

**(Abstract)**

FYUGP - Scheme and Syllabus (two semesters only) of the B.C.A. Programme - Approved & Implemented w. e. f. 2024 Admission- Orders Issued

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**FYUGP Spl.cell**

ACAD C/ACAD C3/22004/2024

Dated: 29.11.2024

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- Read:-1.U.O. No. FYUGPSC/FYSC-I/5074/2024, dated: 18/04/2024  
2.U.O. No. FYUGPSC/FYSC-I/5074/2024, dated: 06.08.2024  
3. E-mail of the Chairperson, Board of Studies in Computer Science (UG), dated 14.05.2024  
4. The Minutes of the Meeting of the Scrutiny Committee held on 14.06.2024  
5. E-mail of the Chairperson, Board of Studies in Computer Science (UG), dated: 17.06.2024  
6. The Minutes of the Meeting of the Academic Council, held on 25.06.2024  
7. This office letter of even number dated 29/10/2024  
8. E-mail of the Chairperson, Board of Studies in Computer Science (UG), dated: 19.11.2024  
9. The Orders of Vice Chancellor dtd. 26.11.2024

**ORDER**

- 1.The Regulations of the Kannur University Four Year UG Programmes (KU-FYUGP Regulations. 2024) for Affiliated Colleges was implemented with effect from 2024 admission vide the paper read (1) above and certain modifications were effected thereafter, vide paper read as (2) above.
- 2.As per paper read (3) above, the Chairperson, Board of Studies (BoS) in Computer Science (UG) submitted the Scheme and the Syllabus (two Semesters only) of the B.C.A. programme, prepared in line with KU-FYUGP Regulations.
- 3.Subsequently,as per the paper read (4) above, a Scrutiny Committee, which included the Dean, Faculty of Technology scrutinized the Scheme and the Syllabus (two Semesters only) of the B.C.A. programme and recommended certain suggestions.
- 4.Thereafter, the Scheme & Syllabus (two Semesters only) of the B.C.A. programme, submitted by the Chairperson BoS in Computer Science (UG), vide paper read (5) was placed before the Academic Council for consideration.
5. The XXVIII<sup>th</sup> Meeting of the Academic Council, as per the paper read as (6) above, approved the Scheme & Syllabus of the FYUGP in affiliated Colleges w.e.f. 2024 admission in principle and permitted to publish the same as and when ready, after making the necessary modifications.
6. The Minutes of the meeting of the Academic Council was approved by the Vice Chancellor.
- 7.Meanwhile, as per paper read (7) above, the Chairperson, BoS in Computer Science(UG) was informed of certain corrections needed in the approved syllabus of the B.C.A. Programme.
- 8.Subsequently, a meeting of the BoS in Computer Science (UG) was convened on 04/11/2024 and as per paper read (8) above, the Chairperson, BoS in Computer Science (UG) forwarded the

modified Scheme & Syllabus (two semesters only) of the B.C.A. Programme(FYUGP).

9. Considering the matter, the Vice Chancellor, in tune with the decision of the Academic Council and ***exercising the powers of the Academic Council conferred under Section 11 (1), Chapter III of Kannur University Act, 1996 approved the Modified Scheme and Syllabus (two Semesters only) of the B.C.A. programme (FYUGP), and accorded sanction to implement the same in the Affiliated Colleges w.e.f. 2024 admission.***

10. The Scheme and Syllabus (two Semesters only) of the B.C.A. programme (FYUGP) to be implemented in the Affiliated Colleges w.e.f. 2024 admission is appended with this U.O. and uploaded in the official website of the University.

Orders are issued accordingly.

Sd/-

**ANIL CHANDRAN R**  
**DEPUTY REGISTRAR (ACADEMIC)**  
For REGISTRAR

To: 1. The Principals of Affiliated colleges offering the B.C.A. programme  
2. The Chairperson, Board of Studies in Computer Science (UG)

Copy To: 1. PA to CE (to circulate the same among the sections concerned under Examination Branch)  
2. PS to VC/PA to R  
3. JR (Exam)  
4. DR/AR (Academic)  
5. IT Cell (to uploading on the website)  
6. Computer Programmer  
7. SF/DF/FC

Forwarded / By Order

  
SECTION OFFICER



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# **KANNUR UNIVERSITY**

**Re-accredited by NAAC with 'B++' Grade**

## ***KUFYUGP***

***BACHELOR OF COMPUTER APPLICATIONS***

**CURRICULUM & SYLLABUS**

*Effective from 2024 Admission Onwards*



**[www.kannuruniversity.ac.in](http://www.kannuruniversity.ac.in)**

## PREFACE

Welcome to the Four-year Integrated UG COMPUTER APPLICATIONS Programme of Kannur University. The Board of Studies of the University has designed this programme on the basis of the National Education Policy 2023 which critically envisions a brand-new holistic education system for the country, hinging on the effective adoption of modern teaching and training methods, application of technology, and imparting practical and contemporary skills, to shape the overall personality of students. Our programme is designed to equip students with a strong foundation in COMPUTER APPLICATIONS principles while also providing specialized training in Artificial Intelligence and Machine Learning. In today's digital age, these technologies are at the forefront of technological advancements, driving innovation across various industries including healthcare, finance, transportation, and entertainment.

The Programme in COMPUTER APPLICATIONS is designed with the objective of equipping the students to cope with the emerging trends and challenges in the field of computers and interrelated disciplines like computer engineering, COMPUTER APPLICATIONS, information systems, information technology, and software engineering. This programme involves various courses such as Value-added courses, Skill enhancement courses, multi-disciplinary courses and ability enhancement courses with an attribution of discipline specific core, discipline specific electives and various scholastic and co scholastic domains. This programme aims at helping the students define and recharge their creative, analytical, problem-solving, and critical thinking abilities, topped by actively pursuing digital literacy.

The BCA COMPUTER APPLICATIONS Honours program emphasizes a strong theoretical foundation complemented by extensive laboratory experience. Students will engage in hands-on experiments that reinforce classroom learning and develop critical technical skills. Through practical work, they will learn to design application programs, software, and analyse data, thus bridging the gap between theory and practice.

For those opting for the BCA COMPUTER APPLICATIONS Honours with Research track, the program offers an enriched experience with a significant focus on independent research. This track is designed for students who wish to delve deeper into specific areas of interest, culminating in a research thesis. Under the mentorship of faculty members, students will undertake original research projects, honing their ability to conduct scientific inquiries, think critically, and contribute to the body of knowledge in COMPUTER APPLICATIONS.

This rigorous training prepares graduates for careers in academia, research institutions, and industry.

The successful revision of this curriculum would not have been possible without the collective efforts and inputs from the BOS members, Ad hoc committee members, COMPUTER APPLICATIONS academic council member, resource persons and the unwavering support of COMPUTER APPLICATIONS faculty members from the affiliated colleges. Their dedication and expertise have played an instrumental role in shaping a curriculum that is relevant, up-to-date, and consistent with international scholarly criteria.

We wish you to have a motivating atmosphere to make use of your extreme potential and caliber to complete this programme and to serve the nation by enriching yourself.

BEST WISHES

(BOS, COMPUTER APPLICATIONS)

## INTRODUCTION

### **Kannur University - Four-Year Undergraduate Programme: Backdrop and Context**

The implementation of the Four-Year Undergraduate Programme (FYUGP) has been driven by the pressing need to address contemporary challenges ensuring responsive changes to the evolving needs of students, industry, and society at large. Recognizing the curriculum as the cornerstone of any education system, it requires regular refinement to align with evolving socioeconomic factors. Higher education must provide students with practical and technical skills relevant to their fields of interest, necessitating the development of a job-oriented curriculum. Despite significant increases in access and expansion of higher education over the years, concerns persist regarding the quality and relevance of educational outcomes, particularly in terms of employability skills. As the world becomes increasingly interconnected, our education system must evolve to instill 21st-century skills, enabling students not only to survive but to thrive in this dynamic environment. Moreover, there is a growing need for higher education institutions to embrace social responsibility and contribute to the development of a knowledge society capable of driving sustainable development through innovation. With the central objective of fostering a robust knowledge society to support a knowledge economy, the Government of Kerala has initiated steps to reform higher education. Accordingly, three commissions were established to suggest reforms in higher education policy, legal and regulatory mechanisms, and evaluation and examination systems. It is within this context that a comprehensive reform of the undergraduate curriculum has been proposed, leading to the restructuring of the Four-Year Undergraduate Programme (FYUGP).

### **VISION AND MISSION OF KANNUR UNIVERSITY**

#### **Vision:**

To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasargod and Kannur Revenue Districts and the Manandavady Taluk of Wayanad Revenue District.

## **Mission:**

- To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.
- To adopt critical pedagogic practices which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.
- To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher education and to cater to the modern notions of equity, social justice, and merit in all educational endeavours.
- To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative, and infrastructural standards in such institutions.
- To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.
- To associate with the local self-governing bodies and other statutory as well as nongovernmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.

## **PROGRAMME OUTCOMES**

<b>PO1</b>	<b>Critical Thinking and Problem-Solving-Apply critical thinking skills to analyze information and develop effective problem-solving strategies for tackling complex challenges.</b>
<b>PO2</b>	<b>Effective Communication and Social Interaction-Proficiently express ideas and engage in collaborative practices, fostering effective interpersonal connections.</b>
<b>PO3</b>	<b>Holistic Understanding-Demonstrate a multidisciplinary approach by integrating knowledge across various domains for a comprehensive understanding of complex issues.</b>
<b>PO4</b>	<b>Citizenship and Leadership-Exhibit a sense of responsibility, actively contribute to the community, and showcase leadership qualities to shape a just and inclusive society.</b>

<b>PO5</b>	<b>Global Perspective-Develop a broad awareness of global issues and an understanding of diverse perspectives, preparing for active participation in a globalized world.</b>
<b>PO6</b>	<b>Ethics, Integrity and Environmental Sustainability-Uphold high ethical standards in academic and professional endeavors, demonstrating integrity and ethical decision-making. Also acquire an understanding of environmental issues and sustainable practices, promoting responsibility towards ecological well-being.</b>

#### **PROGRAMME SPECIFIC OUTCOMES**

<b>PSO1:</b>	<b>Apply COMPUTER APPLICATIONS knowledge to solve diverse real- world Challenges</b>
<b>PSO2:</b>	<b>Design and implement robust software solutions using diverse programming languages and design tools</b>
<b>PSO3:</b>	<b>Utilize advanced techniques for data storage, retrieval, and manipulation across varied computing environments</b>
<b>PSO4:</b>	<b>Critically evaluate and apply information technology tools and methodologies with ethical consideration</b>
<b>PSO5:</b>	<b>Engage in interdisciplinary research to address complex COMPUTER APPLICATIONS challenges</b>
<b>PSO6:</b>	<b>Implementation of professional engineering solutions for the betterment of society keeping the environmental context in mind, be aware of professional ethics and be able to communicate effectively.</b>
<b>PSO7:</b>	<b>Demonstrate lifelong learning and adapt ability in response to evolving technology trends</b>



## STRUCTURE OF THE PROGRAMME

The Programme of instruction will consist of Lecture courses, Practical courses, comprehensive Viva-voce, Seminar, internship/ industrial visit, and Project work.

