To
Managing Director
National Institute of Electronics & Information Technology (NIELIT)
Electronics Niketan, 6, CGO Complex,
Lodhi Road, New Delhi – 110 003

Dear Dr. Sharma,

As the Chairman of the Syllabus Sub-Committee (NIELIT standing syllabus committee) I have carefully examined the curriculum. They are in order. The programme may start soon.

To start with the AMT-‘O’ level curriculum on Multimedia and Animation Technology may be initiated at selected NIELIT centres on a pilot basis, to be introduced by the other centres progressively.

Further, the ‘O’ & ‘A’ level curricula on Multimedia and Animation Technology being a new one of inter-disciplinary nature involving experts from various fields including IT, media design, Film/Video Production etc., NIELIT may take up a project towards content creation for the different modules under the supervision of a suitable Group/Expert Committee.

Considering the objective and coverage of the AMT-O & AMT-A Level courses which are more oriented towards multimedia elements and their processing than animation, the committee had recommended the change of names of the above two courses to - NIELIT ‘O’ and ‘A’ Level Courses in Multimedia and Animation Technology (MAT-O and MAT-A Level respectively).

I also seriously advice NIELIT to frame a ‘B’ level curriculum and work for its approval by AICTE/Universities so that professionals/students can obtain a formal degree. This will enhance job opportunities, scope for further studies and in general, raise level of technical and creative input in the field.

Thanking you

Yours sincerely,

Santanu Chaudhury
National Institute of Electronics & Information Technology
(NIELIT)

Course structure of Diploma in Multimedia & Animation Technology
(MAT-O) Level

Recommended by Syllabus Sub-Committee
(NIELIT standing syllabus Committee)

June 2013
Course structure:

Diploma in Multimedia & Animation Technology (MAT-O) Level

Objective:

a. To acquire the basic knowledge to appreciate the basic Multimedia systems, tools, and techniques.
b. To acquire the basic skills to implement components of Multimedia productions and Web Designing
c. To acquire the basic knowledge for Animation production skills

Likely Career Options:

As per the recent market trend and the objective of the course as well as the projected skill sets of the ‘O’ level qualifiers, it is envisaged that the likely career options will be as Multimedia Production Assistant, Multimedia Technician and as Web Developer.

Eligibility

MAT-O Level: 10+2 [Any Discipline]

MAT-O level

MAT.O1.R0 : - Introduction to Information Technology.
MAT.O2.R0 : - Introduction to Multimedia.
MAT.O3.R0 : - Multimedia Processing Techniques
MAT.O4.R0 : - Multimedia Design Principles and Applications
MAT.O1.R0: - Introduction to Information Technology

Objective of the Course

The objective of this course is to provide an introduction to Information Technology and IT tools. The student will become IT literate, and will understand the basic IT terminology. The students will be able to understand the role of Information Technology and more specifically computers, communication technology and software in the present social and economic scenario.

Outline of Course

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<tr>
<th>Topic</th>
<th>Minimum No. of Hours</th>
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<td>1. Computer Appreciation</td>
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<td>2. Computer Organization</td>
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<tr>
<td>3. Operating Systems</td>
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<td>4. Office Automation</td>
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<td>5. Intellectual Property Right and Copyright Issue</td>
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<td>6. Handheld devices</td>
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<tr>
<td>7. Basic Networking and Internet</td>
<td>08</td>
</tr>
<tr>
<td>8. Information Technology and Society</td>
<td>04</td>
</tr>
</tbody>
</table>

Lecture=60
Practical=60
Total Hours=120
MAT.O1.R0 : - Introduction to Information Technology

Detailed Syllabus

1. **Computer Appreciation:** 04 Hrs
   What is a computer, basic structure of computer, data representation in computer
   [Binary number system, Hexadecimal number system, Binary to Decimal
   Conversion, Decimal to Binary Conversion, Binary Coded Decimal (BCD) Code,
   ASCII Code, UNICODE], representation of visual data.

2. **Computer Organization:** 11 Hrs
   2.1 **Central Processing Unit** (02 Hrs)
   Fundamentals of Control Unit, Arithmetic Unit, Instruction Set, Register. Concept of
   Processor Speed, illustration with popular processors. Basic introduction to GPU

   2.2 **Memory and Storage** (02 Hrs)
   Memory Organization, RAM., Read Only Memories, Flash memory. Basics of
   other storage devices – HDD, CD/DVD, Blue-Ray, magnetic tape etc.

   2.3 **Input Devices** (02 Hrs)
   Keyboard, Mouse, microphone, trackball, joystick, Scanner. OMR, Bar/QR-code
   reader, MICR Digitizer, Card Reader, cameras, fingerprint scanner and other
   biometric devices, tablets etc.

   2.4 **Output Devices** (02 Hrs)
   Display (CRT, LCD, LED), Printers - Dot matrix, Inkjet, laser, Plotters, Projector
   and visualiser,

   2.5 **Ports and Interfaces** (01 Hrs)
   Serial and Parallel ports, Connectors: DIN, RCA, AV; USB, Fire wire (IEEE1394),
   HDMI

   2.6 **Computer Software** (02 Hrs)
   Relationship between Hardware and Software; System Software, Application Software,
   compiler, assemblers, linkers, loaders
3. **Operating Systems:** 13 Hrs

3.1 **Basic concepts of OS**
(04 Hrs)
Function of OS; Basic concept of resource management, CPU, memory, I/O; Power-up process: BIOS, Bootstrap Loader; File systems and user management

3.2 **Case Study**

3.2.1 **Microsoft Windows**
(03 Hrs)
An overview of different versions of Windows, Basic Windows elements, files management through Windows. Using essential accessories: Systems tools- Disk cleanup, Disk defragmenter

3.2.2 **Linux**
(03 Hrs)
An overview of Linux, Basic Linux elements: System Features, Software features. File Structure, File handling in Linux

3.2.3 **Mac Environment**
(03 Hrs)
Overview of Mac OS, features of the Mac OS. File and User management, GUI and Mac devices and tools

4. **Office Automation:** 12Hrs

Word Processing, Spreadsheet, Presentation tools, HTML Tools, Publishing tools.

5. **Intellectual Property Right and Copyright Issue:** 04Hrs

Introduction to Intellectual Property Right and Copyright Issue, Exceptions to Copyright Protection, Guidelines for Clearance, Copyright Elements, Payments, Collaboration.

6. **Handheld Devices (Mobiles and Tabs)** 04Hrs

Features of different handheld devices like – mobile phone, smart phone, Tablets, introduction to Android as OS for hand-held devices. Concepts of Apps, some popular applications

7. **Basic Networking & Internet:** 08Hrs

Overview of the Internet, protocols, Basic definition: networks and topologies; Access networks and physical media, Concept of OSI protocol Layers. TCP/IP (features of IPV4, IPV6), WWW, FTP, Email, DNS, ISP. Concept of multimedia streaming. Basics of Wireless communications, Introduction to Wi-Fi, Bluetooth, GSM, CDMA, GPRS, 3G, 4G.
8. **Information Technology and Society:** 04Hrs

Social Networks, e-Governance, e-Commerce, e-Learning, IT-ethics

**Laboratory Assignments (broad areas):**

- User Level hands-on experience of using Windows, Linux, Mac, Android
- Use of I/O Devices & Connectors/Ports, network components and basic network configuration
- Use of Office automation tools (Word-processor, spreadsheet, presentation tools)
- Exposure to multimedia streaming, messaging, chatting, searching on Internet

**Reference:**

**MAIN READING**

**SUPPLEMENTARY READING**

Refer: Open Office/ MS Office Environment for practice.
MAT.O2.R0 : - Introduction to Multimedia

Objective of the Course

The objective of this course is to provide concept about an application, which uses a collection of multiple media sources e.g. text, graphics, images, audio, animation and video. Students will learn about Multimedia, which is a field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

Outline of Course

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<td>2. Representation of Multimedia Objects</td>
<td>20</td>
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<td>3. Concept of Multimedia Editing</td>
<td>10</td>
</tr>
<tr>
<td>4. Introduction to Compression Technology</td>
<td>06</td>
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<tr>
<td>5. Multimedia Application Design</td>
<td>06</td>
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<tr>
<td>6. Multimedia Authoring and Publishing</td>
<td>10</td>
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</tbody>
</table>

Lecture =60
Practical =60
Total Hours =120
MAT.O2.R0: - Introduction to Multimedia

Detailed Syllabus

1. Introduction to Multimedia: 08 Hrs


2. Representation of Multimedia Objects: 20 Hrs

2.1 Representation of Analog Signals, A/D: Sampling and quantization
2.2 Text: Font and their representation (bitmap, true type)
2.3 Graphics: Raster & Vector representation, aliasing problems
2.4 Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats)
2.5 Audio (speech and wideband audio, sampling rate and aliasing, quantisation, introduction to MP3, WMA, WAV, MIDI etc.)
2.6 Video (frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm)

3. Concepts of Multimedia Editing: 10Hrs

Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling

4. Introduction to Compression Technology 06 Hrs

Concept of lossy and lossless compression. Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)

5. Multimedia Application Design: 06 Hrs

Content design, technical design, visual design, design metaphors, example studies, interactivity

6. Multimedia Authoring and Publishing 10 Hrs

Definition of an Authoring System, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors.
Offline Publishing: Flash, Power Point
Online Publishing: HTML5, Dreamweaver

**Laboratory Assignments (broad areas):**

Capturing & basic processing of media, Media cataloguing, Story boarding, scripting Basic animation & authoring tools.

