

# IKG PUNJAB TECHNICAL UNIVERSITY

Batch 2012

Scheme and Syllabus

Of

B. Tech. 3D Animation and Graphics  
Engineering

PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

# Punjab Technical University

B.Tech 3D Animations & Graphics

Third Semester

Contact Hours: 32 Hrs.

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTCS301	Computer Architecture	3	1	-	40	60	100	4
BTAM302	Engg. Mathematics-III	3	1	-	40	60	100	4
BTCS304	Data Structures	3	1	-	40	60	100	4
BTCS305	Object Oriented Programming using C++	3	1	-	40	60	100	4
<b>BTAG301</b>	Basics of Animation	3	1	-	40	60	100	4
BTCS306	Data Structures Lab	-	-	4	30	20	50	2
BTCS307	Institutional Practical Training	-	-	-	60	40	100	1
BTCS309	Object Oriented Programming using C++ Lab	-	-	4	30	20	50	2
<b>BTAG302</b>	Basics of Animation Lab	-	-	4	30	20	50	2

B.Tech 3D Animations & Graphics

Fourth Semester

Contact Hours: 32 Hrs.

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTAG 401	Fundamentals of Preproduction	3	1	-	40	60	100	4
BTAG 402	Multimedia Technologies	3	1	-	40	60	100	4
BTAG 403	Multimedia Networks	3	1	-	40	60	100	4
BTCS 504	Computer Graphics	3	1	-	40	60	100	4
BTAG 404	Multimedia Devices	3	1	-	40	60	100	4
BTAG 405	Preproduction Workshop	-	-	4	30	20	50	2
BTCS 509	Computer Graphics Lab	-	-	2	30	20	50	1
BTAG 406	Animation lab-II	-	-	4	30	20	50	2
BTAG 407	Network Lab	-	-	2	30	20	50	1
	General Fitness	-	-	-	100	-	100	-
<b>Total</b>		<b>15</b>	<b>5</b>	<b>12</b>	<b>420</b>	<b>380</b>	<b>800</b>	<b>26</b>

# PUNJAB TECHNICAL UNIVERSITY, JALANDHAR

## B.Tech 3D Animations & Graphics

Fifth Semester

Contact Hours: 30 Hrs.

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTAG501	Web Technologies	3	1	-	40	60	100	4
BTAG502	Texturing and lightening Techniques	3	1	-	40	60	100	4
BTAG503	Design and Analysis Of Graphics Algorithms	3	1	-	40	60	100	4
BTAG504	Introduction to 3D Modeling	3	1	-	40	60	100	4
BTIT502	Programming in Java	3	1	-	40	60	100	4
BTAG505	Web Technology lab	-	-	4	30	20	50	2
BTAG506	Software lab-I (Design and Analysis Of Graphics Algorithms lab)	-	-	2	30	20	50	1
BTAG507	Software lab-II (Modelling & Rendering Lab)	-	-	4	30	20	50	2
	Industrial Training	-	-	-	60	40	100	1
<b>Total</b>		15	5	10	350	400	750	26

## Sixth Semester

Contact Hours: Hrs. 34

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTAG601	Audio& Video Editing	3	1	-	40	60	100	4
BTAG602	Fundamentals of Game Theory	3	1	-	40	60	100	4
BTAG603	Character Rigging and Animation	3	1	-	40	60	100	4
BTAG604	Digital Image Processing	3	1	-	40	60	100	4
	Elective-1	3	1	-	40	60	100	4
BT*****	Open Elective	3	1	-	40	60	100	4
BTAG 605	Game Development lab	-	-	4	30	20	50	2
BTAG 606	Audio &Video Editing Lab	-	-	2	30	20	50	1
BTAG 607	Character Rigging and Animation lab	-	-	4	30	20	50	2
BTAG 608	Digital Image Processing Lab	-	-	2	30	20	50	1
	General Fitness	-	-	-	100		100	
Total		18	6	12	460	440	900	30

Seventh/ Eighth Semester

Course Code	Course Name	Marks Distribution		Total Marks	Credits
		Internal	External		
BTAG701	Software Training	150	100	250	8
BTAG702	Industry Oriented Project Training	300	200	500	10
<b>Total</b>		<b>450</b>	<b>300</b>	<b>750</b>	<b>18</b>

Course Code	Course Name	Load Allocation			Marks Distribution		Total Marks	Credits
		L	T	P	Internal	External		
BTAG801	Special Effects features film	3	1	-	40	60	100	4
BTAG802	Major Project	-	-	4	100	100	200	4
BTAG803	Computer Vision	3	-	-	40	60	100	3
CE-216	Environmental Sciences	3	-	-	40	60	100	3
	Elective 2	3	1	-	40	60	100	4
	Elective 3	3	1	-	40	60	100	4
BTAG804	Maya Modeling and Texturing lab	-	-	4	30	20	50	2
BTAG805	Special Effects Features film Lab	-	-	4	30	20	50	2
	General Fitness	-	-	-	100		100	
<b>Total</b>		<b>15</b>	<b>3</b>	<b>12</b>	<b>460</b>	<b>440</b>	<b>900</b>	<b>26</b>

List of Electives:

Elective-1

BTAG 901 Digital Compositing

BTAG 902 Simulation & Modeling

BTAG 903 Open GL

Elective-2

BTAG 904 Graphic designing

BTAG 905 Lightning & Shading

BTAG 906 3D Modeling and Animation

Elective-3

BTAG 907 Maya Modeling and Texturing

BTAG 908 Advanced Character Animation

BTAG 909 Network Security

Third Semester



### BTAG301BasicsofAnimation

OBJECTIVE : The main objective of this subject is to impart strong knowledge about the fundamental principles of animation in addition to an invaluable appreciation for observational techniques & the art of planning .

1. Introduction Animation: (2)  
Its definition, early examples of Animation.
2. History of Animation: (4)  
Stop Motion Photo Animation, Zoetrope, Thaumatrope, Cel and Paper Animation, early Disney's Cel Animation Processes.
3. Types of Animation: (6)  
Cel Animation, Stop Motion Animation, Computer Animation, 2-D Animation, 3-D Animation.
4. Skills for an Animation Artist: (8)  
Visual and creative development of an Artist , importance of observation with minute details, efficiency to draw gestures, facial expressions, good listener, hard work and patience, creative and innovative.

5. Basic Principles of Animation: (8)  
Illusion of Life, straight action and pose to pose Timing, Exaggeration, Drama and Psychological Effect, Fade in and Fade out, Squash and Stretch, Anticipation, staging, follow through and overlapping action, Arcs, Solid Drawing ,Appeal, slow in and slow out, Secondary Action.

6. Various Terms: (8)  
Animation Drawings/Cels, Rough Drawings , Clean ups, Color reference drawings, Layout, Model Sheet, Key Drawings and in Betweens, Master Background, Concept Piece, Character drawing , Story Board.