1. **Lecture courses:** Courses involving lectures relating to a field or discipline by a faculty member
2. **Tutorial courses:** Courses involving problem-solving and discussions relating to a field or discipline under the guidance of qualified personnel in a field of learning,
3. **Laboratory work:** A course requiring students to participate in a project or practical or lab activity that applies previously learned/studied principles/theory related to the chosen field of learning, work/vocation, or professional practice under the supervision of an instructor.
4. **Comprehensive Viva-voce :** This is an essential assessment included in the Programme to evaluate the student's grasp of the subject matter and their ability to apply their knowledge as defined in the course outcomes. It also provides an opportunity for the student to engage in academic discussions and receive valuable feedback from experts in the field.
5. **Seminar:** A course requiring students to participate in structured discussion/conversation or debate focused on assigned tasks/readings, current or historical events, or shared experiences guided or led by an expert or qualified personnel in a field of learning
6. **Internship/ Institutional visit:** All students shall undergo a Field Trip/Summer Internship/Apprenticeship in a Firm, Industry or Organization; or Training in labs with faculty and researchers or other Higher Education Institutions (HEIs) or research institutions. Departments can actively promote internships that can eventually lead to research project work. Institutional visit Incorporating institutional or industrial visits in the Programme brings immense value to the students, making their learning journey more enriching and preparing them for successful careers in COMPUTER APPLICATIONS-related fields.
7. **Research Project:** These students who have opted for the honours with research should complete a research project under the guidance of the mentor and should submit a research report for evaluation. They need to successfully defend the research project to obtain 12 credits under a faculty member of the University/College. The research shall be in the Major discipline

## Course and Credit Structure for Different Pathways

### Course Distribution for Students in Semesters I – II

- (1) *Single Major*: The 6 courses together in B and C can be in different disciplines.
- (2) *Major with Multiple Disciplines*: B and C represent two different disciplines.
- (3) *Major with Minor*: B and C represent the same Minor discipline.

<b>I SEMESTER</b>				
<b>Sl No</b>	<b>Course</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Total Marks</b>
1	AEC1 (English)	4	3	75
2	AEC2 (Additional Language)	3	3	75
3	MDC1	3	3	75
4	DSC A1	5	4	100
5	DSC B1	4/5	4	100
6	DSC C1	4/5	4	100
	<b>Total</b>	<b>23/25</b>	<b>21</b>	<b>525</b>

<b>II SEMESTER</b>				
<b>Sl No.</b>	<b>Course</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Total Marks</b>
1	AEC3 (English)	4	3	75
2	AEC4 (Additional Language)	3	3	75
3	MDC2	3	3	75
4	DSC A2	5	4	100
5	DSC B2	4/5	4	100
6	DSC C2	4/5	4	100
	<b>Total</b>	<b>23/25</b>	<b>21</b>	<b>525</b>

4) **Double major pathway:** A and B represent the courses offered by the two departments. Students should choose one of the disciplines as their major 1 and the other as major 2

<b>I SEMESTER</b>				
<b>Sl No.</b>	<b>Course</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Total Marks</b>
1	AEC1 (English)	4	3	75
2	AEC2 (Additional Language)	3	3	75
3	MDC A/B	3	3	75
4	DSC A1	5	4	100
5	DSC A2	5	4	100
6	DSC B1	4/5	4	100
	<b>Total</b>	<b>24/25</b>	<b>21</b>	<b>525</b>

<b>II SEMESTER</b>				
<b>Sl No.</b>	<b>Course</b>	<b>Hours/Week</b>	<b>Credits</b>	<b>Total Marks</b>
1	AEC2 (English)	4	3	75
2	AEC3 (Additional Language)	3	3	75
3	MDC A/B	3	3	75
4	DSC A3	5	4	100
5	DSC B2	4/5	4	100
6	DSC B3	4/5	4	100
	<b>Total</b>	<b>23/25</b>	<b>21</b>	<b>525</b>

**NOTE:** The syllabus for upcoming semesters needs to be in accordance with the Draft curriculum for BCA published by AICTE

## GENERAL FOUNDATION COURSES

S E M E S T E R	COURSE CODE	COURSE NAME	CREDITS			H O U R S/ W E E K	M A R K S
			L E C T U R E/ T U T O R I A L	P R A C T I C A L	T O T A L		
	<b>MDC</b>						
I	KU1MDCCAP101	Basics of IT for all	3	0	3	3	75
	KU1MDCCAP102	Digital marketing	3	0	3	3	75
II	KU2MDCCAP103	Python Programming for all	3	0	3	3	75
	KU2MDCCAP104	Introduction to Data Science	3	0	3	3	75

## DISCIPLINE SPECIFIC COURSES

S E M E S T E R	COURSE CODE	COURSE NAME	CREDITS			H O U R S/ W E E K	M A R K S
			L E C T U R E/ T U T O R I A L	P R A C T I C A L	T O T A L		
I	KU1DSCCAP101	Foundations of Computers and Programming	3	1	4	5	100
	KU1DSCCAP102	Design Thinking	3	1	4	5	100
	KU1DSCCAP103	Essential IT Tools	3	1	4	5	100

	KU1DSCCAP104	Fundamentals of App Development	3	1	4	5	100
	KU1DSCCAP105	Fundamentals of Web Development	3	1	4	5	100
<b>II</b>	KU2DSCCAP106	Programming with C and C++	3	1	4	5	100
	KU2DSCCAP107	Multimedia and Graphic Designing	3	1	4	5	100
	KU2DSCCAP108	Cyber security and Ethics	4	0	4	4	100
	KU2DSCCAP109	Introduction to Database Management System	3	1	4	5	100
	KU2DSCCAP110	Ethical Hacking	3	1	4	5	100

***NB: The courses for upcoming semesters needs to be in accordance with the draft curriculum for BCA published by AICTE***

## **ASSESSMENT AND EVALUATION**

- The assessment shall be a combination of Continuous Comprehensive Assessment (CCA) and an End Semester Evaluation (ESE)
- As per the regulation of Kannur University, one credit corresponds to 25 marks. Hence a 3-credit course must be evaluated for 75 marks and 4 credit courses for 100 marks. The ratio of continuous comprehensive assessment (CCA) to End semester examination (ESE) for theory/lecture courses is 30:70 and for the practical courses, it is 40:60.
- The 4-credit courses (Major and Minor courses) and 3 credit (Foundational Courses) are of two types:
  - i courses with only theory
  - ii courses with 3-credit theory and 1-credit practical.
- In 4-credit courses with only theory component, out of the total 5 modules of the syllabus, one teacher specific module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated.
- In 4-credit courses with 3-credit theory and 1-credit practical components, out of the total 5 modules of the syllabus, 4 modules are for theory and the fifth module is for practical.

Course Credit	Credit		Mark		L		P		Total marks
	L	P	L	P	CCA (30%)	ESE (70%)	CCA (40%)	ESE (60%)	
4	4	0	100	0	30	70	0	0	100
	3	1	75	25	25	50	10	15	100
3	3	0	75	0	25	50	0	0	75
	2	1	50	25	15	35	10	15	75

- The 3 credit courses (Foundational Courses) are of two types:
  - i courses with only theory
  - ii courses with 2-credit theory and 1-credit practical.
- In 3-credit courses with only theory component, out of the total 5 modules of the syllabus, one teacher specific module with 20% content is designed by the faculty member teaching that course, and it is internally evaluated.
- In 3-credit courses with 2-credit theory and 1-credit practical components, out of the total 5 modules of the syllabus, 4 modules are for theory and the fifth module is for practical.
- Continuous Evaluation includes assignments, seminars, periodic written examinations, or other measures as proposed in the syllabus and approved by the university.

### **Practical exams**

- There shall be a Continuous Evaluation of practical courses conducted by the Course- In-Charge.
- An observation book should be maintained for the experiments done in the lab and the same should be evaluated during the continuous evaluation.
- The process of continuous evaluation of practical courses shall be completed before 10 days from the commencement of the end-semester examination.

- The end-semester practical examination and viva-voce, and the evaluation of practical records shall be conducted by the course in-charge and an internal examiner appointed by the Department Council. Duration of ESE may be 2 to 2.5 Hrs.
- Those who passed in continuous evaluation alone will be permitted to appear for the end semester examination and viva-voce
- The end semester practical examination will in general have the following components:

SI No	Component of Evaluation	Marks
1	MODIFICATION	2
2	RECORD	2
3	VIVA	3
#4	CODE WRITING	3
#5	OUTPUT	5
TOTAL		15

# Foundations of Computers and Programming, Essential IT Tools and Multimedia and graphic designing will have the following components as 4 and 5

<b>KU1DSCCAP101-Foundations of Computers and Programming</b>		
4	CODE WRITING	3
5	ALGORITHM/ FLOWCHART	2
6	OUTPUT	3
<b>KU1DSCCAP103-Essential IT Tools/ KU2DSCCAP107 -Multimedia and graphic designing</b>		
4	PERFECTION OF THE WORK	4
5	COMPLETENESS	4

#For the course **KU2DSCCAP106- Programming With C and C++** Code writing is divided into Part A and Part B each of 1.5 marks and output is divided into Part A and Part B each of 2.5 marks.

