PRESIDENCY UNIVERSITY

(Established under the Presidency University Act, 2013 of the Karnataka Act 41 of 2013)

School of Information Science

Three Year Degree
Program Regulations and Curriculum, 2020

Bachelor of Computer Applications

[Gaming & Graphics]

2020-2023

Regulations No.: PU/AC-20.4/SOIS02/BCG/2020-23

Resolution No. 4 of the 20th Meeting of the Academic Council held on 15th February 2023, and ratified by the Board of Management in its 21st Meeting held on 22nd February 2023.

February-2023

Three Year Degree Program
Regulations and Curriculum, 2020

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

In exercise of the powers conferred by and in discharge of duties assigned under the relevant provision(s) of the Act, Statutes and Academic Regulations, 2020 of the University, the Academic Council hereby makes the following Regulations, namely;

PRELIMINARY

Short Title and Commencement

(a) These Regulations shall be called the **Under Graduate (UG) Program Regulations and Curriculum, 2019**.

(b) These Regulations shall be applicable to Bachelor of Commerce, Bachelor of Business Administration and Bachelor of Computer Application Programs 2019-22 Batch and to which that may be introduced in future.

(c) These Regulations shall be applicable to the ongoing Three-Year Bachelor Degree Programs, and to all other similar programs, which may be introduced in future.

(d) They shall come into force from the Academic Session 2019-22.

Definitions

In these Regulations, unless there is anything repugnant to the subject or context:

a) "Academic Council" means the Academic Council of the University;
b) "Academic Term" means a Semester or Summer Term;
c) "Board of Examinations" means the Board of Examinations of the University;
d) "Clause" means the duly numbered Clause, with Sub-Clauses included, if any, of these Regulations;
e) "Course" means, a specific subject usually identified by its course-number and course- title, with specified credits and syllabus/course-description, a set of references, taught by some teacher(s)/course-instructor(s) to a specific class (group of students) during a specific academic-session/semester;
f) "Course Instructor" means, the teacher or the Course Instructor of a Course;
g) "DAC" means, the Departmental Academic Committee;
h) "Dean" means the Dean of the concerned school;
i) *"Dual Specialization" means two specialization areas which a student concentrates on or wishes to develop his/her expertise;*
j) "Elective" means courses offered under each area of Specialization;
k) "HOD" means the Head of the Concerned Department;
l) "Industrial Practice" means supervised Internship in an Organization for 8 weeks during the fourth semester;
m) *"Open elective" means a course so specified in the Program Curriculum;*
n) "Program" means the Bachelor of Commerce (B.Com), Bachelor of Business Administration (BBA)Program and Bachelor of Computer Application (BCA) ;
o) "Program Regulations" means the Bachelor of Commerce (B.Com), Bachelor of Business Administration (BBA) and Bachelor of Computer Application (BCA)Degree Program Regulations and Curriculum, 2019;
p) "School" means a constituent institution of the University established for monitoring, supervising and guiding, teaching, training and research activities in broadly related fields of studies;
q) "Specialization" means a particular area which a student concentrates on or wishes to develop his/her expertise;
r) "Specialization Core Courses" means a set of courses so specified that a student has to compulsorily complete in the area of his/her specialization;
s) "Specialization Elective Course" means an elective course offered under each area of specialization;
t) "Special Summer Term" means an additional academic term conducted during the summer break (typically in June-July) for a duration of about eight (08) calendar weeks, with a minimum of thirty (30) University teaching days;
u) "Statutes" means the Statutes of Presidency University;
v) "Sub-Clause" means the duly numbered Sub-Clause of these Program Regulations;
w) "Summer Internship" means supervised Internship in an Organization for 8 weeks;
x) "University" means Presidency University, Bengaluru, and
y) "University Learning Course" means a course so specified.
z) "Honors degree" refers to a variant of the undergraduate bachelor's degree containing a larger volume of material or a higher standard of study, or both, rather than an "ordinary", "general" or "pass" bachelor's degree.

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

1.0 INTRODUCTION

1.1 The **Academic Regulations, 2019** are applicable to all existing Degree Programs of the University. The Academic Regulations, and any amendments made therein, shall also be applicable to new Degree and Diploma Programs that may be offered by the University in future.

1.2 These Regulations shall be applicable to the following ongoing Three-**Year Bachelor of Degree Programs:**

1.2.1 **Bachelor of Commerce (B.Com)**;

1.2.2 **Bachelor of Business Administration (BBA)**;

1.2.3 **Bachelor of Computer Application (BCA).**

1.3 These Program Regulations and Curriculum may evolve and get amended or modified or changed through appropriate approvals from the Academic Council, from time to time, and shall be binding on all concerned.

1.4 These Program Regulations and Curriculum are structured as follows:

1.4.1 **PART A:** Specific Regulations relevant to the Three-Year, Semester Based Full Time Bachelor of Commerce and Bachelor of Business Administration Degree Program in pursuant of the provisions in Section 6.0 of the Academic Regulations, 2019 of the University

1.4.2 **PART B:** Program Curriculum for specific Bachelor of Commerce (B.Com) and Bachelor of Business Administration (BBA) Program of study as enumerated and named in Clause 1.2.

2.0 PART A: Program Specific Regulations

2.1 Program Description and Duration

Three-Year Degree Programs are offered in the following schools with specializations

PROGRAM	SPECIALIZATION	PARENT DEPARTMENT
Bachelor of Commerce (B.Com)	Banking and Finance	**SCHOOL OF COMMERCE AND ECONOMICS**
	Corporate Accounting and Taxation	
Bachelor of Commerce B.Com [Honors]	Business Analytics	
	Corporate Accounting with CMA US	
Bachelor Of Business Administration (BBA)	Aviation Management	**SCHOOL OF MANAGEMENT**
Bachelor Of Business Administration (BBA)	Finance Marketing Human Resource Entrepreneurship Business Analytics Supply Chain and Logistics	
Bachelor of Computer Application (BCA)	General	**SCHOOL OF INFORMATION SCIENCE**
	Gaming and Graphics	
	Augmented reality and Virtual Reality	

2.2 Degree Program is a Three –Year, full time semester based program. The minimum duration of the Program is Three (03) years and each year comprises of two academic semesters (Odd and Even Semesters) and hence the duration of the Degree Program is Six (06) Semesters. All Degree Programs are full time programs.

2.3 Admission criteria to the Three-Year Degree Programs

The University admissions shall be open to all persons irrespective of caste, class, creed, gender or nation. All admissions shall be made on the basis of merit in the qualifying examinations: Provided that forty percent of the admissions in all courses of the university shall be reserved for the students of Karnataka State and seats

shall be allotted as per the merit and reservation policy of the State Government from time to time.
The admission criteria to the Degree Program is listed in the following Sub-Clauses:

2.3.1 An applicant who has successfully completed Pre-University course or Senior Secondary School course (+2) or equivalent such as (11+1), 'A' level in Senior School Leaving Certificate Course) from a recognized University of India or outside or from Senior Secondary Board or equivalent, constituted or recognized by the Union or by the State Government of that Country for the purpose of issue of qualifying certificate on successful completion of the course, may apply for and be admitted into the course.

2.3.2 Reservation for the SC/ST and other backward classes shall be made in accordance with the directives issued by the Government from time to time.

2.3.3 Admissions are offered to Foreign Nationals and Indians living abroad in accordance with the rules applicable for such admission, issued from time to time, by the Government of India.

2.3.4 Candidates must fulfill the medical standards required for admission as prescribed by the University.

2.3.5 If, at any time after admission, it is found that a candidate had not in fact fulfilled all the requirements stipulated in the offer of admission, in any form whatsoever, including possible misinformation and any other falsification, the Registrar shall report the matter to the Board of Management, recommending revoking the admission of the candidate.

2.3.6 The decision of the Board of Management regarding the admissions is final and binding.

2.4 Change of Branch/Discipline

A student admitted to a particular Branch of the degree Program will normally continue studying in that Branch till the completion of the program. However, the University reserves the right to provide the option for a change of Branch/Specialization, or not to provide the option for a change of branch, at the end of 1st year of the degree to eligible students in accordance with the rules framed by the University from time to time.

2.4.1 Normally, only those students, who have passed all the Courses prescribed for the 1st Year of the degree Program and obtained a CGPA of not less than 6.00 at the end of the 2nd Semester, shall be eligible for consideration of a change of branch.

2.4.2 Change of Branch, if provided, shall be made effective from the commencement of the 3rd Semester of the degree Program. There shall no provision for change of Branch thereafter under any circumstances whatsoever.

2.4.3 The student(s) provided with the change of branch shall fully adhere to and comply with the Program Regulations and Curriculum of the concerned Program/Branch, the Fee Policy pertaining to that Program/Branch, and, all other rules pertaining to the changed Branch/Program existing at the time.

2.4.4 Change of branch once made shall be final and binding on the student. No student shall be permitted, under any circumstances, to refuse the change of branch offered.

2.4.5 The applicants may be allowed a change in branch, strictly in order of *inter se* merit, subject to the limitations as given below:

2.4.5.1 The actual number of students in the third semester in any particular branch to which the transfer is to be made, should not exceed the sanctioned strength by more than 5%, and,

2.4.5.2 The actual number of students in any branch from which transfer is being sought does not fall below 75% of the total sanctioned intake.

2.4.5.3 The process of change of branch shall be completed on the first day of Registration for the 3rd Semester.

REGISTRAR

2.5 Summer Internship

The Program requires a student to compulsorily undergo minimum 6 weeks of Summer Internship after completion of fourth semester between June and July in an Academic Year. The progress of the student's performance will be assessed and graded based on the method of evaluation prescribed in the concerned Course Handout. A minimum of

40% of the allotted marks is required for "PASS" grade (Grade D). In case a student fails to achieve the pass grade he / she will be required to repeat the summer internship at the end of the VI semester.

2.6 Social Immersion Course

The objective of a Social Immersion Course (SIC) is to sensitise and inculcate commitment to social and environmental issues and make a contribution through service and experiential learning. The outcome is to produce graduates who are sensitised and committed to serving the social and environmental needs of society.

The SIC is a 1-Credit Course coordinated by the Parent Department or a group of Departments and the student is required to complete this course ideally during any of the Semesters of the 2nd or 3rd Year of the B. Tech. Program. The nature and details of the SIC shall be approved by the concerned Departmental Academic Committee (DAC). As per the Academic Regulations, the 'S' grade is awarded for "satisfactory completion" of the Course and the 'NC' grade is awarded for "non-completion" of the Course. The student who receives the 'NC' grade shall repeat the SIC (it may be another type of SIC as approved by the concerned DAC) until the concerned student secures the 'S' grade in the SIC. The 'S' and 'NC' grades do not carry grade points and, hence, are not included in the SGPA, CGPA computations.

2.7 Open Electives

Open electives are courses offered by any department/school of the University. Primary objective of offering Open Electives is to provide interdisciplinary/transdisciplinary learning experiences. The Course details and method of evaluation shall be clearly prescribed in the concerned Course Handout.

2.8 Specific Regulations Governing Evaluation

2.8. l. Evaluation- General

2.8.1.1 The Three Year Degree Program shall follow an instructor-led evaluation system.

2.8.1.2 In courses that have a credit structure of L-0-0 or L-T-0, the components of evaluation shall be as detailed in Table 1.

