Module Title:	Advanced 3D Computer Modelling
Language of Instruction:	English

Credits:	10

NFQ Level:	7

Module Delivered In	No Programmes

Teaching & Learning Strategies:	The learner is immersed in a range of collaborative, problem-solving activities, to investigate and evaluate where design can propose solutions for commercial and social benefit. The holistic, student-centred studio-based approach, facilitated by faculty, is intended to negotiate, facilitate and guide learner engagement and scaffold a deep-learning using the following strategies: Lectures, Studio-based learning and self-directed independent learning.

Module Aim:	The aim of this module is to further develop virtual solid-modelling skills for both product development work and for model making and prototyping purposes. This module will be closely aligned with course work undertaken during the Review Case Study (P12) and the Form and Story Project (P14).

Learning Outcomes	
On successful completion of this module the learner should be able to:	
LO1	Recall principle modelling concepts necessary for successful three dimensional solid modelling.
LO2	Demonstrate an intermediate level of proficiency in computer-aided solid-modelling and surface-modelling when designing individual parts and assemblies.
LO3	Demonstrate an acceptable level of proficiency in using sketches and features necessary for building sheet metal part files and assemblies.
LO4	Demonstrate an acceptable level of proficiency in using sketches and surface modelling features necessary for building complex form factors.
LO5	Prepare fully-defined and dimensioned solid-modelling files for export to conversion software for 3D modelling on the MCor paper printer or alternative 3D printing facility.
LO6	Present a record of all exercises prepared during the delivery of the module on suitable storage media for assessment
LO7	To reviews personal application across module & deliverbles and apply a development plan

Pre-requisite learning		
Module Recommendations *This is prior learning (or a practical skill) that is recommended before enrolment in this module.*		
No recommendations listed		
Incompatible Modules *These are modules which have learning outcomes that are too similar to the learning outcomes of this module.*		
No incompatible modules listed		
Co-requisite Modules		
6858	INTL H3424	Industrial Design
6860	DSGN H3425	Prototyping & Surfaces
Requirements *This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.*		
No requirements listed		

Module Content & Assessment

Indicative Content

Skills - Sheet Metal
Introduction to modelling in sheet materials. Base Flange, base tab, lofted bends, edge flange, mitre flange. Bending, folding and flatten commands.

Skills - Surface Modelling
Introduction to Surface Modelling using features like: surface extrude, surface revolve, surface sweep, surface loft, surface boundary, filled surface and freeform surfacing. Surface editing tools. Surface modelling is a powerful 3D modelling tool and facilitates learners to manipulate and control the surfaces of a model with greater precision than can be achieved by solid modelling alone. Techniques for utilising surface modelling, either exclusively or partially, in the generation of product forms will be demonstrated.

Base Part Generation
Base Part of existing product from Review Case Study project (P12) using solid or surface modelling techniques. Reworking of Base Part file to reflect detail design revisions and improvements from course work on the Review Case Study project (P12).

.stl File Generation
Conversion of Base Part file to .stl file format to facilitate printing of 3D printed component parts within the Prototyping and Surfaces module.

Detail Design and Assembly
Preparation of Part and Assembly files incorporating and reflecting the design revisions proposed in the Review Case Study project (P12)

Motion Study and Articulations
Where design revisions propose moving elements and articulations the learner shall demonstrate these features using Motion Study analysis features within the 3D solid modelling programme.

Rendering
Photorealistic rendering of the three-dimensional parts and assembly files using ray-tracing renderings programmes (KeyShot and PhotoWorks 360). Learners will utilise the product swatch material generated within the Prototype and Surfaces module to inform the material, colour, and texture selections within the rendering packages.

Drawing Files
Generation of Drawing files direct from 3D solid modelling files. Learners will construct a suite of part and assembly files showing a fully dimensioned and annotated 3D models that comply with the latest BSI and ISO standards of technical product specifications and documentation. Elements covered include: adding a title block, creating holes and callouts, adding centre marks and centrelines to a drawing, adding item notes, including a bill of materials, adding balloons to specify parts on an assembly drawing, exploded views and making drawing revisions

Skills - Advanced Form Generation
Introduce learners to advanced form generation techniques and encourage learners to integrate these techniques with solid and surface modelling techniques covered earlier in this module.

Skills – Advanced Assembly Modelling
Bottom-up design, where parts are created separately and then inserted into an assembly, is the traditional method used to generate assembly files. To change the parts, learners must edit them individually and these changes are then seen in the assembly. This skills element will explore Top-down assembly techniques where parts' shape, sizes and locations can be designed within the assembly with modelling that automatically resizes to reflect changes made to dependent component parts. This capability is particularly helpful for parts like brackets, fixtures and housings whose purpose is largely to hold other parts in their correct positions. Learners will be encouraged to employ top-down design where design changes are likely to occur and, therefore, encourage efficient working methods and eliminate or reduce reworking of multiple files within the assembly.

Form Generation Solid Modelling
Learners prepare a fully defined and dimensioned Base Part file of their product design proposal for the Form and Story project (P14). Learners will be expected to employ skills and techniques demonstrated within this module. Learners will prepare tool path files necessary to machine appearance evaluation models in appropriate modelling material.

Project Support
The remainder of this module is allocated for learners to work in parallel with studio-based modules and to prepare deliverables for the Form and Story project (P14). Learners will be constantly challenged during self-directed projects and this section of the module requires learners to employ creative thinking and problem solving when solid-modelling forms they have designed on sketch pads or through sketch models in the studio. Should learners encounter problems with individual project work then instructions or modelling procedures, salient to their specific needs, will be demonstrated either directly within the learner's solid-modelling file or as a live working example to the entire class. Additional modelling skills will be demonstrated using interactive exercises, examples and also as individual learners encounter problems with project work.

Technical Drawings
Learners must prepare and submit, on a memory stick or other storage media, a suite of part and assembly files for the Form and Story project (P14) showing fully dimensioned and annotated 3D models that comply with the latest BSI and ISO standards of technical product specifications and documentation. A full set of printed technical drawings (GA and two, or more, interconnecting parts files) also form part of this module's submission requirements.

Assessment Breakdown	%
Continuous Assessment	100.00%

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Exercise Files for Skills section of module - Sheet Metal and Surface Modelling.	2,3,4,6	10.00	Week 3
Project	P12: 3D Rendering	1,2,3,4	10.00	Week 14
Project	P12: Suite of fully dimensioned and annotated 3D models that comply with the latest BSI and ISO standards of technical product specifications and documentation.	1,2,3,4,5	15.00	n/a
Practical/Skills Evaluation	Exercise Files for Skills section of module - Advanced Assembly Modelling	1,2,6	10.00	Week 20
Project	P14: Form generation base part with dimensions for modelmaking.	1,2,3,4,6	10.00	Week 23
Project	P14: Suite of fully dimensioned and annotated 3D models that comply with the latest BSI and ISO standards of technical product specifications and documentation.	1,5,6	15.00	Week 29
Reflective Journal	P12 and P14: Reflective practice on process, decision & rationale.	1,2,3,4,5,7	20.00	Week 30
Oral Examination/Interview	Showcase defense	1,2,3,4,5,7	10.00	Week 30

No Project

No Practical

No End of Module Formal Examination

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
Workload Type	*Frequency*	*Average Weekly Learner Workload*
Lecture	Every Week	4.00
Independent Learning Time	Every Week	4.00
	Total Hours	8.00