## Mark Distribution for Discipline Specific Courses and Foundation Courses

The detailed mark distribution for 3 credit and 4 credit courses are given below:

*L – Lecture/Theory, P – Practical/Practicum components, CCA – Continuous Comprehensive Assessment, ESE – End Semester Evaluation*

- **4 Credit Course (Theory only)**

Evaluation Type		Marks
E S E		70
CCA		30
a)	*Test Paper	15
b)	**Assignment/ Book- Article Review	10
c)	Seminar/ Viva -Voce	5
<b>Total</b>		<b>100</b>

- **4 Credit Course (3 credit theory + 1 credit practical)**

Evaluation Type		Marks	Evaluation Type		Marks	Total
Lecture		75	Practical		25	100
a)	ESE	50	a)	ESE	15	
b)	CCA	25	b)	CCA	10	
i	*Test Paper	12	i	Punctuality and Lab Skills	3	
ii	**Assignment/ Book- Article review	5	ii	Test	5	
iii	Seminar/ Viva-Voce	8	iii	Record	2	



- **3 Credit Course (Theory only)**

Evaluation Type		Marks
ESE		50
CCA		25
a)	*Test Paper	12
b)	**Assignment/ Book- Article Review	5
c)	Seminar/ Viva -Voce	8
<b>Total</b>		<b>75</b>

- **3 Credit Course (2 credit theory + 1 credit practical)**

Evaluation Type		Marks	Evaluation Type		Marks	Total
Lecture		50	Practical		25	75
a)	ESE	35	a)	ESE	15	
b)	CCA	15	b)	CCA	10	
i	*Test Paper	8	i	Lab Skills and Punctuality	3	
ii	**Book-Article review/ Assignment	2	ii	Test	5	
iii	Seminar/ Viva-Voce	5	iii	Record	2	

\* Best out of two test papers

\*\* Or any other evaluation technique like quiz, open book exam, group activity

## **INTERNSHIP**

- All students should undergo Internship of 2-credits during the first six semesters in a firm, industry or organization, or training in labs with faculty and researchers of their own institution or other Higher Educational Institutions (HEIs) or research institutions.
- Internship can be for enhancing the employability of the student or for developing the research aptitude.
- Internship can involve hands-on training on a particular skill/ equipment/ software. It can be a short project on a specific problem or area. Attending seminars or workshops related to an area of learning or skill can be a component of Internship.
- A faculty member/ scientist/ instructor of the respective institution, where the student does the Internship, should be the supervisor of the Internship.

***NB: Guidelines and Evaluation criteria for internship will be published as per AICTE norms***

## **PROJECT IN HONOURS PROGRAMME**

- In Honours programme, the student has the option to do a Project of 12-credits in Major instead of three major Courses or Project of 8-credits in Major and one major course in semester 8.
- The Project can be done in the same institution/ any other higher educational institution (HEI) / research centre/ training centre.
- The Project in Honours programme can be a short research work or an extended internship or a skill-based training programme.
- A faculty member of the respective institution, where the student does the Project, should be the supervisor of the Project.

## **PROJECT IN HONOURS WITH RESEARCH PROGRAMME**

- Students who secure 75% marks and above (equivalently, CGPA 7.5 and above) cumulatively in the first six semesters are eligible to get selected to Honours with Research stream in the fourth year.

- In Honours with Research programme, the student has to do a mandatory Research Project of 12-credits instead of three Core Courses in Major in semester 8.
- The number of seats for the Honors with research shall be determined as per the availability of eligible faculty.
- The selection criteria for Honors with research stream shall be in accordance with the guidelines of UGC or as approved by Kannur University.
- Students who have chosen the honours with research stream shall be mentored by a faculty with a PhD.
- The mentor shall prescribe suitable advanced-level courses for a minimum of 20 credits to be taken within the institutions along with the papers on research methodology, research ethics, and research topic-specific courses for a minimum of 12 credits which may be obtained either within the institution or from other recognized institutions, including online and blended modes.
- These students who have opted for the honours with research should complete a research project under the guidance of the mentor and should submit a research report for evaluation. They need to successfully defend the research project to obtain 12 credits under a faculty member of the University/College within the University.
- The research outcomes of their project work may be published in peer-reviewed journals or presented at conferences or seminars or patented.

***NB: Guidelines and Evaluation criteria for project evaluation will be published as per AICTE norms***

## **EXTERNAL EVALUATION**

- Examinations will be conducted at the end of each semester. The students can write the external examinations in COMPUTER APPLICATIONS in both English and Malayalam languages.
- Individual questions are evaluated in marks and the total marks are converted into grades by the University based on 10-point grading system.

<b>Letter Grade</b>	<b>Grade Point (P)</b>
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

- A minimum of grade point 4 (Grade P) is needed for the successful completion of a Course.
- A student who has failed in a Course can reappear for the End Semester Examination of the same Course along with the next batch without taking re-admission or choose another Course in the subsequent Semesters of the same programme to acquire the minimum credits needed for the completion of the Programme.
- There shall not be provision for improvement of CE and ESE.
- A student who has successfully completed the CE requirements in a subsequent semester can also appear for the ESE subject to the maximum duration permitted.

### **Computation of SGPA and CGPA**

The following method is recommended to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

- The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.  $SGPA (S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$  Where  $C_i$  is the number of credits of the course and  $G_i$  is the grade point scored by the student in the course.

**Example:**

Semester	Course	Credit	Letter Grade	Grade point	Credit Point (Credit x Grade)
I	Course 1	3	A	8	3 X 8 = 24
I	Course 2	4	B+	7	4 X 7 = 28
I	Course 3	3	B	6	3 X 6 = 18
I	Course 4	3	O	10	3 X 10 = 30
I	Course 5	3	C	5	3 X 5 = 15
I	Course 6	4	B	6	4 X 6 = 24
		20			139
<b>SGPA</b>					139/20= <b>6.95</b>

- The Cumulative Grade Point Average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.  $CGPA = \frac{\sum(C_i \times S_i)}{\sum C_i}$  Where  $S_i$  is the SGPA of the semester and  $C_i$  is the total number of credits in that semester.
- The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts. Transcript (Format): Based on the above recommendations on Letter grades, grade points and SGPA and CCPA, the HEIs may issue the transcript for each semester and a consolidated transcript indicating the performance in all semesters.

**Example:**

Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
Credit: 21	Credit: 21	Credit: 22	Credit: 24	Credit: 23	Credit: 22
SGPA: 6.9	SGPA: 7.8	SGPA: 5.6	SGPA: 6.0	SGPA: 6.3	SGPA: 8.0
$\text{CGPA} = (21 \times 6.9 + 21 \times 7.8 + 22 \times 5.6 + 24 \times 6.0 + 23 \times 6.3 + 22 \times 8.0) / 133 = 6.74$					

- The SGPA is the ratio of the sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.  $\text{SGPA} (S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$  Where  $C_i$  is the number of credits of the course and  $G_i$  is the grade point scored by the student in the course.

<b>CGPA</b>	<b>Overall letter Grade</b>
<b>9.5 and above</b>	<b>O</b>
8.5 and above but less than 9.5	A+
7.5 and above but less than 8.5	A
6.5 and above but less than 7.5	B+
5.5 and above but less than 6.5	B
4.5 and above but less than 5.5	C
4.0 and above but less than 4.5	D
Less than 4.0	F

Appearance for Continuous Evaluation (CE) and End Semester Examination (ESE) are compulsory, and no Grade shall be awarded to a candidate if the candidate is absent for CE or ESE or both.

## SYLLABUS

### KU1MDCCAP101: BASICS OF IT FOR ALL

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	MDC	100-199	KU1MDCCAP101	3 (3T+0P)	3

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0		25	50	75	1.5hrs

**Course Description:** This course is intended for students with little or no background in information technology. This course introduces students to major areas of COMPUTER APPLICATIONS discipline. It covers the concepts of working principle of computer, basics of operating system, networks. number system, problem solving and security.

**Course Prerequisite:** NIL

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Discuss the basic concepts and fundamental knowledge in the field of COMPUTER APPLICATIONS	U
2	Comprehend the different types of number system	U
3	Develop problem solving skills	U/A
4	Understand the basics of data communication and network	U
5	Understand the basic concepts of cyber Security	U

**\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**



## Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3						
CO 2	2						
CO 3	2	3					
CO 4	2			2			2
CO 5	2			3			2

## COURSE CONTENTS

### Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
1	<b>MODULE TITLE: Introduction to Computer</b>		12
	1	History, Generations of Computer	
		Basic block diagram, Functions of various components of computer	
		Hardware, Software, Types of software	
	2	Basic Computer Organization: Von Neumann Model	
		Operating System, Functions of OS	
	3	<b>Number Systems</b> : Weighted and Non - Weighted Codes, Binary, Decimal, Octal, Hexadecimal, Binary Coded Decimal (BCD), Gray Codes, Alphanumeric codes, ASCII Conversion of bases, 1's, 2's complement representation	
2	<b>MODULE TITLE: Introduction to Programming</b>		12
	1	Procedure oriented language, Object oriented language	
	2	Computer Languages, Machine language, Assembly Language and High-Level Language	
	3	Language Translators, Compiler, Interpreter and Assembler	
	4	Flowchart, Algorithm	

	<b>MODULE TITLE: NETWORKING ESSENTIALS</b>		
<b>3</b>	1	Fundamental computer network concepts	12
	2	Types of computer networks	
		Network layers , TCP/IP model	
		Wireless Local Area Network, Ethernet, WiFi	
3	Network Routing, Switching, Network components		
	<b>MODULE TITLE</b>		
<b>4</b>	1	An Overview of Computer Security	12
		Security: Vulnerabilities, Attacks, and Countermeasures	
		Cryptography, Basic Techniques, Cryptanalysis	
		Digital Signatures	
	2	Applications of COMPUTER APPLICATIONS	
	AI, Types of Learning, Applications of AI, Different types of AI		
	Problems (Basic ideas only)		
<b>5</b>	<b>Teacher Specific Module</b>		12
	<i>Directions</i>		
	Teacher can implement proper methodologies and evaluation metrics related with the topics		

**Essential Readings:**

1. Digital Fundamentals, 11th edition Published by Pearson (July 14, 2021) © 2015 Thomas L. Floyd
2. . Goel, Anita (2010). Computer fundamentals. Pearson Education India
3. Forouzan, B. A., &Fegan, S. C. New York: “Data communications and networking”, McGraw-Hill Higher Education, 2007.
4. Kernighan, Brian W (2011). *D is for Digital: What a well-informed person should know about computers and communications.* CreateSpace Independent Publishing Platform

**Assessment Rubrics:**

<b>Evaluation Type</b>		<b>Marks</b>
ESE		50
CCA		25
a)	Test Paper	12
b)	Assignment/ Book- Article Review	5
c)	Seminar/ Viva -Voce	8
<b>Total</b>		<b>75</b>

### KU1MDCCAP102: DIGITAL MARKETING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	MDC	100-199	KU1MDCCAP102	3 (3T+0P)	3

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0	-	25	50	75	1.5 Hrs

**Course Description:**

In today's digital age, mastering the art of digital marketing is crucial for businesses to thrive. This course provides a comprehensive understanding of the core principles and strategies involved in promoting a brand or product online. Students will explore various digital channels, gain hands-on experience with essential tools, and develop the skills to create and manage effective digital marketing campaigns

