Maulana Abul Kalam Azad University of Technology, WB
(Formerly known as West Bengal University of Technology)
Syllabus of B. Sc. In Animation & Film Making
Effective from academic session 2023-24

Semester-IV

Paper Name: Lighting & Rendering
Paper Code: BAFM 401
Credit Points – 2
Total Contact Hours – 30

Course Objective: This course is designed to provide reasoning and problem-solving process of 3D lighting. Lighting is a fundamental aspect of visual arts, particularly in 3D modeling, photography, cinematography. It refers to the technique of using light sources to illuminate objects and scenes in a way that enhances the visual appeal, viewer's focus, and conveys mood or atmosphere.

Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Ability to get the understanding concept of 3D lighting.	5	25	1	5,7		
M2	Ability to explain shading network & CG light.	5	25	1,2,3,4,	5,7		
M3	Ability to understand Fundamentals of rendering.	10	25	2,3,4,5,6	5,7		
M4	Ability to explain Process and render passes.	10	25	2,3,4,5,6	5,7		
	Total Lecture	**30**	**100**				

BAFM 401 (2 Credits) – 30 hours

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SL No.	Topic/Module	Hours
1	**Module 1 - Introduction to concept of Lighting:** • Comprehensive introduction to the Classical Lighting • Define types of shadow and concepts of creation of depth. • The fundamentals of design lighting. • core concepts of lighting.	5
2	**Module 2 – Shading network & CG light:** • A shading network is a system of interconnected nodes or shaders that control how a surface interacts with light, creating realistic textures and materials. This network determines how light is absorbed, reflected, refracted, or transmitted on a 3D object's surface. The network can be highly complex, involving various types of shaders and input nodes, depending on the desired material or surface effect. • Area Light, sun light, point light fundamentals.	5
3	**Module 3 - Fundamentals of rendering:** • Define how light interacts with a surface—whether it's shiny, rough, metallic, or transparent. • Render process to the engine. • Software - hardware render engine. • Look development process.	10
4	**Module 4 - Render Process and render passes** • The 3D scene is set up with models, lights, cameras, materials, textures, and environmental effects. • The scene is projected from 3D space onto a 2D image plane. This is where the depth and color information for each pixel are calculated, based on the 3D geometry and lighting. • Render Passes (Beauty Pass, Specular Pass, Shadow Pass).	10

Suggested Software: Maya

Suggested Reading:
• Essential CG Lighting Techniques by Darren Brooker.
• Aesthetic 3D Lighting: History, Theory, and Application by Lee Lanier.
• Digital Lighting & Rendering by Jeremy Birn

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Paper Name: Lighting & Rendering
Paper Code: BAFM 491(P)
Credit Points – 2
Total Contact Hours – 30

Course Objective: This course is designed to provide reasoning and problem-solving process of 3D lighting. Lighting is a fundamental aspect of visual arts, particularly in 3D modeling, photography, cinematography. It refers to the technique of using light sources to illuminate objects and scenes in a way that enhances the visual appeal, viewer's focus, and conveys mood or atmosphere.

Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Ability to get the understanding concept of 3D lighting.	5	25	1	5,7		
M2	Ability to explain shading network & CG light.	5	25	1,2,3,4,	5,7		
M3	Ability to understand Fundamentals of rendering.	10	25	2,3,4,5,6	5,7		
M4	Ability to explain Process and render passes.	10	25	2,3,4,5,6	5,7		
	Total Practical	**30**	**100**				

BAFM 491 (P) (2 Credits) – 30 hours

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3	**Module 3 - Fundamentals of rendering:** • Define how light interacts with a surface—whether it's shiny, rough, metallic, or transparent. • Render process to the engine. • Software - hardware render engine. • Look development process.	10
4	**Module 4 - Render Process and render passes** • The 3D scene is set up with models, lights, cameras, materials, textures, and environmental effects. • The scene is projected from 3D space onto a 2D image plane. This is where the depth and color information for each pixel are calculated, based on the 3D geometry and lighting. • Render Passes (Beauty Pass, Specular Pass, Shadow Pass).	10

Suggested Software: Maya

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Paper Name: Rigging
Paper Code: BAFM 402
Credit Points – 2
Total Contact Hours – 30

Course Objective: Rigging is the process of creating the skeleton and structure that allows a 3D model to move in a realistic way. It involves creating bones (or joints) that are connected in a hierarchy and assigning weights to parts of the model, so they move with the bones.
Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Rigging & skeleton setup	5	25	1	6		
M2	Parent – child relation and control setup	5	25	1,2,3,4,	6		
M3	Bind Skin & Weight paint	10	25	2,3,4,5,6	6		
M4	Checking process to rigging	10	25	2,3,4,5,6	6		
	Total Lecture	**30**	**100**				

BAFM 402 (2 Credits) – 30 hours

SL No.	Topic/Module	Hours

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1	**Module 1 - Rigging & skeleton setup:** • Ensure the mesh is clean and free of non-manifold geometry or unnecessary vertices. • Begin by creating a series of bones that will serve as the skeleton. • Build the spine, arms, legs, and head bones in a hierarchy, ensuring the bones are aligned with the character's anatomy	5
2	**Module 2 - Parent – child relation and control setup:** • What is parent – child relation to the rigging. • Point orient constrain to rigging. • Aim constrains. • Control set up to the bone. • Normal parent. • Separate objects that need individual control.	5
3	**Module 3 - Bind Skin & Weight paint:** • What is skinning • How to weight paint to 3D rigging. • Use the brush to reduce the weight methodology. • Check the control • Check the weight pain. • Control settings to the skinning. • Component editor for skinning process.	10
4	**Module 4 - Checking process to rigging:** • Pose set up for rigging. • Checking process. • Weight paint process. • Demo movement to the rig.	10

Suggested Software: Maya

Suggested Reading:

• An Essential Introduction to Maya Character Rigging by Cheryl Briggs.