#### Text Books:

1. The complete animation course by Chris Patmore Pub.-Baron's Educational Series.(New York)
2. Animation Unleashed by Ellen Bessen, Michael Weise Productions,2008(U.S.A)
3. The Animator's Survival Kit by Richard Williams , Arrar Straus & Giroux Pub.(U.S.A)
4. Anatomy of the Artist – Thompson & Thompson

#### References:

1. The Encyclopedia of Animation Techniques, Richard Taylor, 1996 (India)
2. Experimental Animation: An Illustrated Anthology by Robert Russet and Cecile Starr Pub.- Van Nostrand Reinhold Compa Pub.1976 (U.S.A)

## BTAG302BasicsofAnimationLab

**OBJECTIVE:** The objective of the subject is to create vibrant and enthusiastic environment wherein students are guided through a multitude of experimental animation techniques to develop more diverse animation skills.

### 1. Flip Books :

Capture a series of images using your camera's continuous mode. Design your Flipbook , Printing the flipbook ,Lay out the Flipbook pages, Arrange the pictures, Holding the end of the stack.

### 2. Clay Animation:

Designing Characters with Wax and Oil Based Clay

### 3. Stop Motion Animation :

using characters in stop motion animation.

### 4. Set Designing:

Experimental Work with different mediums like sand, stones, grass, hard board, pen and Ink , water colors, poster colours, dry brush etc.

### 5. Cut Out Animation:

Making Cut Outs and capturing the images.

### 6. Role of Puppets in Animation

. ALICE Software Tool, GIF Builder, Microsoft GIF Animator, Windows Movie Maker.

Fourth Semester

## BTAG401-Fundamentals of Preproduction

OBJECTIVE: This course introduces the basic knowledge of pre-production techniques related films and animations. Also it covers the script writing and story boarding techniques.

### STORYTELLING

1. Introduction to Drawing: How to Draw, How to choose Pencil, How to Improve your Designing skills, How to ink a Drawing, How to Sketch. (2)
2. CONCEPT DESIGN: Focus area foundation, developing concept, cartoon animation writing and storytelling. Sources of story line, adaption, structure of story, writing the story line from classical animation. (4)
3. STORY BOARD: Importance of story board, definition, advantage, different types of story boards, paper storyboard and screen storyboard. (4)
4. Elements of storyboard, types of storyboards: Linear story board, non-linear storyboard, Hierarchical storyboard, graphical storyboard and hand drawn story board. (4)
5. Storyboarding movements, storyboarding without sketching, multimedia development process, create a storyboard and finally prepare an animatic. (4)

### SCRIPTWRITING

1. Story, elements of story, expansion, dialogues interaction through dialogue, script and its elements, theme, genre of script. Basic of script writing, basic building blocks. (4)
2. The three act structure, beginning, middle and end. Script writing formats, physical format, Dialogue and description Imagery, Character, Plot. (4)
3. Modern ways to write Script, Quick methods to produce fast scrip, writing scripts, with soft ware, advantage of script writing with software's. Storyboarding (in brief). (4)
4. Scriptwriting for cartoon movies and its storyboard, Script for dramatic and emotional story and its storyboard. (4)
5. Script for mythological movie and its story board, Script writing for comedy movie and its storyboard. (2)

Text Books-

1. J. Michael Straszynski, "The Complete Book of Scriptwriting", Synthetic World Ltd. Publication.
2. Dwhite V. Swain and Joye R. Swain, "Film Scriptwriting- A practical Mannual".
3. Syd Field, "Screenplay: Foundation of Screenwriting".

## BTAG402-MultimediaTechnologies

OBJECTIVE: This course will cover all the basic in the multimedia technologies with all phases like digital images, digital audio & video, compression & standards etc.

1. Introduction: What is Multimedia? What is Design Processes, Hypertext, Links, Frames, Files, HTML, HGML, Morphing, Media Control interfaces. (4)
2. Text and Image: Introduction, Types of text, Font, insertion, compression, File formats. Types of images, color models, Basic steps for image processing, principle and working of scanner and digital camera, Gamma and gamma correction. (8)
3. Audio and Video technology: Fundamental characteristics of sound, psycho20 acoustics, Raster scanning principles, sensors for TV cameras, color fundamentals, additive and subtractive color mixing, Liquid crystal display (LCD), Plasma Display Panel (PDP), file formats , Video for Window, QuickTime (8)
4. Compression and coding: What is compression? Need for compression, Types of compression-basic compression techniques-run length, Huffman's coding, JPEG, zip coding, Overview of Image and Video compression techniques. (8)
5. Multimedia presentation and authoring: Overview, multimedia authoring metaphor, multimedia production, presentation and automatic authoring, Design paradigms and user interface, overview of tools like adobe premiere, director, flash and Dreamweaver. (8)

### Books:

Principles of Multimedia by Ranjan Parekh. Tata McGraw-Hill  
Multimedia technologies by Ashok banerji

### References:

1. Prabhat K. Andleigh and Kiran Thakrar, "Multimedia Systems Design", PHI publication
2. John F. Koegal Buford, "Multimedia systems", Pearson Education.
3. Ze-Nian Li and MS Drew, "Fundamentals of multimedia", PHI EEE edition.
4. A Banerji & A M Gosh, "Multimedia Technologies", Tata Mc Graw Hill.



## BTAG403-MultimediaNetworks

OBJECTIVE: This course provides knowledge about computer network related hardware and software using a layered architecture.

(8)

1. ApplicationLayer:

World Wide Web (WWW), Domain Name System (DNS), E-mail, File Transfer Protocol (FTP), Introduction to Network security, Electronic mail in the internet, DNS-The internet directory service, Peer to Peer Application

(10)

2. TransportLayer:

Elements of transport protocols: addressing, connection establishment and release, flow control and buffering, multiplexing and de-multiplexing, crash recovery, introduction to TCP/UDP protocols and their comparison, Principle of Reliable data Transfer (Building a Reliable data Transfer protocol, Pipelined Reliable data transfer Protocol)

(8)

3. DataLinkLayerandPhysicalLayer:

Design issues, Framing, Error detection and correction codes: checksum, CRC, hamming code, Data link protocols for noisy and noiseless channels, Sliding Window Protocols: Stop & Wait ARQ Concept of Analog & Digital Signal, Bandwidth, Transmission Impairments: Attenuation, Distortion, Noise.

(10)

4. IntroductiontoComputerNetworksandNetworkLayer:

Data Communication System and its components, Data Flow, Computer network and its goals, Types of computer networks: LAN, MAN, WAN, Wireless and wired networks, broadcast and point to point networks, Network topologies, Network software: concept of layers, protocols, interfaces and services, Introduction of forwarding and Routing , Routing Algorithms.

Suggested Readings/Books:

1. James F. Kurose and Keith W. Ross, "Computer Networks: A Top to Down Approach", 6th Edition.
2. Larry L. Peterson and Bruce S, "Computer Networks: A System Approach"



## BTAG404-MultimediaDevices

OBJECTIVE: To familiarize the students of all branches in engineering with different multimedia devices problem solving and programming. After the students have successfully completed the course, they shall have sufficient knowledge of the basic computer devices and various programming techniques.