**MAIN READING**


**SUPPLEMENTARY READING**

MAT.O3.R0 : - Multimedia Processing Techniques

Objective of the Course

The objective of this course is to provide a basic knowledge about processing and editing of multimedia content with more emphasis on image processing. The students will be able to understand how to create, edit and modify the multimedia content using different software tools.

Outline of Course

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<td>2. Digital representation of Color</td>
<td>02</td>
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<tr>
<td>3. Image Capture.</td>
<td>02</td>
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<tr>
<td>4. Scanning.</td>
<td>02</td>
</tr>
<tr>
<td>5. Image Processing.</td>
<td>04</td>
</tr>
<tr>
<td>6. Scalable Vector Graphics (SVG)</td>
<td>02</td>
</tr>
<tr>
<td>7. Introduction to MIDI</td>
<td>02</td>
</tr>
<tr>
<td>8. Image Editing</td>
<td>20</td>
</tr>
<tr>
<td>10. Sound Editing</td>
<td>06</td>
</tr>
<tr>
<td>11. Video Editing</td>
<td>08</td>
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</tbody>
</table>

Lecture =60
Practical =60
Total Hours=120
MAT.O3.R0 : - Multimedia Processing Techniques

Detailed Syllabus

1. **Introduction:** 02 Hrs

2. **Digital representation of Color:** 02 Hrs
   Basic Color Models (RGB, CMYK, HSV) and their use Color Characteristics, Color Palette, Monitor vs Print Display.

3. **Image Capture:** 02 Hrs
   Exposure, aperture, field of view, resolution, focal length

4. **Scanning:** 02 Hrs
   Basic principles of image and slide scanning

5. **Image Processing:** 04 Hrs
   Thresholding, Intensity histogram, histogram manipulation for image enhancement, Basic low pass, high pass, Filters: median filtering, Layer, Image Manipulation (cropping, scaling, rotation), Bitmap image editing,

6. **Scalable Vector Graphics (SVG):** 02 Hrs
   Introduction, Why SVG, use of SVG in HTML, SVG elements, SVG shapes, filters, effects, gradients-linear and nonlinear

7. **Introduction to MIDI:** 02 Hrs
   Definition, MIDI Interfaces, MIDI Instruments, MIDI file structures, MIDI file formats

8. **Image Editing: (Photoshop as reference software tool)** 20 Hrs

   **8.1) Masks and Channels:**
   Working with masks and channels, Creating a quick mask, Editing a quick mask, Saving a selection as a mask, Editing a mask, Loading a mask as a selection and applying effects, Creating a gradient mask, Loading the gradient mask as a selection and applying effects.
8.2) **Retouching and Repairing:**

Using the Clone Stamp tool for repair, Using the Pattern Stamp tool to create, Using the Healing Brush and Healing Patch to repair flaws, History palette and snapshots.

8.3) **Painting and Editing:**

Using the Photoshop paint engine, Using blending modes, Painting shadows and highlights, Smoothing the edges of strokes, Using the History Brush and the Art History Brush, Brush palette, Painting with specialty brushes, Using the Color and Swatch palettes, Adding brush libraries, Saving customized preset brushes, Image and canvas size, Creating and painting with custom brushes, Pattern Maker filter.

8.4) **Basic Pen Tool Techniques:**

Drawing paths with the pen tool, Drawing straight paths, Drawing curved paths, Combining straight and curved lines, Drawing a path around artwork, Using keyboard shortcuts.

8.5) **Creating Special Effects:**


9. **Image and Graphic Pattern Generation:**

(Adobe illustrator & Indesign as reference software tool)

9.1) **Creating Basic Shapes:**

Setting up the document, Using the tools, Drawing shapes, Painting artwork, Copying & scaling shapes, Painting, Filling with color, Stroking with color, Building a custom palette, Copying paint attributes, Saturating colors, Painting with patterns and gradients, Painting with a pattern brush, Drawing with the Pen, Drawing straight lines, Drawing curves, Editing curves.

9.2) **Working with Brushes:**

Using the Art Brushes, Using Scatter Brushes, Changing the color attributes of brushes, Using a fill color with brushes, Using Calligraphic brushes, Using Pattern brushes, Using Pattern brushes, Creating brushes.
9.3) Transforming Objects:

Scaling objects, Rotating objects, Distorting objects, Changing the perspective, Using the Free Transform tool, Making multiple transformations.

9.4) Blending Shapes and Colors:

Creating a gradient fill, Adjusting the direction of the gradient blend, Adding colors to a gradient, Creating smooth-color blends, Blending intermediate steps, Modifying the blend, Combining blends with gradients, Creating Shapes with the Pathfinder, Uniting shapes, Removing shapes to create a new object, Intersecting objects, Trimming objects, Blending colors with the Soft Mix command, Blending colors with the Hard Mix command, Dividing shapes with the Divide command.

9.5) Creating Layers:

Moving objects and layers, Locking layers, Viewing layers, Pasting layers, Merging layers.

9.6) Creating Watercolor or Airbrush Effects:

Setting Smart Guide preferences, Painting with the gradient mesh tool, Specifying the number of mesh lines, Applying colors to the mesh, Highlighting a mesh object, Editing mesh points, Reflecting mesh objects, Modifying mesh lines.

9.7) Drawing Cylinders and Boxes:

Drawing three-dimensional objects, Drawing Cylinders, Drawing boxes.

9.8) Printing Artwork & Producing Color Separations:

Overview of printing, Color management, Printing B&W proofs, Document info command, Creating Color separations, Working with two-color illustrations, Creating a trap, Overprinting objects, Combining Photoshop & Illustrator, Vector vs. bitmap, Placing a Photoshop file, Copying a placed image, Adjusting color in a placed image, Masking an image, Sampling colors in placed images, Replacing a placed image.

9.9) Preparing Graphics for Web Publication:
Optimizing images for the Web, Exporting flat-color artwork, Exporting continuous-tone and gradient artwork, Linking objects in an image map to URL’s.

10. Sound Editing: (Sonic Soundforge as reference software tool) 06 Hrs

   Introduction to Sound editing software, Working with existing sound files, Editing sound files, adding effect, Recording sound clips, Dubbing.

11. Video Editing: (Adobe Premier as reference software tool) 08 Hrs

   Introduction to video editing tools, Importing and capturing projects, working with clips, Editing techniques, Transitions, Video Effects.

Laboratory experiments:

   Image Editing: Selection, painting and transformation tools, Layers, Channels, Masks, Anti-aliasing, Dithering, Filters
   Sound Editing: Normalising, Mixing, Cross-fading, Dynamics, Filters, Mono/stereo formats, Noise Gate
   Video Editing: Importing Clips, trimming clips, splitting clips, manipulating audio content, adding transitions, changing the speed of a clip, changing opacity, applying special effects, superimposing an image, exporting a movie

Multimedia processing using tools such as Adobe Photoshop, Adobe illustrator, Adobe Premier/ Final Cut-Pro, Adobe InDesign and Sonic Soundforge, advanced features of MS Powerpoint, Publisher, Corel Tools.

MAIN READING

SUPPLEMENTARY READING
MAT.O4.R0: Multimedia Design Principles and Applications

Objective of the Course

This course will teach the use of visually rich and dynamic graphics elements to enhance web pages and sites. Advanced concepts in page layout and site optimization will be studied with emphasis on principles used to craft dynamic web pages that get noticed. Exercises and projects will allow students to apply the principles of web design to their own sites that will be created in the course.

Outline of Course

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<td>2. Elements of visual design:</td>
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<tr>
<td>3. Human Computer Interface Design</td>
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<td>4. Information Architecture</td>
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<td>5. Animation Design</td>
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<td>6. Visual Effects</td>
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<tr>
<td>7. Application Examples/ Case studies</td>
<td>04</td>
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</tbody>
</table>

Lecture =60  
Practical =60  
Total Hours =120
MAT.O4.R0 : - Multimedia Design Principles and Applications

Detailed Syllabus

1. Design Overview 06 Hrs
Need for design, Human factors, fundamentals of Human perception, Human skill level and behavior, dialogues and tasks, Learning and Learning Modes, Cognitive Domain Learning, Affective and Psychomotor Domain Learning, Multimedia Educational Software Modeling, System Quality, Elements of user Interface.

2. Elements of visual design: 12 Hrs
Introduction to basic visual elements - Line shape, colour, texture, layout, motion, framing, surfaces, visual hierarchy, typography
Elements of composition, Visual rhetoric, organizing information, factors designers consider when creating illustration and visual design, designing for screen, spatial relationships in the interface, symbols and semiotics in the interface. Visual design methodology: Clarity, consistency, appearance, visual coding layout principles.

3. Human Computer Interface Design: 10 Hrs
Information design, interaction and sensorial design, guidelines for user interface design, dialogue design, Cognitive Walkthrough- case studies/ examples – Different Android applications, like Talking Tom, Monkey Trap etc.

4. Information Architecture: 08 Hrs
Definitions of Story, Flowchart, scripts, storyboard. Necessity of the pre-production documentations, Interactive flowchart and storyboard. Examples and case studies

5. Animation Design: 12 Hrs
i. Introduction & Learning perspective drawing - Drawing for Animation: Gesture Drawing, Action Drawing, Line of action, Dynamic Poses, Action Sketches (Key Poses)
ii. 2D Design concepts & Composition.
iii. Principles of Animation.
v. Editing & Animatics.
vi. Input Sound- Sound Effects – Sound Recording.
vii. Designing, Developing Characters (Realistic, Exaggerated & Stylized)

6. Visual Effects: 08 Hrs
What are visual effects; when to use visual effects, examples of simple visual effects – glare effect, fade-in/ fade-out, motion blur
7. Application Examples/ Case studies: 04 Hrs


Laboratory experiments:
Creating website using Flash, Aftereffects, Dreamweaver, Fireworks, Visual InterDev.

