

**Maulana Abul Kalam Azad University of Technology, West Bengal**  
**Syllabus of B. Sc. in Animation and Film Making (CBCS)**  
**(Effective from academic session 2021-22)**

**SEMESTER-4**

**Paper: RIGGING**

Code: BAFM 401

**Course Objective:**

1. To study the organic and inorganic rigging of humans and machines.
2. To understand advanced techniques for characters such as blend shape and facial expression setups.
3. Understand and incorporate various industry-standard rigging techniques.
4. Work in advance techniques and methodologies of 3d character rigging.

SI	Course Outcome	Mapped modules
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3,M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	<b>Rigging Basics</b>	6	25		
M 2	<b>Prop Rig</b>	8	25		
M 3	<b>Biped/Quadruped rigging</b>	8	25		
M 4	<b>Facial Rigging</b>	8	25		
		<b>30</b>	<b>100</b>		

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**RIGGING**

Total Credit: 4

Total hours of lectures: 30 hours

Sl.	Topic/Module	Hour
1.	<b>Module 1- Rigging Basics I – Inorganic/ Organic Rig</b> <ul style="list-style-type: none"> <li>• Understanding the anatomy</li> <li>• Model Clean up</li> <li>• Nomenclature</li> <li>• Binding Kinematics (IK &amp; FK),</li> <li>• Requirements for a clean Model,</li> <li>• Parenting and grouping objects using point, orient, parent constrains</li> <li>• Creating controllers, set driven keys etc.</li> </ul>	4
2.	<b>Module 2- Creating Skeletons</b> <ul style="list-style-type: none"> <li>• Creating joints, editing joints, parenting joints, orienting joints</li> <li>• Creating hierarchical structures and skeletons for biped and quadruped characters</li> <li>• Using IK solvers on skeletons, blending FK and IK</li> <li>• Creating facial setups, blend shape deformers</li> </ul>	8
3.	<b>Module 3- Skinning</b> <ul style="list-style-type: none"> <li>• Understanding Rigid Bind and Smooth Bind</li> <li>• Binding skeletons to characters</li> <li>• Painting skin weights, editing skin weights Adding influence objects and muscles</li> </ul>	10
4.	<b>Module 4- Advanced Rigging</b> <ul style="list-style-type: none"> <li>• Ik spine rig, Ik Blend shapes,</li> <li>• Muscles system</li> <li>• Ribbon IK</li> <li>• Set driven Key, character sets</li> <li>• Redirect, prune membership tools</li> </ul>	8

Suggested Software: Autodesk Maya

**Suggested Readings:**

1. Animation Methods - Rigging Made Easy: Rig Your First 3D Character in Maya by David Rodriguez
2. Essential Skills in Character Rigging by Nicholas B. Zeman
3. Rig it Right! Maya Animation Rigging Concepts (Computers and People) by Tina

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O'Hailey

4. Introducing Autodesk Maya 2013 (Autodesk Official Training Guides) by Dariush Derakhshani,
5. Mastering Autodesk Maya 2012, by Todd Palamar (Author)

**Paper: RIGGING Lab**

Code: BAFM 491

**Course Objective:** Rigging is a crucial step in character development and animation. This course introduces the rules of rigging—good geometry, organization, and controls—and shows how to create joints, constraints, and connections. This course then dives into a real-world project, taking a model and building out the skeleton and the leg, foot, body, and hand controls required for effective animation. It also devotes a chapter to FK/IK switching for finer control over arm movement. Finally, learn how to attach a character mesh to your skeleton with the skinning tools in Maya—and take your skills up a notch with a time-saving mirroring technique.

SI	Course Outcome	Mapped modules
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	Rigging Basics	6	25		
M 2	Introduction to Basic Perspective	8	25		
M 3	Basic Figure Drawing	8	25		
M 4	Masses of the Figure	8	25		
		<b>30</b>	<b>100</b>		

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**RIGGING Lab**

Total Credit: 2

Total hours of lectures: 30 hours

Sl.	Topic/Module	Hour
1.	<b>Module 1- Rigging Basics</b> <ul style="list-style-type: none"><li>• Rigging small props</li><li>• Ball</li><li>• Gun</li><li>• Cycle</li><li>• Rigging a vehicle</li></ul>	6
2.	<b>Module 2- Character (Organic) Rig</b> <ul style="list-style-type: none"><li>• Rigging a Biped/Toon character</li></ul>	8
3.	<b>Module 3- Advanced Skinning</b> <ul style="list-style-type: none"><li>• Rigging a Biped/Toon character</li></ul>	8
4.	<b>Module 4- Facial Rigging</b> <ul style="list-style-type: none"><li>• Adding muscle deformer to character</li><li>• Automated Vehicle</li></ul>	8

