UNIVERSITY of NICOSIA

Course Syllabus

Course Code	Course Title	ECTS Credits
COMP-523DL	Game Programming	10
Prerequisites	**Department**	**Semester**
None	Computer Science	Fall, Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Computer Science	English
Level of Course	**Lecturer(s)**	**Year of Study**
2nd Cycle	Andreas Savva	2nd
Mode of Delivery	**Work Placement**	**Corequisites**
Distance Learning	N/A	None

Course Objectives:

The main objectives of the course are to:
- Introduce students the standards and innovative techniques for game programming.
- Provide the tools and inspiration that game developers need to excel.
- Feature cutting-edge, ready-to-use techniques contributed by industry veterans and experts.
- Introduce a plethora of time-saving, ready-to-use methods for the developer's tool box.
- Provide answers to the needs of passionate developers, eager newcomers, voracious production requirements, and to the demand for innovating and entertaining game-play.
- Provide students with practical ideas and techniques and get them ready to develop games that are more inventive, entertaining, and satisfying.
- Provide students the mathematical background of game development.
- Provide practical experience to computer game development.

Learning Outcomes:

After completion of the course students are expected to be able to:
1. Deal with the practicalities of writing a computer game.
2. Explain the mathematics involved in computer games.
3. Explain the AI algorithms and Physical Laws involved in generating computer games.
4. Implement computer games for various platforms.
5. Describe how Computer Graphics, AI, Physics and Networks are combined in developing computer games.

Course Content:

1. Games: History and Society
   - The First Video Games
   - Games for the Masses, The Console Kings
   - Audience and Demographics, Societal Reaction to Games, Cultural Issues, Society within Games
2. Game Design
   - The Game Designer, A Model of Games
   - Game, Player and Experience
   - Play Mechanics, Interface, Game Systems
   - Design Work, Prototyping and Playtesting Cycles, Playtesting
3. Game Production and Project Management
   - Programming Teams
   - Methodologies, Common Practices and Quality
   - Leveraging Existing Code
   - Platforms
   - Concept Phase, Preproduction Phase, Production Phase, Postproduction
4. Programming Languages and Fundamentals
   - C++ and Game Development, Java, Scripting Languages
   - Data Structures, Object-Oriented Design in Games
   - Component Systems, Design Patterns
5. Game Architecture, Memory and Debugging
   - Bird's-Eye View of a Game, Initialization/Shutdown Steps, Main Game Loop, Game Entities
   - Memory Management, File I/O, Game Resources, Serialization
   - The Five-Step Debugging Process, Expert Debugging Tips, Tough Debugging Scenarios and Patterns
   - Understanding the Underlying System, Adding Infrastructure to Assist in Debugging, Prevention of Bugs
6. Mathematics and Physics in Games
   - Applied Trigonometry, Vectors and Matrices, Transformations, Geometry
   - Collision Detection, Overlap Testing, Intersection Testing
   - Simplified Geometry, Bounding Volumes
   - Terrain Collision Detection, Collision Resolution, Physics Simulations
   - Beyond Particles, Third-Party Physics Engines
7. Graphics and Animation
   - Introduction to 3D Modeling, Box Modeling with Polygons, NURBS, Subdivision Surfaces
   - 3D Sculpting, Reverse Engineering, BSP Modeling, Modeling Methodology
   - Texture Mapping, Mapping UV Coordinates
   - Animation, Motion Capture, Motion Extraction, Mesh Deformation, Inverse Kinematics, Collision Detection
   - Real-Time Animation Playback, Character Animation, Facial Animation, Simulation Animation
8. Artificial Intelligence
   - AI for Games, Game Agents

- • Finite-State Machines
- • Common AI Techniques, Search Space, Pathfinding
9. Audio and Network
  - • Programming Basic Audio
  - • Programming Music Systems
  - • Programming Advanced Audio
10. Game Industry
  - • Game Developers, Publishers, Platform Holders
  - • Deal Dynamics, Payment Negotiation
  - • Advertising, Media, Publicity Opportunities, Marketing
  - • IP Protection, The IP Content of Video Games
  - • Patents, Copyrights, Trademarks, Transfers of IP Rights
11. Video Game Content Regulation

Learning Activities and Teaching Methods:

Presentations, Textbook Exercises, Online Exercises

Assessment Methods:

Final Exam
Project (Individual – Design & Implementation of a game
Assignments

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
3D Game Programming: All in One, 3rd Ed	Kenneth C. Finney	Course Technology	2013	978-1-4354-5744-7

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Game Development, 2nd ed.	Edited by Steve Rabin	Course Technology	2010	978-1-58450-679-9

Game Programming Gems 8	Edited by Adam Lake	Course Technology, Cengage Learning	2011	978-1-58450-702-4
Mathematics for 3D Game Programming and Computer Graphics, 3rd Edition	Eric Lengyel	Course Technology, Cengage Learning	2012	978-1-43545-886-4