MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WB
Syllabus for B. Sc (H) in Gaming and Mobile Application Development (CBCS) (In-house)
(Effective from Admission Session 2021 -2022)

COURSE STRUCTURE

Semester I

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
	Theory			L	P		
1	Core (C1)	Introduction To Computer Fundamentals	BGMAD 101	4		40	4
2	Core (C2)	Drawing	BGMAD 102	4		40	4
	Practical						
1	Core (CP1)	Computer Software Lab	BGMAD 191		2	20	2
2	Core (CP2)	Digital Drawing Lab	BGMAD 192		2	20	2

II. Elective Courses

B.1 General Elective

	Theory						
1	General Elective (GE1)	a) Python Programming b) R Programming	BGMAD GE 101	4		40	4
	Practical						
1	General Elective Practical (GEP1)	a) Python Programming b) R Programming	BGMAD GEP 191		2	20	2

III. Ability Enhancement Courses

1. Ability Enhancement Compulsory Courses (AECC)

	Theory						
1	Ability Enhancement Compulsory Courses (AECC1)	Communicative English I	BGMAD AECC 101	2		20	2

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Semester II

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
				L	P		
	Theory						
1	Core (C3)	Introduction to Object Oriented Programming and Data Structures	BGMAD 201	4		40	4
2	Core (C4)	Introduction to Operating System	BGMAD 202	4		40	4
	Practical						
1	Core (CP3)	C# Programming Lab	BGMAD 291		2	20	2
2	Core (CP4)	OS Lab	BGMAD 292		2	20	2

II. Elective Courses

B.1 General Elective

	Theory						
1	General Elective (GE2)	a) Web and XML Design b) Scripting Technology	BGMAD GE201	4		40	4
	Practical						
1	General Elective Practical (GEP2)	a) XML Lab b)Scripting Lab	BGMAD GEP291		2	20	2

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III. Ability Enhancement Courses

1. Ability Enhancement Compulsory Courses (AECC)

	Theory						
1	(AECC2)	Environmental Science	BGMAD AECC201	2		20	2

Semester III

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
				L	P		
	Theory						
1	Core(C5)	Game Idea: Visualization & Storytelling	BGMAD 301	4		40	4
2	Core (C6)	Introduction to 2D game design	BGMAD 302	4		40	4
3	Core (C7)	3D Modeling & Texturing for gaming	BGMAD 303	4		40	4
	Practical						
1	Core (CP5)	Game storyboard Lab	BGMAD 391		2	20	2
2	Core (CP6)	2D Game design with Unity Lab	BGMAD 392		2	20	2
3	Core (CP7)	Computer System architecture & Network Lab	BGMAD 393		2	20	2

II. Elective Courses

B.1 General Elective

	Theory						
1	General Elective (GE3)	a) Big Data Analytics in ECommerce b) Data Mining	BGMAD GE301	4		40	4
	Practical						
1	General Elective Practical (GEP3)	a)Big Data Analytics in E commerce Lab b)Data Mining Lab	BGMAD GEP391		2	20	2

III. Ability Enhancement Courses

2. Skill Enhancement Course (SEC)

1	**Skill Enhance ment Course (SEC1)**	Soft skill Development	BGMAD SEC301	2		20	2

Semester IV

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
				L	P		
	Theory						
1	Core (C8)	Introduction to Game physics,Lighting and Rendering	BGMAD 401	4		40	4
2	Core (C9)	Introduction to Character Designing	BGMAD 402	4		40	4
3	Core (C10)	3D Game Design Techniques	BGMAD 403	4		40	4
	Practical						
1	Core (CP8)	Game Physics Rendering Lab	BGMAD 491		2	20	2
2	Core (CP9)	3D Character Designing Lab	BGMAD 492		2	20	2

3	Core (CP10)	3D Game design with Unity Lab	BGMAD 493		2	20	2

II. Elective Courses

B.1 General Elective

	Theory						
1	General Elective (GE4)	a) Office Automation Tools b) Operating System c) Interactive Computer Graphics	BGMAD GE401	4		40	4
	Practical						
1	General Elective Practical (GEP4)	a) Office Automation Tools b) Operating System Lab c)Computer Graphics Lab	BGMAD GEP491		2	20	2

II. Ability Enhancement Courses

2. Skill Enhancement Course (SEC)

1	Skill Enhancement Course (SEC2)	Personality Development	BGMAD SEC401	2		20	2

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Semester V

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
				L	P		
	Theory						
1	Core (C11)	Mobile Application Development	BGMAD 501	4		40	4
2	Core (C12)	Computer & Mobile architecture with Networking	BGMAD 502	4		40	4
	Practical						
1	Core (CP11)	Mobile Application Lab-I	BGMAD 591		2	20	2
2	Core (CP12)	Computer & Mobile architecture Lab	BGMAD 592		2	20	2

II. Elective Courses

A.1 Discipline Specific Elective

	Theory						
1	Discipline Specific Elective (DSE1)	a) Role based game development b) Multiplayer Game devlopment	BGMAD DSE501	4		40	4
2	Discipline Specific Elective (DSE2)	a) Introduction to Game Engine b) AR VR in Games	BGMAD DSE502	4		40	4
	Practical						
1	Discipline Specific Elective Practical (DSEP1)	a) Role based Game development Lab b) Multiplayer Game development Lab	BGMAD DSEP591		2	20	2
2	Discipline Specific Elective	a) Game Engine Lab	BGMAD DSEP592		2	20	2

Practical (DSEP2)	b) AR VR in Games Lab						

Semester VI

I. Core

SL	Type of Paper	Paper Name	Paper Code	Contracts Period per week		Total Contact Hours	Credits
				L	P		
	Theory						
1	Core (C13)	VFX & SFX For Games	BGMAD 601	4		40	4
2	Core (C14)	Optimization technique for computer games	BGMAD 602	4		40	4
	Practical						
1	Core(CP13)	VFX & SFX Lab	BGMAD 691		2	20	2
2	Core(CP14)	Game optimization Lab	BGMAD 692		2	20	2

II. Elective Courses

A.1 Discipline Specific Elective

	Theory						
1	Discipline Specific Elective (DSE3)	a) Modelling, Texturing & Lighting for Games b) Rigging & Animation for Games	BGMAD DSE601	4		40	4
2	Discipline Specific Elective (DSE4)	DISSERTATION + PROJECT	BGMAD DSE602	4+2		40+20	4 + 2
	Practical						

1	Discipline Specific Elective Practical (DSEP3)	a) Modelling, Texturing & Lighting Games Lab b) Rigging & Animation for Games Lab	BGMAD DSEP691		2	20	2

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Detailed Syllabus

Aim

The program has been outlined for understudies who have a propensity for learning activity and realistic planning and create models and imagination through extraordinary impacts. The understudies will be instructed around both aesthetics as well as specialized angles of activity and illustrations planning. The program moreover envelops specialty and up and coming ranges of activity like 3D plan and creating gaming ventures with VFX and AR VR. The tools of game designing include the game design and mobile application development.