MAIN READING

1. Designing Interactive Systems: People, Activities, Contexts, Technologies, by David Benyon
2. Designing Visual Interfaces: Communication Oriented Techniques, by Kevin Mullet and Darrell Sano
3. Show Me the Numbers: Designing Tables and Graphs to Enlighten, by Stephen Few
4. An Introduction to Digital Multimedia by Terry Michael Savage and Karla E Vogel
5. Basics Animation: Digital Animation by Andy Chong
6. Envisioning Information by Edward R. Tufte
7. Thinking with Type: A Primer for Designers: A Critical Guide for Designers, Writers, Editors, & Students by Ellen Lupton
8. Design Basics by David Lauer, Stephen Pentak
National Institute of Electronics & Information Technology  
(NIELIT)

Course structure of Diploma in Multimedia & Animation Technology  
(MAT-A) Level

Recommended by Syllabus Sub-Committee  
(NIELIT standing syllabus Committee)

June 2013
Course structure:
Diploma in Multimedia & Animation Technology (MAT-A) Level

Objective:
d. To acquire the knowledge to apply multimedia authoring, editing and animation in digital multimedia productions.
e. To acquire the skills to implement and supervise Multimedia productions and Web application Development.

Likely Career Options:
As per the recent market trend and the objective of the course as well as the projected skill sets of the ‘A’ level qualifiers, it is envisaged that the likely career options will be as Multimedia Production Assistant, Multi-Media content developer, 2D/3D Animator, Audio/Video editor and Web Application Developer.

Eligibility
Graduate in any discipline (The final year students are also eligible for admission) as per NIELIT norms

MAT-A level

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<td>Multimedia Processing Techniques</td>
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<tr>
<td>MAT.A3.R0</td>
<td>Multimedia Design Principles and Applications</td>
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<tr>
<td>MAT.A4.R0</td>
<td>Human-Computer Interaction Design</td>
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<tr>
<td>MAT.A5.R0</td>
<td>Video Editing</td>
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<td>MAT.A6.R0</td>
<td>Sound Processing</td>
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<tr>
<td>MAT.A7-R0</td>
<td>Web Application Development</td>
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<td>MAT.A8-R0</td>
<td>Animation in 2D and 3D</td>
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Electives (MAT-AE9)

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<td>MAT.AE9.1-R0</td>
<td>Videography and Cinematography</td>
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<td>MAT.AE9.2-R0</td>
<td>Motion Picture Production</td>
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Electives (MAT-AE10)

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<tr>
<td>MAT.AE10.1-R0</td>
<td>Computer Programming and Problem Solving through ‘C’ Language</td>
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<tr>
<td>MAT.AE10.2-R0</td>
<td>Introduction To Object Oriented Programming Through Java.</td>
</tr>
<tr>
<td>MAT.AE10.3-R0</td>
<td>Advanced Animation Techniques</td>
</tr>
</tbody>
</table>
MAT.A1.R0 : - Introduction to Multimedia

Objective of the Course

The objective of this course is to provide concept about an application, which uses a collection of multiple media sources e.g. text, graphics, images, audio, animation and video. Students will learn about Multimedia, which is a field concerned with the computer-controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

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Lecture =60
Practical =60
Total Hours =120
MAT.A1.R0: - Introduction to Multimedia

Detailed Syllabus

1. Introduction to Multimedia: 08 Hrs


2. Representation of Multimedia Objects: 20 Hrs

2.1 Representation of Analog Signals, A/D: Sampling and quantization
2.2 Text: Font and their representation (bitmap, true type)
2.3 Graphics: Raster & Vector representation, aliasing problems
2.4 Image: (bit depth, resolution, color (RGB, CMYK, HSB), introduction to BMP, GIF, TIFF, PNG and JPEG formats)
2.5 Audio (speech and wideband audio, sampling rate and aliasing, quantisation, introduction to MP3, WMA, WAV, MIDI etc.)
2.6 Video (frame rate and resolution, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Video representation: AVI, MPEG, Quick Time, real video (.rm)

3. Concepts of Multimedia Editing: 10 Hrs

Digital Audio, Music Sequencing and Notation, Image/Graphics Editing, Video Editing (Linear, Non-linear), Subtitling

4. Introduction to Compression Technology 06 Hrs

Concept of lossy and lossless compression. Concept of rate-distortion characteristics, Basics image compression (JPEG, JPEG 2000), Basics of Audio compression (MP3, MP4), Basics of Video Compression (MPEG, H.264)

5. Multimedia Application Design: 06 Hrs

Content design, technical design, visual design, design metaphors, example studies, interactivity

6. Multimedia Authoring and Publishing 10 Hrs

Definition of an Authoring System, uses of an authoring system, Definition and function of Authoring Metaphor, Different Metaphors.
Offline Publishing: Flash, Power Point
Online Publishing: HTML5, Dreamweaver
Laboratory Assignments (broad areas):

Capturing & basic processing of media, Media cataloguing, Story boarding, scripting
Basic animation & authoring tools.

MAIN READING

SUPPLEMENTARY READING
MAT.A2.R0 : - Multimedia Processing Techniques

Objective of the Course

The objective of this course is to provide a basic knowledge about processing and editing of multimedia content with more emphasis on image processing. The students will be able to understand how to create, edit and modify the multimedia content using different software tools.

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<tr>
<td>2. Digital representation of Color</td>
<td>02</td>
</tr>
<tr>
<td>3. Image Capture.</td>
<td>02</td>
</tr>
<tr>
<td>4. Scanning.</td>
<td>02</td>
</tr>
<tr>
<td>5. Image Processing.</td>
<td>04</td>
</tr>
<tr>
<td>6. Scalable Vector Graphics (SVG)</td>
<td>02</td>
</tr>
<tr>
<td>7. Introduction to MIDI</td>
<td>02</td>
</tr>
<tr>
<td>8. Image Editing</td>
<td>20</td>
</tr>
<tr>
<td>10. Sound Editing</td>
<td>06</td>
</tr>
<tr>
<td>11. Video Editing</td>
<td>08</td>
</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total Hours=120
MAT.A2.R0 : - Multimedia Processing Techniques

Detailed Syllabus

1. **Introduction:**
   - **02 Hrs**

2. **Digital representation of Color:**
   - **02 Hrs**
   Basic Color Models (RGB, CMYK, HSV) and their use Color Characteristics, Color Palette, Monitor vs Print Display.

3. **Image Capture:**
   - **02 Hrs**
   Exposure, aperture, field of view, resolution, focal length

4. **Scanning:**
   - **02 Hrs**
   Basic principles of image and slide scanning

5. **Image Processing:**
   - **04 Hrs**
   Thresholding, Intensity histogram, histogram manipulation for image enhancement, Basic low pass, high pass, Filters: median filtering, Layer, Image Manipulation (cropping, scaling, rotation), Bitmap image editing,

6. **Scalable Vector Graphics (SVG):**
   - **02 Hrs**
   Introduction, Why SVG, use of SVG in HTML, SVG elements, SVG shapes, filters, effects, gradients-linear and nonlinear

7. **Introduction to MIDI:**
   - **02 Hrs**
   Definition, MIDI Interfaces, MIDI Instruments, MIDI file structures, MIDI file formats

8. **Image Editing: (Photoshop as reference software tool)**
   - **20 Hrs**

8.1) **Masks and Channels:**

   Working with masks and channels, Creating a quick mask, Editing a quick mask, Saving a selection as a mask, Editing a mask, Loading a mask as a selection and applying effects, Creating a gradient mask, Loading the gradient mask as a selection and applying effects.
8.2) Retouching and Repairing:

Using the Clone Stamp tool for repair, Using the Pattern Stamp tool to create, Using the Healing Brush and Healing Patch to repair flaws, History palette and snapshots.

8.3) Painting and Editing:

Using the Photoshop paint engine, Using blending modes, Painting shadows and highlights, Smoothing the edges of strokes, Using the History Brush and the Art History Brush, Brush palette, Painting with specialty brushes, Using the Color and Swatch palettes, Adding brush libraries, Saving customized preset brushes, Image and canvas size, Creating and painting with custom brushes, Pattern Maker filter.

8.4) Basic Pen Tool Techniques:

Drawing paths with the pen tool, Drawing straight paths, Drawing curved paths, Combining straight and curved lines, Drawing a path around artwork, Using keyboard shortcuts.

8.5) Creating Special Effects:


9. Image and Graphic Pattern Generation: 10Hrs
(Adobe illustrator & Indesign as reference software tool)

9.1) Creating Basic Shapes:

Setting up the document, Using the tools, Drawing shapes, Painting artwork, Copying & scaling shapes, Painting, Filling with color, Stroking with color, Building a custom palette, Copying paint attributes, Saturating colors, Painting with patterns and gradients, Painting with a pattern brush, Drawing with the Pen, Drawing straight lines, Drawing curves, Editing curves.

9.2) Working with Brushes:

Using the Art Brushes, Using Scatter Brushes, Changing the color attributes of brushes, Using a fill color with brushes, Using Calligraphic brushes, Using Pattern brushes, Using Pattern brushes, Creating brushes.
9.3) Transforming Objects:

Scaling objects, Rotating objects, Distorting objects, Changing the perspective, Using the Free Transform tool, Making multiple transformations.