1. Introduction to computers: What is a Computer, History of computer, Computer Generation; Types of computer, Main frame Supercomputers, Servers, and Mini Computers (4)
2. Basic Computer Application: Input, Processing, Control, output, Storage, Block Diagram of Computer. Functional Units: ALU, CU, CPU. Memory System in a Computer: Secondary Memory & Primary Memory (4)
3. Software Applications: Word Processing, Spreadsheets, HTML Editor, Desktop publishing. Types of Software: System software, Programming Software, Application Software, Types of Databases, Queries, Graphic Programs, Drawing Programs, Paint, Animation & Video Programs, Presentation Programs, Communication Programs. (4)
4. Input to Computers: Types of Input hardware.  
Keyboard: Types of Keyboard, keyboard layout, Key types. Pointing devices: Mouse, Trackball, Glide Pads, Light Pens, Touch Screens, Digitizers and Graphic Table  
Game Devices, Point -of -Sale (Pos) Terminal (4)
5. Multimedia Tools and its input Applications: What is Multimedia, Multimedia Tools, Elements of Multimedia, Sound Input.  
Voice Input: Changing Voice to Data, Types of Voice Recognition Systems  
Video Input, Data Automation, General Devices, Optical Character Recognition (OCR) Software, Checking for Accuracy (8)
6. Output Devices: Forms of Output, Printer: Types of printer, Impact Printers, Non-Impact Printers. Screen: CRT Screen, LCD Screen, Plasma Screen (4)
7. Data Storage: Types of Magnetic Disks, Magnetic Tape, Optical Disks (4)
8. Internet Basics: Introduction to the Internet, WWW. (4)

### Suggested Readings/ Books:

1. Robert Murphy, "Multimedia Devices", Network Version.
2. Dick C. A. Bulterman, "Flexible Multimedia For Web, Mobile Devices", Second Edition, Daisy Talking Books.

## BTAG405-Pre-ProductionWorkshop

OBJECTIVE: The main objective of the subject is to impart the practical knowledge about Digital graphic designing and software like Photoshop & Coral Draw.

1. Working with different tools: (8)

Adobe Photoshop: Photoshop and its interface, Navigation and All tools, Working with basic selections, advanced selections- 1(on the basis of channels, color range, extract, filter etc), Exercises on selections, Quick Masks, Layer Mask, Vector Mask, Layers & Layer Blending Modes, Play with Photoshop, Filter Gallery, Exercises, Bring some object and try to make it in computer, Make your own cartoon character.

2. Understanding & Adjustments of Colors: (6)

Color Theory, Make a perfect cropping of some images using Photoshop, Prepare a cut-out of some images using Photoshop, Place nice background for those images, Prepare nice background using gradient tool, Scan

various images, Color adjustment of those images (PHOTO RETOUCHING).

3. Introduction of Digital painting: (8)

Make Nature scene (winter) digital painting, Make Nature scene (summer) digital painting. Make digital

painting (Use brush, pencil, smudge etc), Make something like modern art keeping in mind color combination, Make a collage of Indian art and culture. Make a collage of wildlife animals, Make a portrait of celebrity (Digital painting).

4. Color correction Mode: (8)

Convert a B&W image into color (Use variation), "Choose a theme (Music, Festivals, Sports, Dance) and Design 5-8 graphics on them.", Color Modes, Color Corrections, Advanced color correction techniques (levels, Curves, Hue, Saturation etc), Design that Ad from your own style.

5. Introduction of Coral Draw: (6)

Coral Draw: Introduction of tools, Design a logo by using different tool in tool bar, flex designing.

## BTAG406-Animationlab-II

OBJECTIVE: The main objective of the subject is to impart the practical knowledge about Digital 2D animation and software like Adobe Flash etc.

### 1. RoughSketchestoCleanupDrawings:

- a) Drawing/Sketching of Animation Drawings from live actions.
- b) Cleaning-Up the Animation Drawings.
- c) Inking/Coloring of Clean-Up Drawings.

### 2. PrincipleofStretchandSquash:

- a) Drawing Key Frames and in-betweens for Stretch and Squash Action.
- b) Time and Space should be kept in mind.
- c) Weight of subject should be kept in mind.

### 3. PrincipleofExaggeration:

- a) Drawing Key Frames and In-betweens for Exaggeration.
- b) Time and Space should be kept in mind.

### 4. IntroductiontoFlashAnimation :

Drawing and working with Flash, working on Timeline, Animating-frame by frame or using in-betweens, working with Symbols, Introduction to Motion Guide, Scripting, setting up Scenes for Project, Creating Walk and Run Cycle.

### 5. DigitalStoryboarding:

Using Interface, tools like Ink Brush, Air Brush, Crayon Texture ,Camera Tool, Conceptualizing and Visualizing Ideas / storyboards using Vector Drawings, imported Digital Images and readymade Templates of Software Toon Boom, Exporting Files etc.

## ReferenceBooks

1. Victor Perard, "Drawing and Anatomy", Kingsport Press Pub (U.K).
2. Richard Williams, "The Animator's Survival Kit", Arrar Straus & Giroux Pub. (U.S.A).

### BTAG407-NetworkLab

OBJECTIVE: The main objective is to impart the practical knowledge about multimedia management over the network.

1. Packet-Based Multimedia Communications System on Application layer
2. Network layer protocols for multimedia files
3. Media File management with FTP
4. Understanding Streaming Media
5. Open Source video frameworks for different formats of multimedia files
6. LAN configuration and router management for multimedia files
7. Playing and sharing media files with video conferencing and other collaboration tools
8. Introduction to Digital Media webinar by different players.

# Fifth Semester

## BTAG501 Web Technologies

### 1. Internet and WWW

Introduction to internet and its applications, E-mail, Telnet, FTP, E-commerce, video conferencing, Internet service providers, domain name server, IP Addresses .World Wide Web and its evolution, uniform resource locator (URL), Internet address , HTTP protocol Comparisons of existing web browsers , Web server – Apache, IIS, proxy server.

(5)

### 2. HTML and Graphics

HTML Tag Reference, Global Attributes, Event Handlers

Document Structure Tags - Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Table tags, Form Tags, Frame Tags, Executable content tags.

Introduction to Image maps, Client-side Server-side .Usage. Alternative text for Image maps.

Creating tables in HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background Color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, Spanning multiple rows or columns, Elements that can be placed in a table elements, Table Section and column properties, Application of table in 3D

(8)

### 3. Frames

Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting <FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames

(5)

### 4. Forms

Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers Passing form data.

(6)

### 5. Style Sheets

Introduction to style sheets , Different approaches to style sheets, Using Multiple approaches, linking to style information in s separate file, setting up style information, Using the <LINK> tag, Embedded style information, Using <STYLE> tag, Inline style information.

