Finally, your name as the designer must also appear on the poster.
   This poster will be a good piece for your portfolio.

SUBMISSIONS

Assignment 1: NEW SPORT SHOE- Task Clarification (Research and Concepts) - Week 4

You are required to present 5 PDF slides that comprises Research and three Concepts as follows:

Research- 2 PDF slides that must include a short introduction (60 words maximum), identify your chosen market and sport, analysis of other Sport Shoes in the chosen market and sport, features, strengths and weaknesses, standards, Moodboard, expected retail price, and environmental factors. Must include a list of your design guidelines that will drive your design process. Must also include references (Note: references are on an additional slide).

Concept Generation- 3 PDF slides at 4K resolution (3840 x 2160 pixel) that must include 3 concepts (one slide per concept) of ***quality*** hand generated sketches with explanatory notes indicating materials, novel features, aesthetics, ergonomics, structural integrity, and manufacturing, for your tutor to critique. The TNT logo must appear on the shoes. Slides should include a graphic theme to project a professional
You can use photoshop, illustrator or any other software to prepare your presentation.

Submit a copy of your 5 PDF slides to the unit Canvas site.

30%

Assessment 1 Criteria *& Feedback derived from UNIT LEARNING OUTCOMES:*

1. Do the designs fit the chosen market, user and brand?
2. Is there sufficient development of the concepts reflected in your design sketches and or renders?
3. Level of originality (creativity, novelty, and innovation).
4. Ergonomic consideration and verification.

5. Have all the materials been assigned and can the design be manufactured?
6. Does the presentation clearly communicate the design intent and is the presentation of a professional level?

Assignment 2: NEW SPORT SHOE-Refinement - Week 6

You are required to present 3 PDF slides at 4K resolution (3840 x 2160 pixel) of your refined Sport Shoe design that include:

- Quality hand generated sketches/renderings and explanatory text.
- Novel features, ergonomics and structural integrity
- Materials, manufacturing processes, and environmental considerations
- Target market and user

You can use photoshop, illustrator or any other software to prepare your presentation.

Submit a copy of your 3 PDF slides to the Canvas site.

20%

Assessment 2 Criteria *& Feedback derived from UNIT LEARNING OUTCOMES:*

1. Does the refined design fit the chosen market, user and brand?
2. Is there sufficient progress from the concept stage reflected in your refined design sketches and or renders?
3. Is there sufficient progress from the concept stage reflected in your refined design aesthetics?
4. Level of originality (creativity, novelty, and innovation).
5. Ergonomic consideration and verification.
6. Have all the materials been assigned and can the design be manufactured?
7. Does the presentation clearly communicate the design intent and is the presentation of a professional level?

Assignment 3: NEW SPORT SHOE- CREO Model and Rendered Images - Week 13

You are required to present a 3 slide PDF marketing poster, at 4K resolution (3840 x 2160 pixel), in the week 13 class for your tutor to critique. The poster needs to promote your design by clearly communicating all the features of your sport shoe design as identified in your design guidelines, project requirements and the assessment criteria below.

You are also required to submit a copy of your 3 slide PDF poster and CREO Model files (assembly file, skeleton file and all the part files as per the assessment criteria below) to the Canvas site.

50%

***Assessment 3 Criteria** & Feedback derived from UNIT LEARNING OUTCOMES:*

1. CREO- Have the correct working units (mm, Newtons, seconds) been applied?
2. CREO- Has the Skeleton file been used correctly- no solid features in the skeleton file, parts & their features referenced to the skeleton file, and no circular references.
3. CREO- Do the parts fit together accurately in the assembly- no overlapping parts and appropriate clearances between parts?
4. CREO- How complete is the model?
5. CREO- How well have the different parts been constructed and resolved so that they can be assembled and manufactured including draft angles and wall thicknesses? Does each part file contain only one component?
6. CREO- Have layers and the renaming of features been used to manage the information?
7. POSTER: how well has the new Sport Shoe been presented in terms of composition, graphic theme, and appropriate background? How well has the brand name, market, user, structural integrity, novel features and ability to perform its intended task been communicated?
8. POSTER: Has the scale, lighting, shadows, materials, finishes, textures, and reflections been properly applied to allow details to be clearly recognized, give a realistic appearance to showcase and promote the Sport Shoe as an item of value?