Objectives

1. Graduates will build a working vocabulary of design, and software terminology.

2. Graduates will develop broad understanding of graphics and train students in game assets

3. Graduates will Expose students to the basics of two and three dimensional game

4. Graduates will develop hands-on experience of mobile application development

5. Graduates will become skilled with techniques of PC and Mobile game development

6. Graduates will develop skills of development of Unity software

7. Graduates will develop basic concepts of gaming projects

8. Graduates will explore the field of gaming and mobile application development

Program Outcomes

Gaming and Mobile application graduates will be able to:

1. Gaming and Media knowledge: Apply the knowledge of game, mobile application development fundamentals and a game specialization to the solution of complex game and media problems.

2. Problem analysis: Identify, formulate, review research literature and analyze complex games and mobile problems and decision making models.

3. Design/development of solutions: Design solutions for game problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety and the cultural, societal and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select and apply appropriate techniques, resources, and modern media, game and animation tools including prediction and modeling to complex animation activities with an understanding of the limitations.

6. The graduates and society: Apply reasoning informed by the contextual knowledge to assess technical issues and the consequent responsibilities relevant to the professional practice.

7. Environment and sustainability: Understand the impact of the professional entertainment impacts in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the educational practice.

9. Individual and team work: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on entertainment and animation activities with the community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

11. Project management and finance: Demonstrate knowledge and understanding of the media and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological and social changes.

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Paper: Introduction To Computer Fundamentals

Code: BGMAD-101

Paper Type: Theory, Core (C1)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the historical perspective of computer

CO2: Classify different types of computer

CO3: Explain the principles of computer fundamentals

CO4: Develop basic knowledge of computers

CO5: Develop computer hardware and software knowledge

CO6: Analyze different application of computers

CO7: Explain methods of creating various documents and media files

CO8: Analyze overall architecture of a computer system.

MODULE	CONTENT	Teaching Hours
1	**Introduction to the Computer System** Different generations of the computers and Evolution of the computers,Hardwares and Softwares of the computers, Introduction to Different Computer Programming Languages.	10
2	**Introduction to OS:** What is an Operating System; Basics of Popular Operating Systems; The User Interface,Process, Introduction to smart OS. With Case study android and ios	12
3	**Introduction to Office Tools:** Introduction to the word processing, Working with spreedsheets,Working with presentation	6
4	**Introduction to the Internet** Introduction to Internet, WWW and Web Browsers: Basic of Computer networks; LAN, WAN; Concept of Internet; Applications of Internet; connecting to internet; What is ISP; Knowing the Internet; Basics of internet connectivity related troubleshooting, World Wide Web; Web Browsing softwares, Search Engines; Understanding URL; Domain name; IP Address; Using e-governance website	12

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SUGGESTIVE READINGS:

- Computer Fundamentals : Concepts, Systems & Applications- P K Sinha
- Computer Fundamentals by Goel

Paper: Drawing

Code: BGMAD-102

Paper Type: Theory, Core (C2)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the role and contribution of drawing

CO2: Analyze the history and development of visual art

CO3: Analyze the political, cultural and aesthetic nuances of drawing

CO4: Analyze the history and development of art and culture

CO5: Demonstrate the stages of drawing

MODULE	CONTENT	Teaching Hours
1	Character drawing with help of basic shapes	2
2	Drawing with different perspective(one point, two point, three point) and different eye views	6
3	Animal and Human study	6
4	Live model study	4
5	Line in action	2
6	Human walk cycle study	4
7	Drawing character (cartoon, Realistic, Semi-realistic)	8
8	Photo manipulation and Background concept study	8

SUGGESTIVE READINGS:

- Modern cartooning: Essential techniques for drawing today's popular cartoons

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Paper: Computer Software Lab

Code: BGMAD-191

Paper Type: Practical, Core (CP1)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Description of Computer Software

CO2: Developing concepts respect with various hardware components

CO3: Build concept of office automation

CO4: Demonstrate layouts of software

MODULE	CONTENT	Teaching Hours
1	Fundamental application softwares	2
2	Working with basic system commands	2
3	Operating System basis	4
4	Introduction to Word	2
5	Introduction to Spreadsheet	4
6	Introduction to presentation creation	2
7	Working with computer drawing and images	2
8	Project : Presentation of different use of softwares with case study	2

SUGGESTIVE READINGS:

- Computer Fundamentals 1St Edition 2017 by RS Salaria

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Paper: Digital Drawing LAB

Code: BGMAD-192

Paper Type: Practical, Core (CP2)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop a digital drawing concept

CO2: Implementation of real word experience in digital drawing

MODULE	CONTENT	Teaching Hours
1	Digital Drawing Lab Project-I	10
2	Digital Drawing Lab Project-II	10

SUGGESTIVE READINGS:

- Pen and Ink Drawing: A Simple Guide,Alphonso Dunn

Paper: Python Programming

Code: BGMADGE-101A

Paper Type: Theory, General Elective (GE1)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Demonstrate the basic understanding of Python programming language.

CO2: Implement logical thinking and decision making.

CO3: Develop Skill enhancement of repeated task management.

CO4: Implement string manipulation, List data structure, dictionary data structure

CO5: Develop the skill of creating functions**,** Input and Output techniques.

CO6: Demonstrate animation modules in Python.

CO7: Implement 2D animation in Python

CO8: Develop animation sequences in Python.

Course link : https://onlinecourses.swayam2.ac.in/cec21_cs01/preview

Platform : Swayam

SUGGESTIVE READINGS:

- Learn Python The Hard Way, Zed A. Shaw, ADDISON-WESLEY Learning Python, Mark Lutz, O'REILY
- Programming In Python, Dr. Pooja Sharma, BPB

Paper: R Programming

Code: BGMADGE-101B

Paper Type: Theory, General Elective (GE1)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Demonstrate basics of R programming language.