(5)

### 6. XML

Introduction to XML, Anatomy of an XML document, Creating XML Documents, Creating XML, DTDs, XML Schemas, XSL

(7)

### References:

1. Teach yourself web technologies part I & II- I. Bayross. BPB
2. Web Design in a Nutshell- J. Niederst, SPD
3. Java Server Programming- J2EE Edition – A Subramanyam, SPD
4. Step by Step XML- M.Young, PHI
5. Web Technologies By: Vision Publication Author: Poonam Ponde

## BTAG-502 Texturing and lightening techniques

### 1. Rigging Techniques

Producing natural articulation of realistic & semi-realistic, imaginary characters, Body language, attitude, character interaction, Animal walk & run cycles, snakes and birds. Biped Character walk cycles, Biped Character run cycles, Pushing and pulling objects. Facial animation and lip-synchronization, Nonlinear Animation with trax editor. (7)

### 2. Track Editors:

Working with character sets and clips, QUADRAPED Character Animation, Building a crowd from one animation, Character redirection, Character remapping, Using trax and clips with particle animations, Getting free stock motion capture files. (6)

### 3. Lightening and UV texturing:

Introduction to CG Lighting, Working with Maya Lights 1-Point, Direct, Spot, Working with Maya Lights 2-Ambient, Area and Volume, Direct Illumination-Creating and Illuminating a Stage Show, Three Point Lighting and Exterior Lighting, Cast shadows, decay rate, Previewing lighting and shadows, Creating depth map Shadow, creating ray traced shadows and radiosity, Concept of lighting system and shadows, Creating area light shadows, setting area light visibility, Creating soft shadows with spot lights, Indirect lighting: Setting illumination for interiors, Tuning global illumination, Global illumination photons (15)

### 4. Rendering Techniques:

Render layers: introduction, creating, splitting a scene into render layers, Applying render layer presets, setting overrides, creating render layer composites, Render Passes: Introduction, compare render passes and render layers, Render quality: anti aliasing, setting color profiles, diagnosing ray tracing, adjusting motion blur. (8)

### Reference Books:

1. Digital Lighting & Rendering, Second edition by Jeremy Birn
2. Lighting and Rendering in Maya: Lights and Shadows by Jeremy Birn
3. Multimedia In Practical Technology and Application by Judith Jcffcoate, PHI.
4. Multimedia by Simon J.Gibbs and Dionysion C Tschrikzis, Addison Wesley.
5. Multimedia Systems by John F. KocglBuford. Addison Wesley.
6. 3D in Photoshop CS4 by Dan Moughamian and Scott Valentine.
7. Adobe Photoshop CS6 Classroom in a Book by Adobe Creative Team.

## BTAG-503 Design and Analysis of Graphics Algorithms

Objective: It covers the issue of modeling graphics hardware and 3D-scenes as well as the development, analysis, implementation and experimental evaluation of rendering algorithms.

### 1. Introduction to Graphic Primitives

Difference between raster and vector Images, Bitmap and Vector-Based Graphics, Resolution, Comparison between RGB and CMYK, Applications of Computer Graphics. (4)

### 2. Scan-Conversion of graphics primitives:

Scan-Conversion of a Lines (Digital Differential Analyzer Algorithm, Bresenham's Line-Drawing Algorithm, Scan-Conversion of Circle and Ellipse (Bresenham's Method of Circle Drawing, Midpoint Circle Algorithm), Drawing Ellipses and Other Conics. (7)

### 3. 2D-Axis

Introduction to 2D Axis , Co-ordinates, Pivots Transformation Matrix, , Scaling, Reflection, Shear Transformations, Rotation, Translation (Top, Side ,Front and perspective view) ,Grids , 2D Coordinate locking , 2D orientation , Notation and Conventions (8)

### 4. 3D- Axis

Introduction to 3D Axis, Co-ordinates , Pivots Objects in Homogeneous Coordinates,Scaling, Translation, Rotation, Reflection, World Coordinates and Viewing Coordinates, All four views Grid Study ,Image mensuration through axis,3D Coordinate locking,3D orientation , Notation and Conventions (8)

### 5. Graph Algorithms

Lowest common ancestor, Minimum spanning trees, Shortest paths trees, Radius-cost tradeoffs, Steiner trees, Minimum matching's, Network flows Degree-constrained trees (7)

### Reference Book:

Parag H. Dave; Himanshu B. Dave, "Design and Analysis of Algorithms", Pearson Education India, edition 2007

Alan Watt and Mark Watt, Advanced Animation and Rendering Techniques, Addison-Wesley.



## BTAG-504 Introduction to 3D Modeling

Objective: Control the screen environment through workspaces. Gain knowledge of 3D max method of viewing 3D objects. Understand the creation of drawing objects in different planes and recognize the properties of objects that relate to 3D imagery.

### 1. Introduction to 3D-Max

Interface of 3DS max, Understanding the concept of four view ports, Aligning object in the each view port in X, Y, Z axis, Hot keys, User defined hot keys, using the menus, Floating and docking. Command panel, customizing the interface, Using drag and drop feature, Introduction to different workspaces, "Geometry, Sub objects, Extruding, Welding, bridging etc. (7)

### 2. Concept of Standard and Extended Primitives

Introduction to standard and extended primitives. "Introduction to creating complex objects with Standard and extended primitives", Understanding the spline tools. Introduction to polygons. Using modifier stack, navigating the modifier stack, File navigation, Introduction to Connection (Hierarchy, Group, and Link). (8)

### 3. Introduction to Modifiers

Introduction to the 3d elevators and walk through, "Introduction to modifiers and modifier gizmos, Familiarity with Modifiers like Bend, edit poly, X form, wave, lathe symmetry etc  
Advanced 3DS Max, Modeling objects with lathe, loft, extrude etc, Creating 3D objects from 2D spline shapes, Organic and inorganic modeling, Introduction to texturing, Working with Diffuse, Opacity and Reflection, Basics of UV unwrapping, Creating texture maps, Bump and Displacement Mapping. (7)

### 4. Concept of Kinematics

Introduction to Bones & IK-FK, Introduction to Biped Rig-1, Introduction to Biped Rig-2 (Creating Controls and Finishing the Rig), Basic Key frame Animation. (6)

### 5. Introduction to Maya

Introduction to the interface of Maya, Menu bar, Tool bar, Hot box, Using the shelf, hot keys. Using the spacebar, manipulating a view. Creating objects: Simple primitives, Lights, cameras.  
Selecting objects, types of selection, Single selection, adding and subtracting selection. Edit menu selection options, Marquee selection, Lasso selection, selection mask Using hyper shade, Relationship editor, hyper graph and outliner. (8)

### 6. Modelling

Introduction to Polygon modeling, Nurbs modelling, Modelling Props and sets (Locations), Modelling a high poly model, Technical issues related to managing high poly model. Managing the display of huge sets and models in the view port. Modelling the character using templates & view port references, "Optimizing the final model, refining the mesh, basic posture, Testing the model", Difference between hi-poly & low-poly characters. (4)

Text Books:

1. Mastering Autodesk Maya 2011 by Eric Keller.
2. Introducing Maya 2011 by dariush derakhshani.
3. 3ds Max 2010 Bible by Kelly Murdock (John Wiley & Sons).
4. 3ds max a step by step approach by kurt wendt.
5. 3ds Max 2009 Architectural Visualization - Intermediate to Advanced by Brian L .Smith.