**Course Prerequisite: NIL**

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Analyze the digital marketing landscape and its impact on consumer behavior.	U, An
2	Develop and implement a comprehensive digital marketing strategy aligned with business objectives.	U, A
3	Utilize various digital channels (SEO, SEM, Social Media, Email Marketing) to reach target audiences effectively.	U, E
4	Create engaging content that resonates with target audiences and drives conversions.	U, A, C

5	Measure and analyze campaign performance using key metrics and data insights.	U, An
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*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

## Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	P S O 7
CO 1	3			2		2	2
CO 2	2	3					2
CO 3	3		2	3		2	2
CO 4	2			3		3	3
CO 5				2	2	3	2

### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
	<b>MODULE 1: Foundations of Digital Marketing</b>		
<b>1</b>	1	Introduction to Digital Marketing - Terminology & Landscape Overview	12
	2	Understanding Customer Behavior in the Digital Age	
	3	Developing a Buyer Persona and Targeting Strategies	
	4	Setting SMART Goals and Measuring Success in Digital Marketing	

	<b>MODULE 2 : Content Marketing &amp; SEO</b>		
<b>2</b>	1	Content Strategy & Development - Creating Engaging Content Across Channels	12
	2	Search Engine Optimization (SEO) Principles - Optimizing Websites for Search Visibility	
	3	Keyword Research & Content Planning for Improved Ranking	
	4	Content Marketing Platforms and Tools	

	<b>MODULE 3: Social Media Marketing &amp; Paid Advertising</b>		
<b>3</b>	1	Social Media Marketing Strategies - Building Brand Communities on Key Platforms	12
	2	Engaging Content Creation for Social Media Channels	
	3	Paid Advertising Fundamentals - Introduction to PPC (Pay-Per-Click) Advertising	
	4	Social Media Advertising Platforms and Campaign Management	

	<b>MODULE 4: Email Marketing &amp; Analytics</b>		
<b>4</b>	1	Effective Email Marketing Strategies - Building Email Lists and Segmentation	12
	2	Crafting Compelling Email Campaigns - Design & Copywriting Techniques	
	3	Email Marketing Automation Tools and Best Practices	
	4	Data Analysis for Digital Marketing - Key Performance Indicators (KPIs) & Tracking Tools	

<b>5</b>	<b>Teacher Specific Module</b>	12
	<i>Directions</i>	
	Teacher can implement proper methodologies and evaluation metrics related with the topics	

**Assessment Rubrics:**

Evaluation Type		Marks
ESE		50
CCA		25
a)	Test Paper	12
b)	Assignment/ Book- Article Review	5
c)	Seminar/ Viva -Voce	8
<b>Total</b>		<b>75</b>

## KU2MDCCAP103: PYTHON PROGRAMMING FOR ALL

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	MDC	100-199	KU1MDCCAP103	3 (3T + 0P)	3

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0	1	25	50	75	1.5 Hrs

### Course Description:

This course introduces the learner to how to develop an algorithm, then progress to reading code and understanding how programming concepts relate to algorithms. This is done using Python language.

*NB: Students may be given hands on training in basic programs using Python. Sample list of lab experiments are given below*

### Course Prerequisite: NIL

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand Fundamentals of Computers	U, R
2	Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.	U, A
3	Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.	U,A
4	Express proficiency in the handling of strings and functions.	U, A
5	Develop basic programs using Python	A,C

***\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)***



### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3						
CO 2	3	2					
CO 3	2	3		2			
CO 4	2	3		2			
CO5	2	3				2	2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>MODULE 1: Introduction to Programming</b>			
<b>1</b>	1	Basic block diagram and functions of various components of a computer	12
	2	Basic Concepts of Problem solving in a computer (Solution Logic), Flow Charts and Algorithms	
	3	Definitions of Machine level, Assembly level and High-level programming	
	4	Language translators-Compiler, Interpreter, Assembler	
<b>MODULE 2: Introduction to Python language</b>			
<b>2</b>	1	Introduction to Python and features of Python	12
	2	Python Interpreter and program execution	

	3	Python Environment Setup, Python IDE	
	4	Python variable declaration, Keywords, Indents in Python, Python input/output operations	
	<b>MODULE 3: Operators and Datatypes in Python</b>		
<b>3</b>	1	Arithmetic Operators, Comparison Operators, Assignment Operators, Logical Operators, Bitwise Operators.	12
	2	Membership Operators, Identity Operators, Ternary Operator, Operator precedence	
	3	Declaring and using Numeric datatypes: int, float, complex, string data type	
	4	List, Tuple, Set, Dictionary – Creating and using built-in methods of these data types	
	<b>MODULE 4: Conditional and Looping Statements in Python</b>		
<b>4</b>	1	Conditional Statements a) If, If-else, If-elif-else, b) Nested-if	12
	2	loop control statements a) for, while, nested loops, b) Break, Continue, Pass statements	
<b>5</b>	<b>Teacher Specific Module</b>		

**Sample List of Lab experiments:**

1. Write a program for checking the given number is positive, negative or zero
2. Write a program for checking the given number is even or odd
3. Calculate the multiplication and sum of two numbers
4. Write python program to print Hello World
5. Write a python program to get string, int, float input from user

6. Write a python program to find the length of list?
7. Write a program to create a dictionary.
8. Write a python program to create a list and print the values of it using for and while loops
9. Write a program for checking the given value is present in a list or not.
10. Write a program to find the sum of values in a set using built-in method.

**Essential Readings:**

1. Computer Fundamentals Goel, Anita Pearson
2. Core Python Programming Wesley J. Chun Publisher: Prentice Hall PTR First Edition
3. Python Tutorial/Documentation [www.python.org](http://www.python.org) 2010
4. Allen Downey, Jeffrey Elkner, Chris Meyers , How to think like a computer scientist : Learning with Python , Freely available online.2015
5. Web Resource: <http://interactivepython.org/courselib/static/pythonds>

**Suggested Readings:**

1. T. Budd, Exploring Python, TMH, 1st Ed, 2011

**Assessment Rubrics:**

Evaluation Type		Marks
End Semester Evaluation		<b>50</b>
Continuous Evaluation		<b>25</b>
a)	Test Papers	12
b)	Assignment	8
c)	Viva/Seminar	5
Total		<b>75</b>

## KU2MDCCAP104: INTRODUCTION TO DATA SCIENCE

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	MDC	100-199	KU1MDCCAP104	3 (3T+ 0P)	3

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	0	-	25	50	75	1.5 hrs.

### Course Description:

This course introduces the fundamental concepts, techniques, and tools used in data science. Students will learn how to collect, clean, analyze, and visualize data using various programming languages and libraries. The course will cover topics such as data manipulation, exploratory data analysis, statistical modeling, machine learning, and data visualization.

**Course Prerequisite: NIL**

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Analyse data using statistical methods to draw meaningful conclusions.	U, An
2	Apply machine learning algorithms to real-world datasets for problem-solving	U, A
3	Understand data characteristics and patterns through exploratory data analysis (EDA).	U

4	Demonstrate proficiency to collect, clean, and preprocess data using Python and relevant libraries.	U, A
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*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

## Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3		3	3		3	
CO 2	3	2		2		3	2
CO 3	3		2			3	
CO 4	3	2	3	2		3	2

## COURSE CONTENTS

### Contents for Classroom Transaction:

<b>M O D U L E</b>	<b>U N I T</b>	<b>DESCRIPTION</b>	<b>HOURS</b>
	<b>MODULE 1: Introduction to Data Science</b>		
<b>1</b>	1	Overview of data science and its applications Role of data scientists and data analysts	12
	2	Introduction to data lifecycle and data-driven decision-making	
	3	Data Acquisition and Preprocessing Techniques for data collection and storage	
	4	Data cleaning, transformation, and normalization	
	<b>MODULE 2: Introduction to Python and Statistical Analysis</b>		
<b>2</b>	1	Introduction to data types, data structures, and libraries (NumPy, Pandas)	12
	2	Data cleaning and preprocessing techniques, Handling missing data and outliers	
	3	Data visualization techniques (Matplotlib, Seaborn)	

	4	Descriptive Statistics: measures of central tendency and dispersion	
	5	Inferential Statistics: hypothesis testing, confidence intervals, and regression analysis	

	<b>MODULE 3: Machine Learning Fundamentals</b>		
3	1	Introduction to machine learning	12
	2	Supervised Learning: Regression, Classification	
	3	Unsupervised learning: Clustering, Dimensionality Reduction	
	4	Model evaluation - metrics for assessing model accuracy, precision, recall, and F1 score	
	5	Hyperparameters and its tuning	

	<b>MODULE 4: Real World Applications and implications</b>		
4	1	Bias in machine learning algorithms	12
	2	Responsible AI, Explainable AI	
	3	Introduction to deep learning and neural networks	
	4	Computer Vision, Robotics	
	5	Natural Language Processing, Large Language Models	

	<b>Teacher Specific Module</b>		
5	<i>Directions</i>		12
	<p>Teacher can provide assignments and seminars related to following questions</p> <ol style="list-style-type: none"> <li>1. Python library commonly used for data manipulation and analysis?</li> <li>2. The purpose of exploratory data analysis (EDA) in the data science process.</li> <li>3. How to determine the correlation between two variables in a dataset?</li> </ol>		

	<ol style="list-style-type: none"> <li>4. Usage of classification algorithm versus regression algorithm?</li> <li>5. Steps involved in creating a data analysis pipeline for a classification task.</li> </ol>	
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**Essential Readings:**

1. "Introduction to Data Science", Jeffrey Stanton, Chapman and Hall/CRC in 2013.
2. "Data Science from Scratch: First Principles with Python", Joel Grus, O'Reilly Media.
3. "Python for Data Analysis", Wes McKinney, O'Reilly Media

**Suggested Readings:**

1. "Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking", Foster Provost and Tom Fawcett, O'Reilly Media, 1st Edition (2013)

**Assessment Rubrics:**

Evaluation Type		Marks
End Semester Evaluation		<b>50</b>
Continuous Evaluation		<b>25</b>
a)	Test Papers	12
b)	Assignment	8
c)	Viva/Seminar	5
Total		<b>75</b>

## DISCIPLINE SPECIFIC COURSES

### KU1DSCCAP101: FOUNDATIONS OF COMPUTERS AND PROGRAMMING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCCAP101	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs

**Course Description:** To introduce students to the foundations of computing, programming and problem-solving. It aims to train the student to the basic concepts of the C-programming language. This course involves a lab component which is designed to give the student hands- on experience with the concepts.