**Suggested Readings:**

1. Animation Methods - Rigging Made Easy: Rig Your First 3D Character in Maya by David Rodriguez
2. Essential Skills in Character Rigging by Nicholas B. Zeman
3. Rig it Right! Maya Animation Rigging Concepts (Computers and People) by Tina O'Hailey
4. Introducing Autodesk Maya 2013 (Autodesk Official Training Guides) by Dariush Derakhshani,
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**Paper: PROP AND CHARACTER ANIMATION**

Code: BAFM 402

**Course Objective:** Using the rig developed in this course how to animate a walk, create a jump, animate changes in facial expression and posture, animate a "zip out" or quick exit, and then show how to finalize and render the complete project. Throughout the course, it touches on animation principles such as squash and stretch, exaggeration, follow-through, and overlapping action.

SI	Course Outcome	Mapped modules
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	<b>Introduction to Animation</b>	6	25		
M 2	<b>Props Animation</b>	8	25		
M 3	Character Animation I	8	25		
M 4	Character Animation II	8	25		
		<b>30</b>	<b>100</b>		

**PROPS & CHARACTER ANIMATION**

Total Credit: 4

Total hours of lectures: 30 hours

Sl.	Topic/Module	Hour
1.	<b>Module 1- Introduction to Animation</b> <ul style="list-style-type: none"> <li>• Theory on types of animations</li> <li>• Understanding animation films and Live ,Action Movies</li> <li>• Importance and Difference between object and character animation</li> <li>• Understanding the Animation Interface</li> </ul>	4

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	<ul style="list-style-type: none"> <li>• Animation principles, theory with examples – Theory</li> <li>• Creating Layouts for animation</li> </ul>	
2.	<b>Module 2- Props Animation</b> <ul style="list-style-type: none"> <li>• Animating using the Set key</li> <li>• Modifying keys on the timeline</li> <li>• Modifying keys on the dope sheet</li> <li>• Modifying keys in the graph editor</li> <li>• Working with the time editor</li> <li>• Animate objects along spline paths</li> <li>• Visualize animation</li> </ul>	8
3.	<b>Module 3- Character Animation I</b> <ul style="list-style-type: none"> <li>• Understanding timing and spacing Assignment: Bouncing ball</li> <li>• Understanding the weights and balances of primitive object motions.</li> <li>• Making of animation with multiple primitive objects as the both get co-ordinates in motion as if combination in motion.</li> <li>• Understanding posing, line action to various proportionate characters. Theory</li> </ul>	10
4.	<b>Module 4- Character Animation II</b> <ul style="list-style-type: none"> <li>• Body mechanics and character locomotion defining in the manner of blocking, breakdowns, actions. Assignment: walk cycles ( stationary ) in 32 Frames</li> <li>• Body mechanics and character locomotion defining in the manner of blocking, breakdowns, primary. Assignment: run cycles( stationary ) in 16 Frames</li> </ul>	8

**Suggested Readings:**

1. Animation Methods - Rigging Made Easy: Rig Your First 3D Character in Maya by David Rodriguez
2. Essential Skills in Character Rigging by Nicholas B. Zeman
3. Rig it Right! Maya Animation Rigging Concepts (Computers and People) by Tina O'Hailey
4. Introducing Autodesk Maya 2013 (Autodesk Official Training Guides) by Dariush Derakhshani,
5. Mastering Autodesk Maya 2012, by Todd Palamar (Author)
6. Animator's Survival Kit – Richard Williams

**Paper: PROP AND CHARACTER ANIMATION Lab**

Code: BAFM 492

**Course Objective:** Rigging is a crucial step in character development and animation. This course introduces the rules of rigging—good geometry, organization, and controls—and shows how to create joints, constraints, and connections. This course then dives into a real-world project, taking a model and building out the skeleton

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and the leg, foot, body, and hand controls required for effective animation. It also devotes a chapter to FK/IK switching for finer control over arm movement. Finally, learn how to attach a character mesh to your skeleton with the skinning tools in Maya—and take your skills up a notch with a time-saving mirroring technique.