Table 1. Method of Assessment for Courses with Credit Structure L –T – 0 and L – 0 – 0

Components of Continuous Assessments		Weightage (% of Total Marks)	Duration of Assessment
1.	*Mid Term	30%	1.5 hour
2.	This component of continuous assessment shall consist of at least TWO (02) of the followings: (1) Assignment(s) (2) Quiz (3) Technical Seminar / Report (4) Attendance / Class participation (5) Assessment on self-learning topic(s), or (6) Any other type of assessment as prescribed in the concerned Course Handout.	20%	NA
3.	End Term Final Examinations	50%	3 hours
Total		**100%**	

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Note:
(i) Applicable from the academic year 2022-2023 onwards

2.8.1.3 Continuous Assessment:

Continuous Assessment will be based on the student's performance in Mid Term Examination and Internal Assessment. Internal Assessment includes regular course work, research writing, assignments, quizzes, projects, term papers, case analysis, paper presentations, Viva-Voce, role plays, etc. At the beginning of each semester, the scheme of weightage of each component of Internal Assessment shall be notified by the faculty concerned, in the Course Handout.

2.8.1.3 In courses that have a credit structure of 0-T-P or 0-0-P, the components of evaluation shall be as detailed in Table 2.

Table 2. Method of Assessment for Practical Courses with Credit Structure 0 –0 – P and L – 0 – P

	Components of Continuous Assessments	**Weightage (%of Total Marks)**	**Duration of Assessment**
1.	Laboratory/ Practical Exercise conducted in every Practical Class and Laboratory Records, Practical/ Project Reports as prescribed by the Course Handout.	30%	NA
2.	Practical Test/ Viva/ Quiz/ Assignments as prescribed by the Course Handout.	20%	NA
3.	End Term Final Practical Examinations	50%	2 or 3 hours
Total		**100%**	

2.8.2 Evaluation – Personal and Professional Development Courses

2.8.2.1.The assessment will be made on the basis of continuous evaluation throughout the semester, which may include regular course work, practice work, assignments, presentations, quizzes, simulations, industrial tours and viva-voce.

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

2.8.4 Evaluation – Internship

2.8.4.1 Students shall maintain an Internship Diary detailing the day to day activities that are carried out during their summer/winter training/internship in the prescribed format.

2.8.4.2 Students shall submit one Internship Report in addition to the internship diary, detailing one particular task/project undertaken during the internship.

2.8.4.3 Students will be required to appear for a Viva -Voce Examination.

2.8.4.4 The students shall submit the Internship Diary and the Report to the Internship

Coordinator of the respective batches on or before such dates duly notified by the Dean of the School.

2.8.4.5 An Assessment Committee constituted by the Dean of the School comprising of internal and external members will evaluate internship.

2.8.4.6 The Evaluation components for Internship and the respective weightages are detailed in Table 3:

Table 3
Internship Evaluation Components and Weightage

Evaluation Components		Weightage (of the total marks)
1.	Record/Internship Diary	50 %
2.	Internship Report	40 %
3.	Viva-Voce	10%

2.8.4 Evaluation – Dissertation

2.8.4.7 Every student shall, carryout dissertation under the overall supervision of the supervisor(s).

2.8.4.8 Normally, only a faculty member of the School concerned shall be allowed to supervise a dissertation. If the topic of a dissertation warrants, at the most two faculty members of the same School may be allowed to supervise a dissertation/project work. Considering the interdisciplinary nature of the work involved a faculty from other School and/or from industry/corporate organization active in the area in which the work is being carried may be allowed, to be associated as a co-supervisor.

2.8.4.9 The Faculty Coordinator(s) shall, in consultation with the Dean concerned, finalize the topic for dissertation along with the name(s) of the supervisor(s) in Semester IV. For this purpose, the Coordinator shall take into account the relevance of the topic on which the candidate proposes to work. However, the Coordinator may, if he considers it necessary or expedient, ask a student to carry out dissertation on a topic other than the topic proposed by the student and/or under a supervisor other than the one under whom the student proposed to carry out his/her dissertation.

2.8.4.10 Midcourse alteration/ modification in the scope of dissertation would need explicit approval from the Dean of the School. The Coordinator shall prepare a list comprising the names of the students, topic allotted to each of them along with the name of the supervisor(s). The list duly approved by the Dean of the School shall be sent to the CoE.

2.8.4.11 A certificate in the prescribed format to the effect that the dissertation carried out by the student independently or in collaboration with other student(s) issued by the Supervisor(s) concerned and endorsed by the Faculty Coordinator concerned, shall form the part of the submission for evaluation.

2.8.4.12 Every student who spends a specified period of time in an industry/organization/institute for reasons of work related to his/her dissertation, with prior permission from the Faculty Coordinator concerned will explicitly acknowledge working in the relevant industry/organization/institute.

2.8.4.13 The dissertation will normally be of 30 to 60 pages. Students are required to submit the dissertation in the VI Semester within the stipulated time. The dissertation will not be accepted after expiry of last date as stipulated. If a student fails to submit the same by the stipulated date, he/she will be declared failed and will be required to repeat the same in the appropriate semester of the next academic session provided other provisions of the Regulations permit continuance of studies in the University.

2.8.4.14 The student shall submit to Program Coordinator one printed soft bound copy of his/her dissertation.

2.8.4.15 An Assessment Committee constituted by the Dean of the School comprising of internal and external members shall conduct Viva-Voce on dissertation.

2.8.4.16 The Evaluation components for dissertation and the respective weightages are detailed

in Table 4:

Table 4 Dissertation Evaluation Components and Weightage		
Evaluation Components		Weightage (of the total marks)
1.	Dissertation	50 %
2.	Supervisor Evaluation and Feedback	20%
3.	Viva-Voce	30 %

2.8.4.17 The final grade on Dissertation shall be awarded by the Assessment Committee and shall be forwarded to the CoE.

2.8.5 Evaluation – Other courses

2.8.6 The courses with only continuous evaluation the faculty concerned shall in consultation with the Dean of the School decide on the type of evaluation component to be adopted for the course and the minimum performance criteria shall be as per the academic regulations of the university.

For the courses with grades but without grade points, 'S' or 'NC' grades shall be awarded as per the Academic Regulations of the university

2.9 **Course Handout**

The Course Handout is a comprehensive document describing the Objectives/Outcomes of the Course, the detailed syllabus (with the prescribed Text Book(s) and Reference Material) and the Lesson/Session-wise Plan, and all the relevant and necessary details regarding the pedagogy, expectation from the students regarding preparation, participation and self-learning, components of continuous assessment and respective weightage (in percentage (%) of the total marks of all components of assessment) given to the components, and the method of evaluation. The guidelines for preparation of the Course Handout, its approval and delivery is listed in the following Sub-Clauses:

2.9.1 Normally the Course Handout is prepared by the Course Instructor(s) assigned to teach the Course. In cases of multiple sections of students registered for the same Course, an Instructor In-Charge, assigned by the DAC, shall prepare the Course Handout in consultation with the other Course Instructors assigned to the concerned Course.

2.9.2 The DAC shall examine each Course Handout and arrange for necessary deliberations as required. On acceptance of the completeness and quality of the Course Handout, the DAC shall approve the Course Handout.

2.9.3 A consolidated printed Booklet of all Course Handouts corresponding to the academic semester of a particular Program of Study shall be provided to every student concerned on the first day/Registration day of the concerned Semester.

2.9.4 The Course Handout is a very important guide for the students registered in the concerned course. The students are expected to use the Course Handout Booklet to prepare regularly and benefit from each session (lecture/tutorial/practical) of the course(s) and perform well in the continuous assessments and end term final examination, as applicable. Every student shall read and adhere to all the guidelines prescribed in the Course Handout.

2.10 **Rules and Guidelines for Transfer of Credits from Massive Open Online Courses**

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

(Refer Section 18.0 of the Academic Regulations, 2019.)

The provisions and rules pertaining to the transfer of credits through Massive Open Online Courses are outlined in Section 18.0 of the Academic Regulations, 2019.

With reference to Clause 18.2 of the Academic Regulations, the rules and guidelines for transfer of credits specifically from Study Webs of Active-Learning for Young Aspiring Minds-National Program on Technology Enhanced Learning (SWAYAM-NPTEL) are as stated in the following Sub-Clauses:

2.10.1. A student may complete SWAYAM-NPTEL courses and transfer equivalent credits to partially or fully complete the mandatory credit requirements of Discipline Elective Courses and/or the mandatory credit requirements of Open Elective Courses and/or the mandatory credit requirements of Management Sciences Courses as prescribed in the concerned B. Tech. Program Regulations and Curriculum. However, it is the sole responsibility of the student to complete the mandatory credit requirements of the Discipline Elective Courses, the Open Elective Courses and the Management Sciences Courses as prescribed by the Program Regulations and Curriculum of the concerned B. Tech. Program.

2.10.2. Approved SWAYAM-NPTEL Courses shall be included as annexes to the Program Regulations and Curriculum for the concerned B. Tech. Program and shall be announced through University Notifications to the students from time to time. A student shall only request for transfer of credits from such approved/notified SWAYAM-NPTEL Courses as published by the concerned Departments.

2.10.3. SWAYAM-NPTEL Courses are considered for transfer of credits only if the concerned student has successfully completed the SWAYAM-NPTEL Course(s) and obtained the SWAYAM-NPTEL Certificate to this effect.

2.10.4. A student cannot transfer credits from SWAYAM-NPTEL Courses to earn the mandatory credits assigned for any other type of Courses (other than Discipline, Open Elective Courses and Management Sciences Courses) as prescribed in the concerned Program Regulations and Curriculum. However, a student may complete SWAYAM-NPTEL Courses and transfer equivalent credits in excess of the required mandatory Credits (and Courses). In the case of such transfers beyond the mandatory Credits the transferred Credits will be included in the calculations of SGPA and CGPA.

2.10.5. Before the commencement of each Semester or during Pre-Registration schedule as per the Academic Calendar, Parent Departments may release a list of SWAYAM-NPTEL courses approved as Discipline Elective courses for each B. Tech. Program offered by them. In addition, Departments may also release a list of Open Elective courses offered for all B. Tech. Programs.

2.10.6. Students may Pre-Register for the approved SWAYAM-NPTEL Courses in the respective Departments and register for the SWAYAM-NPTEL Courses as per the schedule announced by SWAYAM-NPTEL.

2.10.7. The credit equivalence of the SWAYAM-NPTEL Courses are based on course durations and/or as recommended by SWAYAM-NPTEL. The Credit Equivalence mapped to SWAYAM-NPTEL course durations for transfer of credits is summarised in Table 2.10.1 below.

REGISTRAR

Registrar

PRESIDENCY UNIVERSITY BANGALORE

Table 2.10.1 SWAYAM-NPTEL Course Durations and Credit Equivalence

S. No.	Course Duration	Credit Equivalence for

		Transfer of Credits
1	4 Weeks	1 Credit
2	8 Weeks	2 Credits
3	12 Weeks	3 Credits

2.10.8 A student who has successfully completed the approved SWAYAM-NPTEL Course(s) and wants to avail the provision of transfer of equivalent credits to fulfil (partially or fully) the mandatory credit requirements of the Discipline Electives and/or Open Electives and/or Management Sciences Courses as prescribed in the concerned Program Regulations and Curriculum, must submit the original SWAYAM-NPTEL Course Certificates to the Head of the Parent Department concerned, with a written request for the transfer of the equivalent credits. On verification of the SWAYAM-NPTEL Course Certificates and approval by the Head of the Department concerned, the SWAYAM-NPTEL Course(s) and equivalent Credits will be included in Course (with associated Credits) Registration of the concerned student in the Semester immediately following the completion of the SWAYAM-NPTEL Course(s).

