



Bachelor of Science in Computer Games Development Program
For Fall 2022 and onward
(Computing & Non-Computing Students)

Department of Computer Games Development
Faculty of Computing and Artificial Intelligence
Air University, Islamabad

1 Structure of the Proposed Program

The Bachelor of Science in Computer Games Development (BSCGD) program provides students an opportunity to combine a sound foundation in Computer Games Development with concrete and concentrated knowledge in the latest developments in particular areas. The program provides preparation in the advanced principles and processes of computation and training in applying these principles in application areas in industry, science, research, government, and business. The program emphasizes on course work along with practical assignments and projects.

The four-year BS Computer Games Development program consists of six core courses and four electives from various areas of specializations.

1.1 Degree Title

The title of degree is “**Bachelor of Science in Computer Games Development (BSCGD)**”

1.2 Duration

The **minimum duration** for completion of BS degree is four years and **maximum period of seven years** to complete BS degree requirements.

1.3 Award of degree

For the award of BS (Computer Games Development) degree, a student must have:

- Passed courses with at least 130 credit hours, including all those courses that have been specified as core courses.
- Obtained CGPA of at least 2.00.

2 PROGRAMME GENERAL INFORMATION

Academic year	2022
Awarding body	Air University
Teaching institute and location	Air University, Islamabad Campus
Language of study	English
Final award	BS
Program title	Computer Games Development
Duration of study	4 years (maximum time up to 6 years)
Total number of semesters	8
Number of weeks per semester	16 - 18 (16 for teaching and 2 for examinations)
Total number of credit hours	130
Total number of courses	41

Credit hours per semester	14-18
Proposed starting date	Fall 2022 Semester

2.1 Distribution of Courses

Following is the distribution of courses:

#	Category	Credit Hours	No of Courses	HEC/NC EAC Cr Hrs.	HEC/NC EAC num. of Courses
1	General Education	19	7	19	7
2	University Electives	12	4	12	4
3	Mathematics & Science Foundation	12	4	12	4
4	Computing Core	39	11	39	11
5	Computer Science Core	18	5	18	5
6	Computer Games Development Core (Domain Core)	18	6	18	6
7	Computer Games Development Electives (Domain Electives)	12	4	12	4
	Total Credit Hours	130	41	130	41

2.2 General Education Electives – 19 Cr.Hr.

S.No.	Course Code	Course Title	Credit hours
1	CS180	Intro to Info. & Comm. Technologies	(2-1-3)
2	EL100	English Composition and Comprehension	(3-0-3)
3	EL200	Communication & Presentation Skills	(3-0-3)
4	EL400	Technical & Business Writing	(3-0-3)
5	HU124	Islamic Studies/ Ethics	(2-0-2)
6	BA202	Pakistan Studies & Global Perspective	(2-0-2)
7	GDXXX	Professional Practices	(3-0-3)
		Total	(18-1-19)

2.3 University Elective Courses – 12 Cr.Hr.

(Not limited to the list below, the University may add more courses)

Course Code	Course Title	Credit hours
BA356	Entrepreneurship	(3-0-3)
BA157	Management information systems	(3-0-3)
GD501	Computer Game Project Management	(3-0-3)
GD502	Game Marketing	(3-0-3)
HU113	Introduction to Psychology	(3-0-3)
EL300	Interpersonal skills/Public relations	(3-0-3)
HU214	Introduction to sociology	(3-0-3)
FL202	Foreign Language	(3-0-3)
HU414	Social Service	(1-0-1)
Total		(12-0-12) (1 Non Credit)

2.4 Mathematics and Science Foundation Courses – 12 Cr.Hr.

Course Code	Course Title	Credit hours
MA110	Calculus & Analytical Geometry	(3-0-3)
MA201	Linear Algebra	(3-0-3)
MA301	Probability & Statistics	(3-0-3)
PH104	Physics for Games	(3-0-3)
Total		(12-0-12)