CO2: Implement data types and manipulating data used in R programming language.

CO3: Implement string manipulation, list data structure

CO4: Develop statistical concept, problem solving skills

CO5: Develop the skill of different types of data representation.

CO6: Implement prediction skills based on data visualization.

Course link: https://www.coursera.org/learn/r-programming

Platform : Coursera

- R Programming for Beginners, Nathan Metzler
- R Programming, A Step-by-Step Guide for Absolute Beginners, Daniel Bell
- The Art of R Programming, Norman Matloff

Paper: Python Programming Lab

Code: BGMADGEP-191A

Paper Type: Practical, General Elective Practical (GEP1)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop of skills in python programming basics.

CO2: Develop skills of logical thinking and problem solving

CO3: Implement linear data structures.

CO4: Develop file handling and animation in python.

MODULE	CONTENT	Teaching Hours
1	Write, test, and debug simple Python programs	3
2	Implement Python programs with conditionals and loops.	3
3	Use functions for structuring Python programs.	3
4	Represent compound data using Python lists, tuples, dictionaries.	4
5	Read and write data from/to files in Python	4
6	Animation using python	3

Paper: R Programming Lab

Code: BGMADGEP-191B

Paper Type: Practical, General Elective Practical (GEP1)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills in R programming basics.

CO2: Develop skills of logical thinking and problem solving

CO3: Implement Statistical data handling

CO4: Develop skills of statistical concepts in R.

MODULE	CONTENT	Teaching Hours
1	Understand the basics in R programming in terms of constructs, control	5

	statements, string functions	
2	Understand the use of R for Big Data analytics	5
3	Learn to apply R programming for Text processing	5
4	Able to appreciate and apply the R programming from a statistical perspective	5

Paper: Communicative English I

Code: BGMADAECC-101

Paper Type: Theory, Ability Enhancement Compulsory Courses (AECC1)

Contacts Hours / Week: 2L

Credits: 2

On completion of the course, students will be able to

CO1: Implement accurate voices and tenses for basic communication practices

CO2: Write formal letters

CO3: Demonstrate the role of adjective and grammar in English

CO4: Write application for job

MODULE	CONTENT	Teaching Hours
1	Grammar- Part of Speech, Tense, Voice, Common Errors. Writing- Formal Letters (Making Enquires, Placing Orders, Listening and Handling Complains	8
2	Grammar- Degrees of Adjectives, Essay Writing	6
3	Comprehension, Grammar- One word Substitution, Use of Idioms, Job Application and CV	6

SUGGESTED READING:

1. Leo Jones, Richard Alexander : New International Business English (Communication Skills in

   English for Business Purposes), Cambridge University Press.

2. NCERT, Knowing about English – A Book of Grammar & Phonology

3. NCERT, Working with English – A Workbook

4. Effective Communication Skills, Kulbhushan Kumar, Khanna Publishing House

5. A.E. Augustine & K.V. Joseph : Macmillan Grammar – A Handbook, Macmillan

6. Krishna Mohan & N.P. Singh : Speaking English Effectively, Macmillan

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Semester II

Paper: Introduction to Object Oriented Programming and Data Structures

Code: BGMAD-201

Paper Type: Theory, Core (C3)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the object oriented programming

CO2: Demonstrate the role of elements and principles of data structure

CO3: Demonstrate the object oriented walkthrough with data structures

MODULE	CONTENT	Teaching Hours
1	**DATA ABSTRACTION & OVERLOADING** Structures – Class Scope and Accessing Class Members – Reference Variables – Initialization – Constructors – Destructors – Member Functions and Classes – Friend Function – Dynamic Memory Allocation – Static Class Members – Container Classes and Integrators – Proxy Classes – Overloading: Function overloading and Operator Overloading.	6
2	**INHERITANCE & POLYMORPHISM** Base Classes and Derived Classes – Protected Members – Casting Class pointers and Member Functions – Overriding – Public, Protected and Private Inheritance – Constructors and Destructors in derived Classes – Implicit Derived – Class Object To Base – Class Object Conversion – Composition Vs. Inheritance – Virtual functions – This Pointer – Abstract Base Classes and Concrete Classes – Virtual Destructors – Dynamic Binding.	8
3	**LINEAR DATA STRUCTURES** Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation — singly linked lists – Polynomial Manipulation - Stack ADT – Queue ADT - Evaluating arithmetic expressions	6
4	**NON-LINEAR DATA STRUCTURES** Trees – Binary Trees – Binary tree representation and traversals – Application of trees: Set representation and Union-Find operations – Graph and its representations – Graph Traversals – Representation of	10

	Graphs – Breadth-first search – Depth-first search - Connected	
5	**SORTING AND SEARCHING** Sorting algorithms: Insertion sort - Quick sort - Merge sort - Searching: Linear search –Binary Search	10

SUGGESTED READING:

● Object Oriented Programming and Data Structures-Balagurusamy

Paper: Introduction to Operating System

Code: BGMAD-202

Paper Type: Theory, Core (C4)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the role of operating systems in computer

CO2: Demonstrate the role of process

MODULE	CONTENT	Teaching Hours
1	**Operating System Overview** Overview of UI and UX,Collecting a list of the system's functionality to achieve the project's goal and needs of the user.	4
2	**Process** -Introduction to operating system process,Process scheduling and synchronization,Mobile OS process	6
3	**Graphical user interface design** Designing different types of user interfaces, Application specific design for mobile and desktop	6
4	**Memory and Resource** Testing of various types of UI and UX with feasibility analysis	4

SUGGESTIVE READINGS:

● Operating system Concepts-Abraham Silberschatz,Galvin

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Paper: C# Programming Lab

Code: BGMAD-291

Paper Type: Practical, Core (CP3)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop the skills of object oriented concept in c#

CO2: Become familiar with C# object oriented programming

CO3: Develop designs for development of software applications

MODULE	CONTENT	Teaching Hours
1	Working with syntaxes and data types	4
2	Logical condition and looping	4
3	Object Oriented Programming with C#	6
4	Working with various script using C# for games	6

SUGGESTIVE READINGS:

- Programming in C#, Balaguruswamy

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Paper: OS Lab

Code: BGMAD-292

Paper Type: Practical, Core (CP4)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Become familiar with OS

CO2: Implement Process lifecycle management

MODULE	CONTENT	Teaching Hours
1	OS commands and tools	4
2	Working with shell scripts	4
3	Conduct GUI application interface design	2
4	Mobile OS practical	2
5	Project 1	4
6	Project 2	4

SUGGESTIVE READINGS:

- Operating system Concepts-Abraham Silberschatz,Galvin

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Paper: Web and XML Design

Code: BGMADGE-201A

Paper Type: Theory, General Elective (GE2)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop the basic skills of website designing.