### BTAG505WebTechnologyLab

1. Web server – apache, IIS, proxy server, HTTP protocol.
2. HTML and Graphics: (Making web pages by using HTML tags)
3. XML
4. Adobe Dreamweaver (Designing with coding and without coding)
5. Develop a web page with flash Animation

BTAG 506 Software lab-I ( Design and Analysis of Graphics algorithms Lab)

1. Computer Graphics and Primitive Algorithms
2. Scan-Conversion of graphics primitives:
3. 2-D Axis
4. 3-D Axis
5. Graph algorithms

BTAG 507 Software lab-II (Modelling & Rendering Lab)

1. Modeling and Rendering Architecture from Photographs
2. A hybrid geometry- and image-based approach.
3. Interior and exterior design with rendering.
4. Inorganic high poly model
5. Organic high poly model

**Sixth Semester**

## BTAG 601 Audio & Video Editing

Objective: The main objective is to give student knowledge of audio and video editing.

### Part-A

Manipulating audio: Auto trim/crop, mute, DC offset, resample, reverse, smooth/enhance, Fade in/out, insert silence, bit depth converter etc, Understanding various digital audio formats like .WAV, .AIFF, .MP3, .swf, .WMA etc, Understand audio plug-in, importing and exporting into multiple audio file formats like MP3, real audio, QuickTime formats, etc. Event tool: move, split, slip and trim multiple events, create fades, apply ASR Attack/Sustain/Release.

Understanding script editor window, Spectrum analysis tools, scrub tool etc, statistics tool (Max, RMS, DC offset, zero crossings), sampler tool etc, Audio editing: workflow, real time editing, event based editing, waveform volume and pan envelopes, Edit, record, encode and master digital audio, editing audio by drag and drop options, cross fading audio tracks, balancing sound levels, creating smooth fades etc.

Understanding Multichannel audio recording, synchronize audio and video. Understanding regions and play lists, editing of fields, name markers, loops, and regions, Timing basis: absolute frames, measures and beats, Time and frames.

Audio effects like: Equalizer, Volume, chorus, distortion, Delay/echo, pitch, bend/shift, reverb, vibrato, normalize etc Insert track markers, adding multiple tracks, adjusting track time, musical instrument file processing

### Part-B

Adobe Premiere: Concept of non linear editing, The basics of editing: Overview, Importing and Exporting: various audio, video and graphics in various formats, Edit, manipulate and arrange these elements in visual timeline, understand all Tools of toolbox for editing clips. Titling and superimposing.

Panels: Tools panel, Project, Monitors: Source and program, Timeline, Audio meters, Misc. Tasks and functions: Titles, Transitions, speed and duration, Effects, Key frames, Types of edit, Opacity, trimming, Adding Special effects like: Star trek transporter effect, Blur part of an image, Ghost effect, Highlight part of an image etc

Text Books:

1. The Sound Effects Bible: How to Create and Record Hollywood Style Sound Effects. Author: Ric Viers (Michael Wiese Productions).
2. Adobe Premiere Pro CS5 Classroom in a Book (Author: Adobe Creative Team) Adobe Press.

Reference:

1. Film Editing: Great Cuts Every Filmmaker and Movie Lover Must. Know Author: Gael Chandler (Michael Wiese Productions).

## BTAG 602 Fundamentals of Game Theory

**Objective:** This chapter provides a brief overview of basic concepts in game theory. These include game formulations and classifications.

### Part-A

Introduction to game engine and its components, game assets, Overview of component interaction inside game engine.

Game theory, the process of game development and its management, Concept of machinima, editing game engine footage.

Game testing, Internal testing - External testing, Game engine navigation, user interface.

Menu bar & tool box, Introduction to level design, prop design & static elements of game art. Creating textures for the levels and making the level functional.

### Part-B

Expanding the levels by adding lights and objects, Understanding machinima, Capturing machinima to make short movie. Working with interactive elements, movers and triggers.

Advanced techniques emitters, sprites, importance of animatable models inside game engine.

Design consideration., Debugging, error hunting and diagnosis.

Text Books:

1. Artificial Intelligence for Computer Games: An Introduction (2004) by John D. Funge.
2. Programming Game AI by Example (2004) by Mat Buckland
3. AI Game Engine Programming (2004) by Brian Schwab
4. AI for Game Developers (2004) by David M. Bourg and Glenn Seeman

References:

1. AI Game Development: Synthetic Creatures with Learning and Reactive Behaviors (2003) by Alex Champandard. See also the companion web site AiGameDev.com.
2. AI Game Programming Wisdom 2 (2003) edited by Steve Rabin.



## BTAG603 Character Rigging and Animation

**OBJECTIVES:** it shows how character animation evolved from its earliest beginnings, into what it is today. This will help give you an understanding of the universal concepts and techniques of character control that are used today in 3D digital character animation.

### Part-A

Introduction to bone system/Joints and IK handles, Creating bone system and maintaining naming conventions, Skinning: types, import and export of skin weights, IK and FK basics, IK and FK switch, stretchy IK and FK, Introduction to Deformers: attics, wrap, cluster, riggle, wire . Use of deformers in rigging process.

Introduction to constraints and implementation to rigging, Maintaining proper hierarchy, grouping and creating controls, Rigging the characters, Introduction to Muscle system, Working with Muscle rigging, Introduction to automated rigging systems and methods

Embedding small scripts in the hierarchy control system to save time and facilitate handling, Advanced rigging, Vertex weighting techniques, Rigging solutions to Anatomical Problems, Using advanced rigging to archive natural articulation of character.

Human, animals and cartoons in perspective, Quick studies from real life, Quick sketches, Line of action, Poses and gestures.

### Part-B

Caricaturing the Action.Thumbnails, Drama and psychological effect.Motion studies, drawing for motion.The body language,Re-defining the drawings.

Introduction to animation production process. Basic principles in animation. Squash and Stretch, Anticipation, Staging. Straight ahead and pose to pose

Follow through and overlapping action. Slow in and slow out, Arcs, Secondary action. Timing, Exaggeration, Solid drawing, Appeal.Mass and weight, Character acting, Volume. Line of action, Path of action, Walk cycles of animal and human

#### Text Books:

1. Animators Survival Kit by RICHARD WILLIAMS (Faber & Faber).
2. The Animator's Workbook: Step-By-Step Techniques of Drawn Animation by Tony White.
3. An Essential Introduction to Maya Character Rigging by Cheryl Cabrera (Focal press).
4. The ADVANCED Art of Stop-Motion Animation by Ken A. Priebe
5. Advanced Maya Texturing and Lighting By Lee Lanier (John Wiley and Sons).

