COURSE CONTENT

Course Code	DT2018
Course Title	Animation for Games I
Pre-requisites	Nil
No of AUs	3
Contact Hours	39 hours studio contact

Course Aims

In this intermediate course you will explore animation and motion blending using a real-time digital game environment. You will engage with and experiment with a range of digital methods such as key-framed animation, motion capture blending, real-time rendering, game-based interaction, digital world building, and alternative forms of digital narrative. The learning in this course will position you for future learning and independent projects based around real-time digital game environments.

Intended Learning Outcomes (ILO)

By the end of the course, you should be able to:

1. Describe contemporary animation and motion-based processes appropriate for real-time digital game rendering.
2. Develop original animations and motion blends for real-time digital game rendering.
3. Create a real-time digital environment that utilises animation and motion blends in a semi-interactive narrative format.
4. Critique and develop original solutions to technical challenges presented by the real-time digital medium.
5. Contribute constructively in class critiques and activities to discuss and solve challenges in animation, node-based coding and rendering.

Course Content

The real-time digital game environment.
You will begin this course with an introduction and overview of the real-time digital game environment. You will explore how this medium can incorporate traditional digital key framing techniques, as well as motion capture, and combine these sources into a game-engine digital space with real-time rendering.

Keyframing and motion capture
You will become familiar with the workflow from 3D modelling and animation imported into a game engine. Once in the game engine environment, a range of features and possibilities, unique to that space, will be explored. You will also explore several techniques of using motion capture sources, whether this be into your 3D animation, or directly into the game engine. Various methods to blend these motions to create convincing sequences will be examined, as will the possibilities of creating new blended motions.

Interaction
You will have the option of also taking advantage of a limited range of interaction possibilities

offered by a game engine. This may be in response to your pre-animated actions, or in response to a first-person player, who moves through your digital space, as in a "walking simulator". This introduction to game-play interaction opens up possibilities that can be further extended in subsequent game-oriented courses.

Game world

Principles and processes of building a basic digital game world will be covered in this course. Concepts such as maps, levels, objects, textures, and lighting and rendering demands will be examined, particularly in light of real-time rendering requirements. You will gain an appreciation of the difference between high-end cinematic rendering from a 3D program compared to the graphics-processing rendering capabilities of a game engine. You will also apply style considerations from previously learning, to create a stylistically consistent environment within which you will place a motion-based narrative.

Final format

In all cases the final assessible format will be a rendered video file. This may be of an animated narrative, or a play-through video of a first-person walk-through. You will also have the option of rendering to a playable executable file.

Class structure

The first 6 weeks of the course focuses on learning new techniques and processes, how these are applied, and free exploration and experimentation.
The second half of the course focuses on applying the learning to a project that demonstrates high proficiency with advanced digital processes and the application to a meaningful narrative.

Assessment (includes both continuous and summative assessment)

Component	ILO Tested	Programme LO	Weighting	Team/ Individual
Continuous Assessment Process learning tasks Short experiments	1,2,4	N.A.	40	Individual
Final Project: Animation in a real-time digital environment	2,3,4	N.A.	40	Individual
Continuous Assessment: Participation	5	N.A.	20	Individual
Total			100%	

Reading and References

1. *A Boy and his Kite*. Epic. https://www.youtube.com/watch?v=0zjPiGVSnfI 2015
2. Cooper, Jonathan. *Game Anim: Video Game Animation Explained: A Complete Guide to Video Game Animation*. CRC Press, 2019.
3. Pohl, B., et al *Fortnite: supercharging CG animation pipelines with game engine technology.* In Proceedings of the ACM SIGGRAPH Digital Production Symposium, Jul 29 (p. 7). ACM. 2017
4. Rogers, Scott. *Level Up! The guide to great video game design.* John Wiley & Sons,

2014.

