

## COURSE CONTENT

<b>Course Code</b>	DT3009
<b>Course Title</b>	Cinematic Concepts and Motion Capture Applications
<b>Pre-requisites</b>	NIL
<b>No of AUs</b>	3
<b>Contact Hours</b>	39 hours studio contact

### **Course Aims**

This elective course will introduce you to creative concepts and production strategies for cinematic experiences using motion capture technology and real-time animation film making. You will have the opportunity to apply these virtual production techniques to your own original creative project. The strategies and approaches developed in this course can be applied to projects in a variety of other media-based courses.

### **Intended Learning Outcomes (ILO)**

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

1. Identify and discuss techniques used in motion capture real-time animation film making.
2. Demonstrate fundamental techniques required to create real-time motion captured animated films.
3. Apply motion capture and other virtual production techniques with originality to create artistic cinematic experiences.
4. Present and evaluate the effectiveness of motion capture and selected virtual production processes.
5. Critique virtual production ideas and techniques employed by peers in a constructive manner

### **Course Content**

#### **The role of Real-Time Animation**

Real-Time Animation, also called “Real-Time Performance Capture,” is the process of using motion capture system to animate 3D characters in real-time. Apart from creating real-time animated films, this technique is also used for pre-visualisation of cinematic sequences, creating animation assets for gaming, augmented and virtual reality. This course will introduce you to the basic concepts of motion capture, virtual cinematography, real-time rendering, virtual production and will deliver a practice-based introduction to the fundamental techniques and processes involved.

#### **Motion Capture fundamentals**

Through practice-based exercises and project assignments, you will learn essential and advanced techniques for successful motion capture using industry standard hardware and software tools.

#### **Virtual Cinematography**

Using virtual camera, you will learn the basic techniques of cinematography in real-time animation filmmaking and virtual production. Through theory and practice, you will be able to familiarise with virtual cinematography in a narrative context.

#### **Real-time rendering**

You will learn the fundamentals of real-time rendering engines and their role in virtual

productions. Through practice-based assignments, you will learn how to prepare scenes and characters to be efficiently rendered in real-time renderers.

### **Cinematic narration**

You will explore storytelling and narrative considerations for real-time animation and virtual production that is derived from traditional formats as well as contemporary virtual production techniques.

### **Class assignments**

Creative projects, which explore concept-development, motion capture, character re-targeting, real-time rendering, and post-process techniques, as well as story-formats for virtual production. Developed through lectures, tutorials, class exercises, and peer/instructor feedback sessions.

### **Assessment (includes both continuous and summative assessment)**

<b>Component</b>	<b>ILO Tested</b>	<b>Programme LO</b>	<b>Weighting</b>	<b>Team/ Individual</b>
<b>Continuous Assessment</b> Projects 1 - 6	1,2,3	N.A	40	Individual
<b>Final Project:</b> Virtual Production Film	1,2,3,4	N.A	40	Individual
<b>Continuous Assessment: Participation</b>	5	N.A	20	Individual
<b>Total</b>			100%	

### **Reading and References**

1. Hawkins, B. *Real-Time Cinematography for Games*. Charles River Media, 2005
2. Katz, S. *Film Directing Shot by Shot: Visualizing from Concept to Screen*. Michael Wiese Productions, 2007
3. Kitagawa, M. Brian Winsor. *MoCap for artists: Workflow and Techniques for Motion Capture*. Focal Press, 2008
4. Newman, R. *Cinematic Game Secrets for Creative Producers: Inspired Techniques From Industry Legends*. Focal Press, 2013
5. Tobon, R. *The Mocap Book: A Practical Guide to the Art of Motion Capture*. Foris Force, 2010
6. Van Sijll, J. *Cinematic Storytelling: The 100 Most Powerful Film Conventions Every Filmmaker Must Know*. Michael Wiese Productions, 2005

### **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\*

\*Subjected to adjustment by instructor according to students' progress, public holidays and unforeseeable circumstances.