#### References:

1. Character Animation Crash Course! By Eric Goldberg.
2. Cartoon Animation (The Collector's Series) by Preston Blair.

## BTAG 604 Digital Image Processing

Objective:-Introduce the student to analytical tools which are currently used in digital image processing as applied to image information for human viewing.

### Part -A

Fundamentals: Introduction, Origin, Areas of Image Processing, steps in Digital Image Processing, Components of Image Processing System, Image Sensing, Sampling and Quantisation, Neighbouring of Pixels

Image Enhancement and Restoration: Enhancement: Spatial Filtering, Introduction to Fourier Transformation, Restoration: A model of the Image Degradation/ Restoration Process.

Color Image Processing: Color fundamentals, models, transformation and segmentation. Noise in color images.

Wavelets: Wavelet functions, Wavelet transformations in one and two dimensions, fast wavelet transform.

### Part -B

Image Compression: Image compression models, Error free compression, Lossy compression.

Image segmentation: Line detection, edge detection, Edge linking and boundary detection, region based segmentation.

Representation and Description: Representation, Boundary and Regional Descriptors, Relational Descriptors.

Object Recognition: Pattern and pattern classes, recognition based on Decision Theoretic Methods, Structural Methods.

References:

Digital Image Processing by Rafael C. Gonzalez, Richard E. Woods

## BTAG 605 Game Development Lab

**Storyboarding:** in-depth coverage of storyboarding for the development of games and simulations. Addresses pre-production preparation and creation of comprehensive design for a game or simulation including target audience analysis, purpose, goals and objectives, content outline, flow chart, and storyboard.

**Level Design:** Introduction to the tools and concepts used to create levels for games and simulations. Incorporates level design, architecture theory, concepts of critical path and flow, balancing, play testing, and storytelling. Includes utilization of toolsets from industry titles.

**Character Sculpting :** Creation of original characters from the drawing stage to sculpting clay status. Explores a variety of poses using clay and aluminum armatures.

**Introduction to 2D Game Art :** Introduce industry software tools used in the creation of 2D game and simulation art. Includes the concepts, commands and interfaces of industry standard raster and vector graphics. Learn to edit and manipulate existing art.

**Introduction to 3D Game Modeling:** Introduce industry software tools used in creating 3D models for games and simulations. Includes the concepts, commands, and interfaces of the tool. Includes techniques for building, texturing, and lighting a game level for real-time processing.

**Introduction to 3D Game Animation:** Introduce industry software tools used in creating game and simulation animation. Introduce techniques used to create movement of game assets; covers the principles of animation and their application in 3D space. Introduces animation issues such as animation hierarchies, game combat timing, and in-game storytelling.

## BTAG 606 Audio and video editing lab

Video editing using Adobe Premiere Pro CS5

Audio editing using Sony sound forge

## BTAG 607 Character Rigging and Animation lab

Character Rigging and Animation Using Maya

Character Rigging and animation Using 3Ds Max

## BTAG 608 Digital Image Processing Lab

Using MATLAB tool:

ImageFiltering

2-DRandomProcesses

NeighborhoodsandConnectedComponents

PointwiseOperationsandGamma

Eigen-ImageAnalysis

IntroductiontoColorimetry

ImageRestoration

ImageSegmentation

JPEGImageCoding

Noise Removal

# Seventh/Eighth Semester

## BTAG 801 Special Effects Features Film

**OBJECTIVE** - The main objective of the subject is to impart the practical knowledge about how to make special effects for feature films.

### Section-A

Essential concepts of Special effects : Visual or Special Effects and Concept Design about ideas and concept generation for the film and games industries - ranging from characters, vehicles, products, clothing, sets and environments. The content may be historical, contemporary or future-based ie 'visions' of society, lifestyles, environments as the game/film plot dictates.

Special effects planning :Overview of story boarding of effects, planning and managing the test shot and research about techniques, flying effects, laser lighting, Theatrical smoke and fog, CO2 effects, pyrotechnics, confetti

Visual special effects techniques: Bullet time, Computer-generated imagery, Digital compositing, Dolly zoom, In-camera effects, Match moving, Matte (filmmaking) and Matte painting, Miniature effects, Morphing, Motion control photography, Optical effects

### Section-B

Paint, Retouch & Wire removal: The complete and advance study of the usage of paint and brush tools like brush, clone, stamp, eraser and wire removal to suspend an actor or prop in mid-air.

Camera Matching, Tracking & Stabilizing: The study of Image stabilization consists in compensating for the camera motion by applying a suitable transformation (warping) to the image. In the stabilized image, scene points are motionless in spite of camera motion.

Maya render passes & 3D compositing :The study of render passes or diffuse or specular passes can even be rendered or composite on a light basis to increase the degree of post-control.

### Submissions

- Clips with Special effects (minimum 01 minute)

### References books:

- Special effects : The History & Techniques – Richard Rickitt Publisher: Watson-Guption
- Adobe after effects CS6 Visual effects & compositing studio techniques - Mark Christiansen. Publisher: Adobe Press
- Maya Visual effects : The innovator's guide – Eric Keller Publisher:Sybex
- Special Effects: An Introduction to Movie Magic By Ron Miller
- Maya Documentation
- After Effect Documentation



## BTAG 803 Computer Vision

Objectives: To provide the mechanics for representation and analysis of Multispectral data. Also introduces the fundamental problems of 3D computer vision & main concepts and techniques used to solve those.

### Part- A

Introduction: Image Formation and Image Models: Projective Geometry, Modeling Cameras, Projection Matrix, Camera distortions and artifacts, Camera calibration

Early Vision: Multiple Images: The geometry of multiple views, Stereo Vision, epipolar constraints, disparity, Shape from stereo, correspondence

### Part- B

Shape from X: Reflectance map, Shape from shading, Photometric stereo, Shape from optical flow (moving camera, moving objects), Rotating camera, Silhouettes, Space carving, Light stripe encoding, Laser range systems (TOF)

High Level Vision: Model-based Vision, Aspect graphs, Tracking, Finding Templates and Recognition

### Text Books:

1. Computer Vision: A Modern Approach, Forsyth Ponce , Pearson Education
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Thomson Learning

### References:

1. Machine Vision, Jain R C Kasturi R, McGrawHill
2. Three Dimensional Computer Vision, Y Shirai, Springer Verlag
3. Computer And Robot Vision Vo I and II, Haralick R M And Shapiro L G, Addison Wesley
4. Computational Vision, Wechsler, Academic Press
5. Robot Vision, Horn B K P, Cambridge MIT press
6. Digital Image Processing & Computer Vision, Robert J Schalkoff, John Willey Publication

## BTAG 804 Maya Modeling and Texturing lab

- Navigate the Maya interface
- Access your objects in the Maya scene graph
- Use the Maya polygon and NURBS modeling tools
- Shade and apply texture maps to objects inside of Maya
- Union: Region belonging to one or both polygons
- Intersection: Region belonging to both polygons
- Difference: Region belonging to first but not second
- Polygon Texturing
- Rendering

## BTAG 805 Special Effects Features film lab

- Special Effects in feature film using Adobe After effects
- Special Effects in feature film using Final cut pro
- Special Effects in feature film using Fusion

Details of Electives

Elective-I

### BTAG 901 DIGITAL COMPOSITING

Objective:-To learn the basics of good image-making through the study of frame composition, timing, colour theory and editorial techniques and to attain mastery of compositing tools and techniques found in Compositing Software

#### Part-A

Concepts for Broadcast animation for logos, channel IDs and montages, Multi-layer compositing, Special effects, Super imposition and titling, Exporting various file formats outputs as per the end user requirements.