CO2: Development of planning of a design.

CO3: Development of planning of a browser oriented design & grid structure.

CO4: Development of skills of interactive design & website promotion.

Course link: https://www.coursera.org/specializations/web-design

Platform : Coursera

SUGGESTIVE READINGS:

- Teach Yourself visually Dreamweaver CS5 by Janine Warner
- JavaScript and JQuery: Interactive Front-End Web Development by Jon Duckett
- Cookbook of web design
- Designing beautiful web design
- Handbook of Multimedia Computing by Borivoje Furht
- Introduction To Multimedia Systems by Gaurav Bhatnager

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Paper: Scripting Technology

Code: BGMADGE-201B

Paper Type: Theory, General Elective (GE2)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Demonstrate basic networking principles.

CO2: Implement data and signal.

CO3: Develop skills of multiplexing techniques.

CO4: Develop skills on OSI, TCP/IP layer

CO5: Demonstrate different frame formats.

CO6: Demonstrate LAN technologies

CO7: Demonstrate functionalities of different LAN

CO8: Develop skill of Bridging and Routing.

Course link: https://www.coursera.org/learn/hands-on-introduction-to-linux-commands-and-shell-scripting

Platform : coursera

SUGGESTIVE READINGS:

- Linux Command Line and Shell Scripting Bible,Richard Blum

Paper: XML Lab

Code: BGMADGEP-291A

Paper Type: Practical, General Elective Practical (GEP2)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills of web page designing .

CO2: Develop skills of client server architecture

CO3: Implement HTML,CSS.

CO4: Develop skills of multimedia files, website scripting using javascript and jquery

MODULE	CONTENT	Teaching Hours
1	Web site, Web Page, Types of Web Pages, Browsers and their types, Client –Server Model, Web –Server, Working of different types of Web Pages, General structure of a Web Page, Scripting languages, URL, Popular Search Engines, WWW	4
2	Basic HTML physical character tags, Logical character tags	4
3	XML Tags	4
4	Working with data and tags	4
5	XML attirtibutes	4

Paper: Scripting Lab

Code: BGMADGEP-291B

Paper Type: Practical, General Elective Practical (GEP2)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills of computer networking.

CO2: Develop skills IP addressing.

CO3: Implement client server architecture.

CO4: Develop skills of operating system based networking & web hosting.

MODULE	CONTENT	Teaching Hours
1	Introduction to basic command tools for script	5
2	Working with scripting library	5
3	Script for Game	5
		10

Paper: Environmental Science

Code: BGMADAECC-201

Paper Type: Theory, Ability Enhancement Compulsory Courses (AECC2)

Contacts Hours / Week: 2L

Credits: 2

On completion of the course, students will be able to

CO1: Analyze the issue of environmental, ecosystem & biodiversity

CO2: Solve problems of environmental pollution by mere laws.

CO3: Analyze usage of natural resources.

CO4: Analyze social & environmental issues

CO5: Correlate the issues of human population & environment

MODULE	CONTENT	Teaching Hours
1	**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY** Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.	4

2	**UNIT II ENVIRONMENTAL POLLUTION** Definition – causes, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.	4
3	**UNIT III NATURAL RESOURCES** Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and overutilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.	4
4	**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT** From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.	4
5	**UNIT V HUMAN POPULATION AND THE ENVIRONMENT** Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.	4

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SUGGESTED READINGS:

TEXTBOOKS:

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.

2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2nd edition, Pearson Education, 2004.

REFERENCES:

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD,New Delhi, 2007.

2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.

3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.

4. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 201

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Semester III

Paper: Game Idea: Visualization & Storytelling

Code: BGMAD-301

Paper Type: Theory, Core (C5)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the role of research in visual communication

CO2: Develop the skill of writing storyline

CO3: Analyze the production planning & budgeting details

CO4: Develop the idea of script a composition

MODULE	CONTENT	Teaching Hours
1	Introduction Basics of Storytelling, Story arc, Hero's Journey	8
2	Spatial Storytelling	6
3	Character design	12
4	Dialogue & Branching Story Line	4
5	Game Design Document Game mechanics	10

SUGGESTED READINGS:

- Storytelling with Data: A Data Visualization Guide for Business Professionals

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Paper: Introduction to 2D game design

Code: BGMAD-302

Paper Type: Theory, Core (C6)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop the skill of 2D game

CO2: Develop the skills of 2D animation game

MODULE	CONTENT	Teaching Hours
1	Game Engines concepts,Introduction to the development tools	10
2	Introduction to the Unity,Adding script(C#) into the game,Game loops and functions,Simple Movement and Input,Easy Input Handling in Unity.2D Physics Concepts ,Rigidbody Components ,Unity Colliders ,Physics Materials ,Scripting Collision Events.	16
3	Organizing Game Objects,Parent-Child Objects,Sorting Layers,Tagging Game Objects,Collision Layers,2D Game design,2D Game Design Strategies.	14

SUGGESTED READINGS:

- Mastering Unity 2D Game Development - Using Unity 5 to develop a retro RPG,Ashley Godbold

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Paper: 3D Modeling & Texturing for gaming

Code: BGMAD-303

Paper Type: Theory, Core (C7)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Apply the fundamental concepts of dimensions and axis

CO2: Analyze the difference between 2D & 3D

CO3: Analyze the historical perspective of 3D animation

CO4: Explain the role of different industries of 3D animation

CO5: Become familiar with Autodesk Maya and Tools

CO6: Explain basic modeling techniques

CO7: Explain the role of texturing in 3D animation

MODULE	CONTENT	Teaching Hours
1	Modeling for game definition types of modeling:Box modeling patch modeling ,scratch modeling,Boolean modeling	12
2	Difference between game modeling and animation modeling	8
3	Organic and Inorganic model of game : set modeling asset modeling and set modeling	10
4	Texturing for game: High poly model with low texture and low poly model with high texture	10

SUGGESTED READINGS:

- David A. Patterson and John L. Hennessy, Computer Organization and Design

- William Stallings, Computer Organization and Architecture – Designing for Performance, Eighth Edition

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Paper: Game storyboard Lab

Code: BGMAD-391

Paper Type: Practical, Core (CP5)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop the skills of writing screenplay in respect to framing a shot

CO2: Analyze the role of storyboard in film making

CO3: Implement the idea of storytelling through screenplay

CO4: Draw a detailed storyboard for film.