5. Unreal Engine, *Unreal Engine SIGGRAPH User Group (official) | Unreal Engine (Animation Capabilities)* [Retrieved 25 Aug 2017 from https://www.youtube.com/watch?v=otmxoK4lCNw 2017
6. Unreal Engine YouTube Channel (Search UnrealEngine) https://www.youtube.com/channel/UCBobmJyzsJ6Ll7UbfhI4iwQ
7. Unreal Engine Video Tutorials http://api.unrealengine.com/INT/Videos/index.html
8. Unreal Engine Website https://www.unrealengine.com

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned readings, activities, assignments, attend all classes punctually and complete all scheduled assignments by due dates. You are expected to take responsibility to follow up with assignments and course related announcements. You are expected to participate in all project critiques, class discussions and activities.

(2) Punctuality

You are expected to be punctual for all classes. If you are more than 30 minutes late, you will be deemed as absent and will not be able to sign on the attendance register.

(3) Absenteeism

In-class activities make up a significant portion of your course grade. Absence from class without a valid reason will affect your participation grade. Valid reasons include falling sick supported by a medical certificate and participation in NTU's approved activities supported by an excuse letter from the relevant bodies. There will be no make-up opportunities for in-class activities.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the academic integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Planned Weekly Schedule*

*Subject to adjustment by instructor according to the teaching situation, students' progress, public holidays and unforeseeable circumstances. A revised schedule will be issued to students at the

start of the semester.

Week	Topic	Course LO	Readings/ Activities
1	Introduction Introduction to animation in a real-time digital environment. Overview of software. Navigation and simple manipulation.	1,2	**Introductory Lecture** Overview and discussion on software requirements and skill requirements. Overview of assignments and class exercises. Class Activity: Introduction to the game-engine digital environment.
2	Basic movement Preparation of files. Importing objects into game engine. Introduction to Blueprints: Applying physics to objects.	1,2	Lecture/Demonstration: Basic Movement Class Activity: Prepare objects, import, apply physics.
3	Importing animations, surface properties, sequencer Demonstration and class exercises of importing animations with correct surfaces. Using the game sequencer to create animations in the game engine.	1,2	Lecture/Demonstration: Importing animations, surface properties, using a game engine sequencer Class Activity: Using Sequencer with multiple animations, cameras, and rendering to a video file. Part of week 7 assessment.
4	Using motion capture Importing motions from a motion capture library and applying to a character in the game engine. Blending using the game sequencer.	1,2	Lecture/Demonstration: Importing motion capture. Apply to a character. Blending in sequencer. Class Activity: Import motion capture. Apply to a character. Blend in sequencer. Render. Part of week 7 assessment.
5	Combining keyframing and Motion capture Options of combining keyframing with motion capture, and how this influences the design of a project.	1,2,3	Lecture/Demonstration: Combining keyframing and Motion capture Class Activity: Explore the animation options. Ascertain ability level. Discuss application to a narrative.

6	Interaction with collisions Using object collisions to trigger events, including other animations. Application to a “Walking Simulator”	1,2,3,4	Lecture/Demonstration: Interaction with collisions. Presentation of project requirements. Class Activity: Explore potential of collision triggers. Discuss project ideas.
7	Presentations Presentation of proposed project. Commitment of topic and team structure. Discussions of production approaches.	1,2,3,4,5	**Presentations** Student presentations of proposed projects covering concept, visual precedents and influences, sketches, and proposed method of execution.
8	Production considerations Formation of required processes and allocation of team responsibilities. Design iterations. Review and feedback.	2,3,4,5	Lecture/Demonstration: Building a game world. Issues, problem-solving, techniques arising from proposed projects.
9	Exploring through prototyping Using rapid prototyping iteration to explore processes.	2,3,4,5	**Lecture:** From prototype to production An overview of considerations, techniques and process when moving from prototype into production.
10	**Project Production** Final assignment production. Continuous review and feedback of project through various stages of completion.	2,3,4,5	**Project studio** Students in studio work.
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12	**Project Production** Final assignment production. Continuous review and feedback of project through various stages of completion.	2,3,4,5	Short Lecture: Preparation for final presentation **Project studio** Students in studio work.
13	**Final Presentation**	1,2,3,4,5	**Student Presentations** on final assignment with critique and feedback