2.10.9 The grading system for such SWAYAM-NPTEL Courses with transfer of credits is specified in Table 2.10.2 below.

Table 2.10.2 Grading System for SWAYAM-NPTEL Courses

S. No.	Final Score on the SWAYAM-NPTEL Certificate	Grade Awarded
1	90% and above	O
2	From 80% to 89%	A+
3	From 70% to 79%	A
4	From 60% to 69%	B+
5	From 50% to 59%	B
6	From 40% to 49%	C

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

2.10.10. A student may submit a request for credit transfer from SWAYAM-NPTEL Courses before the last instruction day of the seventh (7th) Semester of the B. Tech. program as specified in the Academic Calendar. Requests for credit transfers shall not be permissible in the eighth (8th) semester.

2.10.11. The maximum permissible number of credits that a student may request for transfer in a Semester is ten (10) credits.

2.10.12. The University shall not reimburse any fees/expense, a student may incur for the SWAYAM-NPTEL Courses.

PART B: Three Year Degree Program Curriculum and Structure

3. Bachelor of Computer Applications (BCA) Degree Program – Program Structure and Curriculum

The Bachelor of Computer Applications (BCA) is a three-year undergraduate program that span six semesters. It is designed to bridge the gap between the studies of computers and its applications The Bachelor of Computer Applications course usually consists of core courses in programming with C, algorithm and data structures, advanced programming with C, computer organization and network fundamentals, relational database management systems, Web programming, software engineering and visual programming. Some of the main course highlights are meant to heighten technological know-how, to train students to become industry specialists, to provide research-based training and to encourage software development. The syllabus is intended to not only teach students theory and applications, but can also help equip them with professional and communication skills.

PEOs

After the completion of BCA Program from Presidency University, the graduates shall:

PEO1: Demonstrate success as a Computer professional with innovative skills, having moral and ethical values.

PEO2: Engage in lifelong learning through software development

PEO3: Serve as a leader in the profession through consultancy, extension activities and/ or entrepreneurship.

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Program Outcomes (PO)

Graduates of the BCA Program will acquire:

PO1: Application Knowledge: Apply the knowledge of mathematics, science and software engineering fundamentals in software development.

PO2: Problem Analysis: Identify, formulate and apply appropriate techniques to solve domain problems.

PO3: Design/Development of Solution: Apply relevant resources and design optimal software solutions to real-time applications.

PO4: Conduct investigations of complex problems: Conduct and design experiments relevant to software development.

PO5: Professional and Society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional practices.

PO6: Environment and Sustainability: Understand the impact of the professional solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO7: Ethics: Apply ethical principles and commit to professional ethics and responsibilities.

PO8: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

Program Specific Outcomes (PSO)

At the end of the BCA Program the students shall:

PSO1: Apply the knowledge of mathematics, science, software engineering, structured and object oriented programming concepts to provide efficient solutions.

PSO2: Identify, formulate and apply appropriate techniques in the areas related to machine learning, IoT and data analytics of varying complexities in real-time applications.

PSO3: Apply relevant resources, design and develop Web and Cloud based solutions for real-time applications.

3.1 I. Structure of BCA

In order to qualify for the award of the BCA Degree, a student must obtain a total of 121 Credits as per the Structure of the BCA Programme .

III. Structure of BCA [Gaming and Graphics]

S.No	Table 3.1 Structure of BCA	No Of Courses	BCA Credits
1	**Core Courses**	**29**	**85**
2	**Foundation Course**	**1**	**1**
3	**Ability Enhancement Compulsory Course (AECC)**	**5**	**10**
4	**Personal and Professional Development (PPD)**	**4**	**00**
5	**Discipline Elective Courses**	**4**	**12**
6	**Open Elective Courses**	**2**	**06**
7	**Summer Internship**	**1**	**02**
8	**University Learning Course**	**1**	**01**
9	**Project/Dissertation**	**1**	**04**
	Total	**48**	**121**

In order to qualify for the award of the BCA Degree, a student must obtain a total of 121 Credits as per the Structure of the BCA Programme .

3.2 I. BCA [Gaming and Graphics] Program Structure

Table 3.1.1 BCA PROGRAM STRUCTURE		
Semester	**Courses**	**Total Credits**
Semester I	1 Core Course x 4 Credits 2Core Course x 3 Credits 1 Core course x 1credit 3 AECC x 2 Credits 1fundational course X1Credit 1 PPD **Sub-Total**	4 Credits 6Credits 1 Credit 6 credits 1 credit **18 Credits**

Semester II	1 Core Course x 4 Credits 3 Core Course x 3 Credits 2 core courseX2 credit 2 AECC x 2 Credits 1PPD **Sub-Total**	4 Credits 9 Credits 4 credits **4credits** **21 Credits**
Semester III	5 Core Course x 3 Credits 2 Core Course x 2 credits 1 ULC x 1 Credit 1 PPD **Sub-Total**	15 Credits 4 credits 1 Credit **20 Credits**
Semester IV	2 Core Course x 4 Credits 5 Core Course x 3 Credits 1 PPD **Sub-Total**	8 Credits 15 Credits **23 Credits**
Semester V	2 Core Course x 3Credits 1 CoreCourseX2 Credits 2 DE x 3Credits 1 OE x 3 credits Internship **Sub-Total**	6 Credits 2 Credits 6 Credits 3 Credits 2 credits **19 Credits**
Semester VI	1 Core Course x 4 Credits 1 Core Course x3 Credits 2 DE x 3 Credits 1 OE x 3 credits Dissertation 1 x 4 credits **Sub-Total**	4 Credits 3 Credits 6 Credits 3 Credits 4 Credits **20 Credits**
	Grand Total	**121 Credits**

3.3 I. BCA PROGRAMME STRUCUTRE

III. BCA [Gaming and Graphics] PROGRAMME STRUCTURE

SUGGESTED SEMESTER-WISE COURSES

I Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	T	P	C	
1	MAT 111	Statistical Methods and Techniques	Core	3	0	0	3	3
2	BCA 101	Problem Solving using C	Core	2	0	4	4	6
3	BCA 102	Digital electronics	Core	3	0	0	3	3
4	BCA 251	Digital electronics Lab	Core	0	0	2	1	2
5	ENG 105	Essentials of English	AECC	2	0	0	2	2
6	LNG 106	Communicative English-1	AECC	2	0	0	2	2
7	KAN 101	Kannada Kali	F	1	0	0	1	1

8	PPD 111	Personal and Professional Development-1	PPD	0	0	2	-	2
9	EVS 107	Environmental Studies	AECC	2	0	0	2	2
Total				**15**	**0**	**8**	**18**	**23**

LTPC refers to Lecture, Tutorial, Practical, and Credits

II Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	T	P	C	
1	BCA 255	Preproduction Techniques for Games	Core	0	0	4	2	4
2	MAT 110	Applied Mathematics	Core	3	1	0	4	4
3	BCA 105	Data Structures	Core	3	0	0	3	3
4	BCA 252	Data Structures Lab	Core	0	0	4	2	4
5	BCA 106	Computer Organization	Core	3	0	0	3	3
6	BCA 107	Programming in Python	Core	1	0	4	3	5
7	ENG 207	Technical Written Communication	AECC	2	0	0	2	2
8	LNG 206	Communicative English-2	AECC	2	0	0	2	2
9	PPD 112	Personal and Professional Development-2	PPD	0	0	2	-	2
Total				**14**	**1**	**14**	**21**	**29**

III Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	T	P	C	
1	BCA 219	Introduction to 3D Animation	Core	3	0	0	3	3
2	BCA 203	Database Management Systems	Core	3	0	0	3	3
3	BCA 204	Operating System	Core	3	0	0	3	3
4	BCA 264	Introduction to Game Design	Core	3	0	0	3	3
5	BCA 205	Database Management Systems Lab	Core	0	0	4	2	4
6	BCA 256	3D Modelling Lab	Core	0	0	4	2	4
7	BCA 257	Computer Graphics and Multimedia Lab	Core	2	0	2	3	4
8	SIC 501	Social Immersion course		-	-	-	1	0
9	PPD 131	Personal and Professional Development-3	PPD	0	0	2	-	2
Total				**15**	**0**	**12**	**20**	**26**

IV Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	T	P	C	
1	BCA 273	Programming using C# for Unity	Core	2	0	4	4	6
2	BCA 265	2D Game Design and Development	Core	2	0	4	4	6

3	BCA 266	Game Mechanics and Dynamics	Core	3	0	3	3	3
4	BCA 313	Image Processing	Core	2	0	2	3	4
5	BCA 208	Computer Networks	Core	2	0	2	3	3
6	BCA 217	Artificial Intelligence for Gaming	Core	3	0	0	3	3
7	BCA 259	Video and Audio for Games	Core	2	0	2	3	4
8	PPD 132	Personal and Professional Development-4	PPD	0	2	0	-	2
Total				**18**	**0**	**10**	**23**	**32**

Note: Summer Internship during Summer Vacation

V Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	**T**	**P**	**C**	
1	BCA 221	Animation and Shaders	Core	2	0	2	3	4
2	BCA 222	Character Modeling and Rigging	Core	0	0	4	2	4
3	BCA 260	3D Game Engine	Core	1	0	4	3	5
4	BCA XXX	Discipline Elective - I	DE	3	0	0	3	3
5	XXX XXX	Open Elective – I	OE	3	0	0	3	3
6	XXX XXX	Open Elective – II	OE	3	0	0	3	3
7	BCA320	Summer Internship/ UP-I		2	0	0	2	2
Total				**14**	**0**	**10**	**19**	**24**

*Students may opt any 2 Discipline Electives from the below given specialization list.

Discipline Elective – I	Machine Vision
	Motion Capture
	AR/ VR based Game Development
	Cloud Storage and Applications
Discipline Elective – II	Cryptography and Network security
	Embedded Systems
	Game Interface and Level Design
	XR Development

VI Semester

SL.No	COURSE CODE	COURSE NAME	TYPE	CREDIT STRUCTURE				CONTACT HOURS
				L	**T**	**P**	**C**	
1	BCA 262	Digital Compositing	Core	2	0	4	4	6
2	BCA 333	Mobile and Web Applications Development	Core	1	0	4	3	5
3	CSA XXX	Discipline Elective – II	DE	1	0	4	3	5
4	CSA XXX	Discipline Elective – III	DE	3	0	0	3	3
5	CSA XXX	Discipline Elective – IV	OE	3	0	0	3	3
6	BCA315	Dissertation / UP-II		-	-	8	4	8
Total				**9**	**0**	**20**	**20**	**29**

*Students may opt any 2 Discipline Electives from the given specialization list.

Discipline Elective – III	Programming in Java
	Human Computer Interaction
	Game Testing and Analysis
	Rendering Technique
Discipline Elective –IV	Social media Marketing/
	UI/UX Design
	Game Architectures

Note: The course structure of BCA(G&G) is tentative & subject to revision & approval of the Academic Council.

BCA COURSES OF 1ST SEMESTER

Course Name:	**Statistical Methods and Techniques**					
Course Code:	**MAT111**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Objectives/Course Description: To acquaint students with various statistical methods. To cultivate statistical thinking among students. To prepare students for future courses having quantitative components.

