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| Module Title: | Games Engineering II |
| Language of Instruction: | English |
| Credits: | 10 |
| NFQ Level: | 8 |
| Module Delivered In | No Programmes |
| Teaching & Learning Strategies: | As well as traditional lectures students will undertake various laboratory exercises implementing various algorithms. They will be expected to participate in class on the materials covered. A term papers will involve a more in-depth study of the issues raised. Combination of lecture and laboratory sessions. Lectures will provide traditional theory. Laboratory sessions will employ formative practical assessment and learning concurrent and functional programming. Project work will be based on programming in C++11, C++14, Erlang and Haskell languages |
| Module Aim: | Analyse, evaluate and implement concurrent algorithms, design patterns and testing techniques which allow computational processes to be executed efficiently within digital games. Design and develop programs to perform tasks in parallel on single, multi-core and distributed CPU's and GPU's |

| Learning Outcomes | |
|---|--|
| <i>On successful completion of this module the learner should be able to:</i> | |
| LO1 | Select, design, develop and implement testing strategies appropriate to games development |
| LO2 | Evaluate methods for synchronising concurrent processes and assess effects of concurrency in specific domains, applied to games development and title execution environments |
| LO3 | Design algorithms that execute on multiple processes with core or processor affinity |
| LO4 | Develop functional programs that express the logic of a computation (without defining flow) and integrate into a digital game |
| LO5 | Evaluate, select and program appropriate design patterns within digital games |

| Pre-requisite learning |
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| 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> |
| Game Engineering 1 or equivalent |

Module Content & Assessment

| Indicative Content |
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| Testing Continuous Testing, Unit Testing, Automated Testing, Testing Tools, Coverage Techniques (Graph, Logic, Partitioning), White versus Black box testing, Managing Testing |
| Concurrent programming Processes and Threads, Microchip Architectures (multicore, NUMA, hUMA) , GPU Architectures (SIMD, SIMT) Mutual Exclusion (Mutex, Semaphore), APIs (Pthreads, OpenMP, MPI, OpenCL, CUDA) and implementations |
| Game Programming Patterns Patterns in games development, pattern languages, examples and case studies. |
| Game Engine Architecture Concepts and techniques utilised in implementing and using a game engine |
| Functional Programming Definition, process creation, message passing, registering processes |

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

| Continuous Assessment | | | | |
|-----------------------|--|-------------------|------------|-----------------|
| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
| Written Report | Reading and criticism of industry/academic papers. Personal research/educational essay writing | 1,2,3,4,5 | 20.00 | Every Week |

| Project | | | | |
|-----------------|--|-------------------|------------|-----------------|
| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
| Project | Complete a project which includes games programming patterns and concurrency | 2,5 | 20.00 | Sem 1 End |

| Practical | | | | |
|-----------------------------|--|-------------------|------------|-------------------|
| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
| Practical/Skills Evaluation | Complete a series of module practicals | 1,3,4,5 | 20.00 | Every Second Week |

| End of Module Formal Examination | | | | |
|----------------------------------|------------------------|-------------------|------------|-----------------|
| Assessment Type | Assessment Description | Outcome addressed | % of total | Assessment Date |
| Formal Exam | End of year exam | 1,2,3,5 | 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 | 30 Weeks per Stage | 2.00 |
| Laboratory | 30 Weeks per Stage | 2.00 |
| Estimated Learner Hours | 30 Weeks per Stage | 3.00 |
| Total Hours | | 210.00 |