2.5 Computing Core Courses – 39 Cr.Hr.

Course Code	Course Title	Credit hours
CS111	Programming Fundamentals	(3-1-4)
CS112	Object Oriented Programming	(3-1-4)
CS214	Data Structures & Algorithms	(3-1-4)
MA216	Discrete Structures	(3-0-3)
CS225	Operating Systems	(3-1-4)
CS230	Database Systems	(3-1-4)
SE100	Software Engineering	(3-0-3)
CS360	Computer Networks	(3-1-4)
CY406	Information Security	(3-0-3)
GD497	Final Year Project - I	(0-1-1)
GD498	Final Year Project - II	(0-2-2)
GD499	Final Year Project - III	(0-3-3)
Total		(27-12-39)

2.6 Computer Games Development Supporting Courses/CS Core Courses – 18 Cr.Hr.

Course Code	Course Title	Credit hours
GD301	Artificial Intelligence for Games	(2-1-3)
GD202	Computer Graphics	(2-1-3)
CS332	Design and Analysis of Algorithms	(3-0-3)
GD104	UI/UX Design and Development	(2-1-3)
GD204	Software Architecture for Games	(3-0-3)
GD201	Visual Programming	(2-1-3)
Total		(14-4-18)

2.7 Computer Games Development Core Courses – 18 Cr.Hr.

Course Code	Course Title	Credit hours
GD101	Game Design Principles	(3 – 0 – 3)
GD102	Graphic Design & Illustration	(1 – 2 – 3)
GD103	3D Design and Modelling	(1 – 2 – 3)
GD401	3D Animation and Visual Effects Production	(1 – 2 – 3)
GD203	Cross Platform Game Development	(2 – 1 – 3)
GD205	Unreal Game Engine	(2 – 1 – 3)
Total		(10-8-18)

2.8 Computer Games Development Elective Courses – 12 Cr.Hr.

(More Courses may be added to this list)

Course Code	Course Title	Credit hours
GD300	Fundamental of Game Design	2 – 1 – 3
GD301	Modeling and Simulation	2 – 1 – 3
GD302	3D Texturing and Lighting	2 – 1 – 3
GD303	Applied 3D Geometry	2 – 1 – 3
GD304	Level Design Methods	2 – 1 – 3
GD310	Practical Scripting for Games	2 – 1 – 3
GD411	Game Engine Programming	2 – 1 – 3
GD312	Console Game Development Environments	2 – 1 – 3
GD313	Object Oriented Game Development	2 – 1 – 3
GD314	Fundamentals of Simulation Development	2 – 1 – 3
GD315	Game Mechanics	2 – 1 – 3
GD316	Tools for Game Development	2 – 1 – 3
GD317	Game Engines	2 – 1 – 3
GD320	Introduction to Digital Media, Film & TV	2 – 1 – 3
GD321	Virtual Reality Game Development	2 – 1 – 3

GD322	AR and MR Technologies	2 – 1 – 3
GD323	Real World Modelling and Simulation	2 – 1 – 3
GD324	Introduction to Illustration	2 – 1 – 3
GD325	Making Comics	2 – 1 – 3
GD330	2D and 3D Animation	2 – 1 – 3
GD331	3D Design and Modelling	2 – 1 – 3
GD332	3D Character Animation	2 – 1 – 3
GD333	Hand-Drawn Character Animation	2 – 1 – 3
GD334	3D Rigging	2 – 1 – 3
GD335	Animation Scripting and Mechanics	2 – 1 – 3
GD336	Stop Motion Animation	2 – 1 – 3
GD337	Motion Graphics	2 – 1 – 3
GD438	Motion Capture	2 – 1 – 3
GD340	Introduction to Media Technologies	2 – 1 – 3
GD341	Multimedia Sensors Interactive Schemes	2 – 1 – 3
GD342	Web Design and Development	2 – 1 – 3
GD343	Machine learning for multimedia Systems	2 – 1 – 3
GD344	Creative Studio Methods	2 – 1 – 3
GD445	Digital Film Making	2 – 1 – 3
GD446	Digital Cinema Production	2 – 1 – 3
Total (Any Four of the Above)		(8-4-12)

