

<b>Module Title:</b>	Conceptual Design
<b>Language of Instruction:</b>	English
<b>Credits:</b>	5
<b>NFQ Level:</b>	8
<b>Module Delivered In</b>	<a href="#">1 programme(s)</a>
<b>Teaching &amp; Learning Strategies:</b>	The module will be delivered with a blend of lectures and problem based learning through tutorials and software labs. Instructional Methodology - Lectures, Quizzes, Various media platforms, Group work
<b>Module Aim:</b>	The aim of the module is to provide learners with the techniques and knowledge required to perform a conceptual design of a light aircraft. Conceptual design techniques will be presented on aerodynamics, structures, performance, and propulsion systems. Students have to work together in a virtual industrial environment and carry out individual tasks upon which the whole team is dependent.

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Apply conceptual design techniques to develop a series of conceptual designs and iterate to a design solution based on a specification.
LO2	Work effectively as a team member in the planning, managing, organising and completion of tasks among a group of peers.
LO3	Assess ethical issues in relation to group work and sustainability of the final design.
LO4	Evaluate aircraft designs using software applications and numerical analysis.
LO5	Resolve conflicting issues within a team dynamic, in both leadership and specialist positions.

Pre-requisite learning
<b>Module Recommendations</b> <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>
No recommendations listed
<b>Incompatible Modules</b> <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>
No incompatible modules listed
<b>Co-requisite Modules</b>
No Co-requisite modules listed
<b>Requirements</b> <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>
No requirements listed

## Module Content & Assessment

### Indicative Content

#### Design Process

- Introduction - Phases of Aircraft Design - Conceptual Design Process

#### Initial Sizing

- Takeoff Weight - Empty Weight and Fuel Fraction - Powerplant Sizing - Geometry Sizing - Control Surface Sizing

#### Conceptual Layout

- Vertical Wing Location - Wing Configuration, Dihedral, Structural - Cabin Configuration - Propeller Configuration - Empennage Configuration - Landing Gear Configuration

#### Weights Analysis

- Initial Weight Analysis Methods - Detailed Weight Analysis Methods - Statistical Weight Analysis Methods - Direct Weight Analysis Methods

#### Cost Analysis

- Elements of Life-Cycle Cost - Sustainability, End of Life Considerations - Production, Operation and Maintenance Costs

#### Performance and Aerodynamics

- Aerofoil Geometries - Forces and Moments - High Lift Devices - Wingtip Design - Take-off - Climb - Cruise - Range Analysis - Descent - Landing

#### Project Brief

Initially, the team will be presented with a conceptual design and a budget. The team will have to produce a: - Design Specification - Objectives - Literature search - Project management plan - Address any ethical issues in relation to the design - Assess the sustainability of the design. The supervisor will discuss the assessment plan with the team to ensure a clear understanding

#### Team structure

Team members will be assigned responsibilities for the following key areas: Team leader ( rotating position between team members) Propulsion system Aerodynamics Control system Software / Hardware design System Integration Testing Quality control / budget costs

#### Presentation

The student will be required to make presentations on the progress of their project. A final presentation by the team or member on the completed design

#### Thesis

Formal report on the final project

Assessment Breakdown	%
Continuous Assessment	60.00%
Project	40.00%

### Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	In-class assessment, written or online	1,4	20.00	Week 7
Examination	Analysis and interpretation of design data assessment	1,3,4	40.00	Week 12

### Project

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Project	The final report is assessed on: Conducting a literature survey using available resources. Carrying out a project plan. Initial concept designs. Evaluating design and iterating through out the process to meet the specification. Effort and participation as a team, design innovation and skill in report writing.	1,2,3,4,5	40.00	n/a

No Practical

No End of Module Formal Examination

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

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	12 Weeks per Stage	2.00
Laboratory	12 Weeks per Stage	2.00
Independent Learning Time	15 Weeks per Stage	5.13
Total Hours		125.00

**Module Delivered In**

Programme Code	Programme	Semester	Delivery
CW_EEAER_B	<a href="#">Bachelor of Engineering (Honours) in Aerospace Engineering</a>	7	Mandatory