Text Book:

Schaum Series – Statistics and Probability, McGraw Hill Publications

Reference Book:

Berenson and Levine, Basic Business Statistics, New Jersey, 6th edition, Prentice- Hall India, 1996.

D.C. Montogomery and G.C.Runger, Applied Statistics and Probability for engineers, New Jersey, John Wiley and Sons, 3rd edition, 2003.

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Name:	**Problem Solving Using C**					
Course Code:		**Credit Structure :**	**L**	**T**	**P**	**C**

	BCA101		**2**	**0**	**4**	**4**

COURSE DESCRIPTION:

This Course will provide an introduction to foundational concepts of computer programming to students of all branches of Engineering. Topics covered in this Course are problem formulation and development of simple programs, Pseudo code, Flow Chart, Algorithms, data types, operators, decision making and branching, looping statements, arrays, functions, structures, Unions, File handling and pointers. In the lab secession students are required to solve problems based on the above concepts to illustrate the features of the structured programming.

REFERENCE MATERIALS: Textbooks, reference books, any other resources, like webpages.

(i)Textbook(s)

1. E. Balagurusamy, "Programming in ANSI C", Seventh Edition - Tata McGraw Hill.

(ii)Reference Book(s)

1. Yale Patt, Sanjay Patel, "Introduction to Computing Systems: From bits and gates to C and beyond", McGraw Hill.

2. Behrouz A Forouzan, Richard F Gilberg, "Computer Science: A structured programming approach using C", Cengage Learning.

3. B.W. Kernighan & D. M. Ritchie, "The C Programming Language", Second Edition, 2001,Pearson Education

Course Name:	**Digital Electronics**					
Course Code:	**BCA102**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course description:

Digital Electronics is a study of electronics that are used to process and control digital signals. In contrast to analog electronics, where information is represented by a continuously varying voltage, digital signals are represented by logic levels. This course is designed to provide knowledge on basic logic gates, universal gates and its requirement in designing digital circuits. This course also aims at reducing and implementing complex Boolean expression using simplification techniques namely K-map and QM. This course also deals with broad classification of digital systems such as combinational logic and sequential logic.

Topics include: Number system, Boolean algebra, Logic Gates, K-map, Quine McClusky method, Adders, Subtractor, Multiplexer, De-Multiplexer, Encoder, Decoder, Code converters, Latches, Flip-flops, Shift Registers, Counters.

REFERENCE MATERIALS:

Textbooks:

1. Donald P Leach, Albert Paul Malvino, & Goutam Saha: Digital Principles and Applications, 8th Edition, Tata McGraw Hill, 2010

Reference books:

1. Mano. M. Morris and Cilletti Michael D., - Digital Design, Pearson Education
2. Floyd T, Digital Fundamentals, Pearson
3. Charles H. Roth: Fundamentals of Logic Design, Jr., 5th edition

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Name:	Digital Electronics Lab					
Course Code:	BCA251	Credit Structure :	L	T	P	C
			0	0	2	1

Course Description:

To provide hands-on experience in designing and implementing digital/logic circuits like verification of logic gates, universal gates, De Morgan's theorem, reducing Boolean expression using K-map, Adder and Subtractor circuits, Multiplexer and De multiplexer using gates, Flip flops. The laboratory exercises are designed to give students ability to design, build, and implement digital circuits and systems.

Course Name:	English-1 Essentials of English					
Course Code:	ENG105	Credit Structure :	L	T	P	C
			2	0	0	2

COURSE DESCRIPTION:

A course on **Essentials of English** is designed primarily to help develop the linguistic skills of learners. First module consists of short literary pieces which facilitate the learners in generating ideas and enjoying in discussing issues which are sensitive as well as of global interest. Learners are required to read the main text outside the class hours. Exercises, Tasks, and Activities that are designed for classroom discussion direct them to understand not only the main ideas but also provide opportunities to use language fruitfully. The other modules focus on essential grammar, vocabulary and basic write-ups like note-making and note-taking, summary writing and paragraph writing. Continuous assessment helps the learners to develop confidence and hone their language and life skills.

REFERENCE MATERIALS:

1. Steve Hart, Aravind R.Nair, Veena Bhambani. *Embark- English for Undergraduates*. Cambridge University Press, 2016
2. Course Manual cum Workbook by the Instructor.
3. Videos and PPT's suggested by the instructor.
4. Michael Vince, Peter Sunderland. *Advanced language Practice,* Macmillan, 2003
5. Raman, Meenakshi. Sharma, Sangeetha. *Technical Communication: Principles and Practice*. Oxford University Press, New Delhi. 2015.

Course Name:	Communicative English-I					
Course Code:	LNG106	Credit Structure :	L	T	P	C
			2	0	0	2

COURSE DESCRIPTION:

A course on **Communicative English-I** facilitates the holistic development of English language skills i.e., Listening, Speaking, Reading and Writing. The listening module includes monologues and interacting speakers which focuses comprehension of gist and detailed information A module on Speaking skills aims at developing the communicative competence of learners by participating in various narration related group activities and by enacting in role-plays pertaining to functional

English. The Writing skills module expects the learners to produce written texts of various types of discourse and draft professional business letters. Lastly, the Reading skills module involves comprehension of business-related texts of topical relevance and drawing inferences from the given text.

REFERENCE MATERIALS:

1. Course Material by the Instructor.
2. PPT's and Videos provided by the instructor.

SUGGESTED READINGS:

3. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. *Embark: English for Undergraduates*. New Delhi; Cambridge University Press, 2016.
4. J. K. Gangal, *A Practical course in Spoken English*, PHL Learning Private Limited, Delhi-2014.

Course Name:	**Personal and Professional Development 1**					
Course Code:	**PPD 111**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	2	**0**

COURSE DESCRIPTION:

Confidence Building

Self-Esteem

Having a high self-esteem helps an individual believe in himself which eventually helps him to carry out his roles and responsibilities effectively. He is also perceived as a great influencer.

Speak Better

Management is all about good people skills. Effective communication from Manager enhances the team productivity. The art of effectively communicating binds the team together and is helpful in influencing people and building relationships. The importance of voice clarity & body language.

Story Telling

Everyone is telling stories to promote their vision, mission, product, companies and philosophy. Use this art to train voice modulation, body language and facial expressions.

RECOMMENDED BOOK:

(i) Textbook(s)

Building Self Confidence Training Manual

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

REFERENCE BOOKS :

Prakash Iyer, *"The Habit of Winning"*, 2nd Edition, Penguin Books Ltd., 2016

Jack Canfield, *"The Success Principles"*, 8th Edition, HarperCollins Publishers India, 2015

Shiv Khera, 3d Edition, *"You Can Win", Bloomsbury India*

Course Name:	ENVIRONMENTAL STUDIES					
Course Code:	EVS107	Credit Structure :	L	T	P	C
			2	0	0	2

Course Description: The overall objective of the course is to provide clear understanding of natural resources, environment, its maintenance and the basic concepts of disaster management. The course consists of the concepts of renewable and non-renewable resources, conservation of these resources, ecosystems, role of human being in maintaining a clean and useful environment for the future generations, maintaining ecological balance and conservation of biodiversity. It includes causes of environmental deterioration and its control; human environmental disturbances, water and air pollution, mitigation measures, disaster and waste management etc. After successful completion of the course, the students would be able to understand the various types of natural resources and problems due to over exploitation. Also gain knowledge about the different components of the ecosystem, their interrelation, various hazards, natural disasters, their effects and management.

Textbooks:

1. Benny Joseph, *"Environmental Studies",* McGraw-Hill.

Reference Books:

1. R. Rajagopalan, *"Environmental studies–From Crisis to Cure",* Oxford University Press.
1. P. Anandan and R. Kumaravelan, *"Environmental Science and Engineering",* Scitech.
2. ErachBharucha, *"Environmental Studies for Undergraduate courses",* Universities Press.
3. R.B. Singh (Ed), *"Disaster Management",*Rawat.
4. MahuaBasuand S. Xavier "*Fundamentals of Environmental Studies*" Cambridge University Press.

Course Name:	KANNADA KALI/KANNADA MANASU					
Course Code:	KAN101	Credit Structure :	L	T	P	C
			1	0	0	1

II SEMESTER

Course Name:	Applied Mathematics					
Course Code:	MAT110	Credit Structure :	L	T	P	C
			3	1	0	4

COURSE DESCRIPTION:

This course aims to introduce the idea of trigonometric functions and applications of mean value theorems. Also introduce the idea of applying differential and integral calculus to notions of curvature and to improper integrals. Express a transcendental function as a power series to learn advanced Mathematics. Familiarize the student with functions of several variables and develop the essential tool of matrices in a comprehensive manner.

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

REFERENCE MATERIALS:

(a) Textbook

T1 : Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

T2 : Hugh Neill, Trigonometry : A complete Introduction, John Murray Learning, 2018

(b) Reference Books

R1: B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 42nd Edition, 2010.

R2: Ron Larson, Trigonometry, Brooks/Cole, 9th Edition, 2013

Course Name:	**Data Structures**					
Course Code:	**BCA105**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Description: The purpose of this Course is to provide the students with solid foundations in data structures and algorithms. It focuses on logical structures of data, their physical representation, design of algorithms and techniques for program development and debugging. Emphasis is placed on the appropriate use and choice of standard data structures.

Topics include: ADT, lists, stacks, queues, trees, heaps, hash tables, and graphs.

Text Book(s):

Richard F Gilberg and Behrouz A Forouzan, *"Data Structures: A Pseudocode Approach with C", Cengage learning.*

Reference Book(s):

1. Robert L Kruse, Bruce P Leung and Clovis L Tondo, *"Data Structures and Program Design in C"*, Pearson.

2. Seymour Lipschutz, "*Data Structures with C(Schaum's Outline Series)"*, McGraw Hill Education.

Course Name:	**Computer Organization**					
Course Code:	**BCA 106**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	**0**	**3**

Course Description: This Course introduces the modern computer organization and architectures. The emphasis is on understanding the interaction between computer hardware and software at various levels. The students will learn the concepts of computer technology, performance evaluation, instruction set design, computer arithmetic, data path and control unit design of processors and enhancing performance with pipelining.

Topics include: Introduction to Computer Arithmetic, Instruction sets, Computer organization, CPU Design, Memory system, Input-Output Interface, Asynchronous Data Transfer, Programmed I/ O, Interrupts, Direct Memory Access, Basic Input / Output Structure, serial and parallel communications, Device Drivers, Buses, Introduction to Parallel Processing: Evolution of computer systems (RISC vs. CISC), Parallelism in uniprocessor systems, Architectural classification schemes, Principles of Pipelining and Vector processing.

Text Book(s):

1. Cart Hamacher,Vranesky and zaky « Computer Organisation and Embedded systems »,MGH.

2. Patterson, Hennessy , "*Computer Organization and Design"*,Morgan Kaufmann.

Reference Book(s):

1. Carter ,*"Computer Architecture"*,Tata McGraw Hill.

2. John D. Carpinelli, *"Computer System Organization and Architecture"* ,Pearson Education.

Course Name:	**Programming in Python**					
Course Code:	**BCA107**	**Credit Structure :**	**L**	**T**	**P**	**C**
			1	**0**	**4**	**3**

COURSE DESCRIPTION: This course provides the opportunity for the students of BCA to develop Python scripts using its powerful programming features like lists, sets, tuples, dictionaries and sets. Students will also be introduced to object oriented programming concepts and packages for data visualization. Topics include: Basics of Python programming, operators and expressions, decision statements, loop control statements, functions, strings, lists, list processing : searching and sorting, nested list, list comprehension, tuples and dictionaries, sets, file handling, exception handling, object oriented programming concepts, modules and packages for data visualization.