MODULE	CONTENT	Teaching Hours
1	Game Design as Narrative Architecture	5
2	Dialogue & Branching Story Line	5
3	Project I : Storytelling through Screenplay	5
4	Project II : Draw a detailed storyboard of a Game	5

SUGGESTED READINGS:

- Storytelling with Data: A Data Visualization Guide for Business Professionals

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Paper: 2D Game design with Unity Lab

Code: BGMAD-392

Paper Type: Practical, Core (CP6)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Design a 2D Set

CO2: Develop the skill of Unity

CO3: Design costume according to the script requirement

MODULE	CONTENT	Teaching Hours
1	Creating 2D Game Projects in Unity	10
2	Project 1	5
3	Project 2	5

SUGGESTED READINGS:

- Mastering Unity 2D Game Development - Using Unity 5 to develop a retro RPG,Ashley Godbold

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Paper: Modeling and Texturing Game Lab

Paper Type: Practical, Core (CP7)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Model hard surface in Maya

CO2: Model a Set in Maya

CO3: Model organic characters in Maya

CO4: Unwrap Uv of 3D models

CO5: Texture the models which are required for 3D animation

MODULE	CONTENT	Teaching Hours
4	Project 1	10
5	Project 2	10

SUGGESTED READINGS:

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Paper: Big Data Analysis in E commerce

Code: BGMADGE-301A

Paper Type: Theory, General Elective (GE3)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Demonstrate fundamentals of big data.

CO2: Implement Big data in E commerce.

CO3: Apply various softwares for big data.

CO4: Develop skills of cloud computing concepts

CO5: Develop skills of NoSQL & graph databases.

CO6: Develop skills of document based database with mongodb.

Course Link: https://www.udemy.com/course/ecommerce-analytics-big-data-and-machine-learning/

Platform: Udemy

SUGGESTED READINGS:

- Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
- Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
- Mark Gardener, "Beginning R - The Statistical Pr ogramming Language", John Wiley & Sons, Inc., 201

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Paper: Data Mining

Code: BGMADGE-301B

Paper Type: Theory, General Elective (GE3)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop skills of Big data platform.

CO2: Develop statistical data distribution.

CO3: Develop skills of data sampling.

CO4: Develop analysis skills, fuzzy models

CO5: Develop the time series

CO6: Demonstrate features of non euclidean space.

CO7: Develop the MapReduce

Course Link: https://onlinecourses.nptel.ac.in/noc21_cs06/preview

Platform: Swayam

SUGGESTED READINGS:

- Nina Zumel, John Mount, "Practical Data Science with R", Manning Publications, 2014.
- Jure Leskovec, Anand Rajaraman, Jeffrey D. Ullman, "Mining of Massive Datasets", Cambridge University Press, 2014.
- Mark Gardener, "Beginning R - The Statistical Pr ogramming Language", John Wiley & Sons, Inc., 2012

Paper: Big Data Analysis in E commerce Lab

Code: BGMADGEP-391A

Paper Type: Practical, General Elective Practical (GEP3)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills of Big data analysis.

CO2: Develop skills of handling Excel Pivot tables.

CO3: Implement E commerce data.

CO4: Develop skills of Hadoop.

MODULE	CONTENT	Teaching Hours
1	Introduction to Excel Pivot Table	5
2	Working with financial data set handling using python/R	5
3	E commerce data set analysis using python/R	5
4	Introduction to Hadoop	

Paper: Data Analytics Lab

Code: BGMADGEP-391B

Paper Type: Practical, General Elective Practical (GEP3)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills of data analytics.

CO2: Develop skills of data mining extensions

CO3: Implement MDX query.

CO4: Develop skills of SQL server.

MODULE	CONTENT	Teaching Hours
1	Create and Manage graph data	5
2	Perform various steps of preprocessing on the given relational database / warehouse.	5
3	To implement Data Mining Extensions (DMX) language and MDX query language	5
4	Creating Data Mining Structure & Predictive Models using the Excel Add-In for SQL Server 2008.	5

Paper: Soft Skill Development

Code: BGMADSEC-301

Paper Type: Theory, Skill Enhancement Course (SEC1)

Contacts Hours / Week: 2L

Credits – 2

On completion of the course, students will be able to

CO1: Develop skills of Problem solving

CO2: Develop skills of face to face communication

CO3: Write formal letters such as business communication

CO4: Develop skills of communication with peers

MODULE	CONTENT	Teaching Hours
1	Verbal presentations Telephonic communications Face to face communication Body language and attire Interview skills (Conducting an interview, facing an interview) Pitching skills	8
2	Written communications Business letters Emails How to say 'no' politely Visual presentations	6
3	Optimal use of PPT Communication with peers Communication with boss Communication with subordinates	6

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SUGGESTED READINGS:

- Soft Skills Training: A workbook to develop skills for employment by Frederick H. wentz

Semester IV

Paper: Introduction to Game physics,Lighting and Rendering

Code: BGMAD-401

Paper Type: Theory, Core (C8)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Implement game physics

CO2: Develop skills to lighting

CO3: Develop skills to rendering

MODULE	CONTENT	Teaching Hours
1	Different components in a game,Game engines; Geometric primitives,2D and 3D linear transforms, Homogeneous matrices;	12
2	Physics engine,Gravity simulation; Rigid body interaction,Collisions.	10
3	Vector Math in game development ,physics simulation.	6
4	Audio assets,Different audio formats,Audio mixing.	4
5	Introduction to light and different point lights for game	4
6	Rendering basis and Rendering for game	4

SUGGESTED READINGS:

- https://assetstore.unity.com/packages/templates/2d-platformer-controller-69772 4.
- https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-tobetter-2d-game-art-r2959/
- Game Physics by David H. Eberly

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Paper: Introduction to Character Designing

Code: BGMAD-402

Paper Type: Theory, Core (C9)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Explain the role of rigging in 3D animation