Introduction to batch render & work group, Adding cameras & lights to a simple scene to make a complex compositing, Adding 2D back ground and elements into a 3D character layers, Creating object, material IDs for further adding special effects, Effects for digital video 2D layers and 3D layers for more effective outputs, adding particle effects into a scene.

Introduction to color character and keying, "Editing the real time video with CG based scene and merging both of them to create a final output, Exporting various file format, output as per the end user requirements.

#### Part-B

Introduction to the batch rendering and work groups, Introduction to the concepts of editing in terms of compositing, Adding special effects in built in compositing software to make a simple shot into a perfect output.

Chroma keying, Luma key, Blue screen, Key frame text & layer animation & 3D particles, Effects etc. Color correction, Introduction to 3D compositing concepts i.e. Layers and masking, Rot scoping, Rig removal, Morphing.

Text Books:

1. Creating motion graphics with after effects by Trish and Chris Meyer (Focal press).
2. Adobe after Effects CS5 Classroom in a Book (Author: Adobe Creative Team) Adobe Press.

References:

1. After Effects Apprentice, Second Edition [Paperback] Author: Chris and Trish Meyer (focal press.)
2. The After Effects Illusionist: All the Effects in One Complete Guide by Chad Perkins (Focal press.)

## BTAG 902 Simulation and Modeling

Objective: Overview of simulation modeling and analysis

### PART-A

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

### PART-B

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model.

Simulation of PERT Networks, critical path computation, uncertainties in activity duration, resource allocation and consideration. Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

### References

1. Geoffrey Gordon, "System Simulation", PHI
2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education
3. V P Singh, "System Modeling and simulation", New Age International.
4. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis", TMH

## BTAG 903 Open-GL

**Objective:** The goal of this course is to provide an introduction to the theory and practice of computer graphics. This course will be the prerequisite of advanced computer graphics and game engine

### PART-A

Introduction, Motivation, Uses, History Graphics Systems and Models Graphics Programming : Getting started with OpenGL input and Interaction in OpenGL Geometrical Objects and Transformations in 2D and 3D: Objects representation, Coordinates transformation, windows and viewports.

Viewing in 3D: Orthogonal and projective views, hidden surface removal  
Light, Shading and Materials: Illumination and shadows, light sources, surfaces

### PART-B

From Vertices to Fragments: Graphics pipeline, rasterization, color system Texture Mapping  
Modeling Techniques: Graphics data structure, curve and surface representations, modeling methods

Advanced Rendering Techniques: Ray tracing, radiosity, image based rendering Programmable shaders:  
Shading language, vertex and fragment shaders.

Scientific Visualization: CT/MRI datasets, color compositing, transfer functions

Text Books:

Edward Angel, Interactive Computer Graphics: A Top-Down Approach with OpenGL, 4th edition  
Addison-Wesley, 2005.

Additional Reference Books:

Edward Angel, OpenGL : A primer, 2nd edition, Addison-Wesley, 2005

The OpenGL Programmer's Guide (the Redbook), Addison-Wesley

The OpenGL Reference Manual (the Bluebook), Addison-Wesley

James D. Foley, Andries van Dam, Steven K. Feiner, John F. Hughes, Computer Graphics Principles &  
Practices, Addison Wesley, 2nd edition in C, 1995

Donald Hearn, M. Pauline Baker, Computer Graphics with OpenGL, 3rd edition, 2003, PHI

## BTAG 904 Graphic Designing

Objective: To give student advance concepts of graphics designing and editing using Photoshop.

### Part-A

Photoshop and its interface, Navigation and All tools, Working with basic selections, advanced selections(on the basis of channels, color range, extract, filter etc), Exercises on selections, Quick Masks, Layer Mask, Vector Mask, Layers & Layer Blending Modes, Play with Photoshop, Filter Gallery, Exercises, Bring some object and try to make it in computer, Make your own cartoon character. Color Theory, Make a perfect cropping of some images using Photoshop, Prepare a cut-out of some images using Photoshop, Place nice background for those images, Prepare nice background using gradient tool, Scan various images, Color adjustment of those images (PHOTO RETOUCHING).

Make Nature scene (winter) digital painting, Make Nature scene (summer) digital painting. Make digital painting (Use brush, pencil, smudge etc), Make something like modern art keeping in mind color combination, Make a collage of Indian art and culture. Make a collage of wildlife animals, Make a portrait of celebrity (Digital painting).

### Part-B

Convert a B&W image into color (Use variation), "Choose a theme (Music, Festivals, Sports, Dance) and Design 5-8 graphics on them.", Color Modes, Color Corrections, Advanced color correction techniques (levels, Curves, Hue, Saturation etc), Design that Ad from your own style.

Design motifs tribe art, Make an animal character, "Plan a story of that character & Make its backgrounds in three/four frames", Make posters on nature/earth, Matte Painting-Composition, Creating images for the web: Exporting images from Photoshop.

#### Text Books:

1. Adobe Photoshop CS5 Classroom in a Book (Author: Adobe Creative Team) Adobe Press.

#### References:

1. Teach Yourself Visually - Adobe Photoshop CS5 by Mike Wooldridge (Wiley publishing).
2. Adobe Photoshop CS5 Bible by Steve Johnson.
3. Adobe Photoshop CS5 Bible by Lisa Danae Dayley & Brad Dayley.

## BTAG 905 Lightning & Shading

Objective: The course will additionally enhance the students' ability to utilize lighting and shading for storytelling and visual communication.