**Course Prerequisite:** NIL

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Understand the basic concepts and fundamental knowledge in the field of COMPUTER APPLICATIONS	U /R
2	Comprehend the different types of number system	U /R
3	Understand the principles and terminology of digital logic.	U
4	Develop efficient algorithms for solving a problem.	A
5	Write the program on a computer, edit, compile, debug, correct, recompile and run it.	A, An, C

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*



### Mapping of Course Outcomes to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2		2		
CO2	3					
CO3	2	2				
CO4	2	3		2		
CO5	3	3				2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

MODULE	UNIT	DESCRIPTION	HOURS
	<b>MODULE 1: Building blocks of Computers</b>		
<b>1</b>		<b>Generation and classification of Computers:</b> Super, Mainframe, Mini, Personal Computer, Work stations, Parallel machines. <b>Basic Computer Organization:</b> Von Neumann Model <b>Hardware:</b> Central Processing Unit (CPU), Primary memory and Secondary Storage devices, I/O devices. <b>Software:</b> System Software and Application Software, Operating System (definition and functions only)	<b>12</b>
	2	<b>Computer Languages-</b> Machine language, Assembly Language and High-Level Language <b>Language Translators-</b> Compiler, Interpreter and Assembler	
	3	<b>Basic concept of networking:</b> LAN, WAN, Internet and its working	
	4	<b>Artificial Intelligence:</b> Types of Learning, Applications of AI, Different types of AI Problems (Basic ideas only)	

	<b>MODULE 2: Number Systems &amp; Boolean Algebra</b>		
2	1	Weighted and Non - Weighted Codes, Positional, Binary, Octal, Hexadecimal, Binary Coded Decimal (BCD), Gray Codes, Alphanumeric codes, ASCII, EBCDIC, Conversion between bases	16
	2	Signed arithmetic, 1's, 2's complement representation	
	3	Logic gates AND, OR, NOT, NAND, NOR, XOR	
	4	Fundamental concepts of Boolean Algebra Logic Circuits, Conversion from expression to logic Circuits	
	<b>MODULE 3: Introduction to Algorithms and C Programming</b>		
3	1	Introduction to algorithmic concepts using flowcharts and pseudocode	16
	2	Concept of Structured Programming The language of C: Phases of developing and executing a computer program using C. Standard input and output library, header file "stdio.h"	
	3	Data concepts in C: Character set, Constants, literals, Variables, identifier, Keywords, Datatypes, Variables, Declaration of Variables Operators, Expressions and operator precedence in C	
	4	Simple C programs Syntax Errors - Run-Time Errors - Logical Errors	
	<b>MODULE 4: Control Structures and Arrays</b>		
4	1	Decision Making statements: if, if-else, if-else-if, Nested if and switch	16
	2	Loop control statements - Entry controlled loop (for, while), Exit controlled loop (do-while) Jump statements: goto, break. Continue	
	3	One dimensional array: declaration and initialization, integer and character array	
	4	Two dimensional array: declaration and initialization	

<b>5</b>	<b>Teacher Specific Module</b>	<b>15</b>
	<i>Directions</i>	
	<p data-bbox="403 360 600 389"><b>Lab Exercises</b></p> <p data-bbox="389 412 488 441"><b><i>Cycle 1</i></b></p> <ol style="list-style-type: none"> <li data-bbox="437 479 1062 508">1) Hardware familiarisation and PC assembling</li> <li data-bbox="437 517 679 546">2) OS installation</li> <li data-bbox="437 555 1134 629">3) Familiarise network devices, Set up and configure computer network</li> <li data-bbox="437 638 743 667">4) Familiarise AI tools</li> <li data-bbox="437 676 1023 705">5) Familiarise writing and presentation tools</li> </ol> <p data-bbox="389 736 488 766"><b><i>Cycle 2</i></b></p> <ol style="list-style-type: none"> <li data-bbox="437 801 1126 913">1) Setting up a Linux Environment: Work in Linux environments and to be able to compile and run C programs.</li> <li data-bbox="437 922 791 952">2) Basic Linux commands</li> </ol> <p data-bbox="389 1005 488 1034"><b><i>Cycle 3</i></b></p> <p data-bbox="389 1048 722 1077"><b><i>Basic Arithmetic and I/O</i></b></p> <ol style="list-style-type: none"> <li data-bbox="485 1120 1163 1149">i) Write a C program that prints a welcome message</li> <li data-bbox="485 1158 1163 1270">ii) Print the size of data types - int, float, bool, char and double on your device and understand the maximum value limits of data types.</li> <li data-bbox="485 1279 1182 1368">iii) Write a C program that accepts a distance in inches and prints the corresponding value in cms. Note that 1 inch = 2.54 cm</li> <li data-bbox="485 1377 1182 1467">iv) Write a C program to evaluate <math>a - b + c * 3</math></li> <li data-bbox="485 1498 1219 1713">v) Write a program to convert Fahrenheit To Celsius vi) Given the initial price, discount in percentage and tax in percentage on a computer and pendrive, calculate the bill after buying both the products. Restrict output to 2 decimal places</li> </ol> <p data-bbox="389 1731 762 1760"><b><i>Decision making and Loops</i></b></p> <ol style="list-style-type: none"> <li data-bbox="485 1783 1206 1872">i) Write a program to input three numbers and find the largest.</li> <li data-bbox="485 1904 1198 1993">ii) Write a program to take a number as input from the user and find the factorial.</li> </ol>	

iii) Given marks of the course for a student, follow the below grading scheme and print the corresponding grade as output.

Constraints:  $0 \leq \text{marks} \leq 100$  and  $\text{marks} \in \mathbb{R}$

86 - 100: A+

71 - 85: A

56 - 70: B+

41 - 55: B

26 - 40: C

0 - 25: F

iv) Write a program to take 2 numbers from the user and perform the following operations. i) addition ii) subtraction iii) multiplication iv) division v) modulus. Handle the cases like division by zero and other invalid input cases. (Use switch)

v) Write a program to print the roots of a quadratic equation. Restrict output to 3 decimal places

vi) Write a program which takes an integer n as input denoting a year and outputs whether the year is a leap year or not. The program should print "Leap year" if it is a leap year and "Not a leap year" otherwise. (Leap year is exactly divisible by 4. However if it is a century year then the year must be divisible by 400 to be a leap year)

vii) Write a program that takes as input an integer n. The program should print the  $n^{\text{th}}$  Fibonacci number.

viii) Write a program to take an integer as input and output whether it is a prime number or not.

ix) Write a C program to take a number as input and check if it is a perfect number or not. A perfect number is equal to the sum of all its factors except itself. For example,  $(28 = 1 + 2 + 4 + 7 + 14)$

- x) Write a C program that accepts a positive integer and prints out the sum of the digits of this number.
- xi) Write a program to take a 4 digit number as input from the user and reverse the number. Check whether the number is palindrome.
- xii) Write a program to evaluate the sum of different arithmetic series
- xiii) Write a C program that takes a positive integer n and prints different patterns

### ***Arrays and Strings***

- i) Given an array of n numbers and find average
- ii) Given an array of numbers, output the second largest element in the array ii) Count frequency of an element in an array
- iii) Perform linear search iv) Given a 2D array of size  $n \times n$  as input, write a program to perform matrix addition and multiplication
- iv) Converting a positive integer number ( $n > 0$ ) from one base (inputBase) to another base (outputBase) ( $2 \leq \text{input Base}, \text{outputBase} \leq 10$ ). Input number should be validated before converting to make sure the number uses only digits allowed in the input base?

### **Essential Readings**

1. Digital Fundamentals, 11th Edition by Pearson Eleventh Edition, Thomas L. Floyd.
2. Digital Logic and Computer Design, M Morris Mano, Pearson.
3. Programming in ANSI C, Balagurusamy
4. The C programming Language, Brian Kernighan and Dennis Ritchie
5. Let us C ,YeshwantKanitkar

**Suggested Readings:**

1. Programming in Ansi C, 8th Edition by E Balagurusamy, 25 March 2019

**Assessment Rubrics:**

End Semester Evaluation		<b>65</b>
Theory		<b>50</b>
Practical		<b>15</b>
CCA		<b>35</b>
Continuous Evaluation (Theory)		<b>25</b>
a)	TestPaper-1	12
b)	Assignment	5
c)	Viva/seminar	8
Continuous Evaluation (Practical)		<b>10</b>
a)	Lab Skills and Punctuality	3
b)	OBSERVATION BOOK	2
c)	Test	5
Total		<b>100</b>

## KU1DSCCAP102: DESIGN THINKING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCCAP102	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5Hrs

**Course Description:** This course equips aspiring students with the design thinking principles and innovative problem-solving tools to solve business challenges. Thus, they will be able to address, identify and solve problems creatively in any field or specialization.

**Course Prerequisite:** NIL

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Create Awareness and a sense of Discovery to drive innovation.	U
2	Create innovative solutions to the most challenging problems	U/A
3	Create prototypes to test your idea early, before making a big investment of time and money	C
4	Apply design thinking to your problems in order to generate innovative and user-centric solutions	A

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

### Mapping of Course Outcomes to PSOs

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
<b>CO1</b>	3	2		3		2	2
<b>CO2</b>	2	3		3	2	2	
<b>CO3</b>	3	2		3		2	
<b>CO4</b>	3	3		3	2	3	2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
		<b>MODULE 1:</b>	
<b>1</b>	1	Design Thinking and innovation: History and Introduction, challenges	<b>15</b>
	2	The 5 stages in design thinking process: Empathise, Define, Ideate, Prototype, Test	
	3	How to Build Empathy with the People You Design For: Techniques to get empathy with your users: Ask what, how, and why, Empathy interviews, observation	
	4	How to Define the Problem: Point Of View – Problem Statement, Empathy maps The four Ws : Who, what, where, and why?, persona	
5	Activity: 1) Problem Framing: Reframe problems from various perspectives (deep, emotional, broad, and dynamic) to identify new pain points and make new solutions possible  2) Practice researching the innovation context and empathizing with users through structured tools. 3) Create Empathy map to an innovation problem of your own choosing, or a provided scenario 4) Create persona to an innovation problem of your own choosing, or a provided scenario		



