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| <b>Module Title:</b>   | Advanced Programming  |
| <b>Language of Instruction:</b>  | English   |
| <b>Credits:</b>  | 10  |
| <b>NFQ Level:</b>  | 7   |
| <b>Module Delivered In</b>   | No Programmes   |
| <b>Teaching &amp; Learning Strategies:</b>   | Lectures, Laboratories, Programming Assignments, Continuous Assessment and Final Examination  |
| <b>Module Aim:</b>   | To give students a thorough understanding and practical experience of programming with C, and to introduce OOP and GUI programming with C++ and C#. |
| <b>Learning Outcomes</b>   |   |
| <i>On successful completion of this module the learner should be able to:</i>  |   |
| LO1  | Be familiar with correct program structure and good programming practice  |
| LO2  | Have an understanding of C/C++ necessary to design and implement a given application  |
| LO3  | Be able to identify time critical or hardware critical code components.   |
| <b>Pre-requisite learning</b>  |   |
| <b>Module Recommendations</b><br><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><br><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><br><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  |
|---|
| <b>Application types</b><br>Development details of multiple source file programs using external object files, libraries, components, etc.; Debugging; Testing; Programming paradigms;   |
| <b>C programming</b><br>Introduction; Data types; Enumerations; Symbolic constants; Operators; Expression evaluation - precedence & associativity;  |
| <b>Flow control</b><br>Program structure; Programming standards   |
| <b>Functions</b><br>Parameter passing; Recursion; Stack issues; Scope; Static functions. Functions with variable sized parameter lists.   |
| <b>Arrays</b><br>Contiguosness; Arrays as function parameters; Strings; Initialisation.   |
| <b>Pointers</b><br>Pointer arithmetic; Pointers on PC   |
| <b>Pointers and arrays</b><br>Arrays of pointers; Character arrays vs. string constants; Pointers to functions; Dynamic memory; Stack & Heap;   |
| <b>Complex declarations</b><br>n/a  |
| <b>Preprocessor</b><br>n/a  |
| <b>Structures</b><br>Unions, bit fields, Typedef  |
| <b>I/O &amp; file handling; Scripting;</b><br>I/O & file handling; Scripting;   |
| <b>C++</b><br>Building on C; OOP; Classes, objects, constructors and destructors; Data hiding; Encapsulation; Inheritance; Polymorphism; Operator and function overloading; Other C++ enhancements; GUI & systems programming |

| Assessment Breakdown             | %      |
|----------------------------------|--------|
| Continuous Assessment            | 25.00% |
| Practical                        | 25.00% |
| End of Module Formal Examination | 50.00% |

| Continuous Assessment |  |                   |            |                 |
|-----------------------|--|-------------------|------------|-----------------|
| Assessment Type       | Assessment Description   | Outcome addressed | % of total | Assessment Date |
| Other                 | Continuous assessments to test knowledge and application of lecture material | 1,3               | 25.00      | n/a             |

No Project

| Practical                   |   |                   |            |                 |
|-----------------------------|---|-------------------|------------|-----------------|
| Assessment Type             | Assessment Description  | Outcome addressed | % of total | Assessment Date |
| Practical/Skills Evaluation | Practical assignments to apply learned knowledge and develop problem solving skills | 1,2               | 25.00      | Sem 1 End       |

| End of Module Formal Examination |                        |                   |            |                 |
|----------------------------------|------------------------|-------------------|------------|-----------------|
| Assessment Type                  | Assessment Description | Outcome addressed | % of total | Assessment Date |
| Formal Exam                      | No Description         | 1,2,3             | 50.00      | End-of-Semester |

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                    | 20 Weeks per Stage | 2.00                                   |
| Laboratory                 | 20 Weeks per Stage | 4.00                                   |
| Estimated Learner Hours    | 20 Weeks per Stage | 2.50                                   |
| Total Hours                |                    | 170.00                                 |