• Advanced 3D Character Rigging by Eric Allen and Kelly L. Murdock.

• The Art of Rigging (Vol. 1-3) by CG Toolkit

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Paper Name: Rigging
Paper Code: BAFM 492(P)
Credit Points – 2
Total Contact Hours – 30

Course Objective: Rigging is the process of creating the skeleton and structure that allows a 3D model to move in a realistic way. It involves creating bones (or joints) that are connected in a hierarchy and assigning weights to parts of the model, so they move with the bones.

Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Rigging & skeleton setup	5	25	1	6		
M2	Parent – child relation and control setup	5	25	1,2,3,4,	6		
M3	Bind Skin & Weight paint	10	25	2,3,4,5,6	6		
M4	Checking process to rigging	10	25	2,3,4,5,6	6		
	Total Practical	**30**	**100**				

BAFM 402 (P) (2 Credits) – 30 hours

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SL No.	Topic/Module	Hours
1	**Module 1 - Rigging & skeleton setup:** • Ensure the mesh is clean and free of non-manifold geometry or unnecessary vertices. • Begin by creating a series of bones that will serve as the skeleton. • Build the spine, arms, legs, and head bones in a hierarchy, ensuring the bones are aligned with the character's anatomy	5
2	**Module 2 - Parent – child relation and control setup:** • What is parent – child relation to the rigging. • Point orient constrain to rigging. • Aim constrains. • Control set up to the bone. • Normal parent. • Separate objects that need individual control.	5
3	**Module 3 - Bind Skin & Weight paint:** • What is skinning • How to weight paint to 3D rigging. • Use the brush to reduce the weight methodology. • Check the control • Check the weight pain. • Control settings to the skinning. • Component editor for skinning process.	10
4	**Module 4 - Checking process to rigging:** • Pose set up for rigging. • Checking process. • Weight paint process. • Demo movement to the rig.	10

Suggested Software: Maya

Suggested Reading:
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Paper Name: Props & Character animation
Paper Code: BAFM 403
Credit Points – 3
Total Contact Hours – 45

Course Objective: The course is designed to provide a detailed Introduction to the numerous methods of arty of movements & motion which guide the creation of different process of animation to complete 3D motion design.

Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Ability to explain the concept of Animation	10	25	1	1,5		
M2	Ability to explain different principles of animation	15	25	1,2,3,4,	1,5		
M3	Ability to explain different motion concept	10	25	2,3,4,5,6	1,5		
M4	Ability to study Graph editor	10	25	2,3,4,5,6	1,5		
	Total Lecture	**45**	**100**				

BAFM 403 (3 Credits) – 45 hours

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SL No.	Topic/Module	Hours
1	**Module 1 - Fundamentals of Animation:** • Detailed Introduction to the numerous methods of computer animation • Creation of different process of animation. • The fundamentals of motion design	10
2	**Module 2 – Principles of Animation:** • What is principle • Action poses using Maya • Ease in & out, overlapping. Primary action, timing & spacing	15
3	**Module 3 – Weight Study:** • The basic bouncing ball of different weight • Three different weight ball action • Iron ball dropping action • Squash & stretch action	10
4	**Module 4 – Graph editor Study:** • What is graph editor. • Graph editor process for animation. • How graph editor effects animation. • Smooth animation ion graph editor	10

Suggested Software: Maya

Suggested Reading:
1. Fundamentals of Multimedia by Ramesh Bangia.
2. Multimedia & Animation by V.K. Jain.
3. 3D Animation Essentials by Andy Beane.
4. Animators' survival kit by Richard Williams

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Paper Name: Props & Character animation
Paper Code: BAFM 493 (P)
Credit Points – 2
Total Contact Hours – 30

Course Objective: The course is designed to provide a detailed Introduction to the numerous methods of arty of movements & motion which guide the creation of different process of animation to complete 3D motion design.

Course Outcome:

SL No.	Course Outcome	Mapped Unit
1	Remembering	M1, M2
2	Understanding the course	M1, M2, M3, M4
3	Applying the general problem	M2, M3, M4
4	Analyze the problems	M2, M3, M4
5	Evaluate the problems after analyzing	M3, M4
6	Create using the evaluation process	M3, M4

Module Number	Content	Total Hours	%age of questions	Covered CO	Covered PO	Blooms Level (If applicable)	Remarks (If any)
M1	Ability to explain the concept of Animation	5	25	1	1,5		
M2	Ability to explain different principles of animation	5	25	1,2,3,4,	1,5		
M3	Ability to explain different motion concept	10	25	2,3,4,5,6	1,5		
M4	Ability to study Graph editor	10	25	2,3,4,5,6	1,5		
	Total Practical	**30**	**100**				

BAFM 493(P) (2 Credits) – 30 hours

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3	**Module 3 – Weight Study:** • The basic bouncing ball of different weight • Three different weight ball action • Iron ball dropping action • Squash & stretch action	10
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