REFERENCE MATERIALS:

Textbooks, reference books, any other resources, like webpages.

Textbook(s)

1. Ashok Namdev Kamthane and Amit Ashok Kamthane, "Problem Solving and Python Programming", Tata Mc Graw Hill Edition, 2018.

2. Charles Dierbach, "Introduction to Computer Science Using Python", Wiley India Edition, 2015.

Course Name:	**Data Structures Lab**					
Course Code:	**BCA252**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	**4**	**2**

Course Description: Implementing Data structures like Stacks, Queues, Linked lists, Trees, Binary search trees, Heaps, Graph traversal using C language.

Text Book(s):

Richard F Gilberg and Behrouz A Forouzan, *"Data Structures: A Pseudocode Approach with C"*, Cengage learning.

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Reference Book(s):

1**.** Behrouz A Forouzanand Richard F Gilberg, "*Computer science: A structured programming approach using C",*Cengage Learning.

2. Robert L Kruse, Bruce P Leung and Clovis L Tondo, "*Data Structures and Program Design in C"*, Pearson.

	Preproduction Techniques for Games					
Course Code:	BCA255	Credit Structure :	L	T	P	C
			0	0	4	2

Course Description: To course is to provide knowledge and hands on training on the basic drawing and sketching techniques, Shading, Character drawings, Basic Tools, Image Manipulation, creating different types of graphics for print and Games. The software tools for creating and manipulating sprites for both vector and raster images will be dealt in this course.

Text Book(s):

1. Chris Solarski, "*Drawing Basics and Video Game Art: Classic to Cutting-Edge Art Techniques for Winning Video Game Design*", Watson Guptill Publications.

2. Faulkner Andrew , Chavez Conrad, *"Adobe Photoshop CC Classroom in a Book",* Adobe Press.

3. Brian wood, *"Adobe Illustrator CC Classroom in a Book",* Adobe Press.

Reference Book(s):

1. Marc Taro Holmes, *"Designing Creatures and Characters: How to Build an Artist's Portfolio for Video Games, Film, Animation and More"*, Impact Books.

2. Peter Parr , *"Sketching for Animation: Developing Ideas, Characters and Layouts in Your Sketchbook"*, Bloomsbury

3. David H. Ross, "Freehand Figure Drawing for Illustrators: Mastering the Art of Drawing from Memory", Watson Guptill Publications.

4. Chad Chelius , Rob Schwartz, "*Learn Adobe Illustrator CC for Graphic Design and Illustration: Adobe Certified Associate Exam Preparation, 2/e*", Adobe Press

5. Smith Jennifer, AGI Creative Team, *"Illustrator CC Digital Classroom"*, Wiley

6. Lisa DaNae Dayley, *"Adobe Photoshop CC Bible - The Comprehensive Tutorial Resource"*, Wiley

Course Name:	English-2 Technical Written Communication					
Course Code:	ENG207	Credit Structure :	L	T	P	C
			2	0	0	2

COURSE DESCRIPTION:

The course aims at initiating writing skills in the field of technical communication concentrating letters, emails, minutes of meeting, memos etc. New media and communication technologies are dramatically altering technical fields at an outstanding rate. Students are prone to work more efficiently, more globally and more visually. These changes are incorporated in the course giving importance to online communication.

REFERENCE MATERIALS:

1. Van Akens, David C., Hosford, William F. *Reporting Results: A Practical Guide for Engineers and Scientists.* Cambridge University Press, 2008

2. Alred, Gerald J., Brusaw, Charles T., Oliu, Walter E. *Handbook of Technical Writing*. Bedford/St. Martin's, Boston, 2015
3. Johnson, Richard. *Technical Communication Today*. Pearson, 2015

Course Name:	**Communicative English-2**					
Course Code:	**LNG206**	**Credit Structure :**	**L**	**T**	**P**	**C**
			2	**0**	**0**	**2**

COURSE DESCRIPTION:

The course is specially designed for the students, to make them face the competitive world. Each chapter of this book is clearly structured with a strategic approach to learn the target language through all the skill areas – Listening, Speaking, Reading and Writing. It also prepares the learners for effective communication not only as students during their collegiate days but also as employees after being employed. The students will also discover society and its norms which controls the lives of people who apparently have built it by coming and living together. To set or decide the target audience or customers this will help students to understand and respect various backgrounds and beliefs.

The objective of this course is to provide crucial support for English language learners in enhancing and equipping them with the basic communication skills which in turn will help them to converse effectively in the target language and be employable. As per the statement "Action is the language of commitment; it speaks louder than words", the course with its specific and target oriented topics is based on learning process followed by the functional application in the classroom. The course includes a lot of interaction which enables language practice; of course an immense help for the learners in learning English.

REFERENCE MATERIALS:

1. Course Material by the Instructor.
2. PPT's and Videos provided by the instructor.

SUGGESTED READINGS:

3. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. *Embark: English for Undergraduates*. New Delhi; Cambridge University Press, 2016.

Course Name:	**Personal and Professional Development 2**					
Course Code:	**PPD 112**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	2	**0**

III SEMESTER

Course Name:	**Introduction to 3D Animation**					
Course Code:	**BCA219**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	0	**3**

COURSE DESCRIPTION:

Computer organization defines the constituent parts of the system, how they are interconnected andhow they interoperate in order to implement the architectural specification. The emphasis is on understanding the interaction between computer hardware and software at various levels. The students will learn the

concepts of computer technology, performance evaluation, Instruction set design, computer arithmetic, hierarchical memory systems, data path and control unit design of processors.

REFERENCE MATERIALS:

(Textbooks, reference books, any other resources, like webpages.)

Text Book(s):

1. Michael O'Rouíke, "*Píinciples of l'híee – Dimensional Computeí animation*", 3íd edition, **W.W. Noíton & company, 2003**

Reference Book(s):

2. John Vince, "*Essential Computeí Animation*", spíingeí UK , 2000.

Course Name:	**Database Management Systems**					
Course Code:	**BCA203**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	0	**3**

Course Description: This Course aims at developing and managing efficient and effective databases. It helps the students to learn and practice data modelling using the entity-relationship diagrams and developing database designs using structured query languages.

Topics include: Introduction to Database systems, Data modelling, Relational Database design, Various Database Languages, Relational Database Issues , Transaction Management, File structure Techniques, Query processing and optimization, Advanced topics- introduction to distributed databases and spatial-temporal databases.

Text Book(s):

Silberschatz A, Korth H F and Sudarshan S, "*Database System Concepts*", McGraw Hill Education.

Reference Book(s):

1. Elmasri R andNavathe S B, *"Fundamentals of Database System"*, Pearson Education.

2. Hector G Molina, Jeffrey D Ullman and Jennifer Widom, *"Database Management Systems"*, McGraw Hill Education.

Course Name:	**Operating System**					
Course Code:	**BCA204**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	0	**3**

Course Description: Operating systems being central to computing activities, this Course provide understanding of the functions and functional modules of operating systems. The design and implementation of Operating systems is also covered.

Topics include: Core concepts of operating systems, such as processes and threads, scheduling, synchronization, memory management, file systems, input and output device management and security.

Students should have previous familiarity with programming in a high-level language, assembly language programming, CPU organization, instruction sets and registers.

Text Book(s):

Silberschatcz A, Galvin P B and Gagne G, "*Operating System Concepts*", Wiley.

Reference Book(s):

1. William Stallings, *"Operating systems",* Prentice Hall, Pearson.

2. Andrew S Tanenbaum and Albert S Woodhull, *"Operating Systems Design and Implementation"*, Pearson.

Course Name:	**Introduction to Game Design**					
Course Code:	**BCA264**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	0	**3**

COURSE DESCRIPTION:

The course aims at providing knowledge on understanding the aesthetics and pre-requisites required for game designing. The students will be able understand and utilize physics and mathematical concepts required for game environments and game development. This course exposes the student to the holistic view necessary for game design.

REFERENCE MATERIALS: Textbooks, reference books, any other resources, like webpages.

Text Book(s):

1. Michael Moore, Basics of Game Design, CRC Press, 2016

2. Scott Rogers, "Level Up! The Guide to Great Video Game Design," John Wiley Publishers, 2010

Reference Book(s):

3. Ernest Adams, "Fundamentals of Game Design", Pearson Education, 2012.

4. Jesse Schell, "The Art of Game Design: A book of lenses", Morgan Kauffman Pub

Course Name:	**Database Management Systems Lab**					
Course Code:	**BCA205**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	4	**2**

Course Description: Database management lab is designed to have a real feel of database design using structured query languages, which includes use of various data definition, data manipulation commands, functions, joins, sub-queries, views ,set operations, procedures and triggers.

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Text Book(s):

Elmasri R and Navathe S B, "*Fundamentals of Database System*", Pearson Education.

Reference Book(s):

Silberschatz A, Korth H F and Sudarshan S, "*Database System Concepts*", McGraw Hill Education.

Course Name:	3D Modelling Lab					
Course Code:	BCA256	Credit Structure :	L	T	P	C
			0	0	4	2

COURSE DESCRIPTION:

The 3D Modeling Lab explores the various techniques for simulating real world virtually. The course focuses on the necessary attributes of developing a fully finished 3D Model from modeling, texturing, Applying cameras and Lighting to the Model and render it as a fully operational 3D Model for using in Game Development and Augmented and Virtual Reality Applications.

Text Book(s):

1. Michael O'Rourke, "*Principles of Three – Dimensional Computer animation*", 3rdedition, W.W. Norton & company, 2003

Reference Book(s):

2. John Vince, "*Essential Computer Animation*", springer UK , 2000.

Course Name:	Computer Graphics and Multimedia Lab					
Course Code:	BCA257	Credit Structure :	L	T	P	C
			2	0	2	3

COURSE DESCRIPTION:

This Course aims to equip students with the fundamental skills in traditional and digitalMultimedia and Animation techniques. It emphasizes on practical applications. It will also helpthe students to develop creativity and conceptualizing ability, effective communication and presentation skills.Topics include: Introduction to multimedia, Design fundamentals, Fundamentals of art , Concepts of story boarding, Image editing techniques, Graphic design techniques, Fundamentals of engineering graphics, Video Editing Techniques, Audio Editing Techniques,, Principles of animation, Interactive animation techniques, Programming fundamentals, 2D Animation, 3D Animation, Modelling and Texturing, Lighting and Rendering.

Paul Wells and Samantha Moore, "The Fundamentals of Animation", Bloomsbury Publishing,Second Edition.

Reference Book(s):

1. https://docs.toonboom.com/download/ (Getting Started Guide, Keyboard Shortcuts, Preferences Guide, Reference Guide, User Guide)

2. Adam Philips, "Animate to Harmony, The Independent Animator's Guide to Toon Boom", Taylor & Francis, 2014.

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Name:	Social Immersion Course					
Course Code:		Credit Structure :	L	T	P	C

	SIC501		**0**	**0**	0	**1**

Course Description: Social Immersion Course is one credit Course which includes the knowledge, skills and competencies embedded within every aspect of the college to inspire and enhance each student's transferable learning skills. It represents the broad categories of competence that enable students to be successful in further education, careers, as citizens and in their personal lives. Students will effectively express and exchange ideas through listening, speaking, reading, writing and other modes of interpersonal expression. Students will be able to gather and synthesize relevant information, evaluate alternatives and implement creative and effective solutions. Students will be prepared to practice community engagement that addresses environmental responsibility, social justice and cultural diversity. Students will become independent learners who understand and express the lifelong skills necessary for physical, social, economic, mental and emotional health.