9.4) Blending Shapes and Colors:

Creating a gradient fill, Adjusting the direction of the gradient blend, Adding colors to a gradient, Creating smooth-color blends, Blending intermediate steps, Modifying the blend, Combining blends with gradients, Creating Shapes with the Pathfinder, Uniting shapes, Removing shapes to create a new object, Intersecting objects, Trimming objects, Blending colors with the Soft Mix command, Blending colors with the Hard Mix command, Dividing shapes with the Divide command.

9.5) Creating Layers:

Moving objects and layers, Locking layers, Viewing layers, Pasting layers, Merging layers.

9.6) Creating Watercolor or Airbrush Effects:

Setting Smart Guide preferences, Painting with the gradient mesh tool, Specifying the number of mesh lines, Applying colors to the mesh, Highlighting a mesh object, Editing mesh points, Reflecting mesh objects, Modifying mesh lines.

9.7) Drawing Cylinders and Boxes:

Drawing three-dimensional objects, Drawing Cylinders, Drawing boxes.

9.8) Printing Artwork & Producing Color Separations:

Overview of printing, Color management, Printing B&W proofs, Document info command, Creating Color separations, Working with two-color illustrations, Creating a trap, Overprinting objects, Combining Photoshop & Illustrator, Vector vs. bitmap, Placing a Photoshop file, Copying a placed image, Adjusting color in a placed image, Masking an image, Sampling colors in placed images, Replacing a placed image.

9.9) Preparing Graphics for Web Publication:
Optimizing images for the Web, Exporting flat-color artwork, Exporting continuous-tone and gradient artwork, Linking objects in an image map to URL’s.

10. Sound Editing: (Sonic Soundforge as reference software tool) 06 Hrs

Introduction to Sound editing software, Working with existing sound files, Editing sound files, adding effect, Recording sound clips, Dubbing.

11. Video Editing: (Adobe Premier as reference software tool) 08 Hrs

Introduction to video editing tools, Importing and capturing projects, working with clips, Editing techniques, Transitions, Video Effects.

Laboratory assignments:

Image Editing: Selection, painting and transformation tools, Layers, Channels, Masks, Anti-aliasing, Dithering, Filters
Sound Editing: Normalising, Mixing, Cross-fading, Dynamics, Filters, Mono/stereo formats, Noise Gate
Video Editing: Importing Clips, trimming clips, splitting clips, manipulating audio content, adding transitions, changing the speed of a clip, changing opacity, applying special effects, superimposing an image, exporting a movie

Multimedia processing using tools such as Adobe Photoshop, Adobe illustrator, Adobe Premier/ Final Cut-Pro, Adobe InDesign and Sonic Soundforge, advanced features of MS Powerpoint, Publisher, Corel Tools.

MAIN READING

SUPPLEMENTARY READING
MAT.A3.R0 : - Multimedia Design Principles and Applications

Objective of the Course

This course will teach the use of visually rich and dynamic graphics elements to enhance web pages and sites. Advanced concepts in page layout and site optimization will be studied with emphasis on principles used to craft dynamic web pages that get noticed. Exercises and projects will allow students to apply the principles of web design to their own sites that will be created in the course.

Outline of Course

<table>
<thead>
<tr>
<th>Topic</th>
<th>Minimum No. Of Hours</th>
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<td>1. Design Overview</td>
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<tr>
<td>2. Elements of visual design:</td>
<td>12</td>
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<tr>
<td>3. Human Computer Interface Design</td>
<td>10</td>
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<tr>
<td>4. Information Architecture</td>
<td>08</td>
</tr>
<tr>
<td>5. Animation Design</td>
<td>12</td>
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<tr>
<td>6. Visual Effects</td>
<td>08</td>
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<tr>
<td>7. Application Examples/ Case studies</td>
<td>04</td>
</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total Hours =120
MAT.A3.R0 : - Multimedia Design Principles and Applications

Detailed Syllabus

1. Design Overview 06 Hrs
   Need for design, Human factors, fundamentals of Human perception, Human skill level and behavior, dialogues and tasks, Learning and Learning Modes, Cognitive Domain Learning, Affective and Psychomotor Domain Learning, Multimedia Educational Software Modeling, System Quality, Elements of user Interface.

2. Elements of visual design: 12 Hrs
   Introduction to basic visual elements - Line shape, colour, texture, layout, motion, framing, surfaces, visual hierarchy, typography
   Elements of composition, Visual rhetoric, organizing information, factors designers consider when creating illustration and visual design, designing for screen, spatial relationships in the interface, symbols and semiotics in the interface. Visual design methodology: Clarity, consistency, appearance, visual coding layout principles.

3. Human Computer Interface Design: 10 Hrs
   Information design, interaction and sensorial design, guidelines for user interface design, dialogue design, Cognitive Walkthrough- case studies/ examples – Different Android applications, like Talking Tom, Monkey Trap etc.

4. Information Architecture: 08 Hrs
   Definitions of Story, Flowchart, scripts, storyboard. Necessity of the pre-production documentations, Interactive flowchart and storyboard. Examples and case studies

5. Animation Design: 12 Hrs
   viii. Introduction & Learning perspective drawing - Drawing for Animation: Gesture Drawing, Action Drawing, Line of action, Dynamic Poses, Action Sketches (Key Poses)
   ix. 2D Design concepts & Composition.
   x. Principles of Animation.
   xii. Editing & Animatics.
   xiii. Input Sound- Sound Effects – Sound Recording.
   xiv. Designing, Developing Characters (Realistic, Exaggerated & Stylized)

6. Visual Effects: 08 Hrs
   What are visual effects; when to use visual effects, examples of simple visual effects – glare effect, fade-in/ fade-out, motion blur
7. Application Examples/ Case studies: 04 Hrs

Laboratory assignments:
Creating website using Flash, Aftereffects, Dreamweaver, Fireworks, Visual InterDev.

MAIN READING

1. Designing Interactive Systems: People, Activities, Contexts, Technologies, by David Benyon
2. Designing Visual Interfaces: Communication Oriented Techniques , by Kevin Mullet and Darrell Sano
3. Show Me the Numbers: Designing Tables and Graphs to Enlighten , by Stephen Few
4. An Introduction to Digital Multimedia by Terry Michael Savage and Karla E Vogel
5. Basics Animation: Digital Animation by Andy Chong
6. Envisioning Information by Edward R. Tufte
7. Thinking with Type: A Primer for Designers: A Critical Guide for Designers, Writers, Editors, & Students by Ellen Lupton
8. Design Basics by David Lauer, Stephen Pentak
MAT.A4-R0 : Human-Computer Interaction Design

Objective of the Course

The objective of this course is to provide a basic idea about Metaphors and conceptual models, Visual design, Cognitive principles, Prototyping Interaction design tools, Human emotions and Social Interfaces

Outline of Course

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<thead>
<tr>
<th>Topic</th>
<th>Minimum No. of Hours</th>
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<td>1. Introduction to Human-Computer Interaction</td>
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<tr>
<td>2. User-oriented process</td>
<td>05</td>
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<tr>
<td>3. Working with users</td>
<td>05</td>
</tr>
<tr>
<td>4. Fundamentals of Interaction</td>
<td>06</td>
</tr>
<tr>
<td>5. Metaphors and conceptual models</td>
<td>06</td>
</tr>
<tr>
<td>6. Design of Visual elements</td>
<td>04</td>
</tr>
<tr>
<td>7. Cognitive principles</td>
<td>06</td>
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<tr>
<td>8. Prototyping</td>
<td>06</td>
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<tr>
<td>9. Interaction design tools</td>
<td>06</td>
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<tr>
<td>10. Emotions and Affect</td>
<td>04</td>
</tr>
<tr>
<td>11. Physical devices and tangible interaction</td>
<td>04</td>
</tr>
<tr>
<td>12. Introduction to Social Media</td>
<td>04</td>
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</tbody>
</table>

Lecture = 60
Practical/Tutorial = 60
Total Hours = 120
MAT. A4-R0 : Human-Computer Interaction Design

Detailed Syllabus

1. Introduction to Human-Computer Interaction: 04 Hrs

2. User-oriented process: 05 Hrs

3. Working with users: 05 Hrs

4. Fundamentals of Interaction: 09 Hrs
   Direct Manipulation, Seven Stages of Action, The Interaction Cycle, Conceptual Models Engagement, Affordances, Natural mapping Constraints, Feedback, Error

5. Metaphors and conceptual models: 09 Hrs
   Metaphors, the Desktop Metaphor, Notebook Metaphor Bookshelf, Metaphor Web Book Physical Device Metaphors, Conversational Agents, Timeline Metaphor, design aspects.

6. Design of Visual elements: 04 Hrs
   Types of visual presentations, Visual language, Visual complexity, Scanning, Grouping. Design of Icons, buttons, layout, menus

7. Cognitive principles: 06 Hrs
   Limited Processing Resources, Visual Search and Pre-attentive Processing, Short term (working) memory, Long-term memory.
8. Prototyping: 06 Hrs

Introduction to Prototype, Iterative Prototyping vs. the Waterfall Model, Uses of Prototypes, Prototype Dimensions, Designing the Prototype, Early Stage Prototypes.

9. Interaction design tools: 06 Hrs

Tools, Success of Tools, Application Types, Threshold & Ceiling, Window Managers, Toolkits, Event Languages, Graphical Interactive Tools, Interactive Prototypes

10. Physical devices and interaction tools: 04 Hrs


11. Introduction to Social Media: 04 Hrs

Aspects of the Social Interface, Computer Supported Collaborative Work, Peer-to-peer Applications, Social behavior, Social Network Applications.