	<b>MODULE 2:</b>		
2	1	How to Ideate for innovative solutions	15
	2	Ideation Methods: Brainstorm, Mindmap, Storyboard, Scamper	
	3	Ideation Methods to Select Ideas: Post-it Voting or Dot Voting, Six Thinking Hats	
	4	<b>Activity</b> <ol style="list-style-type: none"> <li>1. Start with a problem statement, point of view, possible questions create a mind map to an innovation problem of your own choosing, or a provided scenario</li> <li>2. Start with a problem statement, point of view, possible questions to an innovation problem of your own choosing, or a provided scenario</li> <li>3. Start with a problem statement, point of view, possible questions create a storyboard to an innovation problem of your own choosing, or a provided scenario</li> <li>4. Practice Six thinking hats to an innovation problem of your own choosing, or a provided scenario</li> </ol>	
	<b>MODULE :3</b>		
3	1	Prototyping Your Ideas, prototyping by creating critical questions related to a concept's desirability, feasibility, and viability.	10
	2	Different kinds of prototype: Sketches, Storyboards, Role-Playing, Fidelity	
	3	<b>Activity</b> Organize all information about an innovation concept to identify critical questions for prototyping	
	<b>MODULE 4:</b>		
4	1	Testing Design Solutions: Desirable, Feasible and Viable Solutions	15
	2	Guidelines for Conducting a Test : Users analyse multiple prototypes. Ask Participants to Talk Through Their Experience, Observe Your Participants, Ask Follow-Up Questions	
	3	<b>Activity</b> You have an idea for your innovation problem. Perform Testing <ul style="list-style-type: none"> <li>□ Go out, meet people and engage them with your concept. Ideally you will have an experiential prototype. So let the testers experience that for</li> </ul>	

	<p>themselves. If you have a more visual prototype, such as a storyboard, show it to them, but do as little explanation as possible.</p>	
	<ul style="list-style-type: none"> <li>□ Let them express their thoughts. Use the interviewing techniques such as the 80/20 rule. Listen carefully and take notes. Observe how the testers are dealing with your prototype. Ask open questions that leave space for the tester to really tell their opinion</li> </ul>	
	<p><b>Teacher Specific Module</b></p>	
	<p><i>Directions</i></p>	
<b>5</b>	<p><b>1.) Task is to</b> Implement FYUGP. Try to come up with many different ways to solve it. There are no correct solutions or even one best solution that are trying to find; rather, they are simply using their imaginations to generate as many possibilities as they can and in the end, vote for the 2 or 4 that they are most excited about. Apply the ideation techniques.</p> <p><b>2)</b> The marketing team at a tech company need to Generate innovative marketing campaign ideas for a new product launch. Perform brain storming for ideation and create a storyboard</p> <p><b>3)</b> The marketing team at a tech company need to Generate innovative marketing campaign ideas for a new product launch. Illustrate six hat method for the scenario.</p> <p><b>4.</b> Illustrate the design thinking approach for designing a bag for college students within a limited budget. Describe each stage of the process and the iterative procedure involved. Use hand sketches to support your arguments.</p>	<b>15</b>

## Essential Readings

1. Creative Confidence, Unleash the creative potential within us all, Tom Kelley and David Kelley
2. Design Thinking for Training and Development, Sharon Boller, Laura Fletcher
3. "The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods" by Michael Lewrick, Patrick Link, and Larry Leifer

## Suggested Readings:

1. A practical guide to design thinking, A collection of methods to re-think social change, Moritz Gekeler © 2019 Friedrich-Ebert-Stiftung India Office
2. Design Thinking: The Handbook, Falk Uebernickel, Li Jiang, Walter Brenner, Britta Pukall, Therese Naef, Bernhard Schindlholzer

## Online course

1. <https://www.interaction-design.org/courses/design-thinking-the-ultimate-guide>  
<https://online.hbs.edu/courses/design-thinking-innovation/>

## Employability for the Course / Programme

- Entrepreneurs
- Apply creative concepts in any field of specialization

## Assessment Rubrics

End Semester Evaluation		<b>65</b>
Theory		<b>50</b>
Practical		<b>15</b>
CCA		<b>35</b>
Continuous Evaluation (Theory)		<b>25</b>
a)	TestPaper-1	12
b)	Assignment	5
c)	Viva/ Case study	8
Continuous Evaluation (Practical)		<b>10</b>
a)	Lab Skills and Punctuality	<b>5</b>
b)	Test	<b>5</b>
Total		<b>100</b>

## KU1DSCCAP103: ESSENTIAL IT TOOLS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCCAP103	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5Hrs

**Course Description:** This course aims to impart skills related to e-mail creation, using google services, document processing, spreadsheet handling and creating attractive presentations.

**Course Prerequisite:** NIL

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Explain and apply the proficiency in using Google Drive, Docs, Sheets, Slides, and Forms to create, collaborate, and manage documents efficiently in the Google Workspace suite.	U,A
2	Develop proficiency in Microsoft Word to create, format, and edit documents effectively.	U, A
3	Create, analyse, and manipulate spreadsheet data.	U, A, C
4	Develop effective presentation skills using Microsoft PowerPoint	U, E

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	3					2
CO 2	3	3		2			2
CO 3	2	3				2	2
CO 4	3	3				2	2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>1</b>	<b>MODULE 1: Creating a google account and accessing related services</b>		
	1	Overview of Information Technology and its Tools: Basic concepts and terminology related to IT tools and their role in supporting business operations and personal productivity.	9
	2	Google Essentials:  Introduction to Google Services Overview of Google Workspace,  Creating and managing a Google account, Navigating the Google interface	
	3	Gmail for Communication: Managing emails in Gmail, Organizing and labelling emails, Using filters and settings effectively	
	4	Google Drive for File Management, Uploading and organizing files in Google Drive, Collaborative document editing and sharing, Version history and document recovery	

	5	Google Calendar for Time Management: Creating events and appointments Managing multiple calendars, Integrating Google Calendar with other services	
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	<b>MODULE 2: Document Processing Techniques</b>		
2	1	Text Creation and manipulation, Document Creation, Editing Text, Text Selection, Cut, Copy and Paste, Font, Color, Style and Size selection, Alignment of Text, Undo & Redo, AutoCorrect, Spelling & Grammar, Find and Replace.	12
	2	Table Manipulation, Insert & Draw Table, changing cell width and height, Alignment of Text in cell, Delete / Insertion of Row, Column and Merging & Splitting of Cells, Border and Shading, Mail Merge, Table of Contents, Indexes, Adding Comments, tracking changes, Macros, Creating Headers, Footers, and Page Numbers	
	3	Formatting the Text, Creating and using user defined Styles, Paragraph Indentation, Bullets and Numbering, change case, Header & Footer, Page Setup, Page Layout, Borders, Using the Help, Watermark, Print Preview, Printing of Documents, PDF file and Saving a Document as PDF file.	
	4	Referencing and Citations, Document Security and Protection	
	5	Google Docs for Document Creation: Creating and formatting documents in Google Docs, Real-time collaboration features, Inserting media and links	

	<b>MODULE 3: Introduction to Spreadsheets</b>		
3	1	Concept of Cell Address: [Row and Column] and selecting a Cell, Entering Data [text, number, date] in Cells, Page Setup, Printing of Sheet, Saving Spreadsheet, Opening and Closing	15

	2	<p>Manipulation of Cells &amp; Sheet, Modifying / Editing Cell Content, Formatting Cell (Font, Alignment, Style), Cut, Copy, Paste &amp; Paste Special, Changing Cell Height and Width, Inserting and Deleting Rows, Column, AutoFill, Sorting &amp; Filtering, Freezing panes</p>
	3	<p>Formulas, Functions</p> <p>a) Formulas for Numbers</p> <p>b) AutoSum functions</p> <p>c) Logical Functions</p> <p>d) Text Functions</p> <p>e) Statistical Functions</p> <p>f) Date &amp; Time Functions</p>
	4	<p>Creating Charts and Graphs, Working with Large Datasets - Filtering &amp; Sorting, Data Analysis Tools (e.g., PivotTables), Creating Macros and Automation</p>
	5	<p>Google Sheets for Data Management: Introduction to Google Sheets for spreadsheets, Data entry, formatting, and basic formulas, Collaborative data analysis and sharing</p>

	<b>MODULE 4: Creating presentations</b>	
4	1	<p>Creating a Presentation Using a Template, Creating a Blank Presentation, Inserting &amp; Editing Text on Slides, Inserting and Deleting Slides in a Presentation, Saving a Presentation</p>
	2	<p>Inserting Table, Adding Pictures, Inserting Other Objects, Resizing and Scaling an Object Creating &amp; using Master Slide.</p>

	3	Choosing a Set Up for Presentation, Playing a Slide Show, Transition and Slide Timings, Automating a Slide Show, Providing Aesthetics to Slides & Printing	9
	4	Enhancing Text Presentation, Working with Color and Line Style, Adding Movie and Sound, Adding Headers, Footers and Notes, Printing Slides and Handouts	
	5	Google Slides for Presentations: Creating and designing, presentations in Google Slides, Collaborative editing and commenting, Adding multimedia elements	

	<b>Teacher Specific Module</b>		
	<i>Directions</i>		
5	Teacher can implement proper methodologies and evaluation metrics related with the topics	9	

**Essential Readings:**

1. "Microsoft Office 2019 Step by Step": by Joan Lambert and Curtis Frye:
2. Google Apps for Seniors: A Practical Guide to Google Drive Google Docs, Google Sheets, Google Slides, and Google Forms: By Scott La Counte
3. Introduction to Information Technology" by Pearson Education
4. <https://workspace.google.com/learning-center/>

**Software:**

- Access to a computer with word processing and spreadsheet software (e.g., Microsoft Word and Excel, Google Docs and Sheets) is required. .□

**Suggested Readings:**

- Look for online resources that are compatible with your software version (e.g., Word 2021, Excel 2023, etc.).□
- Consider your learning style - some resources offer video tutorials, while others focus on text-based explanations. Choose what works best for you.□



**Assessment Rubrics:**

End Semester Evaluation	<b>65</b>
Theory	<b>50</b>
Practical	<b>15</b>
CCA	<b>35</b>
Continuous Evaluation (Theory)	<b>25</b>
a) TestPaper-1	12
b) Assignment	5
c) Viva/ Case study	8
Continuous Evaluation (Practical)	<b>10</b>
a) Lab Skills and Punctuality	3
b) Observation Book	2
b) Test	5
Total	<b>100</b>

### KU1DSCCAP104: FUNDAMENTALS OF APP DEVELOPMENT

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCCAP104	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs.