Course Name:	**Personal and Professional Development-3**					
Course Code:	**PPD131**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	2	**0**

IV SEMESTER

Course Name:	**2D Game Design and Development**					
Course Code:	**BCA265**	**Credit Structure :**	**L**	**T**	**P**	**C**
			2	**0**	4	**4**

COURSE DESCRIPTION:

The main emphasis of this course is on the organization and management of networks. The course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of LAN systems.

Topics include: Basics for 2D , 2D Workflow, Graphics for Games, Animate 2D Sprites, Materials and Textures, Procedural Geometry and Textured Quads, Generating Atlas Textures , UVs and Animation, Cameras and Pixel Perfection, Input for 2D Games Programming Player Controls and Game Physics, Building a Tile-Based Level System. Making a Platform Game, Enemies and Coins, Building an In-Game UI

Text Books:

1. Jeff W Murray, "2D Unity", William Pollock 2015,
2. Alan Thorn, "Learn Unity for 2D Game Development", Tia 2017.

Reference Book(s):

1. Jodessiah Sumpter, "Make a 2D Arcade Game in a Weekend With Unity", Apress 2015.
2. Ernest Adams, "Fundamentals of Game Design", Pearson Education, 2012.

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Name:	**Game Mechanics and Dynamics**					
Course Code:		**Credit Structure :**	**L**	**T**	**P**	**C**

	BCA266		**3**	**0**	3	**3**

COURSE DESCRIPTION:

The course explores the mechanics of contemporary digital games, understood in this context as sets of rules which determine a range of possible player interactions in order to facilitate an intended gameplay experience. The students learn how to identify, differentiate, and categorize a wide range of game mechanics, as well as to evaluate how game mechanics contribute to the design and development of single-player and multi-player digital games. Competing theoretical perspectives regarding the history, evolution, and significance of popular game mechanics are analyzed. Students also evaluate the role and contribution of game mechanics in both 2D and 3D single-player and multi-player digital games. Through interactive lectures, studio work, in-class and online assignments, and group projects students learn how to determine which mechanics are best suited for achieving an intended gameplay result, and to judge whether or not game mechanics have been implemented successfully. Students also learn to analyze and troubleshoot mechanics that don't seem to be working.

Textbook(s)

Ernest Adams, Joris Dormans "Game Mechanics: Advanced Game Design", New Riders Publishing, 2012.

(The course is conceptual and this 10 year old comprehensive text book includes the basics)

Reference Book(s)

1. Beat Suter, Mela Kocher, Rene Bauer, "Games and Rules", Transcript Verlag Publications, 2019.
2. Amy Jo Kim, "Game Thinking", GameThinking.io Publications, 2018.
3. Ennio De Nucci, Adam Kramarzewski, "Practical Game Design: Learn the Art of Game Design Through Applicable Skills and Cutting-edge Insights", Packt Publishing, 2018.

Course Name:	**Image Processing**					
Course Code:	**BCA313**	**Credit Structure :**	**L**	**T**	**P**	**C**
			2	**0**	2	**3**

Course Description: This Course is an introduction to image processing and image analysis techniques and concepts. Image processing has found much more wider applications not only in the space program, but also in the areas such as medicine, biology, industrial automation, astronomy, law enforcement, defense, intelligence. With the progress made in multimedia these days, digital image processing has become an indispensable part of our digital age.

Topics include: Fundamentals, Applications, Human Visual Perception, Image Formation, Sampling and Quantization, Binary Image, Three-Dimensional Imaging, Image file formats. Color and Color Imagery: Perception of Colors , Image Transformation: Fourier Transforms, Discrete Cosine Transform, Discrete Wavelet Transform: Wavelet Transform, Extension to 2D Signals, Lifting Implementation of the Discrete Wave Transforms ,Image Enhancement and Restoration , Image Restoration, Image Reconstruction, Image Segmentation, Recognition of Image Patterns,

Text Book(s):

TinkuAcharya and Ajoy K. Ray, "*Image Processing Principles and Applications*", John Wiley and Sons publishers.

Reference Book(s):

1. MariaPetrou and Costas Petrou , "*Image Processing the Fundamentals*", John-Wiley and Sons Publishers.

2. Rafael C. Gonzalez , Richard E. Woods, Steven L. Eddins, "*Digital Image Processing Using MATLAB*", Gatesmark Publishing.

Course Name:	Computer Networks					
Course Code:	BCA208	Credit Structure :	L	T	P	C
			2	0	2	3

Course description: The main emphasis of this Course is on the organization and management of networks. The Course objectives include learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of LAN systems.

Topics include: Fundamental concepts on data communication and the design, deployment, and management of computer networks. Components, protocols and standards, Network and Protocol Architecture , Open Systems Interconnection, communication model, error detection and recovery; local area networks; bridges, routers and gateways; network naming and addressing, and local and remote procedures.

Text Book(s):

1. Larry L, Peterson and Bruce S. Davie, *"Computer Networks: A system Approach",* Elsevier.

2. A. S. Tannenbum, D. Wetherall, *"Computer Networks",* Prentice Hall.

Reference Book(s):

1. FredHalsall, *"Computer Networks",* Addison – Wesley Pub. Co.

2. Behrouz A. Forouzan, *"Data Communications and Networking"*, Tata McGraw-Hill.

3. Tomasi, *"Introduction To Data Communications and Networking"*, Pearson.

4. William Stallings, *"Data and Computer Communications"*, Prentice Hall.

Course Name:	Artificial Intelligence for Gaming					
Course Code:	BCA217	Credit Structure :	L	T	P	C
			3	0	0	3

Course Name:	Video and Audio for Games					
Course Code:	BCA259	Credit Structure :	L	T	P	C
			2	0	2	3

Course Name:	Programming using C# for Unity					
Course Code:	BCA273	Credit Structure :	L	T	P	C
			2	0	4	4

COURSE DESCRIPTION:

This course will guide you through the fundamentals of programming, covering the basic data types that all programming languages use and helping you to understand how computers read and process instructions in the form of code.

You'll then look at how to create and use variables in your code and learn techniques for simplifying complex problems, helping any future programming run much smoother, even when you hit coding issues along the way.

Text Book(s):

1. Patrick Felicia, "Mastering C# with Unity", Epackt 2017

2.Jeff W Murrey "C# Game Programming for Unity 3D" , CRC Press 2019.

Course Name:	**Personal and Professional Development -II**					
Course Code:	**BCA132**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**2**	0	**0**

V SEMESTER

Course Name:	**Animation and Shaders**					
Course Code:	**BCA221**	**Credit Structure :**	**L**	**T**	**P**	**C**
			2	**0**	2	**3**

COURSE DESCRIPTION:

This course is designed to start your animation journey of the character of real life. To create models that is essential for research and study. Animation allows you to create 3D, realistic models that allow diagrams and it shows accurate representations of realistic movies. The scope like Web Designer, Content Developers/Curators, 2D/3D Animators or Designers, Graphic Designer, Technical Trainer, 3D Modeler, Compositors, Multimedia Programmers, Visualizers, and many more in leading animation studios and entertainment companies will attain.

Type of Skill: Skill development

Nature of the Course: Conceptual/Application Based

REFERENCE MATERIALS:

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

(i) Textbooks	
T1	John M. Blain "The Complete Guide to Blender Graphics: Computer Modeling & Animation", CRC Press, 2022 7th Edition.
(ii) Reference Book(s)	

R1	3D Totol Publisher, “beginner’s Guide to Creating Characters in Blender Paperback”, 3DTotal Publishing 2021.
R2	Xury Greer “Sculpting the Blender Way: Explore Blender's 3D sculpting workflows and latest features, including Face Sets, Mesh Filters, and the Cloth brush”, Packet Publishing, 2022.
“*Surveying Lab Manual”*, Presidency University.	

(iii) Additional web-based resources

a) https://www.classcentral.com/course/swayam-digital-land-surveying-and-mapping-dls-m-7983
https://www.blender.org/features/animation/
b) https://onlinecourses.nptel.ac.in/noc20_ce18/preview
c) https://www.udemy.com/course/surveying/
d) https://www.coursera.org/courses?query=survey

Course Name:	**Character Modeling and Rigging**					
Course Code:	**BCA222**	**Credit Structure :**	**L**	**T**	**P**	**C**
			0	**0**	4	**2**

COURSE DESCRIPTION:

This course is designed, to fundamentals of Character modeling and rigging through the interface of the blender tool, this comprehensive course is packed with useful techniques that ease you into the workflow of the program to meet the industry’s need for creating character designing and rigging methods to create models that are essential for research and study. A character rigger generates the internal structural frameworks and controls of a 3D model, defining how the student will be able to manipulate it. Their goal is to build a skeleton that will operate a character and bring it to real life.

The general objective of the course is to provide knowledge on modeling and rigging in various domains.

Type of Skill: Skill development

Nature of the Course: Conceptual/Application Based

REFERENCE MATERIALS:

Textbooks:

1. Oliver Villar, “*Learning Blender: A Hands-On Guide to Creating 3D Animated Characters*”, Pearson, second edition, 2015.

Reference books:

1. 3D Totol Publisher, “*beginner’s Guide to Creating Characters in Blender Paperback*”, 3DTotal Publishing, 2021.
2. Xury Greer “*Sculpting the Blender Way: Explore Blender's 3D sculpting workflows and latest features, including Face Sets, Mesh Filters, and the Cloth brush*”, Packt Publishing, 2022.

REGISTRAR Registrar

Course Name:	**3D Game Engine**					
Course Code:		**Credit Structure :**	**L**	**T**	**P**	**C**

	BCA260		**1**	**0**	4	**3**

COURSE DESCRIPTION:

3D Game Engine Course covers creating games and connecting with audiences including unity asset store, Cloud Build, Ads, and Every play, Complete integrated development environment (IDE) with an integrated editor, asset workflow, scene builder, scripting, networking using Unity 3D is a game engine. The course is project-based, so student learning dry programming concepts, but applying them immediately to real indie games as you go.

This course will cover game development using two well-known game engines Unity and Unreal.

REFERENCE MATERIALS:

(i) Textbooks	
T1	Unity Game Development Cookbook- Paris Buttfield-Addis, Jonathan Manning, and Tim Nugent, Publisher - O'Reilly, 2019
T2	Learning C# from Developing Games with Unity 5.x, Greg Lukosek, 1St Edition, Packt Publishing Limited, 2021.
(ii) Reference Book(s)	
R1	Learning C# by Developing Games with Unity 2020: An enjoyable and intuitive approach to getting started with C# programming and Unity, 5th Edition, 2020.
R2	Ernest Adams, "Fundamentals of Game Design", Pearson Education, 2012.

(iii) Additional web-based resources

1. Unity User Manual 2021.3- https://docs.unity3d.com/Manual/index.html
   Unreal Engine 5 Documentation - https://docs.unrealengine.com/5.0/en-US/

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Name:	**Game Architecture**					
Course Code:	**BCAXXX**	**Credit Structure :**	**L**	**T**	**P**	**C**
			3	**0**	0	**3**

COURSE DESCRIPTION:

This Course is designed to help the students to understand the storage concepts of Cloud Computing and its applications. Cloud Computing has emerged in recent years as a new paradigm for hosting and delivering services over the Internet. The students can understand Cloud Computing terminology and cloud storage methods. With good knowledge of Cloud computing and cloud storage methods, Students can discover a scientific application of cloud in Healthcare, Biology and Geoscience.