Laboratory assignments:

Using and authoring package viz. Adobe Director: Basic features – Stage, Cast, Score, Sprite, Markers, Behaviours, Property Inspector, Behaviour Inspector, Control Panel, Registration Point, Inks, Paint window, Vector window, Text window;
Creating animations – Tweening, Exchanging cast members, Cast to Time, Space to Time, Film loop, Step recording, Real time recording, Onion skinning;
Additional features – Transition channel, Audio channel, Script channel, Tempo channel, Xtras, Shockwave;
Creating and modifying behaviours, Using Cue points in Audio and Video, Editing Quicktime Video, Changing cursor appearance, Sending message between sprites, Modifying sprites at runtime;
Working with multiple movies;
Publishing – Director movies (DIR) and Projector (EXE) files, External casts (CST files), Protected external casts (CXT files), Protected movies (DXR files), shockwave movies (DCR files)

MAIN READING

1. Designing Interactive Systems: People, Activities, Contexts, Technologies, by David Benyon
MAT.A5-R0 : - Video Editing

Objective of the Course

The objective of this course is to provide knowledge about how to manipulate video images. Video editing includes cutting segments (trimming), re-sequencing clips, and adding transitions and other special effects.

Outline of Course

<table>
<thead>
<tr>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>1. Basics of Video.</td>
<td>10</td>
</tr>
<tr>
<td>2. Video Formats</td>
<td>08</td>
</tr>
<tr>
<td>3. Video Editing</td>
<td>30</td>
</tr>
<tr>
<td>4. Special Effects on Video.</td>
<td>12</td>
</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total class =120
MAT.A5-R0 : - Video Editing

Detailed Syllabus

1. **Basics of Video:** 10 Hrs
   Basics of Video, Lines, Frames, Fields, Raster Scan, Frame rate and resolution, Aspect Ratio, interlaced and non-interlaced video, colour planes (YCBCR, YUV), Video broadcast standards (PAL, NTSC, SECAM), HD Video, 3D TV, Audio-Video Synchronization,

2. **Video Standard:** 08 Hrs
   Video overview (MPEG-1, MPEG-2, MPEG-4, H.264), CODECs (Cinepak etc.)

3. **Video Editing:** 30 Hrs
   Introduction to Editing, introduction to digital nonlinear editing software (Video & Film), Digital film making & the difference between Film & Video, Media management (Pre-edit), Capturing from different media storage devices & formats, Interface & basic tools of a video editing software, Understanding the timeline, Tools & techniques for advance editing, Media management (Post-edit), Alpha correction, Chroma correction, Audio tools, Adding audio, Audio editing, Colour correction, Titleing & composting , Packaging timeline, Edit to tape (mastering) & Exporting to different media.

4. **Special Effects for Video** 12 Hrs
   Overview of special effects for video, working with effects, keyframing effects, effects presets, overview of frequently used effects, overview of colour correction and colour oriented effects, special colour effects, colour keying, working with the opacity effect, working with alpha-channel transparencies.

Lab Assignments
Create a movie trailer of 30 Seconds duration.

**MAIN READING**
1. Video Editing and Post-Production: A Professional Guide -by Gary H Anderson
2. An Editor's Guide to Adobe Premiere Pro - by Richard Harrington, Robbie Carman,Jeff I. Greenberg
4. Premiere Pro Editing Workshop - by Marcus Geduld
MAT.A6-R0 : - Sound Processing

Objective of the Course

The objective of this course is to provide an introduction to Sound and Audio. The students will understand the basic editing of sound and assembling sound recordings in preparation for the final sound mixing or mastering of a television program or motion picture.

Outline of Course

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<td>1. Introduction.</td>
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<tr>
<td>2. Musical Sound and Noise.</td>
<td>06</td>
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<tr>
<td>3. Elementary Sound system.</td>
<td>06</td>
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<tr>
<td>4. Digital Representation of Sound.</td>
<td>06</td>
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<tr>
<td>5. Digital Audio recording and reproduction.</td>
<td>03</td>
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<tr>
<td>6. Audio Production</td>
<td>09</td>
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<tr>
<td>7. Digital Music Making</td>
<td>06</td>
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<tr>
<td>8. Sound Editing</td>
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</tbody>
</table>

Lecture = 60
Practical = 60
Total class = 120
MAT.A6-R0 : - Sound Processing

Detailed Syllabus

1. Introduction: 04Hrs

2. Musical Sound and Noise: 06 Hrs
   Definition, note and tone, characteristics of a musical sound. S/N Ratio, Noise Cancellation

3. Elementary Sound system: 06 Hrs
   Microphones, Pressure Microphones, Velocity Microphones, Amplifier, Loudspeaker, Sound Channels and their spatial reproduction : 2.1 channels, 5.1, phases

4. Digital Representation of Sound: 06 Hrs
   Early Sound Storage and transmission technology, Pulse Code Modulation, Sampling Rate, Sampling Resolution, Bit Rate.

5. Digital Audio recording: 03 Hrs
   Recording from different source, digital audio consoles and controllers, overview of MP3

6. Audio Production: 09 Hrs
   Multi–track recording, Mixer, Delay, Reverb, Noise gate and compressor.

7. Digital Music Making: 06 Hrs
   Synthesizer, MIDI, MIDI file format, Sound Cards, PCM playback and recording.

8. Sound Editing: 20 Hrs
   8.1) Sound Format and Settings:
       Audio Interchange File Format (AIFF, AIF), Musical Instrument Digital Interface (MID, MDI, MFF), Resource Interchange File Format (RIFF), Wave (WAV).
   8.2) Adobe Audition:
       Recording your Voice in the Studio, Importing Music into a Project, Editing Audio in Edit View, Editing Audio in Multi-track View, Exporting and Finishing an Audio Project, Using CD Project View to Burn an Audio CD, Adding Music from a regular CD
8.3) Simple Editing and Navigation:
Cut, Copy, Paste, Clear, Trim/Crop, Mix, Crossfade, Magnification and Zooming.

8.4) Advanced Editing:
Changing Sound Formats, Using Markers, Using Regions.

8.5) Recording:
Recording Basics, Recording modes, Remote Recording.

8.6) Applying Sound Effects:
Acoustic Mirror, Amplitude Modulation, Chorus, Delay/Echo, Distortion, Dynamics, Envelop, Flange/ Wah-Wah, Gapper/ Snipper, Noise Gate, Pitch, Reverb, Stutter, Vibrato, Wave Hammer.

8.7) Applying Sound Process:
Auto Trim/Crop, Bit-Depth Converter, Channel Converter, DC Offset, EQ, Fade, Insert Silence, Invert/Flip, Mute, Normalize, Pan/Expand, Resample, Reverse, Smooth/Enhance, Swap Channels, Time Stretch, Volume.

Lab Assignments
Record voice and music; mixing background music; apply effects, saving in different formats

MAIN READING
2. Sound Forge Power - By Scott R Garrigus.
3. JBL Audio Engineering for Sound Reinforcement - by John Eargle, Chris Foreman.
MAT.A7-R0 : - Web Application Development

Objective of the Course

The objective of this course is to provide basic knowledge about the software technologies and their applications in web based applications and applications for handheld devices.

Outline of Course

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<td>1. Programming Logic</td>
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<tr>
<td>2. Concept of Markup Language</td>
<td>10</td>
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<tr>
<td>3. Concept of Client Side Scripting</td>
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<tr>
<td>4. Concept of Server Side Scripting</td>
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<tr>
<td>5. Interacting with the server: Forms</td>
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<tr>
<td>6. String Handling</td>
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<tr>
<td>7. Introduction to Databases</td>
<td>04</td>
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<tr>
<td>8. Designing and Creating a Database</td>
<td>02</td>
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<tr>
<td>9. Using Databases: Storing and Retrieving Data</td>
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<tr>
<td>10. Cookies and Sessions</td>
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<tr>
<td>11. User Authentication</td>
<td>01</td>
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<tr>
<td>12. File Uploading</td>
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<tr>
<td>13. Working with Dates and Times</td>
<td>01</td>
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<tr>
<td>14. XML and XHTML</td>
<td>04</td>
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<tr>
<td>15. Development and Deployment</td>
<td>02</td>
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<tr>
<td>16. Web based Tools</td>
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</tbody>
</table>

Lecture=60  
Practical=60  
Total Hours=120
MAT.A7-R0: Web Application Development

Detailed Syllabus

1. Programming Logic 08 Hrs
   Algorithm (Definition and Procedures), Flow Chart (Definition, Procedure & Symbols) Problem Solving Techniques (Problem Decomposition, Top Down Design, Bottom Up Design), Simple programming examples (Concept can be illustrated through pseudo codes).

2. Concept of Markup Language: 10 Hrs
   2.2 DHTML: CSS Introduction, CSS Syntax, CSS Background, CSS Text, CSS Font, CSS Border, CSS Margin, CSS Padding, CSS List.

3. Concept of Client Side Scripting 08 Hrs

4. Concept of Server Side Scripting: 08 Hrs
   PHP: Introduction, Configuration, Object oriented programming knowledge, Variable and Operator, Control statement, working with array, Using inbuilt function.

5. Interacting with the server: Forms: 02 Hrs
   An example of forms, Working with HTML forms, Adding a form to your page, How Data is submitted, Accessing the form data within script, Character sets and forms, Working With The Server, Server considerations, Server Variables, Environment Variables, Redirecting the user.