### Part-A

Introduction and Design What is Digital Lighting, Cinematography Documentary: "Visions of Light", Lighting Techniques for Computer Generated Imagery, Storytelling with lighting, Composition

Physics of lighting The human eye, Wave vs. ray models, Color, Surface reflection,

Computer Lighting Models Math for illumination models, Light and surface physics, Illumination Model examples

RenderMan Introduction to renderer(s) , RenderMan shading language, Functions in digital images

### Part-B

Surface Shading Fundamentals Illumination, Surface geometry, Surface generation techniques, Color and shape generation, Layering and compositing , Aliasing and Antialiasing,

Advanced Procedural Techniques Bump and Displacement shaders, Stochastic patterns , Solid textures Turbulence

Advanced Lighting Techniques light shaders , Shadow generation, Reflectance modeling, Global Illumination

Non-photorealistic lighting models Simulating flat media, Indirect rendering with RenderMan

### Text Book:

Apodaca, Anthony A. and Larry Gritz. Advanced RenderMan: Creating CGI for Motion Pictures, Morgan Kaufmann, 2000. ISBN 1-55860-618-1.

### Reference:

Glassman, Arnold, Todd McCarthy and Stuart Samuels (directors) Visions of Light: The Art of Cinematography, American Film Institute / NHK Japan Broadcasting Corporation, 1992.

Glassner, Andrew S. "Surface Physics for Ray Tracing" from An Introduction to Ray Tracing. Academic Press, 1989. (handout)

Kahrs, John, Sharon Calahan, Dave Carson, and Stephen Poster, A.S.C., "Pixel Cinematography: A Lighting Approach for Computer Graphics," ACM Siggraph Course Notes #30, 1996.



## BTAG 906 3D Modeling and Animation

Objective: This course introduces fundamental 3D theories, principles of computer modeling, animation and basic techniques of 3D Modeling and Animation.

### PART-A

Introduction to fundamental 3D theories and principles of computer modeling and animation. Modeling methods – Modeling with Primitives – Planning your Model – Deforming Lattices, Wire or Cluster. Extrusion – Object duplication – Pivots and CV Surfaces – The Production Process – Complex Model Hierarchy. Complexities over various Modeling Techniques – Purpose and Modeler Dependency - Hardware and Software Considerations.

### PART – B

Basic Animation – Animation Types – Key frame Animation – Understanding Animation workflow. Animation Techniques – Non – Linear and Character Animation – Posing, Timing and Refining – Working with Poses.

Suggested books for Reading:

The Animator's Survival Kit: A Manual of Methods, Principles, and Formulas for Classical, Computer, Games, Stop Motion, and Internet Animators by Richard Williams

Cartoon Animation (How to Draw and Paint series) by Preston Blair.

The Illusion of Life: Disney Animation by Frank Thomas, Ollie Johnston (Contributor), Collie Johnston.

Mastering 3D Animation , by Peter Ratner (Author)

Autodesk Maya, 2011

## BTAG 907 Maya Modeling and Texturing

Objective: This course introduces 3D Modelling techniques, principles of computer modeling, and texturing using different techniques and tools .

### Part-A

Maya Basic Modeling – Maya Interface – Creating objects using EP curve, CV curve – Making Table Lamp – Polygon Terminology, Polygon over view – Modeling a dice using Boolean – Making An Box using loft – Modeling some inorganic objects – Creating Terrain using sculpt geometry tool.

B.G & Set Modeling – Creating Mountains – Interior & Exterior Modeling – Modeling a garden – Modeling a Landscape.

Maya Character Modeling – Modeling the eyes, nose – Modeling the Leg of the Character – Modeling the body – Modeling a Female Character – Modeling a Male Character – Modeling a High Polygonal.

### Part-B

Material assigning – Hyper Shade over view – Shades and Textures – Material Linking – Light Linking to the materials – Mental Ray Shades – Mental Ray Textures – Image based Lighting Shades – Controlling Photon Emission from Shades.

Character UV Texturing – UV Texturing over View – Applying Texture for Dice – Applying UV's for Inorganic Models – Applying UV's for head – Applying UV's for body – Applying UV's for B.G.

### Suggested Readings

1. Paul Steed : Modeling a Character in 3Ds Max 7, Published by dreamtech, Second Edition – 2005.
2. Mastering Maya 7, Wiley Publishing Edition 2006. John Kundert – Gibbs, Eric : Kunzen Dort, Dariush Derakhashani, Mick Larkins, Eric Keller, Boaz Livny, Mark E.A. de Soura

## BTAG 908 Advance Character Animation

Objective: The main objective of the subject is to impart the knowledge about Advance Character animation.

### Part-A

Introduction to nCloth, Use of mesh as nCloth, Optimizing geometry for nCloth, Setting nCloth collisions and constrains, ncloth and external dynamic forces. Various ncloth simulations, ncloth caches creating and editing, nCloth caches attributes Optimizing ncloth, Various nCloth examples like zipper, bag of balloon, shirt etc.

Introduction to Hair, Hair styling, Painting and setting positions for hair follicles, signing hair system, Making collisions and use of constrains. Introduction to Fur: Defining various furs attributes like fur maps, reversing normal's etc. Shadow and render settings of fur.

MOTION BUILDER: Importing files, exporting files, understanding batch processing, rendering files, working with handle, understanding degrees of freedom, understanding interpolation, understanding FCurves windows and understanding filtering.

### Part-B

MOTION BUILDER: Understanding constraints types, manipulating constraints, understanding the position constraints, working with the range constraints, understanding the relation constraints, using rotation constraints, working with the scale constraints, working with the 3 points constraints, understanding the aim constraints, working with the chain IK constraints, understanding the expression constraints, understanding the mapping constraints, working with the multi-referential constraints, using the parent/child constraints, using auxiliary objects, customizing control rigs, using device assets, understanding motion builder devices and voice devices.

MOTION BUILDER: Understanding story ghosts, understanding story clips, understanding shot clips, jogging animation, changing the play speed, selecting a frame rate, using marks, planning and creating motion clips, creating a trigger group, setting up a device as a trigger, recording triggered animation, creating a trigger tree and understanding animation trigger window.

Text Books:

CG Toolkit's The Art Of Rigging: Volume I, II, III and The making Leon.

## BTAG 909 Network Security

### Introduction :

Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols, etc.

MAC protocols for high-speed LANS, MANS and wireless LANs. (For Example, FDDI, DQDB, HIPPI, Gigabit Ethernet, Wireless Ethernet, etc.)

Fast access technologies (For Example, ADSL, Cable Modem, etc.)

Ipv6: Basic Protocol, extensions and options, support for QoS, security, etc., neighbour discovery, autoconfiguration, routing. Changes to other protocols. Application Programming Interface for IPV6.

Mobility in networks. Mobile IP, Security related issues.

IP Multicasting, Multicast routing protocols, address assignments, session discovery, etc.

TCP extension for high-speed networks, transaction-oriented applications. Other new options in TCP.

Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, key distribution protocols, Digital signatures, digital certificates.

### References:

W.R.Stevens. TCP/IP Illustrated, Volume 1: The Protocols, Addison Wesley, 1994.

R.Wright. TCP/IP Illustrated, Volume 2: The Implementation, Addison Wesley, 1995.

W.R Stevens. TCP/IP Illustrated, Volume 3: TCP for Transactions, HTTP, NNTP and the unix domain protocols, Addison Wesley, 1996.