**Course Description:** This course aims to impart skills related to android application development.

**Course Prerequisite:** NIL

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Evaluate and Deploy advanced mobile applications.	U, A
2	Explain Android SDK	U
3	Construct intuitive interfaces and optimizing user experiences	U, A
4	Develop and formulate code for mobile applications	U, A,C

**\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

## Mapping of Course Outcomes to PSOs

	PS O 1	PS O 2	PSO 3	PSO 4	PSO 5	PSO 6	PS O 7
CO 1	3	3					2
CO 2	3	2					2
CO 3	3	3		2			2
CO 4	3	3		2			2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>1</b>	<b>MODULE 1:</b>		
	1	Overview of mobile app development: Mobile Computing, History of application development	12
	2	Understanding different mobile platforms (iOS, Android), Why Android, iOS-Execution Environment	
	3	Introduction to development environments (Xcode, Android Studio) a) Theory of application development for mobile platforms b) Understanding basics of application development software	
	4	Setting up your Android development environment a) Setting up your Android development environment b) Creating an android development environment Hello, Android c) Starting new android application: Hello World	

	<b>MODULE 2:</b>		
2	1	Introduction to interface elements	15
	2	Design tools and wireframing	
	3	MVC (Model-View-Controller) architecture	
	4	Understanding app components	
	5	Activities, fragments, view controllers	

	<b>MODULE 3:</b>		
3	1	Android User Interface Design Essentials	12
	2	Designing User Interfaces with Layouts, Drawing and Working with Animation.	
	3	Architecture of android based services	
	4	Building basic application	
	5	Designing user interface	

	<b>MODULE 4:</b>		
4	1	iOS Application development a) History of iOS platform	15
	2	Architecture of Apple devices a) Understanding basics of swift b) Application development using swift	
	3	Understanding basics of Objective - C a) App development using objective - C	

	<b>Teacher Specific Module</b>		
5	<i>Directions</i>		
	Teacher can implement proper methodologies and evaluation metrics related with the topics		

**Essential Readings:**

1. Lauren Darcey and Shane Conder, “Android Wireless Application Development”, Pearson Education, 2nd ed. (2011)
2. Reto Meier, “Professional Android 2 Application Development”, Wiley India Pvt Ltd
3. Mark L Murphy, “Beginning Android”, Wiley India Pvt Ltd
4. Android Application Development All in one for Dummies by Barry Burd, Edition: I
5. Android application development-O'REILLY

**Assessment Rubrics:**

End Semester Evaluation	<b>65</b>
Theory	<b>50</b>
Practical	<b>15</b>
CCA	<b>35</b>
Continuous Evaluation (Theory)	<b>25</b>
a) TestPaper-1	12
b) Assignment	5
c) Viva/ Case study	8
Continuous Evaluation (Practical)	<b>10</b>
a) Lab Skills and Punctuality	3
b) Observation Book	2
b) Test	5
Total	<b>100</b>

## KU1DSCCAP105: FUNDAMENTALS OF WEB DEVELOPMENT

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100-199	KU1DSCCAP105	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs

### Course Description:

This course will cover the creation of Web pages and sites using HTML, CSS, and graphical applications as well as the client and server architecture of the Internet and related web technologies.

### Course Prerequisite: NIL

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand different components in web technology and WWW	U, A
2	Design interactive Web pages	U, A
3	Understand HTML Forms and CSS Styling	U, A
4	Understand HTML Frames and its applications	U, A, E
5	Develop skills to design a web page using HTML	A, An, E

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3			3			
CO 2	3			3			
CO 3	3	3					
CO 4	3	3					
CO 5	3	3		3			3

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>1</b>	<b>MODULE 1: Introduction to Web Development Basics</b>		
	1	Introduction to Internet	15
		a) Evolution of the Internet	
		b) World Wide Web	
		c) Web Browsers, URL, http	
	2	Web Basics	
		a) Static Vs Dynamic web pages	
		b) Client-Side Scripting versus Server-Side Scripting	
	3	W3C & Web hosting	
		a) World Wide Web Consortium (W3C)	
		b) Web hosting, types of web hosting, Free hosting	
	4	Domain Name Registration	

	<b>MODULE 2: HTML</b>		
2	1	Introduction to HTML	15
		a) Creating HTML document	
		b) Tags & attributes, syntax of tag	
		c) Starting and ending tag, tag without end, building a webpage	
	2	Text formatting	
		a) Division	
		b) Paragraphs & heading	
		c) Physical style tags, text alignment, fonts	
	3	Hyperlink and loading images	
		a) Linking to other web pages	
		b) Images and <img> tag	
		c) Line breaks, comments	
	4	List: types of list, nested list	

	<b>MODULE 3: HTML Tables and Forms</b>		
3	1	HTML Tables: creating a table, table tags and attributes, formatting the table: width, height, align, border, padding & spacing, col span & row span	15
	2	HTML Forms: Form elements (input, select, text area, button, data list), Input types (text, password, submit, radio, checkbox, date, email, number)	
	3	Input type attributes (value, read only, disabled, max length, autocomplete, list, min, max, placeholder)	
	4	HTML5 form validation (required and pattern attribute of input type)	



	<b>MODULE 4: HTML Frames and CSS</b>		
4	1	Frames: <frame>tag, frame attributes: src, name, frameborder and scrolling	15
	2	Frameset tag and its important attributes, <iframe>, <noframe>	
	3	Applying style to HTML using CSS: Inline, internal and external CSS	
	4	CSS Colours, Fonts, Borders, padding, Applying style using class and id attribute	
	<b>Teacher Specific Module</b>		
5	<i>Directions</i>		15
	<p><b>1. Creation of static web pages using HTML</b> Create a university web site containing 6 html pages (student, department, contact, home, placement, alumni). Use Frames, Hyperlinks to link one page to other, embed images and videos, tables to display faculty profile. Also use Heading and paragraph tags, lists</p> <p><b>2. Create a form containing at least the following:</b></p> <ol style="list-style-type: none"> <li>A text area</li> <li>a radio button</li> <li>data list</li> <li>dropdown</li> <li>option to upload a file</li> </ol> <p><b>3. Creation and usage of CSS</b> Create and include CSS for the university web site containing 6 html pages designed using HTML.</p> <p>Add the following styles to the previously created webpage</p> <ul style="list-style-type: none"> <li>Add a table and provide inline styling for &lt;th&gt;</li> <li>Provide a background image</li> </ul> <p><i>NB: Programs listed here acts as reference. You may include more programs for conducting lab experiments.</i></p>		

### Essential Readings:

1. Internet and World Wide Web How to program, P.J. Deitel& H.M. Deitel Pearson
2. An Introduction to WEB Design and Programming –Wang-Thomson **Technologies**, Black Book, Dream tech Press
3. Internet & World Wide Web How to Program, 5/e – Paul J Deitel, Harvey M Deital, Abbaey Deital

4. Julie C. Meloni, HTML and CSS in 24 Hours, Sams Teach Yourself (Updated for HTML5 and CSS3), Ninth Edition

**Suggested Readings:**

1. Mastering HTML, CSS & Javascript Web Publishing Paperback, 2016 - by Laura Lemay, Rafe Colburn & Jennifer Kyrnin, BPB Publications
2. HTML & CSS: The Complete Reference, Fifth Edition - Thomas a Powell, Tata McGraw Hill

**Assessment rubrics**

End Semester Evaluation	<b>65</b>
Theory	<b>50</b>
Practical	<b>15</b>
CCA	<b>35</b>
Continuous Evaluation (Theory)	<b>25</b>
a) TestPaper-1	12
b) Assignment	5
c) Viva/seminar	8
Continuous Evaluation (Practical)	<b>10</b>
a) Lab Skills and Punctuality	3
b) OBSERVATION BOOK	2
c) Test	5
<b>Total</b>	<b>100</b>

### KU2DSCCAP 106: PROGRAMMING USING C AND C++

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCCAP106	4 (3T+ 1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2		35	65	100	1.5 Hrs

**Course Description:** This course intends to impart basic and advanced programming skills in C and C++.

**Course Prerequisite:** KU1DSCCAP101: Foundations of Computers and Programming

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Decompose a problem into functions and design programs using divide and conquer approach	
2	Discuss fundamental aspects of problem solving and programming concepts in C/ C++ like procedural, structural and object-oriented programming.	
3	Describe the Object-Oriented Paradigm	
4	Apply C++ features such as class, objects, constructors, destructors, inheritance and polymorphism in program design and implementation.	
5	Analyse given problem statement and develop systematic solutions and create basic program designs in C/ C++	

**\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)**

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3	2					
CO 2	3	2		2			
CO 3	2						
CO 4	2	3		2			
CO 5	3	3				2	2

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>1</b>	<b>MODULE 1: Strings, Functions and structures in C</b>		
	1	Strings - Character Arrays, String input and output. Standard string functions (strlen, strcpy, strcat, strcmp, strstr)	15
	2	2D Arrays - declaration, initialisation, Matrix addition, multiplication, transpose	
	3	Functions: function prototype, function definition, Invoking a function (call by value), formal parameters, actual parameters, Arrays as Function Parameters	
	4	Recursion and Storage classes in C	
<b>2</b>	<b>MODULE: Advanced Programming concepts in C</b>		
	1	Structure and Union	15
	2	Pointers: declaration, initialization, accessing variable and arrays through pointers. Pointer as function argument (call by reference)	

	3	File: Defining a file, opening and closing a file, File handling functions (getc, putc, fscanf, fprintf, feof(), fread(), fwrite()) Random access to files: In built file handling functions (rewind (), fseek(), ftell())	
	4	Dynamic Memory Allocation (malloc, calloc, free)	
	5	Pre-processor directives in C (#include, #define) and Command line arguments	
	<b>MODULE: Introduction to Programming in C++</b>		
3	1	Basic concepts of OOP – Encapsulation, Polymorphism, Inheritance Comparison of OOP and Procedure Oriented Programming Structure of C++ Program, Input output statements in C++	15
	2	Defining a class, define member functions, Scope of class and its member, use of access specifiers (private, public and protected), Creating Objects	
	3	Constructor: Default constructor, parameterized constructor, Destructors	
	4	Inline functions, Friend function Dynamic memory allocation operators in C++: new, delete	

	<b>MODULE: Pointers, Inheritance and Polymorphism in C++</b>		
4	1	Pointers to objects, this pointer	15
	2	Base class and derived classes - Abstract classes, Pointers to derived class Types of Inheritance -- single, multiple, multilevel, Hierarchical, Hybrid Inheritance	
	3	Polymorphism – Function overloading, operator overloading Run time polymorphism -- Virtual function, Pure Virtual function, Function Overriding	
	4	Testing and debugging techniques in C++	

	<b>Teacher Specific Module</b>		
	<i>The following exercises may be conducted as lab experiments</i>		
5	<b>Strings</b>		15
	1.	Write a menu driven program to perform following string operations using string handling functions.  Operations: Find length of a string, Concatenate two string, String comparison, string copy, substring	

2. Write a C program to find the length of a string without using string library functions.
3. Write a C program to count number of words in a string
4. Write a C program to check the occurrence of a character in a string
5. Write a program to check whether the string is a Palindrome without using string library functions.

