

## COURSE CONTENT

<b>Course Code</b>	DT3004
<b>Course Title</b>	Rigging for Animation
<b>Pre-requisites</b>	DT2001
<b>No of AUs</b>	3
<b>Contact Hours</b>	39 hours studio contact

### **Course Aims**

This advanced level course will give you a practice-based overview to the art of 3D character rigging, which you will apply to the creation of original character and props in your own 3D digital animation projects. You will also learn the role of the technical artist in the 3D pipeline and explore problem solving strategies that will advance your knowledge and further your skills in handling complex 3D production.

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

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

1. Identify techniques used to create a technically rigorous character pipeline.
2. Develop your own processes in order to solve a range of technical challenges.
3. Apply your skills to create your own rigged characters.
4. Present, evaluate and reflect on the effectiveness of technical solutions for specific situations.
5. Constructively discuss and critique rigging concepts and techniques employed by peers.

### **Course Content**

In this course you will be introduced to the advanced techniques of character set-up and rigging as used in computer animation. You will be familiarized with concepts such as skeleton setup for characters and creatures of different forms and shapes, blend shape creation for facial animation, character driven simulations, and the establishment of a specific 3D pipeline. You will learn to explore practical scripting techniques used for rigs to be used in an animation scenario and become skilled in using these techniques for your own characters.

#### **How should a character be to be ready for animation?**

The course begins with an introduction to the elemental units that constitute the basis for every rigging task. This includes understanding of anatomy and proper topology. This is then applied to various case studies; technical aspects such as skeleton and joint layout, interface creation, pipeline set up and technical choices will be discussed in class.

#### **Building various part of a rig**

You will be introduced to various techniques that can help you to identify different anatomical parts and you will be guided in the understanding of commonalities between different creatures. Concepts such as the puppet rig and the deformation rig will be identified and discussed through practical examples. You will be encouraged to create simple automatic solutions and explore scripting to ease repetitive tasks. You will explore the need for dynamic solutions to create convincing character deformations and secondary motions.

### Beyond traditional rigging

You will receive an introduction to newly emerging and evolving rigging ideas that can be adapted to different animation formats such as video games VR and traditional key animation. The aim of this section is to illustrate the ever changing technological scenarios that continue to emerge as computer animation evolves due to increased sophistication and research development in the field.

### Class assignments

You will produce two projects and a final reel presentation that demonstrate how you can rig your own character using concepts explored in class and how that translates into animation. Classes will include lectures, demonstrations, and activities that may be included in the assessment.

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

Component	ILO Tested	Programme LO	Weighting	Team/ Individual
<b>Continuous Assessment</b> Creation of a range of rigging units. Appropriate topology. Inclusion of scripting, nodes, set-driven key, set attributes, blends.	1,2,3,4	--	40%	Individual
<b>Final Project:</b> Creation of two different rigs exploring different scenarios	1,2,3,4	--	40%	Individual
<b>Continuous Assessment: Participation</b>	5	--	20%	Individual
Total			100%	

### Reading and References

1. Clark, Brad, John Hood, and Joe Harkins. *Inspired 3D Advanced Rigging and Deformations*. Thomson Course Technology PTR, 2005.
2. Naas, Paul. *How to Cheat in Maya 2017: Tools and Techniques for Character Animation*. CRC Press, 2018.
3. Osipa, Jason. *Stop staring: facial modeling and animation done right*. John Wiley & Sons, 2010.
4. Ritchie, Kieran, Oleg Alexander, and Karim Biri. *The art of rigging: Volume 1 2 and 3; a collection of production-rigging scenarios and solutions with Alias Maya*. na, 2006.

### 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	<b>Intro to rigging</b> Overview of the key visual and technical requirements to build a successful character rig: core skill that good rigger should have. Differences and similarities in various software packages. How to analyse modelling ,and character design	2, 3	<b>Introductory Lecture</b> <b>In-class discussion</b> on relevant example does and don't Preparing a character for rigging <b>Assigned Project 1:</b> Find a character that you want rig