Week	Topic	Course LO	Readings/ Activities
1	<b>Introduction to motion capture</b> Overview of key concepts, through analysis of examples, understand the capabilities and limitations of motion capture. System calibration methods. Demonstration of motion capture	1,2, 3, 5	<b>Introductory Lecture on :</b> - Motion capture and virtual production <b>In-class discussion and analysis</b> of motion capture projects examples <b>In-class exercise:</b> Basic motion capture system calibration
2-3	<b>• Actor setup and calibration</b> Students will learn basic techniques of capturing full Range of Motion for actor setup and calibration using tracking marker set.	1,2, 3, 5	<b>Lectures on:</b> - <b>Various motion capture systems</b> - <b>Motion capture system calibration</b> - <b>Human IK system</b> <b>In-class exercises:</b> Practice of system

			calibration and character setup <b>Assigned project 1:</b> Familiarize with the concepts by creating characters using Human IK system
4-5	<p><b>Character preparation and setup</b> Through practical examples, students will learn to set up character and character rigs for successful retargeting of animation.</p> <p><b>Retargeting of animation</b> Using various retargeting software tools students will learn the fundamentals real-time retargeting of animation</p>	1, 2, 3, 5	<p><b>Lectures on:</b></p> <ul style="list-style-type: none"> <li>- <b>Animation retargeting</b></li> <li>- <b>Real-time animation production pipelines</b></li> </ul> <p><b>In-class exercises:</b> Motion capture and recording of real-time animation</p> <p><b>In-class discussion and analysis</b> of strategies and considerations for real-time animation</p> <p><b>Assigned project 2:</b> Expand your competency by motion capturing and retargeting single actor</p> <p><b>Assigned project 3:</b> Expand your competency by motion capturing and retargeting multiple actors</p> <p><b>Project critique and feedback</b> on in-class exercises and assigned projects</p> <p><b>Student presentations</b> on assigned projects</p>
6-7	<p><b>Introduction to virtual production</b> An exploration of the possibilities using virtual production techniques for real-time animation film using virtual cinematography and real-time rendering engine</p>	1, 2, 3, 4, 5	<p><b>Lectures on:</b></p> <ul style="list-style-type: none"> <li>- <b>Virtual production</b></li> <li>- <b>Virtual cinematography</b></li> <li>- <b>Real-time rendering</b></li> </ul> <p><b>In-class exercises:</b> Use of virtual camera for virtual cinematography</p> <p><b>In-class discussion and analysis</b> of strategies and considerations for real-time animation</p> <p><b>Assigned project 4:</b> Real-time retargeting and porting of animation to real-time rendering engines</p> <p><b>Assigned project 5:</b> Using virtual camera to frame real-time animation sequence</p> <p><b>Project critique and feedback</b> on in-class exercises and assigned projects</p> <p><b>Student presentations</b> on assigned projects</p>
8-9	<p>• <b>Introduction of final project</b> Students will learn to plan a short film using virtual production considering the resources at disposal.</p>	1, 2, 3, 4, 5	<p><b>Lectures on:</b></p> <ul style="list-style-type: none"> <li>- <b>Animation film making</b></li> <li>- <b>Planning for virtual production</b></li> <li>- <b>Cinematic devises for narrative</b></li> </ul>

			<p><b>formats</b></p> <p><b>In-class exercises:</b> Planning of final project</p> <p><b>Assigned project 6:</b> Storyboarding and scene set up for the final project</p> <p><b>Project critique and feedback</b> on in-class exercises and assigned projects</p>
10-12	<ul style="list-style-type: none"> <li>• <b>Final project</b></li> </ul> <p>Students will apply the acquired concepts and techniques to create a short film using virtual production.</p>	1, 2, 3, 4, 5	<p><b>Assigned project 7 (Final project):</b> 3-to-4-minute-long animation film created using virtual production techniques</p> <p><b>Project consultation</b> and continuous review, assessment and feedback throughout the production of the final project</p>
13	<ul style="list-style-type: none"> <li>• <b>Final project presentation</b></li> </ul>	1, 2, 3, 4, 5	<p><b>Student Presentations</b> on the final project with critique and feedback</p>