6. String Handling 02 Hrs
   Strings & PHP, Character Sets and Unicode, Configuring PHP for Unicode, Operating on String
7. **Introduction to Databases:** 04 Hrs  
Basics, DBMS and RDMS concept, Motivations for using a Database, The case against simple files or spreadsheets, Database Servers, Major Database Servers, MySQL, PostgreSQL, Oracle Database, Microsoft SQL Server, Other Servers, How to select a database server, Data analysing, Capabilities, Performance, Accessibility from within PHP

8. **Designing and Creating a Database:** 02 Hrs  
Organising Data, Primary Keys, Choosing Data Types, Organizing Data into Tables, Indexes for faster searching, An introduction to SQL, Creating Databases, Setting user permissions, Creating Tables, Deleting Tables and Databases

9. **Using Databases: Storing and Retrieving Data:** 02 Hrs  
Inserting Data into Tables, Retrieving Data from Tables, Modifying Data in Your Tables, Deleting Data from Tables

10. **Cookies and Sessions:** 02 Hrs  
Introduction to Cookies and Sessions, Session Security

11. **User Authentication:** 01 Hr  
Planning for Members, Web Sever Provided Authentication, Implementing Our Own Authentication

12. **File Uploading** 01 Hr  
Uploading User File, A File Uploading Example, Security Consideration

13. **Working with Dates and Times:** 01 Hr  
Sources of Dates and Times, Dates and Times in PHP, More Dates and Times in Database Servers.

14. **XML and XHTML:** 04 Hrs  
XML, Working with XML in PHP, XHTML

15. **Development and Deployment** 02 Hrs  
Coding Standards, Source Code Control, Testing, Deployment

16. **Web based Tools** 03 hrs  
Overview of moodle, joomla, drupal, wordpress.

**Laboratory Assignments:**

Web page designing with HTML and Java script.

Use of DHTML, XML
Basic server side Coding for handling user inputs; accessing, inserting, updating, deleting data from database. Basic coding for handling XML data from PHP.

MAIN READING
1. Internet and World Wide Web How to Program. Author: P.J. Deitel & H.M. Deitel
MAT.A8-R0 : - Animation in 2D and 3D

Objective of the Course

The objective of this course is to make the students understand 2D Animation. The students will be able to create moving pictures in a two-dimensional environment. This is done by sequencing consecutive images, or "frames", that simulate motion by each image showing the next in a gradual progression of steps. Further the students will also be exposed to basics of 3D Animation.

Outline of Course

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<tr>
<td>2. Animation Techniques.</td>
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<tr>
<td>3. 2D Animations.</td>
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<tr>
<td>4. Image Manipulation Techniques.</td>
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<tr>
<td>5. Spatial transformation.</td>
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</tr>
<tr>
<td>6. Creating Animation.</td>
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</tr>
<tr>
<td>7. Introduction to 3D animation and Special Effects</td>
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</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total class =120
1. **Introduction:**
   04 Hrs

2. **Animation Techniques:**
   Traditional Animation, Computer Based Animation.
   04 Hrs

3. **2D Animations:**
   Sprite Animation, Rendered Animation.
   08 Hrs

4. **Image Manipulation Techniques:**
   Tweening, Warping, Morphing, Walk Cycle, Colour cycle.
   06 Hrs

5. **Spatial transformation:**
   Image Translation, Image Rotation, Image Scaling, Key-framing, Lofting,
   Lighting, Revolving.
   02 Hrs

6. **Creating Animation:**
   20 Hrs

   6.1) **Introduction to the Flash MX Environment and Basic Object Creation**
   Definition of Flash? The Flash MX Work Environment, Vector vs. Raster
   Graphics, Basic Drawing and Painting Tools, Creating Custom Colours,
   Gradients, and Line Styles.

   6.2) **Manipulating Objects**
   Selecting Objects, Object Interaction, Transforming and Grouping Objects,
   Working with Bitmap Images.

   6.3) **Text and Multiple Layers**
   Text Blocks, Converting Text into Shapes, Creating and Managing Multiple

   6.4) **Creating Animation**
   Frame-by-Frame Animation, Shape-Tweened Animation, Motion-Tweened
   Animation, Guide Layers, Masked Animations, Selecting Your Publishing
   Settings, Previewing and Publishing Files.

   6.5) **Flash MX:**

   a) **An Animation Review and an Introduction to Symbols and Instances**
   Animation Overview, Understanding Symbols and Instances, Editing Symbols
   and Instances, Creating a Shared Symbol Library, Creating Buttons.
   Using the Movie Explorer.
b) Interactivity and Sound in Flash
Introduction to Interactivity, Using the Stop and Go To Actions, Linking from Flash. Using Drag and Drop within Flash, Using the If Frame is Loaded Action, Adding Sounds to a Flash Movie, Importing and Editing Sound Properties.

c) Advanced Interactivity

d) Testing and Publishing

7. Introduction to 3D animation and Special Effects 16Hrs
Introduction to 3D animation, History of 3D Animation, understanding of 3D coordinate systems, concept of Viewport, navigation in space, modeling of objects in 3D space.

7.1) Introduction to Polygons
a) Sub - Division Modeling
b) Nurbs Modeling
c) Advanced Modeling

7.2) Introduction to Sharers and Textures
a) Using Hyper shade
b) Applying texture to models/ Ch.
c) Photoshop, shaders, bump mapping
d) Displacement mapping
e) Utility nodes

7.3) UV Mapping
a) UV's
b) Planner map
c) Automatic/spherical/ cylindrical map
d) Unfold
e) Repace

7.4) Rigging- Introduction-
 a) Building skeleton- understanding joints
 b) Forward & inverse kinematics
 c) Constraint
d) Skinning
e) Local Rotation Axis
f) Controllers
g) Set driver key 

h) Blend Shapes 

i) Reverse foot 

j) Spline I.K. 

k) FK - IG Switch 

7.5) Lighting - Introduction 
    a) Basic 3 point lighting 
    b) Directional light 
    c) Ambient light 
    d) Spot light 
    e) Depth map shadow 
    f) Indoor lighting 
    g) Outdoor lighting 

7.6) Animation - Introduction 
    a) Key frames 
    b) Squash & stretch 
    c) Graph editor 
    d) Posing a character 
    e) Keys - Extreme & in-betweens 

7.7) Dynamics 
    a) Particle 
    b) Emitters 
    c) Fields 
    d) Soft bodies 
    e) Springs 
    f) Rigid bodies 
    g) Hardware Rendering 

7.8) Camera 
    a) Creating Camera 
    b) Angle of view 
    c) Focal length 
    d) Depth of field 
    e) Aperture 
    f) Film aspect ratio 
    g) Pixel aspect ratio 
    h) Clip planes 
    i) Z – depth 
    j) Motion blur 

7.9) Rendering 
    a) Using software renderer 
    b) Sean Line renders 
    c) Render settings
7.10) Nurbs Modeling
   a) Nurbs curves & surfaces
   b) Components
   c) Nurbs continuity
   d) Tools

Laboratory Assignments:

2D Animation – Creating vector graphics, Creating 2D animation, working with layers, Symbols and libraries, Buttons, Movie clips, Grouping, aligning and transforming objects, Colour gradients and transperencies, Creating animated GIF files, Motion tweening, Motion guides, Shape tweening, Shape hints, Masking, Animating a mask, Interaction, Using 2d animation software, Using scripting languages (e.g. Actionscript), Publishing an animated movie;

3D Animation – Modeling: Creating 3D animation, view-ports and projections, wire-frame and rendered models, Selecting objects, Translating rotating and scaling objects, Creating on customised planes, Rendering scenes, Pivot points, Linear and circular array of objects, Creating 2D shapes, Methods of extrusion, Lathing and Lofting, Using boolean operations, Using space warps and particle systems;
   Surface texture: Adding surface materials, Using material editors, Creating transparent object, Creating metallic objects;
   Lights: Placing lights, Adjusting light parameters, Shadows, Reflections;
   Cameras: Placing cameras, camera movements, Camera motion paths;
   Animation: Creating key frames, Tweening, Rendering, Time-scaling, Adding background sound and images.

MAIN READING
1. Adobe Flash Professional Bible by Todd Parkins.
3. Autodesk 3ds Max 2013 Bible, Kelly L. Murdock
MAT.AE9.1-R0 : - Videography and Cinematography

Objective of the Course:

The objective of this course is to develop expertise related to video and audio related works and towards orientation of Cameraperson and Cinematographers. After completing the module the students will have an overall conception about camera, photography and cinematography.

Outline of Course:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Minimum No. of Hours.</th>
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<tbody>
<tr>
<td>1. Introduction to cinematography</td>
<td>04</td>
</tr>
<tr>
<td>1.1) The Nature of Light.</td>
<td></td>
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<tr>
<td>1.2) The Human Eye.</td>
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<tr>
<td>1.3) Film Stock and Processing.</td>
<td></td>
</tr>
<tr>
<td>2. Basics of Camera</td>
<td>12</td>
</tr>
<tr>
<td>3. Lighting</td>
<td>08</td>
</tr>
<tr>
<td>4. Camera movement</td>
<td>10</td>
</tr>
<tr>
<td>5. Advanced Exposure Control.</td>
<td>04</td>
</tr>
<tr>
<td>6. Cameras &amp; film, digital cameras, film scanners:</td>
<td>08</td>
</tr>
<tr>
<td>7. Digital storage</td>
<td>04</td>
</tr>
<tr>
<td>8. Shooting Principles</td>
<td>10</td>
</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total Hours =120
MAT.AE9.1-R0 : - Videography and Cinematography

Detailed Syllabus

1. Introduction to cinematography: 04 Hrs
Conventional aerial photography, Small-format aerial photography. Chemistry of film exposure.