Type of Skill: Employability

Nature of Course: Conceptual based

REFERENCE MATERIALS:

Text Books:

T1. Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi, "Mastering Cloud Computing", McGraw Hill Education, 2013 edition.

Reference Books:

R1. Thomas Erl, Zaigham Mahmood, and Ricardo Puttini, "Cloud Computing Concepts, Technology & Architecture", PHI publisher 2013 edition.

R2. Anthony T Velte, Toby J Velte, Robert Elsenpeter, "Cloud Computing: A Practical Approach", Tata McGraw-Hill, 2010 edition.

R3. David E.Y. Sarna, "Implementing and Developing Cloud Applications", CRC Press, 2018 edition.

R4. EMC education services. Information Storage and Management: Storing, Managing, and Protecting Digital Information in Classic, Virtualized, and Cloud Environments, Wiley, 2012.

Web Based Resources and E-books:

W1. IEEE Transactions on Cloud Computing-
https://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=6245519

W2. NPTEL Course on "Cloud Computing Prof. Soumya Kanti Ghosh IIT Kharagpur
https://onlinecourses.nptel.ac.in/noc22_cs87/cloudcomputing/

W3. International Journal of Cloud Computing

https://www.inderscience.com/jhome.php?jcode=ijcc

W4. Journal of Network and Computer Networking
https://www.journals.elsevier.com/journal-of-network-and-computer-applications

W5. Presidency University -E Library(Knimbus)

https://presiuniv.knimbus.com/user#/searchresult?searchId=eBook&curPage=0&layout=grid&sortFieldId=none&topresult=false&content=*cloud*

Course Name:	Digital Marketing					
Course Code:	MBA2019	Credit Structure :	L	T	P	C
			3	0	0	3

Course Name:	Supply Chain management					
Course Code:	MEC2003	Credit Structure :	L	T	P	C
			3	0	0	3

VI Semester

Course Code: BCA262	**Course Title: Digital Compositing**		2	4	4
Catalogue prepared by	**Type of Course: Integrated**	**L- P- C**			
Version No.	1.0	Name: Aadhithyan K A Designation: Assistant Professor, Game Design School of Design			
Course Pre-requisites	Composition and Photography, Visual Aesthetics, Drawing, Sculpture & Anatomy, Mechanics and Movement, Passion for Film, Real world observation, Communication skills.				
Recommended by the Board of Studies on	Nil				
Date of Approval by the Academic Council					
Course Description	This course focuses on the seamless integration of computer-generated elements with real world live-action video footage. Students are introduced to compositing techniques found in visual effects, animation, broadcast and game production pipelines.				
Course Objective	The objective of the course is Skill Development of student by using Problem Solving Methodologies.				
Course Outcomes	**On successful completion of the course the students shall be able to:** • Understand the importance of Compositing [Knowledge] • Understand the process are involved in the Animations [Knowledge] • Learn the workflow pipelines [Application] • Learn the process of creating cutscene in engine [Knowledge]				
Course Content:					
Module 1	**Principles of composition and Introduction to 3D Tool**	Assignment	Data Collection/Interpretation		**7 Sessions**
Topics: · Composition Techniques, Blocking, The Rule of Thirds, Balance and symmetry, Leading lines, Interface of Maya · Shelf · Workspace · Perspective and Orthographic views · Different ways of camera movement, Polygon Primitives · NURBS Primitives · Creating Primitives · What is a reference image? · How the reference image should be · Modeling with a reference image					
Module 2	**Advanced Modelling techniques**	Case studies / Case let	Case studies / Case let		**9 Sessions**
Topics: Low Poly Modelling, Blocking a model, decimating a model, Making a game ready model. Reducing a high poly model into low poly. Industry standard techniques. LoD creation.					
Module 3	**Texturing and Baking**	Quiz	Case studies / Case let		**12 Sessions**
Topics: Texturing, fine detailing, Light maps, Normal Map, Normal Map transfer techniques. Testing in engine. Lighting techniques, Realtime vs Baked Lights.					
Module 4	**Cut-Scene and VFX**	Quiz	Case studies / Case let		**13 Sessions**
Topics: Animating in software. Adding Animation to root motion, different Composition techniques, Storyboarding, Timeline and Director in engine, Realtime Cutscene vs Rendered Cutscene. Cinemachine and film grading a game cutscene, Rendering for film in engine.					
List of Laboratory Tasks:					

1. Model a basic object: Using polygon modeling techniques, create a simple object such as a table, chair or bookshelf. Texture and animate the object to make it come to life.
2. Create a detailed model: Using polygon modeling techniques, create a more detailed model such as a car, character, or building. Texture and animate the object to showcase its details and character.
3. UV mapping: Using UV mapping techniques, create a UV map for your model and apply a basic texture. Animate the model to showcase the texture in motion.
4. Texture creation: Using Photoshop or another image editing software, create a set of textures for your model. Apply the textures to the model and animate it to showcase its details.
5. Shading and materials: Using Maya's Hypershade editor, apply shading and materials to your model based on the textures created. Animate the model to showcase its materials and textures.

Lighting: Using directional, point, or ambient lighting, create a well-lit scene with your model. Animate the lighting to showcase the model in different lighting conditions.

Targeted Application & Tools that can be used:
Maya, Unity

Project work/Assignment:

Assignment:

1. Animation: Create a complex animation of your model such as a character animation or object interaction. Incorporate multiple models into the animation and use a variety of animation techniques.
2. Rigging: Using bone or other rigging techniques, rig your model for animation. Animate the rig to showcase its full range of motion.
3. Rendering: Create a final rendered animation of your model and scene, making sure to adjust camera views, add special effects and set up render settings.

Portfolio project: Create a portfolio project that showcases your skills in modeling, texturing, and animation. This could include a detailed character model or a complex scene with multiple models, textures, and animations.

Topics relevant to "Employability": Advanced Modelling techniques, Texturing and Baking, Cut-Scene and VFX

Text Book

1. Compositing Visual Effects: Essentials for the Aspiring Artist by Steve Wright
2. Photoshop Compositing Secrets by Matt Kloskowski
3. Digital Compositing in Depth by Doug Kelly

E-Resources

Video Lectures

1. Concept Art Essentials: https://youtu.be/ip-PMjsKVX8
2. Character Concept Art Tutorial: https://youtu.be/2tMagqFKQ9E
3. Environment concept art tutorial: https://youtu.be/p1WRKyFbBHE

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: BCA333	Course Title: Mobile and Web Applications Development Type of Course: Integrated	L- P- C	1	4	3
Version No.	1				

References

R1: Luke 101: Professional Compositing and Visual Effects by Ron Ganbar.

R2: Digital Compositing with Nuke by Lee Lanier.

R3: The Art and Science of Digital Compositing by Ron Brinkman

Web resources:

1. https://3dtotal.com/tutorials/maya

https://knowledge.autodesk.com/support/maya/learn

Course Pre-requisites	The student needs to have a fundamental understanding of Programming			
Anti-requisites	NIL			
Course Description	React Native is an open-source framework for building cross-platform applications (apps) using React and the platform's native capabilities. React Native has emerged as the most popular framework for building hybrid mobile apps with JavaScript. This course provides basics of web technology and includes advanced implementation using React Native, reviewing a wide range of React components and styling them and also building large lists, configuring user inputs within React Native. The goal of the course is to develop hybrid mobile applications and web applications.			
Course Objective	The course is designed to develop Entrepreneurial skills by using Experiential Learning Techniques			
Course Out Comes	On successful completion of the course the students shall be able to: 1. Describe the fundamentals of web application development.. (Understand) 2. Illustrate the web page styles using JavaScript (Apply) 3. Choose appropriate UI components for React Native application.(Apply) 4. Demonstrate animation and data store (Apply) 5. Use various React Native development tools (Apply)			
Course Content:				
Module 1	**Introduction to DHTML & Cascading Style Sheets**	Assignment	Programming Task	**15 Sessions**
Topics: What is DHTML? Applications of DHTML Components of DHTML Scripting , Introduction, client side v/s server-side Introduction to Cascading Style Sheets (CSS) Ways of specifying style – inline, internal, external. Font, color, background, text, border, margin and list related attributes Use of classes, spans, divs Working with layers				
Module 2	**Basics of JavaScript, DOM**	Assignment	Data Collection	**15 Sessions**

Introduction to JavaScript Applications and advantages of JavaScript Using JavaScript on a webpage. JavaScript basics – syntax, data types and literals, type casting, variables, operators, arrays Flow control statements Built-in functions Working with strings, numbers, dates & times, etc. User interaction through dialog boxes User-defined

functions, Introduction to DOM Understanding objects in HTML DOM hierarchy Manipulating objects Working with HTML forms Basic form elements Event handling, ES6

Module 3	**React Native Application**	Assignment	Programming Task	**10 Sessions**

Introduction, Setting up the environment, building layouts and navigation, UI: creating reusable button, building complex layout using flexbox, custom fonts, font icons, orientation, webview, linking to website, creating form, push notification.

Module 4	**Animation and Data**	Assignment	Programming Task	**15 Sessions**

Introduction, simple animation, multiple animations, animated notifications, expanding and collapsing containers, load animation, storing and retrieving data locally, retrieving data from remote API, sending data to remote API, Persistent database functionality with Realm

Module 5	**Implementing Redux, Native Functionality & Deployment**	Quiz	Programming Task	**15 Sessions**

Introduction, Installing Redux, Action, reducers, Redux Store : connecting & Storing, React Native development tools, React Native : glamorous native, spinkit, side-menu, modalbox, Custom IOS & Android modules: Rendering View Components. Deploying to an IOS and Android device.

List of Laboratory Tasks:

- Hands on browsers and introduction
- Working on HTML tags
- Working on HTML tags and CSS Elements
- Working with Font, Colors & Layer
- Introduction to Javascript, Javascript program to create calculator
- JavaScript program for user login & registration
- User interaction through Dialog boxes
- Using DOM
- Event Handling
- Setting up React Native
- A simple React Native
- Using images to mimic a VideoPlayer
- Displaying a list of Items, Using flexbox to create a layout
- Reusable button with theme support, Complex layout for tablets using flexbox,
- custom fonts and font icons, webview, linking to website, push notification
- Simple & multiple animation, animated notifications
- Expanding and collapsing containers
- Create a FB reaction widget, display images in Full screen
- Storing and retrieve data locally and from remote API
- Persistent database functionality with Realm
- Installing Redux, defining actions, reducers.
- Communicating with Remote API, connecting the store to the view.
- Storing offline content using Redux

- Using NativeBase for cross-platform UI components

Targeted Application & Tools that can be used :

- Applications include mobile and web applications.

Tools

- Android Studio
- Xcode
-

Project work/Assignment:

Assignment:

- Explain the tasks involved in Publishing the app in Google play store?
- Discuss about the anatomy of android application

Text Book

T1. Marijn Haverbeke, "Eloquent Javascript-A modern introduction to Programming ", 3rd edition, Dec 2018

T2. Daniel Ward, "React Native Cookbook", Packt, 2nd Edition, Jan 2019.