CO2: Explain the role of IK and Fk in Rigging

CO3: Analyze the Rigging workflow

CO4: Explain the role of deformer in 3D animation

CO5: Explain the role of constraints in 3D animation

CO6: Explain the role of keyframe, graph editor & timeline in 3D animation

CO7: Create Dope sheet

CO8: Analyze the importance of Ghosting in animation

MODULE	CONTENT	Teaching Hours
1	**Introduction to the Character** Compelling, unique, and purposeful characters.and foundation of the prototype	16
2	**About the Game Design: Art and Concepts Specialization** Exploration of video game design, story, character development, Character	16
3	**Character modeling** Modeling the game characters and scene, Identifying the characters of different game scene	8

SUGGESTED READINGS:

- Anatomy For Sculptors: Understanding the Human Figure,Uldis Zarins

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Paper: 3D Game Design Techniques

Code: BGMAD-403

Paper Type: Theory, Core (C10)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop skills of Game Techniques

CO2: Classify the 2D and 3D design techniques

CO3: 3D Game design techniques

MODULE	CONTENT	Teaching Hours
1	**3D Game Assets** Eveloping the game assets. Game assets in Unity , visuals (2D and 3D graphics, fonts, materials, animations), concepts and creation techniques of graphics, concepts and creation techniques of audio, the asset pipeline, and explore programming best practices.	14
2	**3D character designing** Developing the 3D character,modeling the characters, Fixing the storylines	8
3	**Scripting and Animation** 3D animation and rigging techniques for the 3D charecter Animation using script,Movements of the objects	10
4	**UI Creation** Creation of the UI of the Game, Setting us the things, Creating mosotion UI interfaces	8

SUGGESTED READING:

- Unity in Action: Multiplatform Game Development in C# with Unity 5 by Joe Hocking

- Introduction to Game Design, Prototyping, and Development by Jeremy Gibson Bond

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Paper: Game Physics and Rendering Lab

Code: BGMAD-491

Paper Type: Practical, Core (CP8)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Game physics understanding

CO2: Understanding rendering

MODULE	CONTENT	Teaching Hours
1	**Game Physics-I** Additing physis into the game	5
2	All types of properties	5
3	**Game Sound** Adding sound into the game,Sound mixing	5
4	Project-1	5

SUGGESTED READINGS:

- https://www.gamedev.net/articles/visual-arts/the-total-beginner%E2%80%99s-guide-tobetter-2d-game-art-r2959/
- Game Physics by David H. Eberly

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Paper: 3D Character Designing Lab

Code: BGMAD-492

Paper Type: Practical, Core (CP9)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Rig an organic character in Maya

CO2: Create blendshape required for facial expression in Maya

CO3: Develop a complete organic character with all possible rig movements in Maya

CO4: Animate an organic character performing different actions in Maya

MODULE	CONTENT	Teaching Hours
1	**Character Prototyping** Developing prototype of the characters	4
2	**2D Charcter Designing** Designing of 2D Game Charcter	4
3	**3D Charcter Designing** Designing of 3D Game Charcter	6
4	Project 1	6

SUGGESTED READINGS:

- Autodesk Maya - An Introduction To 3D Modeling by 3dExtrude Tutorial
- 3D Art Essentials The Fundamentals by Ami Chopine

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Paper: 3D Game design with Unity Lab

Code: BGMAD-493

Paper Type: Practical, Core (CP10)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop the skill of 3D gedisn

CO2: Develop the skill of Unity studio

MODULE	CONTENT	Teaching Hours
1	Set Up Unity,Game Engine,Game asset and planning of 3D Game	10
2	Making a shooter 3D Game	10

SUGGESTED READING:

- Unity in Action: Multiplatform Game Development in C# with Unity 5 by Joe Hocking

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Paper: Office Automation Tool

Code: BGMADGE-401A

Paper Type: Theory, General Elective (GE4)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop skills in Office automation devices

CO2: Develop skills of automation management techniques.

CO3: Develop skills of office 365

CO4: Implement use of Microsoft OneDrive

CO5: Develop skills of presentation making.

CO6: Develop skills of video conferencing.

Course Link: https://www.coursera.org/learn/introduction-to-computers-and-office-productivity-software

Platform: Coursera

SUGGESTED READING:

- Microsoft Office 365 Administration Inside Out (Inside Out (Microsoft)) December 2013,Microsoft Press US; 1st edition (6 December 2013)

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Paper: Operating System

Code: BGMADGE-401B

Paper Type: Theory, General Elective (GE4)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop skills of operating systems.

CO2: Develop skills of operating systems working principles

CO3: Develop skills of operating systems process management

CO4: Develop skills of virtual memories

CO5: Develop skills of various comparative studies of operating systems

Course link: https://onlinecourses.nptel.ac.in/noc21_cs44/preview

Platform: Swayam

SUGGESTED READING:

- Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Operating System Concepts. Sixth edition. Addison-Wesley (2003).

- Andrew Tanenbaum, Modern Operating Systems, Prentice Hall.

- William Stallings, Operasting Systems, Prentice Hall

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Paper: Interactive Computer Graphics

Code: BGMADGE-401C

Paper Type: Theory, General Elective (GE4)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Develop skills of hardware and softwares for graphics.

CO2: Develop skills of display techniques of computer graphics

CO3: Skill enhancement of various utility and effects of computer graphics

CO4: Enhance the basic skills of multimedia and computer graphics

Course link: https://www.coursera.org/learn/interactive-computer-graphics

Platform: Coursera

SUGGESTED READING:

- Computer Graphics (Principles and Practice) by Foley, van Dam, Feiner and Hughes, Addisen Wesley (Indian Edition)

- Computer Graphics by D Hearn and P M Baker, Printice Hall of India

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Paper: Office Automation Tool

Code: BGMADGEP-491A

Paper Type: Practical, General Elective Practical (GEP4)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Develop skills in Office 365.

CO2: Develop skills of Outlook mailing.

CO3: Implement Microsoft OneDrive.

CO4: Develop skills of video conferencing.

MODULE	CONTENT	Teaching Hours
1	Introduction to Office 365 including word, Excel, PowerPoint	5
2	Introduction to Microsoft Outlook	5
3	Introduction to OneDrive	5
4	Introduction to video conferencing with skype	5

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Paper: Operating System Lab

Code: BGMADGEP-491B

Paper Type: Practical, General Elective Practical (GEP4)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Development of skills in operating system modules.

CO2: Develop skills of command in windows.