1.1) The Nature of Light:

1.2) The Human Eye:

1.3) Film Stock and Processing:
Photochemical Spectrum, Structure and Anti-Halation, Speed and Exposure, Processing, Densitometry, Sensitometry, Contrast Control, Gamma. Controls of Exposure, Light Meters and Automatic Cameras, Color-Infrared Film.

2. Basics of Camera: 12 Hrs
Drive, Film Transport, Gate, Lenses, Back Focus, Claw and Registration. Components and properties of camera. Basic principles of photographic representation Close, Long shots. Response function of a camera. CCD cameras (1 CCD, 3CCD etc) and their usage, Optical and geometric properties of lens, Depth of Field. Basic Structure – Pin Hole camera model, Wide angle lens, Telephoto lens

3. Lighting: 08 Hrs

4. Camera movement: 10 Hrs
Use of Lenses: Zooming v Tracking, Studio Effects, Back and Front Projection, Depth of Focus, Glass Shots, Trombone shots.

5. Advanced Exposure Control: 04 Hrs
Studio Lighting, Key and Filler Ratios, Exteriors, Day for Night, Window Filters, Spot and Colour Temperature Meters, Key Tone Pegging.
6. **Cameras & film, digital cameras, film scanners:** 08 Hrs
   Features of DSLR video & still cameras, use of features for realization of different effects.

7. **Digital Storage:** 04 Hrs
   Digital storage – Tapes, DVDs, Blu-ray, Zip drives, [techniques for storage on these media] Digital file formats, Studio uncompressed file formats (DVcam etc.)

8. **Shooting Principles:** 10 Hrs
   Shot design and composition (selection of close-up, mid-shot, wide angle etc.) through case studies drawing examples with clippings from important films (*Pather Panchali*, *Meghe Dhaka Tara*, *Tare Zamin Par*, etc.)

**Lab Assignments:**
   Introduction to 3-point lighting through demonstration and discussion, Identify aesthetics in a composition, Identify different features of different cameras, Use of Light-meters, determine set and lighting needs, Demonstrate effective design of ‘filmspace’ and continuity; Demonstrate effective exterior filming and controlling light; Demonstrate effective planning of shots – panning, tracking, dolly and steadicam

**MAIN READING**

1. How to read a film - by James Monaco, Oxford University Press
2. Film Art - An introduction by Bordwell Thompson, Wisconsin University Press
8. Sound Techniques fro Video and TV by Glen Alkin.
9. Creating Special Effects for TV and Video by Bernard Wilkie.
12. Use of Microphone by Alec Nisbett.
13. Motion Picture Camera Techniques by D.W.Samuelson.
14. Motion Picture and Video Camera Filters and Lab Techniques by Gerald Hirschfeld.
15. Lighting for Photography by W. Nurenb.
MAT.AE9.2-R0 : - Motion Picture Production

Objective of the Course:

The objective of this course is to develop capability for taking care of the total production work related to videography or cinematography to enable the students in understanding motion picture production. The course would emphasize Motion Picture as a form of entertainment that enacts a story by a sequence of images giving the illusion of continuous movement.

Outline of Course:

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<thead>
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<td>2. The Cinematographic apparatuses</td>
<td>04</td>
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<tr>
<td>3. Lighting.</td>
<td>06</td>
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<tr>
<td>4. The Moving Camera.</td>
<td>06</td>
</tr>
<tr>
<td>5. Advanced Exposure Control.</td>
<td>02</td>
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<tr>
<td>6. The Screenplay.</td>
<td>02</td>
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<tr>
<td>7. Pre-production</td>
<td>08</td>
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<tr>
<td>8. Production</td>
<td>12</td>
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<tr>
<td>9. Post-production</td>
<td>08</td>
</tr>
<tr>
<td>10. Assignment – Analysis of feature films.</td>
<td>08</td>
</tr>
</tbody>
</table>

Lecture =60
Practical =60
Total Hours =120
MAT.A9.2-R0: - Motion Picture Production

Detailed Syllabus

1. Basics of Optics: 04hrs

2. The Cinematographic apparatuses: 04hrs

3. Lighting: 06 Hrs

4. The Moving Camera: 06 Hrs

5. Advanced Exposure Control: 02 Hrs
Studio Lighting, Key and Filler Ratios, Exteriors, Day for Night, Window Filters, Spot and Colour Temperature Meters, Key Tone Pegging.

6. The Screenplay: 02 Hrs
TV Commercials, Documentaries and Features, From Treatment to Screenplay to Shooting Script, Character and Plot development.

7. Pre-production: 08 Hrs
Requirements of pre-production, Location scouting – indoor & outdoor, Formalities to be observed, Selection of themes – fiction, non-fiction and animated images, Preparation of sequence from storyboard to final script
8. **Production:** 12 Hrs
   Direction - Use of space (Mise en Scene), use of time (Montage) and formation of meaningful narrative, Classical Hollywood paradigm, Alternative paradigms - (Indian, continental), Camera, Handling of actors and Decors, Recording direct sound, Concept of sound design, Lighting arrangement – natural and artificial, Studio visit optional

9. **Post-production:** 08 Hrs
   Introduction to Dubbing, Sound mixing, Special effects, Basics of editing – linear, non-linear, online, Punctuation Marks, Delivery mechanism (digital, analog, streaming video etc.), Dissemination vehicles

10. **Assignment:** 08 Hrs
    *Mise-en-Scene* analysis of selected portions from different fiction and non-fiction films (Report writing on the technical aspects)

**Lab Assignments**
   Introduction to 3-point lighting through demonstration and discussion; Identify different features of different cameras; Demonstrate camera movements - panning, tracking, tilting; Basic aspects of script writing –workshop mode; Production management - workshop mode

**MAIN READING**

1. Understanding Films - Louis Gianetti
2. Learn Photography by Benu Sen (published by PAD)
3. 5 C’s of Cinematography (published by Focal Press).
5. Art of Lighting (published by Focal Press).
8. Lens (published by Focal Press).
MAT.AE10.1-R0: Computer Programming and Problem Solving through ‘C’ Language

Objective of the Course

The objectives of this course are to make the student understand programming language, programming, concepts of Loops, reading a set of Data, stepwise refinement, Functions, Control structure, Arrays. After completion of this course the student is expected to analyze the real life problem and write a program in ‘C’ language to solve the problem. The main emphasis of the course will be on problem solving aspect i.e. developing proper algorithms.

After completion of the course the student will be able to

- Develop efficient algorithms for solving a problem.
- Use the various constructs of a programming language viz. conditional, iteration and recursion.
- Implement the algorithms in “C” language.
- Use simple data structures like arrays, stacks and linked list in solving problems.
- Handling File in “C”.

Outline of Course

<table>
<thead>
<tr>
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<tr>
<td>1. Introduction to Programming</td>
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<tr>
<td>2. Algorithms for Problem Solving</td>
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</tr>
<tr>
<td>3. Introduction to ‘C’ Language</td>
<td>04</td>
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<tr>
<td>4. Conditional Statements and Loops</td>
<td>07</td>
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<tr>
<td>5. Arrays</td>
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<tr>
<td>6. Functions</td>
<td>06</td>
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<tr>
<td>7. Storage Classes</td>
<td>03</td>
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<tr>
<td>8. Structures and Unions</td>
<td>06</td>
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<tr>
<td>9. Pointers</td>
<td>06</td>
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<tr>
<td>10. Self Referential Structures and Linked Lists</td>
<td>04</td>
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<tr>
<td>11. File Processing</td>
<td>04</td>
</tr>
</tbody>
</table>

Lectures = 60
Practical/tutorials = 60
Total = 120
MAT.AE10.1-R0 : - Computer Programming and Problem Solving through ‘C’ Language

Detailed Syllabus

1. Introduction to Programming 04 Hrs
   The Basic Model of Computation, Algorithms, Flow-charts, Programming Languages, Compilation, Linking and Loading, Testing and Debugging, Documentation

2. Algorithms for Problem Solving 10 Hrs
   Exchanging values of two variables, summation of a set of numbers, Decimal Base to Binary Base conversion, Reversing digits of an integer, GCD (Greatest Common Division) of two numbers, Test whether a number is prime, Organize numbers in ascending order, Find square root of a number, factorial computation, Fibonacci sequence, Evaluate ‘sin x’ as sum of a series, Reverse order of elements of an array, Find largest number in an array, Print elements of upper triangular matrix, multiplication of two matrices, Evaluate a Polynomial

3. Introduction to ‘C’ Language 04 Hrs
   Character set, Variables and Identifiers, Built-in Data Types, Variable Definition, Arithmetic operators and Expressions, Constants and Literals, Simple assignment statement, Basic input/output statement, Simple ‘C’ programs.

4. Conditional Statements and Loops 07 Hrs
   Decision making within a program, Conditions, Relational Operators, Logical Connectives, if statement, if-else statement, Loops: while loop, do while, for loop, Nested loops, Infinite loops, Switch statement, structured Programming

5. Arrays 06 Hrs
   One dimensional arrays: Array manipulation; Searching, Insertion, Deletion of an element from an array; Finding the largest/smallest element in an array; Two dimensional arrays, Addition/Multiplication of two matrices, Transpose of a square matrix; Null terminated strings as array of characters, Standard library string functions

6. Functions 06 Hrs
   Top-down approach of problem solving, Modular programming and functions, Standard Library of C functions, Prototype of a function: Formal parameter list, Return Type, Function call, Block structure, Passing arguments to a Function: call by reference, call by value, Recursive, Functions, arrays as function arguments

7. Storage Classes 03 Hrs
   Scope and extent, Storage Classes in a single source file: auto, extern and static, register, Storage Classes in a multiple source files: extern and static

8. Structures and Unions 06 Hrs

National Institute of Electronics and Information Technology
Structure variables, initialization, structure assignment, nested structure, structures and functions, structures and arrays: arrays of structures, structures containing arrays, unions

9. Pointers 06 Hrs
   Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, Arrays and Pointers, pointer arrays, pointers and structures, dynamic memory allocation.