Sl	Course Outcome	Mapped modules
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	<b>Rigging Basics</b>	6	25		
M 2	Introduction to Basic Perspective	8	25		
M 3	Basic Figure Drawing	8	25		
M 4	Masses of the Figure	8	25		
		<b>30</b>	<b>100</b>		

**PROPS & CHARACTER ANIMATION Lab**

Total Credit: 2

Total hours of lectures: 40 hours

Sl.	Topic/Module	Hour
1.	<b>Module 1-</b> <ul style="list-style-type: none"> <li>• Reference video\ footages shown on types of animation</li> <li>• Reference video\ footages shown on Understanding animation Films and Live, Action movies</li> <li>• Reference video\ footages shown to understand difference between prop and character animation</li> </ul>	6
2.	<b>Module 2-</b>	8

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	<ul style="list-style-type: none"> <li>• Bouncing ball</li> </ul>	
3.	<b>Module 3- Character Animation I</b> <ul style="list-style-type: none"> <li>• Working With Simple Pendulum &amp; Follow Through</li> <li>• Animation With Basic Primitive Objects See saw</li> </ul>	8
4.	<b>Module 4- Character Animation II</b> <ul style="list-style-type: none"> <li>• Making Of Walk Cycle With Human Character Blocking</li> <li>• Making Of Walk Cycle With Human Character Primary</li> <li>• Making Of Walk Cycle With Human Character Secondary</li> <li>• Making Of Run Cycle With Human Character Blocking</li> <li>• Making Of Run Cycle With Human Character Primary &amp; Secondary</li> <li>• Assignment: run cycles( stationary ) in 16 Frames</li> </ul>	8

Suggested Software – Autodesk Maya

**Suggested Readings:**

1. Animation Methods - Rigging Made Easy: Rig Your First 3D Character in Maya by David Rodriguez
2. Essential Skills in Character Rigging by Nicholas B. Zeman
3. Rig it Right! Maya Animation Rigging Concepts (Computers and People) by Tina O'Hailey
4. Introducing Autodesk Maya 2013 (Autodesk Official Training Guides) by Dariush Derakhshani,
5. Mastering Autodesk Maya 2012, by Todd Palamar (Author)

**DYNAMICS**

**BAFM 403**

**Course Objective:** The course is designed to learn Maya dynamics skill set needed to make animation projects more realistic and believable. The students will understand atmospheric effects like wind and rain, ocean waves and ripples, as well as the effects of fire and candles, explosions, crumbling, and much more. This course will introduce them to Dynamics, Dyna motive solver, Particles, Emitters, Fields: Air, Drag, Gravity, Newton, Turbulence, Vortex, Volume, Particle collisions, Particle cache, Goals, Soft bodies, Springs, Rigid bodies, Constraints, Effect: Fire, Smoke, Fireworks, Lightening, Shatter, Curve flow, Surface flow, Rendering particles and effects, Maya Paint Effects, baking simulations, Render types. Fluid Effects Introduction to Fluids, Fluid field interaction, Fluid attributes.

SI	Course Outcome	Mapped modules
1	Remembering	M1, M2



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2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	<b>Particle System</b>	8	25		
M 2	<b>Dissipation</b>	7	25		
M 3	<b>Instancing</b>	6	25		
M 4	<b>Fluids</b>	9	25		
		<b>30</b>	<b>100</b>		

Sl.	Topic/Module	Hour
1.	<b>Module 1- Particle System</b> <ul style="list-style-type: none"> <li>• Particles, Fields</li> <li>• Emitters</li> <li>• Collision Models Particle Collision Events</li> <li>• Controllers</li> <li>• Connectable and Connections</li> <li>• Soft Bodies</li> <li>• Springs</li> <li>• Rigid Bodies.</li> <li>• Dynamics of rigid and soft surface simulations: Cloth, hair, fur, paper and solid elements. Physics of explosions: Source, Placement, direction, reaction.</li> </ul>	8
2.	<b>Module 2- Dissipation</b> <ul style="list-style-type: none"> <li>• Fluid ,particles dynamic simulation theory and stages</li> <li>• Understanding Smoke and powder dust: Density, turbulences, color and dissipations. Simulation of a disintegration effect using Maya's powerful ncloth particles and fluid dynamics tools.</li> <li>• Breaking an efficient mesh for disintegration purposes and emitting the detailed secondary particles and fluid simulations.</li> <li>• Creating galaxy with milky way using reference</li> <li>• Working with Per-Particle attributes (RGBPP, Opacity PP) and Rand</li> </ul>	7