T3. David DuRocher, "HTML & CSS Quickstart guide", 2nd edition, Feb 2021

References

R1-Barry Burd, "Android Application Development" All-in-one Dummies, Wiley, 3rd Edition, January 2021

R2-J F DiMarzio, "Beginning Android Programming with Android Studio", 4th Edition, Wiley, 2016

R3-Pradeep kothari, "Android Application Development - Black Book", DreamTech Press, May 2014

R4-R Erik Hellman, "Android Programming – Pushing the Limits", 1st Edition, Wiley, 2014.

R5-Anubhav Pradhan, Anil V Deshpande, "Composing Mobile Apps" using Android, Wiley, 2014.

Web resources:

- https://www.geeksforgeeks.org/dhtml-introduction/
- https://www.codecademy.com/learn/learn-html
- https://www.codecademy.com/learn/learn-css
- https://www.w3schools.com/css/
- https://reactnative.dev/docs/getting-started.html
- https://devdocs.io/javascript/
  https://www.udemy.com/course/create-a-tiny-app-with-react-native/?src=sac&kw=Create+a+tiny+app+with+React+Native

Topics relevant to development of " Entrepreneurship ":

- Web Application
- ReactNative
- Cross Platform Application

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Catalogue prepared by	Blessed Prince P
Recommended by the Board of Studies on	

Date of Approval by the Academic Council	PU/AC18.19/SOIS1/BCA/2022-25

Course Code: **CSA3037**	**Course Title:** **Game Architecture** **Type of Course:** **Program Core & Theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	Game Architecture and Design is a course that covers the fundamental principles and techniques used in the creation of modern video games. The course will explore the various components that make up a game, including the game design, team management and the game architecture, and how they all work together to create an immersive and engaging player experience. The course is designed to provide students with a comprehensive understanding of the principles of game architecture incorporating modularity, reusability, robustness and trackability. The students learn how to begin with feature-based description of the desired end product, the vision document, and move on to a logical abstraction of the game environment, which describes the discrete modules of the game and how they will interface and finally, to create the technical design of the project. Through interactive lectures, assignments, group projects and real life case studies students learn how to converge to reality an ideal vision of a game.				
Course Outcomes	On successful completion of this course the students shall be able to: 1] Produce game design documents to effectively communicate game ideas and designs. 2] Understand the software development process and work effectively in a game development team. 3] Discuss concepts of game architecture and its application.				
Course Content:					
Module 1	Game Design Documents	Assignment	Develop a detailed GDD		**12 Sessions**
Topics:					

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Introduction, basic concepts of Game Architecture and Design. Creative roadmap, core and detailed design, gameplay and interactivity, game balance, aesthetics, gameplay specifications, designer's notes, game design documentation, tiers and test beds, future of game design.				
Module 2	Team Management	Case Study	Effect of losing key personnel	**13 Sessions**
Topics: Origins of industry and current development model, roles and divisions, group responsibilities and interactions, benefits of tool reuse, rotating and reassigning team members, milestones and mini-milestones, design, development and testing procedures, information transmission, troubleshooting, online revolution.				
Module 3	Game Architecture	Assignment	Draft Architecture Specification	**20 Sessions**
Topics: Current game development methods, hardware abstraction, tokenization, 3D engines, software reusability, initial architecture design, tier system, development process, coding standards and priorities, debugging and module completion, feature creep, late evaluation and localization, prototyping, play testing, focus groups, testing. Future development and new directions in development.				
Targeted Application & Tools that can be used: Application Area: Understanding and planning effective game design and architecture documentation. Professionally Used Software: Nuclino, GameMaker Studio				
Project work/Assignment:				
Assignment: 1] Developing a detailed Game Design Document. **Project Assignment: 1]** Prepare a draft of Game Architecture documentation.				
Text Book: **1.** **R**ollings, A., & Morris, D. (2009). "Game Architecture and Design: A new edition". New Riders.				
References: 1. Gregory, J., & Lemarchand, R. (2018). "Game Engine Architecture," 3rd Edition. CRC Press. 2. Rabin, S. (2020). "Game AI Pro 360 Guide to Architecture". CRC Press, Taylor & Francis Group.				
Catalogue prepared by	Dr. Pradeep Bhaskar, Mr. Vetrimani Elangovan			
Recommended by the Board of Studies on				
Date of Approval by the Academic Council				

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: CSA 3069	**Course Title:** **Rendering Techniques** **Type of Course:** **Program Core & Theory only**	**L- P- C**	3	0	3
Version No.	1.0				
Course Pre-requisites	**NIL**				
Anti-requisites	**NIL**				
Course Description	The Game Rendering course covers the fundamental concepts and techniques used in the process of rendering 2D and 3D graphics in video games. The course is designed to provide students with a comprehensive understanding of principles of game rendering and knowledge about industry standard tools and techniques. The students learn how to identify, differentiate, and categorize a wide range of game rendering methods. Through interactive lectures, assignments and group projects students learn how to determine which rendering techniques are best suited for achieving an intended gameplay result, and to judge whether or not the game rendering has been implemented successfully.				
Course Outcomes	On successful completion of this course the students shall be able to: 1] Recognize the concepts and techniques used in 3D graphics, including transformations, texturing and shading. 2] Discuss application of light and shadows in digital games. 3] Review advanced rendering techniques.				
Course Content:					
Module 1	Introduction to Game Rendering	Assignment	Research Assignment		**10 Sessions**
Topics: Introduction, basic concepts of Game Rendering. Graphics rendering pipeline including co-ordinate systems, polygon representation of 3D objects, pixel level process, rasterization, interpolative or incremental shading and merging. Basics of transforms and its applications.					
Module 2	Shading and Texturing	Case Study	Evolution of shading techniques		**10 Sessions**

Topics: Shading basics, light sources, aliasing and anti-aliasing, transparency, alpha, compositing, texturing pipeline, image texturing, texture animation, material and parallax mapping, textured lights.				
Module 3	Shadows and light	Assignment	Sketch a living room with a single source of illumination	**12 Sessions**
Topics: Light and colour, physics of light, ray tracing, camera, reflectance distribution models, microfacet theory, layered materials, blending and filtering materials, local and global illumination, shadows on planes and curves, shadow maps, ray tracing, texturing pipeline, texture animation, material mapping.				
Module 4	Advanced Rendering Techniques	Project	Apply rendering principles using C# or python	**13 Sessions**
Topics: Image space effects, skyboxes, sprites and layers, volumetric rendering, sky rendering, subsurface scattering, polygonal techniques, pipeline optimization, acceleration algorithms, virtual and augmented reality applications, future applications.				
Targeted Application & Tools that can be used: Application Area: Understanding and planning effective game rendering resulting in engaging visual game experience. **Professionally Used Software:** *Python, C#, Unity, Pixar RenderMan*				
Project work/Assignment:				
Assignment: 1] Sketch a living room with a single source of illumination. **Project Assignment: 1]** Apply rendering principles using C# or python to display a reflecting sphere.				
Text Book: 1. Möller Tomas, Haines, E., & Hoffman, N. (2019). "Real-time Rendering", 4th Edition. CRC Press.				
References: 1. Watt, A. H., & Watt, M. (2005). "Advanced animation and rendering techniques: Theory and practice", 2nd Edition. ACM Press 2. Shirley, P., Marschner, S., Ashikhmin, M. (2009). Fundamentals of Computer Graphics. A K Peters.				
Catalogue prepared by	Dr. Pradeep Bhaskar, Mr. Vetrimani Elangovan			
Recommended by the Board of Studies on				
Date of Approval by the Academic Council				

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE

Course Code: **CSA3090**	**Course Title:** **XR Development** **Type of Course:** **Program Core**	**L-P-C**	1	4	3
Version No.	1.0				
Course Pre-requisites	BCA 260 – 3D Game Engine, BCA 299 – Introduction to Game Engine				
Anti-requisites	NIL				
Course Description	An XR Development course that focuses on the development of immersive and interactive experiences for virtual reality (VR), augmented reality (AR), and mixed reality (MR) platforms. The course cover topics such as creating 3D environments and models, programming interactive elements, user interface design, and optimization for different XR devices. Students may learn how to use software and tools such as Unity, Unreal Engine, and Vuforia to develop XR applications for gaming, education, training, and other industries.				
Course Objective	The objective of the course is skill development of student by using Participative Learning techniques.				
Course Out Comes	At the end of the course the student should be able to: CO1 Identify of principles of XR development. [Comprehension] CO2 Demonstrate XR experiences for different devices and platforms [Application] CO3 understand importance of Visual Perception [Comprehension] CO4 use industry standards and trends in XR development [Application]				
Course Content:	Essentials of XR Development, AR Best Practices -VR Best practices – MR Experiences- Visual Perception – Auditory Perceptions – Motion Capture - VR Game Development				
Version No.	1.0				
Module 1	**Module: 1: Essentials of XR Development**	**Assignment**	**Case Studies**	**No. of Classes:10**	
Topics: principles of virtual reality, augmented reality, and mixed reality - XR development software and tools- 3D modelling and animation - interactive design - optimization techniques - XR devices – XR game development principles.					
Module 2	**AR VR Best Practices**	**Assignment**	**ARVR Application**	**No. of Classes:12**	
Topics:					

AR Development- Projection-Based Augmented Reality- Location-Based Augmented Reality- VR Experience – Introduction to HMD architecture – VR Applications – Best Practices.

Assignment: Game Design Activities

Module 3	**Visual and Auditory Perception**	**Assignment**	**Game Programming**	**No. of Classes:11**

Topics:

Visual perception : Resolution -Field of View – Latency- Lighting – Colour- Depth Perception - Comfort and ergonomics – Embodiment - Spatial audio- Sound localization

Assignment: Game Programming

Module 4	**Game Development and Motion Capture**	**Case Study**	**2D Game Development**	**No. of Classes:12**

Topics:

VR Game Development – Locomotion – Teleportation -Introduction to Motion Capture - mocap in VR - Real-time feedback - Immersion – VR Game Development

Case study: 2D Game Development

List of Laboratory Tasks:

1. 3D Modelling in Unity
2. Introduction to Vuforia Engine
3. AR application development
4. Plane Based projection
5. Horizontal and Vertical Projection
6. Multi target projection
7. VR Experience Development
8. VR Use case 1 – Walk on the Bridge
9. VR use Case 2 – Construction Modeling and Visualization
10. VR use Case 3 – Machine Modeling
11. Motion Capture
12. Ray Cast and Feedback system
13. Multiplayer in VR World
14. VR Game Development
15. VR Game Development

REGISTRAR PRESIDENCY UNIVERSITY Registrar BANGALORE

Targeted Application & Tools that can be used:

Unity 3D, Visual Studio

Project work/Assignment:

1. AR Application 2. VR Experience
Textbook(s): 1. Learning Virtual Reality: Developing Immersive Experiences and Applications for Desktop, Web, and Mobile" by Tony Parisi, 2015. 2. "Augmented Reality: Principles and Practice" by Dieter Schmalstieg and Tobias Hollerer, 2016
References 1. "Unity 2018 Augmented Reality Projects" by Jonathan Linowes 2. "Virtual Reality for Physical and Motor Rehabilitation" by Virtual Reality for Physical and Motor Rehabilitation, 2014. **Weblinks:** https://unity.com/solutions/vr https://docs.unity3d.com/Manual/index.html https://learn.unity.com/

Catalogue prepared by	**Vetrimani Elangovan**
Recommended by the Board of Studies on	
Date of Approval by the Academic Council	Academic Council Meeting No. __, Dated _____

REGISTRAR

PRESIDENCY UNIVERSITY Registrar BANGALORE