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| Module Title: | Aircraft Anatomy and Design 2 |
| Language of Instruction: | English |
| Credits: | 5 |
| NFQ Level: | 6 |
| Module Delivered In | 3 programme(s) |
| Teaching & Learning Strategies: | The module will be delivered with a blend of lectures, tutorials and problem based learning activities. The laboratory sessions will involve flight simulation and 'learn as you fly'. The design component of the syllabus will be delivered through design exercises and/or a project. The student will work as an individual or in a team to complete the design or modification of a light aircraft using industry standard tools for design development and evaluation of the final design. The final design may then be exported to and flown in a flight simulator package such as X-Plane. |
| Module Aim: | To provide students with the skills and techniques required to understand the basic concepts used in the conceptual design of an aircraft using industry standard tools. To provide students with a foundation for subsequent modules in the area of aircraft design. |
| Learning Outcomes | |
| <i>On successful completion of this module the learner should be able to:</i> | |
| LO1 | Describe the basic theory of stress, strain and elasticity and how it relates to the loading of an aircraft. |
| LO2 | Solve problems in mechanics. |
| LO3 | Demonstrate an ability to fly a light aircraft in a flight simulator, from preflight to landing. |
| LO4 | Identify a conceptual design solution path given airplane performance specifications. |
| LO5 | Evaluate the effect of a high/low wing loading and power loading on the aircraft performance. |
| Pre-requisite learning | |
| Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i> | |
| No recommendations listed | |
| Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i> | |
| No incompatible modules listed | |
| Co-requisite Modules | |
| No Co-requisite modules listed | |
| Requirements <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

Mechanics - Statics

Elements of theory of stress, strain and elasticity: tension, compression, shear and torsion; Direct stress and direct strain, Modulus of elasticity, Application to compound sections. Poisson's ratio, area and volumetric strain; three dimensional stress systems.

Aircraft Conceptual Design

• Parameter recordings in a flight simulator to include: Forces in flight, controls and stability, aspect ratio, wing loading and power loading. • Performance design specifications – Weight – Wing Loading calculations and validation – Wing area/span – Power requirements – Power Loading – Range – Performance trade-offs – Design optimization. • Computer aided 3D design model manipulation – Performance analysis in a flight simulation package.

| Assessment Breakdown | % |
|----------------------------------|--------|
| Continuous Assessment | 20.00% |
| Practical | 40.00% |
| End of Module Formal Examination | 40.00% |

Continuous Assessment

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------|------------------------|-------------------|------------|-----------------|
| Examination | in class test | 1,5 | 10.00 | Week 6 |
| Examination | In class test | 1,2 | 10.00 | Week 9 |

No Project

Practical

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------------------|--|-------------------|------------|-----------------|
| Practical/Skills Evaluation | The student will undertake the design or modification of an aircraft, which may include a project plan, a literature, design development using industry standard tools, presentation of results and a formal report. | 3,4,5 | 40.00 | n/a |

End of Module Formal Examination

| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
|-----------------|---|-------------------|------------|-----------------|
| Formal Exam | The student will complete a terminal exam covering the topics of mechanics and aircraft loading | 1,2,5 | 40.00 | End-of-Semester |

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

Module Workload

| Workload: Full Time | | |
|----------------------------|--------------------|--|
| <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 | 15 Weeks per Stage | 5.13 |
| Total Hours | | 125.00 |

Module Delivered In

| Programme Code | Programme | Semester | Delivery |
|----------------|--|----------|-----------|
| CW_EEAER_B | Bachelor of Engineering (Honours) in Aerospace Engineering | 2 | Mandatory |
| CW_EEACS_D | Bachelor of Engineering in Aircraft Systems | 2 | Mandatory |
| CW_EEPLT_D | Bachelor of Science in Pilot Studies | 2 | Mandatory |