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	<p>Expression Making dust while blast / destructions.</p> <ul style="list-style-type: none"> <li>• Collisions Expression, Collision Position, Collision U and V Attributes, Dynamic texture marks Forces: Air, Radial, Vortex, Nuton, Uniform, Gravity</li> </ul>	
3.	<p><b>Module 3- Instancing</b></p> <ul style="list-style-type: none"> <li>• Instancing Paint Effects, Light with Optic Effects, Animated Object for crowd Using Gnomon MEL Scripts Instancing Paint Effects, Light with Optic Effects, Animated Object for crowd Using Gnomon MEL Scripts. Falling leafs using instances and rendering using software, hardware and compositing. Creating Sprite images, Sprite Wizard, Smoke Sprite and Per Particle Attributes Sprite Twist PP, Scale PP, Velocity PP, Mass, RGB PP, Opacity PP, Applying Turbulence and Animating attributes. o Particle Instancer</li> </ul>	6
4.	<p><b>Module 4- Fluids</b></p> <ul style="list-style-type: none"> <li>• Generate fluid simulations from scratch and all of the key attributes in the fluid shape node. dynamic simulation settings, adjusting temperature and fuel, converting the fluid simulation into geometry, and working with the shading attributes to name a few.</li> <li>• Fluid Containers (2D and 3D in Maya Fluids), different attributes in the Fluid Shape node and the workflow when creating fluid simulations.</li> </ul>	9

Suggested Softwares – Autoesk Maya

**Ref Book:**

1. Dariush Derakhshani, Introducing Maya 2009, Sybex; 1 Edition, 2009.
2. Eric Keller, Maya Visual Effects: The Innovator's Guide Sybex; 2 edition. 2013.
3. Learning Maya 7: The Special Effects handbook by Alias Learning Tools, Sybex; 1 edition, 2005.
4. Steve Wright, Compositing Visual Effects, Second Edition: Essentials for the Aspiring Artist, Focal Press; 2 edition, 2011.

**DYNAMICS Lab**  
**BAFM 493**

**Course Objective:** The course is designed to Navigate the complex structure of Maya Dynamics. Connect seemingly unconnected areas of Maya such as paint effects, soft bodies and particles. Able

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to create a variety of effects using simple techniques. Comprehend how to use commonly used but little understood expressions.

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1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	<b>Particle System</b>	12			
M 2	<b>Dissipation</b>	8			
M 3	<b>Instancing</b>	8			
M 4	<b>Fluids</b>	12			
		<b>40</b>	<b>80</b>		

Sl.	Topic/Module	Hour
1.	<b>Module 1- Particle System</b> <ul style="list-style-type: none"> <li>• Understanding Physics and natural forces and fields</li> <li>• Analysing timing and colours</li> <li>• particle Simulation (Fire, Tornado, Rain)</li> <li>• Rigid Body Simulation</li> <li>• Concept of Soft Body</li> <li>• Creating particle portal</li> <li>• Creating particle flow with fields</li> <li>• Creating galaxy with milky way using reference</li> </ul>	12
2.	<b>Module 2- Dissipation</b> <ul style="list-style-type: none"> <li>• Working with Per-Particle attributes (RGBPP, Opacity PP) and Rand</li> </ul>	8