2	<p><b>Character and rig requirements</b></p> <p>Topology revision for correct deformation</p> <p>Anatomy analysis for correct joint placement, skeletons in various 3D packages</p> <p>Constraints and various type of node connections</p> <p>Introduction to scripting variables and loops</p>	2,3	<p><b>Lecture: Topology and bones and placement main body parts.</b></p> <p><b>Assess student's first project.</b></p> <p>Critique and feedback on student chosen geometry and definition of starting point</p>
3	<p><b>Identify repetitive tasks and rigging strategies for your own project</b></p> <p>Mel and Python scripting introduction</p> <p>The Maya script editor</p> <p>Creating a simple spine rig; inverse cinematic vs forward cinematic</p> <p>Alternative form of rigging: The Human IK in Maya</p> <p>Rigging for games vs rigging for animation and VFX</p>	2,3 4	<p><b>Lecture: Create a simple script</b></p> <p><b>Continue on Project 1:</b></p> <p>Start lay out your skeleton structure.</p> <p><b>In-class exercise</b> create your own Human IK</p> <p><b>In class discussion</b></p> <p>Critique and feedback.</p>
4	<p><b>Building a script for your own purposes</b></p> <p>Exploration of strategies to construct a variety of functions through reuse of simple elements.</p> <p>Intro to the spline IK</p> <p>Introduction to deformers</p> <p>Particular emphasis will be given to editing skin weights do and don't for a proper workflow.</p> <p>The puppet rig vs the skin geometry</p>	1, 2, 3, 4	<p><b>Lecture: Introduction to functions and more advance use of Python scripting</b></p> <p><b>In-class exercise</b> Simple exercise on scripting a spine rig</p> <p><b>Continue on Project 1:</b> start your own spine</p>
5	<p><b>Utility nodes versus expression</b></p> <p><b>Creating the spine</b></p> <p>How nodes are connected in Maya advantages and disadvantages.</p> <p>Other form of connection set driven keys</p> <p>Add squash and stretch to the spine rig</p> <p>Joint orientation and proper twist for the spine and other body parts</p>	1, 2, 3, 4	<p><b>Lecture: How to create and IK and FK spine</b></p> <p><b>Continue on Project 1:</b> Create a squash and stretch spine for your own character</p> <p><b>In Class discussion</b></p> <p>Critique and Feedback</p>

6	<p><b>Creating the character legs.</b></p> <p>Unique attributes of bipedal and quadruped locomotion and how that reflects in a correct rig for the leg and the foot.</p> <p>How to set proper attributes for proper foot animation</p>	1, 2, 3, 4	<p><b>Lecture: How to create and IK and FK switch for the legs</b></p> <p><b>Continue on Project 1:</b> start creating legs for your own character</p> <p><b>In Class discussion</b></p> <p>Critique and Feedback</p>
7	<p><b>The broken hierarchy</b></p> <p>Expanded on the various tools available in Maya naming conventions for a good pipeline</p> <p>Creating proper controllers</p> <p>How to create a stretchy leg.</p> <p>Connect the leg to the spine</p>	1, 2, 3, 4	<p><b>Assigned Projects</b></p> <p><b>Continue on project 1:</b> Tidy up the outliner and finish your leg rig</p>
8	<p><b>Review of student work in class</b></p> <p>Recap of previous week work in this section students will work closely with the instructor to consolidate concepts introduced in previous weeks</p>	1, 2, 3, 4, 5	<p><b>Continue on Project 1:</b> student own rig progress</p> <p><b>In Class discussion</b></p> <p>Critique and Feedback</p>
9	<p><b>The character arms</b></p> <p>Add arm and hands to the characters</p> <p>The clavicle, the arm and the hand</p> <p>Finger set up</p> <p>Space switching for the arms</p>	1, 2, 3, 4, 5	<p><b>Lecture: How to create proper arm and hand rig</b></p> <p><b>Assigned Projects</b></p> <p><b>Project 2:</b> Chose a new character and start rigging or create a facial rig for the first character</p>
10	<p><b>Head and neck and the character face</b></p> <p>Blend shapes vs joints in creating character emotions</p> <p>Critical issues in facial topology</p> <ul style="list-style-type: none"> <li>The jaw</li> <li>The eyes</li> <li>The mouth</li> </ul> <p>Key expression visual clues</p> <p>Facial interface</p> <p>Assembling the rig</p>	1, 2, 3, 4, 5	<p><b>Lecture: The character head</b></p> <p><b>Project 2:</b> Students in studio work. Continuous assessment and feedback throughout production.</p>
11	<p><b>Character dynamics</b></p> <p>Different form of character dynamic; brief discussion on muscle, appendages, cloth and hair set up.</p>	1, 2, 3, 4, 5	<p><b>Assigned Projects</b></p> <p><b>Project 1 and 2:</b> Students in studio work. Continuous assessment and feedback throughout production.</p>
12	<p><b>Project workshop</b></p>	1, 2, 3,	<p><b>Assigned Projects</b></p>

	Continuous review and feedback of final assignment through various stages of completion	4, 5	<b>Project 5 Final assignment:</b> Students in studio work. Continuous assessment and feedback throughout production.
13	<b>Final Presentation</b>	1, 2, 3, 4, 5	<b>Student Presentations</b> on own characters ;students are encourage to create a short animation to highlight the rig functionality with critique and feedback