CO3: Implement shell command in Linux.

CO4: Develop skills of Linux shell scripting.

CO5: Develop skills of process and memory management.

MODULE	CONTENT	Teaching Hours
1	Working with windows operating system: Module, Command, Utilities	4
2	Working with Linux operating system: Components, Shell and Commands	4
3	Introduction to windows operating system power shell	4
4	Introduction to Linux shell scripting	4
5	Working with processes and memory management in Windows and Linux	4

Paper: Computer Graphics Lab

Code: BGMADGEP-491C

Paper Type: Practical, General Elective Practical (GEP4)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Development of skills in computer graphics.

CO2: Develop skills of image enhancement techniques.

CO3: Develop skills of 3D graphics tools.

CO4: Develop skills of display properties

MODULE	CONTENT	Teaching Hours
1	Introduction to various types of images and format	4
2	Image enhancement techniques	4
3	Display properties and tools	4
4	Different types of drawing algorithms: Line, Circle, Polygon	4
5	Working with 3D graphics tools and Techniques	4

Paper: Personality Development

Code: BGMADSEC-401

Paper Type: Theory, Skill Enhancement Course (SEC2)

Contacts Hours / Week: 2L

Credits – 2

On completion of the course, students will be able to

CO1: Develop skills in professional and inner-personal communications

CO2: Do time management

CO3: Develop personality

CO4: Gain positive thinking in life

CO5: Add humour in communication

CO6: Maintain ethics and Etiquette

MODULE	CONTENT	Teaching Hours
1	Definition & types of mindsets, Learning mindsets, secrets of developing growth mindset Importance of time and Understanding perceptions of time Using time efficiently Understanding procrastination	4

2	Types of people,How to say No, Controlling anger, Gaining power from Positive Thinking	4
3	What makes others dislike you What makes others like you Being attractive	4
4	Humour in communication Humour in workplace Functon of Humour in the Workplace Money & personality Managing love	4
5	Ethics & Etiquette Business Etiquette Managing Mind & Memory Improving Memory Care for Environment	4

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Semester V

Paper: Mobile Application Development

Code: BGMAD-501

Paper Type: Theory, Core (C11)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the mobile application

CO2: Explain Different type of mobile applications

CO3: Explain the app life cycle

CO4: Implementing the mobile application

MODULE	CONTENT	Teaching Hours
1	Introduction to Mobile application,Life cycles of app,Intent and activities,Different types of application,Use of resources and permission control techniques.	20
2	Working with Mobile application database,storage procedure,Concept of document based database, Different opne sources mobile app databases.	20

SUGGESTED READINGS:

- Handbook of Mobile Application Development: A Guide to Selecting the Right Engineering and Quality Features

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Syllabus for B. Sc (H) in Gaming and Mobile Application Development (CBCS) (In-house)
(Effective from Admission Session 2021 -2022)

Paper: Computer & Mobile architecture with Networking
Code: BGMAD-502
Paper Type: Theory, Core (C12)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Analyze the architecture of computer

CO2: Analyze the concept of mobile architecture

CO3: Analyze the concept of networking

MODULE	CONTENT	Teaching Hours
1	Introduction to computer architecture, Different system models and process of pipeline and memory.	16
2	Introduction to mobile architecture and different system models and connection	16
3	Network connectivity between different computer and mobile architecture	8

SUGGESTED READINGS:

● Computer Architecture Design.William Stalings

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Paper:Mobile Application Lab-I
Code: BGMAD-591
Paper Type: Practical, Core (CP11)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Development of Mobile application development

CO2: Development of Mobile application with networking

MODULE	CONTENT	Teaching Hours
1	**Android App development with activities and components**	10
2	**Working with Resources**	4
3	Project-1	6

SUGGESTED READINGS:

- Head First Android Development: A Brain-Friendly Guide

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Paper: Computer & Mobile architecture Lab
Code: BGMAD-592
Paper Type: Practical, Core (CP12)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Development the skill of computer architecture

CO2: Development the skill of mobile architecture

CO3: Networking concept

MODULE	CONTENT	Teaching Hours
1	Computer architecture Practical with networking	10
2	Mobile architecture Practical with networking	10

SUGGESTED READINGS:

- The Beginner's Guide to Android Game Development by James S. Cho

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Paper: Role Based Game Development
Code: BGMADDSE-501A
Paper Type: Theory, Discipline Specific Elective (DSE1)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Analyze role based game development

MODULE	CONTENT	Teaching Hours
1	Introduction to role based game and different character integration and synchronization	10
2	Role creation in MVC	10
3	Connection and cooperation between the role models	10
4	Testing the functionality of roles	10

SUGGESTED READINGS:

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Paper: Multiplayer Game development
Code: BGMADDSE-501B
Paper Type: Theory, Discipline Specific Elective (DSE1)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Analyze the Multiplayer game

MODULE	CONTENT	Teaching Hours
1	Introduction to multiplayer game	10
2	Multiplayer connectivity set up	8
3	Synchronization of Multiplayer games	12
4	Intranet and internet based multiplying game	10

SUGGESTED READINGS:

●

Paper: Introduction to Game Engine
Code: BGMADDSE-502A
Paper Type: Theory, Discipline Specific Elective (DSE2)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Explain concepts of game engine

MODULE	CONTENT	Teaching Hours
1	Game engine basic, Principal components of a Game Engine, Work through examples.	10
2	Software Frameworks for game engine,Introduction to visual development tools	10
3	Game engine middleware,Functionality of game engines in different software layouts,Optimization of Game engine	

		10
	Case studies of different industrial game engines and mode of operation.	
4		10

SUGGESTED READINGS:

- Game Engine Architecture, Third Edition,Jason Gregory

Paper: AR VR in Games
Code: BGMADDSE-502B
Paper Type: Theory, Discipline Specific Elective (DSE2)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Explain various approaches for AR VR in Games

MODULE	CONTENT	Teaching Hours
1	**Introduction to Virtual Reality** Introduction, Fundamental Concept and Components of Virtual Reality. Primary Features and Present Development on Virtual Reality. Computer graphics, Real time computer graphics, Flight Simulation.	**10**
2	**Interactive Techniques in Virtual Reality** Introduction, From 2D to 3D, 3D space curves, 3D boundary representation Geometrical Transformations: Introduction, Frames of reference, Modeling transformations, Instances, Picking, Flying, Scaling the VE, Collision detection Generic VR system: Introduction, Virtual environment, Computer environment, VR technology, Model of interaction, VR Systems.	**15**
3	**Apllication of AR VR in Games** Revival of 3D,Captive experience,Real-time interaction,Change in	**15**

	lifestyle,Unity AR VR in games.	