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	<p>Expression</p> <ul style="list-style-type: none"> <li>• Making dust while blast / destructions</li> <li>• Collisions Expression, Collision Position, Collision U and V Attributes, Dynamic texture marks</li> <li>• Forces: Air, Radial, Vortex, Nuton, Uniform, Gravity</li> <li>• Creating dispersion effect of objects</li> </ul>	
3.	<p><b>Module 3- Instancing</b></p> <ul style="list-style-type: none"> <li>• Instance Particle</li> <li>• Instancing Paint Effects, Light with Optic Effects, Animated Object for crowd Using Gnomon MEL Scripts</li> <li>• Falling leafs using instances and rendering using software, hardware</li> <li>• Creating Sprite images, Sprite Wizard, Smoke Sprite and Per Particle Attributes Sprite Twist PP, Scale PP, Velocity PP, Mass, RGB PP, Opacity PP, Applying Turbulence and Animating attributes</li> <li>• Creating instancing with different object.</li> </ul>	8
4.	<p><b>Module 4- Fluids</b></p> <ul style="list-style-type: none"> <li>• 2d and 3d fluid emitter</li> <li>• Fluid Effects</li> <li>• Making dust while blast</li> <li>• Creating sprite smoke using image sequences for blast and destructions</li> <li>• Smoke Preset ( RGB to HSV, Scale Factor, Twist Factor), Smoke Preset ( Opacity Ramp color entry list and rate)</li> <li>• Creating smoke preset using expressions and custom attributes</li> <li>• Bridge blast with fire, dust, smoke, derbies.</li> <li>• 2D and 3D container Attributes, dynamic Attributes, color and Method and Ramp options, Applying forces, Smoke, Fire.</li> <li>• Creating character foot dust, cigarette smoke, car smoke and fog creation</li> <li>• Creating Explosion</li> </ul>	12

Suggested Software – Autodesk Maya

**Ref Book:**

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2. Eric Keller, Maya Visual Effects: The Innovator's Guide Sybex; 2 edition. 2013.
3. Learning Maya 7: The Special Effects handbook by Alias Learning Tools, Sybex; 1 edition, 2005.
4. Steve Wright, Compositing Visual Effects, Second Edition: Essentials for the Aspiring Artist, Focal Press; 2 edition, 2011.

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**Paper: VISUAL COMMUNICATION**

Code: BAFM 404

**Course Objective:**

- Apply appropriate communication skills across settings, purposes, and audiences.
- Demonstrate knowledge of communication theory and application.
- Demonstrate critical and innovative thinking. 2. Display competence in oral, written, and visual communication. 3. Apply communication theories.

SI	Course Outcome	Mapped modules
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M3, M4
4	Analyse the problems	M3, M4
5	Evaluate the problems after analysing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Blooms Level (if applicable)	Remarks (If any)
M 1	Rigging Basics	6	25		
M 2	Introduction to Basic Perspective	8	25		
M 3	Basic Figure Drawing	8	25		
M 4	Masses of the Figure	8	25		
		<b>30</b>	<b>100</b>		

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**VISUAL COMMUNICATION**

Total Credit: 2

Total hours of lectures: 20 hours

Sl.	Topic/Module	Hour
1.	<p><b>Module 1</b></p> <ul style="list-style-type: none"> <li>• Need for and the Importance of Human and Visual Communication. Communication as an expression, skill and process, Understanding Communication: SMRC-Model</li> <li>• Communication as a process. Message, Meaning, Connotation, Denotation Culture/Codes etc Levels of communication: Technical, Semantic, and Pragmatic. The semiotic landscape: language and visual communication, narrative representation</li> </ul>	5
2.	<p><b>Module 2 - Fundamentals of Design: Definition. Approaches to Design, Centrality of Design, Elements of Design: Line, Shape, Space, Colour, Texture. Form Etc. Principles of Design: Symmetry. Rhythm, Contrast, Balance Mass/Scale etc. Design and Designers (Need, role, process, methodologies etc.)</b></p>	5
3.	<p><b>Module 3 - Principles of Visual and other Sensory Perceptions. Colour psychology and theory (some aspects) Definition, Optical / Visual Illusions Etc Various stages of design process- problem identification, search for solution refinement, analysis, decision making, and implementation.</b></p>	5
4.	<p><b>Module 4 – Basics of Graphic Design. Definition, Elements of GD, Design process-research, a source of concept, the process of developing ideas-verbal, visual, combination &amp; thematic, visual thinking, associative techniques, materials, tools (precision instruments etc.) design execution, and presentation</b></p>	5

**Suggested Readings:**

1. Communication between cultures - Larry A. Samovar, Richard E. Porter, Edwin R. McDaniel & Carolyn Sexton Roy, Monica Eckman, USA, 2012
2. Introduction to Communication studies - John Fiske & Henry Jenkins 3rd edition, Routledge, Oxon 2011
3. An Introduction to communication studies - Sheila Steinberg, Juta & Co., Cape Town, 2007
4. One World Many Voices: Our Cultures - Marilyn Marquis & Sarah Nielsen, Wingspan Press, California, 201