2.9 List of All courses with their Streams/Clusters

		<u>Computer Game Design (0)</u>
1	GD300	Fundamental of Game Design
2	GD301	Modeling and Simulation
3	GD302	3D Texturing and Lighting
4	GD303	Applied 3D Geometry
5	GD304	Level Design Methods
6	GD305	Computer Graphics and Visual Designs

7	GD306	Visual Design for Games
8	GD307	Real-Time Graphics Techniques
9	GD308	Story Boarding and Narrative Development
10	GD309	Elements of Digital Painting
		<u>Computer Games Development (1)</u>
11	GD310	Practical Scripting for Games
12	GD411	Game Engine Programming
13	GD312	Console Game Development Environments
14	GD313	Object Oriented Game Development
15	GD314	Fundamentals of Simulation Development
16	GD315	Game Mechanics
17	GD316	Tools for Game Development
18	GD317	Game Engines
19	GD318	Game Engine Architecture
20	GD419	Advance topics in Game Development
		<u>Immersive Technologies (2)</u>
21	GD320	Introduction to Digital Media, Film & TV
22	GD321	Virtual Reality Game Development
23	GD322	AR and MR Technologies
24	GD323	Real World Modelling and Simulation

25	GD324	Introduction to Illustration
26	GD325	Making Comics
27	GD326	3D Gameplay Programming
28	GD327	Gesture Drawing and characterization
29	GD428	Mobile AR Game Development
30	GD429	VFX for Production
		<u>Digital Animation(3)</u>
31	GD330	2D and 3D Animation
32	GD331	3D Design and Modelling
33	GD332	3D Character Animation
34	GD333	Digital Character Animation
35	GD334	3D Rigging
36	GD335	Animation Scripting and Mechanics
37	GD336	Stop Motion Animation
38	GD337	Motion Graphics
39	GD438	Motion Capture
40	GD439	Advance 3D Animation
		<u>Multimedia Technologies(4)</u>
41	GD340	Introduction to Media Technologies
42	GD341	Multimedia Sensors Interactive Schemes
43	GD342	Web Design and Development
44	GD343	Machine learning for multimedia Systems
45	GD344	Creative Studio Methods
46	GD445	Digital Film Making
47	GD446	Digital Cinema Production
48	GD347	Pattern recognition and analysis
49	GD448	Computer Vision and Digital Media Communications

50	GD349	Game Sound Design
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2.9 Semester Plan

Semester - I

Code	Course Title	Non-Medical Credit Hours	Medical Credit Hours	Prerequisite
CS111	Programming Fundamentals	3 – 0 – 3	3 – 0 – 3	
CS111 L	Programming Fundamentals – Lab	0 – 1 – 1	0 – 1 – 1	
EL100	English Composition & Comprehension	3 – 0 – 3	3 – 0 – 3	
HU118	Islamic Studies/Ethics	2 – 0 – 2	2 – 0 – 2	
MA113	Pre-Calculus	N/A	2-0-2	
CS180	Introduction to ICT	2 – 0 – 2	2 – 0 – 2	
CS180 L	Introduction to ICT – Lab	0 – 1 – 1	0 – 1 – 1	
MA114	Foundational Mathematics	N/A	4-0-4	
Total		(10-2-12)	(16-2-18)	

Semester - II

Code	Course Title	Credit Hours	Prerequisite
CS112	Object Oriented Programming	3 – 0 – 3	CS111, CS111L
CS112L	Object Oriented Programming – Lab	0 – 1 – 1	CS111
HU125	Pakistan Studies and Global Perspectives	2 – 0 – 2	
SE100	Software Engineering	3-0-3	
MS110	Calculus & Analytical Geometry	3 – 0 – 3	
EL200	Communication & Presentation Skills	3 – 0 – 3	EL100
MA216	Discrete Structures	3-0-3	
Total		(17-1-18)	