10. Self Referential Structures and Linked Lists 04 Hrs
    Creation of a singly connected linked list, Traversing a linked list, Insertion into a linked list, Deletion from a linked list

11. File Processing 04hrs
    Concept of Files, File opening in various modes and closing of a file, Reading from a file, Writing onto a file

MAIN READING


SUPPLEMENTARY READING

MAT.AE10.2-R0: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING THROUGH JAVA.

Objective of the Course

The course is designed to impart knowledge and develop skills required to solve real world problems using object oriented approach, Java Language constructs and Unified Modelling Language. This course covers the subject in 3 sections, viz, Introductions to Object Oriented Programming, Introduction to Java Programming Language, Introduction to UML.

After the completion of the course the student is expected to understand:

- Various Object Oriented programming concepts - Abstraction, Objects and Classes, Inheritance, Polymorphism.
- Basic data structures in Java, Objects and Classes, Super Class, sub-class, Interfaces, Inner classes.
- GUI programming using AWT/Swing.
- Deploying Java Applications.
- Accessing Databases in Java.
- What is unified Modeling Language and Why is it used.
- Using Class, Interface, Interaction, State and Activity, Physical diagrams in modeling software.

Outline of Course

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<td>1. Introduction to Object Oriented Programming</td>
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</tr>
<tr>
<td>2. Introduction to Java programming Language.</td>
<td>32</td>
</tr>
<tr>
<td>3. Introduction to UML.</td>
<td>14</td>
</tr>
</tbody>
</table>

Lectures = 60
Practical/tutorials = 60
Total = 120
MAT.AE10.2-R0: INTRODUCTION TO OBJECT ORIENTED PROGRAMMING THROUGH JAVA

Detailed Syllabus

1. Introduction to Object Oriented Programming 14hrs

1.1) Thinking Object-Oriented 1hr

1.2) Abstraction 1hr
   Layers of Abstraction, Other Forms of Abstraction.

1.3) Classes and Methods 1hr
   Encapsulation, Class Definitions, Methods.

1.4) Messages, Instances, and Initialization 2hrs
   Message-Passing Syntax, Statically and Dynamically Typed Languages, Accessing the Receiver from Within a Method, Object Creation, Pointers and Memory Allocation, Constructors{Constant Values}, Destructors and Finalizers.

1.5) Inheritance and Substitution 3hrs
   An Intuitive Description of Inheritance, Inheritance in Various Languages, [Subclass, Subtype, and Substitution], Overriding and Virtual Methods, Interfaces and Abstract Classes, Forms of Inheritance, The Benefits of Inheritance, The Costs of Inheritance. Examples (Language independent)

1.6) Static and Dynamic Behavior 1hr
   Static versus Dynamic Typing, Static and Dynamic Classes, Static versus Dynamic Method Binding.

1.7) Multiple Inheritance 1hr
   Inheritance as Categorization, Problems Arising from Multiple Inheritance, Inner Classes.

1.8) Polymorphism and Software Reuse 1hr
   Polymorphism in Programming Languages, Mechanisms for Software Reuse, Efficiency and Polymorphism, Will Widespread Software Reuse Become Reality?

1.9) Overloading and Overriding 3hrs
   Type Signatures and Scopes, Overloading Based on Scopes, Overloading Based on Type Signatures, Redefinition, Notating Overriding, Replacement versus Refinement, Deferred Methods, Overriding versus Shadowing, Covariance and Contra variance.
2) Introduction to Java Programming Language 32hrs

2.1) An Introduction to Java 1hr
Java as a Programming Platform, The Java "White Paper" Buzzwords, Java and the Internet, A Short History of Java, Common Misconceptions About Java.

2.2) The Java Programming Environment 1hr
Installing the Java Development Kit, Choosing a Development Environment, Using the Command-Line Tools, Using an Integrated Development Environment, Compiling and Running Programs from a Text Editor, Running a Graphical Application, Building and Running Applets.

2.3) Fundamental Programming Structures in Java 2hrs
A Simple Java Program, Comments, Data Types, Variables, Operators, Strings, Input and Output, Control Flow, Big Numbers, Arrays.

2.4) Objects and Classes 2hrs
Introduction to Object-Oriented Programming, Using Predefined Classes, Defining Your Own Classes, Static Fields and Methods, Method Parameters, Object Construction, Packages, Documentation Comments, Class Design Hints.

2.5) Inheritance 2hrs

2.6) Interfaces and Inner Classes 2hrs
Interfaces, Object Cloning, Interfaces and Callbacks, Inner Classes, Proxies.

2.7) Introduction to GUI 2hrs

2.8) Graphics Programming 4hrs
Java2D Rendering Model, Strokes & Fills, Geometries, Fonts and Text Layout, Transformations, Display and manipulation of Images and off-screen buffers, Using Color, Printing through Java, Doing More with Images using Image IO, Hardware Acceleration and Active Rendering techniques.

2.9) User Interface Components with Swing 4hrs
2.10) Deploying Applets and Applications  
2hrs  

2.11) Exceptions and Debugging  
2hrs  

2.12) Streams and Files  
3hrs  
The Complete Stream Zoo, ZIP File Streams, Use of Streams, Object Streams, File Management, New I/O, Regular Expressions.

2.13) Database Programming  
5hrs  

3) Introduction to UML  
14hrs

3.1) Introduction, An outline Development Process and Use cases  
2hrs  

3.2) Class Diagrams and Advance Concepts  
4hrs  
Perspectives, Associations, Attributes, Operations, Generalization, Constraint Rules, When to Use Class Diagrams, Stereotypes, Object Diagram, Class Scope Operations and Attributes, Multiple and Dynamic Classification, Aggregation and Composition, Derived Associations and Attributes, Interfaces and Abstract Classes, Reference Objects and Value Objects, Collections for Multivalued Association Ends, Frozen, Classification and Generalization, Qualified Associations, Association Class, Parameterized Class, Visibility.

3.3) Interaction Diagrams, Packages and Collaborations  
1hrs  

3.4) State and Activity Diagrams  
1hr  
Concurrent State Diagrams, When to Use State Diagrams, Decomposing an Activity, Dynamic Concurrency, Swimlanes, When to Use Activity Diagrams.
3.5) **Physical Diagrams**

Deployment Diagrams, Component Diagrams, Combining Component and Deployment Diagrams, When to Use Physical Diagrams.

3.6) **Case Studies**

MAIN READING


SUPPLEMENTARY READING

MAT.AE10.3-R0 : Advanced Animation Techniques

Objective of the Course

The objective of this course is to provide knowledge of simulation of movement created by displaying a series of pictures, or frames and develop concepts on platform and tools for creating 3D animated contents.

Outline of Course

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<td>1. Introduction</td>
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<tr>
<td>2. Sculpting a 3D Form</td>
<td>12</td>
</tr>
<tr>
<td>3. Spline Modeling.</td>
<td>12</td>
</tr>
<tr>
<td>4. Patch Modeling.</td>
<td>10</td>
</tr>
<tr>
<td>5. Painting Surface.</td>
<td>06</td>
</tr>
<tr>
<td>6. Light, Camera, Rendering</td>
<td>10</td>
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</tbody>
</table>

Lecture =60
Practical =60
Total class =120
MAT.AE10.3-R0 : Advanced Animation Techniques

Detailed Syllabus

1. **Introduction:** 10Hrs
   
   Introduction to 3D animation, History of 3D Animation, understanding of 3D coordinate systems, concept of Viewport, navigation in space, modeling of objects in 3D space, Viewing Transformations: Camera models (orthographic, perspective), modeling of light sources and shading techniques.

2. **Sculpting a 3D Form:** 12Hrs
   
   Creating a editable Mesh, sub object level, types of sub object level, Selection rollout, Boolean Function, Using Transformation tools, Select and Move tool, Selecting and Moving objects, Select and rotate.

3. **Spline Modeling:** 12Hrs
   
   Introduction to shapes, Creating shapes, working with lines, Designing line types, Spline sub-object, Customizing Splines, shapes, Making Splines 3D, Beveling a shape, Extrude modifier, Lathe modifier, The basics of Lofting.

4. **Patch Modeling:** 10Hrs
   
   Introduction to Patch Modeling, working with Patch Grids, Creating a Quad Patch, Working with Tri Patch, Subdividing Patches, Patch Typology.

5. **Painting Surface:** 06Hrs
   
   Bitmap versus Procedural material, Shader Shenanigans, Color maps, Importing Graphics for a material.

6. **Light, Camera, Rendering:** 10Hrs
   
   Standard Light objects, Lurking in the shadows, Basic light rigs, Additional Tidbits, Advanced Lighting, Virtual Camera, Building a shot.

**Laboratory Assignments**

Create an animated film of 1-2 minutes duration

**MAIN READING**

1. Exploring 3D Animation with Maya 6. -By Patricia Beckmann
2. Exploring 3D Modeling with 3ds Max 7 - By Steven Till