SUGGESTED READINGS:

- Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile by Tony Parisi

Paper: Role Based Game Development Lab
Code: BGMADDSEP-591A
Paper Type: Practical, Discipline Specific Elective Practical (DSEP1)
Contacts Hours / Week: 2P
Credits: 2

CO1: Develop a sophisticated use of Role based game

MODULE	CONTENT	Teaching Hours
1	Design a role based game	20

SUGGESTED READINGS:

- Role based game development bible

Paper: Multiplayer Game development Lab
Code: BGMADDSEP-591B
Paper Type: Practical, Discipline Specific Elective Practical (DSEP1)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Model a multiplayer game

MODULE	CONTENT	Teaching Hours
1	**Intranet based multiplayer game**	**10**
2	**Internet based multiplayer game**	**10**

SUGGESTED READINGS:

- Web resource of Unity

Paper: Game Engine Lab
Code: BGMADDSEP-592A
Paper Type: Practical, Discipline Specific Elective Practical (DSEP2)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Skill development of Game Engine

MODULE	CONTENT	Teaching Hours
1	Working with a Game engine	20

SUGGESTED READINGS:

- Unity web resource

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Paper: AR VR in Game Labs
Code: BGMADDSEP-592B
Paper Type: Practical, Discipline Specific Elective Practical (DSEP2)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Skill development of AR and VR

MODULE	CONTENT	Teaching Hours
1	Game in AR	10
2	Game in VR	10

SUGGESTED READINGS:

- Web resource of AR and VR

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Semester VI

Paper: VFX & SFX for Games

Code: BGMAD-601

Paper Type: Theory, Core (C13)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Skill of VFX & SFX in Game

MODULE	CONTENT	Teaching Hours
1	Layer-based, node-based & advanced compositing	10
2	Stereoscopic pipeline	10
3	Concepts of set extension & CG integration for Game	10
4	SFX introduction and application	10

SUGGESTED READINGS:

- Real-Time Visual Effects for Game Programming (Gaming Media and Social Effects)

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Paper:Optimization technique for computer games

Code: BGMAD-602

Paper Type: Theory, Core (C14)

Contacts Hours / Week: 4L

Credits: 4

On completion of the course, students will be able to

CO1: Analyze the concept of Optimization techniques

MODULE	CONTENT	Teaching Hours
1	Introduction to optimization techniques and various tools for optimization	6
2	Game optimization with spacious solution approach	6
3	Comparison between various game optimization techniques	6
4	Display optimization techniques	6
5	Optimization by virtual memory	6
6	Additional tools and techniques for optimization in different OS platform	6

SUGGESTED READINGS:

- Optimization Theory for Large Syste (Dover Books on Mathematics)

Paper: VFX & SFX Lab

Code: BGMAD-691

Paper Type: Practical, Core (CP13)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Implementation concept of VFX and SFX

MODULE	CONTENT	Teaching Hours
1	Create a game project with VFX and SFX	20

Paper: Game OPtimization Lab

Code: BGMAD-692

Paper Type: Practical, Core (CP14)

Contacts Hours / Week: 2P

Credits: 2

On completion of the course, students will be able to

CO1: Become Familiar with Game optimization techniques

MODULE	CONTENT	Teaching Hours
1	**Game Optimization Project**	20

SUGGESTED READINGS:

- Optimization Theory for Large Syste (Dover Books on Mathematics)

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Paper: Modelling, Texturing & Lighting for Games
Code: BGMADDSE-601 A
Paper Type: Theory, Discipline Specific Elective (DSE3)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Analyze Modeling Texturing and Lighting

MODULE	CONTENT	Teaching Hours
1	Modeling for game,Difference between low and high poly model,Difference between quad,tri and penta polygon	**5**
2	Modeling using basic polygon primitives	**5**
3	UV Mapping	**5**
4	Texture mapping	**5**
5	LOD in Game	**5**
6	Lighting:Definition,Types of lighting ,One,Two and Three point of lighting	**5**
7	Difference between natural and CG light	**5**
8	Types of light:Spot light,Point light,ambience light,Bounce light	**5**

SUGGESTED READINGS:

- Maya for Games Modeling and Texturing Techniques with Maya and Mudbox

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Paper: Rigging & Animation for Games
Code: BGMADDSE-601B
Paper Type: Theory, Discipline Specific Elective (DSE3)
Contacts Hours / Week: 4L
Credits: 4

On completion of the course, students will be able to

CO1: Skill of Rigging

MODULE	CONTENT	Teaching Hours
1	Introduction to rigging,Types of rigging, IK and FK definition	10
2	Difference between IK and FK , Organic and Mechanical rigging	10
3	Screen painting:Reducing influence from undesired position	10
4	Animation for games	10

SUGGESTED READINGS:
- Animator's survival kits by Richard Williams
- 3D animation essential

Paper: DISSERTATION + PROJECT
Code: BGMADDSE-602
Paper Type: Theory, Discipline Specific Elective (DSE4)

Contacts Hours / Week: 6L

Credits: 4+2

MODULE	CONTENT	Teaching Hours
1	**DISSERTATION + PROJECT**	**40+20**

Paper: Modelling, Texturing & Lighting Games Lab
Code: BGMADDSEP-691A
Paper Type: Practical, Discipline Specific Elective Practical (DSEP3)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Skills of Modeling and Lighting

MODULE	CONTENT	Teaching Hours
1	Light an exterior set using 3 point lighting and ambience lighting	10
2	Texture a cityscape maintaining LOD	10

SUGGESTED READINGS:

- Maya for Games Modeling and Texturing Techniques with Maya and Mudbox

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Paper: Rigging & Animation for Games Lab
Code: BGMADDSEP-691B
Paper Type: Practical, Discipline Specific Elective Practical (DSEP3)
Contacts Hours / Week: 2P
Credits: 2

On completion of the course, students will be able to

CO1: Skills of Rigging & Animation

MODULE	CONTENT	Teaching Hours
1	Rig a organic character for animation	10
2	Rig a organic character for game	10

SUGGESTED READINGS:

- Animator's survival kits by Richard Williams
- 3D animation essential