Semester - III

Code	Course Title	Credit Hours	Prerequisite
CS214	Data Structures and Algorithms	3 – 0 – 3	CS112, CS 112L
CS214L	Data Structures and Algorithms – Lab	0 – 1 – 1	CS112
PH104	Physic for Games	3-0-3	
MA301	Probability & Statistics	3 – 0 – 3	MA201
GD101	Game Design Principles	3-0-3	
GD201	GD Supporting – I (Visual Programming)	2-0-2	
GD201L	GD Supporting – I (Visual Programming – Lab)	0-1-1	
Total		(14-2-16)	

Semester - IV

Code	Course Title	Credit Hours	Prerequisite
CS332	GD Supporting – II (Design and Analysis of Algorithms)	3 – 0 – 3	CS214
CS230	Database Systems	3 – 0 – 3	CS214, CS214L
CS230L	Database Systems – Lab	0 – 1 – 1	CS214, CS214L
CS225	Operating System	3 – 0 – 3	
CS225L	Operating System – Lab	0 – 1 – 1	
MA201	Linear Algebra	3 – 0 – 3	MA110
GD102	Graphic Design & Illustration	1– 0 – 1	GD101
GD231L	Graphic Design & Illustration – Lab	0 – 2 – 2	GD101
Total		(13-4-17)	

Semester - V

Code	Course Title	Credit Hours	Prerequisite
GD103	3D Design and Modeling	1-0-1	GD102, GD102L
GD103L	3D Design and Modeling - Lab	0-2-2	GD102

GD202	GD Supporting – III (Computer Graphics)	2-0-2	
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GD202L	GD Supporting – III (Computer Graphics – Lab)	0-1-1	
GDXXX	GD Elective – I	3-0-3	
GDXXX	GD Elective – II	3-0-3	
GD203	Cross-Platform Game Development	2-0-2	GD101
GD203L	Cross-Platform Game Development - Lab	0-1-1	GD101
BA356	University Elective -I (Entrepreneurship)	3-0-3	
Total		(14-4-18)	

Semester - VI

Code	Course Title	Credit Hours	Prerequisite
CS360	Computer Networks	3-0-3	
CS360L	Computer Networks Lab	0-1-1	
GDXXX	GD Elective – III	3-0-3	
GDXXX	GD Elective – Iv	3-0-3	
GD104	GD Supporting – Iv (UI/ UX Design and Development)	2-0-2	
GD104L	GD Supporting – IV (UI/ UX Design and Development - Lab)	0-1-1	
EL400	Technical & Business Writing	3-0-3	EL200
GD497	Final Year Project – I	0-1-1	List A
Total		(14-3-17)	

Semester - VII

Code	Course Title	Credit Hours	Prerequisite
GD501	University Elective – II (Computer Game Project Management)	3-0-3	
HU113	University Elective – III (Introduction to Psychology)	3-0-3	
GD204	GD Supporting – V (Software Architecture for Games)	3-0-3	
GD401	3D Animation & Visual Effects Productions	1-0-1	GD103, GD103L

GD401L	3D Animation & Visual Effects Productions - Lab	0-2-2	GD103
GD301	GD Supporting – VI (Artificial Intelligence for Games)	2-0-2	
GD301L	GD Supporting – VI (Artificial Intelligence for Games - Lab)	0-1-1	
GD498	Final Year Project – Part II	0 – 2 – 2	GD497
Total		(12-5-17)	

Semester - VIII

Code	Course Title	Credit Hours	Prerequisite
GD502	University Electives – IV (Game Marketing)	3 – 0 – 3	
GD205	Unreal Game Engine	2-0-2	GD401, GD401L
GD205L	Unreal Game Engine - Lab	0-1-1	GD401
CY406	Information Security	3-0-3	
CS270	Professional Practices	3 – 0 – 3	
GD499	Final Year Project – Part III	0 – 3 – 3	GD498
Total		(11-4-15)	
Total Credit Hours		130	

List A

Code	Course Title	Credit Hours	Pre-requisite
CS214	Data Structure and Algorithms	3-0-3	CS112.CS112L
GD231	3D Modelling and Design	2 – 0 – 2	GD201
GD203	Cross-Platform Game Development	2 – 1– 3	CS112, CS112L