### **2-Dimensional Array**

1. Write a menu driven program to perform matrix addition, multiplication, transpose
2. Illustrate 2D character array. Write a C program to read and display an array of Strings

### **Functions and Recursion**

1. Write a function to find factorial of a number
2. Write a recursive function to print the n<sup>th</sup> Fibonacci number
3. Write a function to print nCr
4. Write a recursive program to count the number of digits of a positive integer number?

### **Pointer**

1. Write a function to swap two numbers using pointers
2. Develop a program using pointers to compute the sum of all elements stored in an array of n real numbers
3. Write a C program to print the elements of an array in reverse order using pointers.
4. Pass array in function. Write a function to perform linear search.

### **Structure**

1. Create a structure named Complex to represent a complex number with real and imaginary parts. Write a C program to add and multiply two complex numbers.
2. *Create a C Program to Calculate the Distance Between Two Points Using Structure*

Euclidean distance between two points (x1, y1) and (x2, y2) is given by:

$$\sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]}$$

### **File and Command line argument**

1. Write a program to read N students roll number, name from the keyboard and then write it to a student file. Also copy the contents into another file.
2. Read file name as command line argument. Check whether the correct number of arguments is passed in the command line and also check whether the file exists. If the file exists, count the number of words, characters and the number of lines in the file.

### **Object Oriented programming**

#### **Class and Objects**

1. Write a program to define a class Car with attributes like brand, model, and year. Write member functions for the following. 1. To read data members. 2. To display car details Create three Car objects with different attributes and display details of each one.
2. Write a program to define a class Book with the private members : BookID, BookName, BookPrice and total\_cost() to calculate total cost for n number of copies where n is passed as an argument. Write public members 1. To input book details 2. Display book details 3. To input no. of copies required and display Total cost to be paid Create 3 Book objects and and calculate Total cost to be paid for each purchase.
3. Write a program to create a Rectangle class with two private data members: length and width. Create a default constructor that initialises both members to 0 and a parameterised constructor. Create two different objects of class Rectangle using these different types of constructors and display their values using a member function. Write a destructor that prints a message when an object is destroyed.

#### **Inline functions, Friend function, Function overloading, Operator overloading.**

1. Write a c++ program to find area of circle, square, rectangle and triangle using inline functions
2. Write a c++ program to find area of circle, square, rectangle and triangle using function overloading
3. Write a C++ program to implement a telephone bill class with Name, Address, Tel. No., No. of calls as data members. Compute the

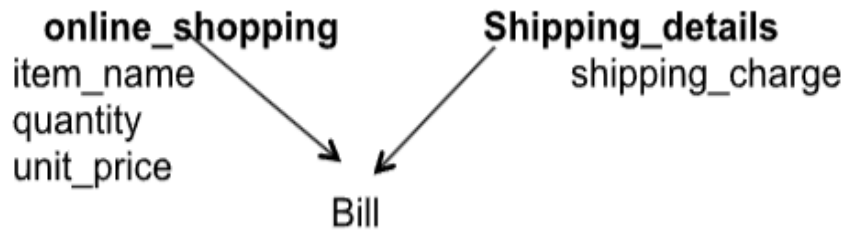
amount to be paid if the charges per call is Rs. 2/-. using friend function

4. Write a program to define a class Time having private members hours, minutes and seconds. Write member functions
  1. To input values to data members
  2. To display Time in Hour:minute:second format.
  3. To find sum of two Time objects using friend function.
5. C++ program to illustrate the use of unary operator overloading, increment ++ operator overloading
6. Perform matrix addition using operator overloading

### **Inheritance, Virtual function**

1. Create a base class Person with data members name and age, and a member function display(). Derive a class Student from Person that adds a data member roll\_number and a member function showDetails(). Demonstrate single inheritance by creating an object of the Student class and calling both base and derived class functions.
2. Write a program to create a base class BankAccount with attributes like account\_number and balance, and functions deposit() and withdraw(). Derive two classes:
  1. SavingsAccount with data member rate\_of\_interst and an additional function calculateInterest() and display it.
  2. CurrentAccount which requires to maintain a minimum balance and an additional function to calculate servicecharge() and reduce it from balance and display the details. Demonstrate inheritance by performing operations on objects of both derived classes.
3. Write a c++ program to perform multiple inheritance





4. Write a C++ program to explain virtual function by creating a base class `c_polygon` which has virtual function `area()`. Two classes `c_rectangle` and `c_triangle` derived from `c_polygon` and these classes have `area()` to calculate and return the area of rectangle and triangle respectively.
5. Write a C++ program to define a class `Student` with data members `Name`, `Rollno`, and `Course`. Derive a class `Test` from `student` with data members as marks in 3 subjects. Derive a class `GraceMarks` from `student` with data member `BonusMark`. Derive a class `result` from both `Test` and `Gracemarks` and calculate Total marks. Display the result with all the details. Use the concept of Virtual base class.
6. Write a program to define an abstract class `Shape` with a pure virtual function `calculateArea()`. Derive two classes, `Circle` and `Square`, that implement the `calculateArea()` function in their own way. Create an array of `Shape` pointers to store objects of both `Circle` and `Square`, and calculate the area for each shape

### Essential Readings

1. Programming in ANSI C, Balagurusamy
2. The C programming Language, Brian Kernighan and Dennis Ritchie
3. Let us C, Yeshwant Kanetkar
4. Object oriented programming in C++, Balagurusamy
5. The C++ Programming Language, Bjarne Stroustrup

### Suggested Readings:

1. Let us C ++, Yeshwant Kanetkar

## Assessment rubrics

End Semester Evaluation	<b>65</b>
Theory	<b>50</b>
Practical	<b>15</b>
CCA	<b>35</b>
Continuous Evaluation (Theory)	<b>25</b>
a) TestPaper-1	12
b) Assignment	5
c) Viva/seminar	8
Continuous Evaluation (Practical)	<b>10</b>
a) Lab Skills and Punctuality	3
b) OBSERVATION BOOK	2
c) Test	5
Total	<b>100</b>

## KU2DSCCAP107: MULTIMEDIA AND GRAPHICS DESIGNING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCCAP107	4 (3T+1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs

### Course Description:

The Graphic Design and Multimedia Arts program of study explores the occupations and educational opportunities associated with designing or creating graphics to meet specific commercial or promotional needs, such as packaging, displays, or logos.

**Course Prerequisite: NIL**

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Describe the media software	U
2	Design digital publications using Image Editing Tools	U, A, C
3	Understand and analyse editing software	U, A
4	Understand the basic idea of audio and video editing	U, A, E

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3			2			
CO 2	3	2					3
CO 3	3	3	3				
CO 4	3	3	3				

### COURSE CONTENTS

#### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
		MODULE 1: Multimedia & Media software	
<b>1</b>	1	Introduction to Multimedia	15
		a) Definition	
	b) Building blocks of multimedia (Text, Graphics, Audio, Video, Animation)		
	2	Multimedia System, desirable Features of multimedia System	
	3	Multimedia Applications, Virtual reality	
4	Definitions of System Software and Application Software Introduction to Media Software Application,		

	<b>MODULE 2: Photo Editing Software Applications</b>		
<b>2</b>	1	Any Image editing Tool (eg.,GIMP) - basic image and layer manipulation ,	15
	2	Adding Text, layers-masking,	
	3	Image formats overview , basic color curves	
	4	Photo Editing- Digital B&W Conversion Luminosity Masks Tone Mapping	
	<b>MODULE 3: Video Editing</b>		
<b>3</b>	1	Software for Video Editing, Open Shot Video Editor – Features, system requirement and Installation	15
	2	Basic terms - Project, Timeline, Track, Clip and Transition	
	3	Introduction to software interface overview, creating first simple project - add photo, music, timeline, preview and export the video	
	4	Clips, transition,Effects and animation,	

	<b>MODULE 4: Audio and Animation</b>		
<b>4</b>	1	Software for Audio: Audacity, software interface, Stereo Audio Track-Track control panel Splitting and Joining Tracks, Changing the track display	15
	2	Applying audio effects, effect adjustments-Volume, fading, pitch, noise removal, delay, distortion	
	3	Software for Basic Animation: An Introduction to Synfig - Importing your artwork, Tools, Layers	
	4	Parameters, Converters, Configuration, Canvas, Interface, Export	
	<b>Teacher Specific Module</b>		
<b>5</b>	<i>Directions: The following programs may be considered as reference to conduct lab experiments</i>		
		<ol style="list-style-type: none"> <li>1. Create/Import an image and apply various Effects on it</li> <li>2. Mixing Audio by importing music files</li> <li>3. A simple project - add photo, music, timeline, preview and export the video</li> <li>4. Create a 30 secs animation video</li> </ol>	15

***NB: In case the tools mentioned here are unavailable you may use relevant tools (preferably open source.)***

**Essential Readings:**

1. Introduction to Information Technology (Second Edition ) by ITL Education Solutions Limited, Pearson
2. <https://www.gimp.org/tutorials/>
3. <https://www.openshot.org/user-guide/>
4. <https://support.audacityteam.org/>
5. <https://synfig.readthedocs.io/en/latest/index.html>

**Suggested Readings:**

1. <https://librearts.org/2022/08/audio-editors-for-linux-that-are-not-audacity/>
2. [https://www.gimp.org/tutorials/The\\_Basics/](https://www.gimp.org/tutorials/The_Basics/)
3. [https://synfig.readthedocs.io/en/latest/quick\\_start.html](https://synfig.readthedocs.io/en/latest/quick_start.html)

**Assessment Rubrics:**

<b>Evaluation Type</b>		<b>Marks</b>
End Semester Evaluation		<b>65</b>
Theory		<b>50</b>
Practical		<b>15</b>
CCA		<b>35</b>
Continuous Evaluation (Theory)		<b>25</b>
a)	Test Papers	12
b)	Assignment	8
c)	Viva/Seminar	5
Continuous Evaluation (Practical)		<b>10</b>
a)	Lab Skills and Punctuality	3
b)	Observation Book	2
c)	Test Papers	5
<b>Total</b>		<b>100</b>

### KU2DSCAPC108: CYBER SECURITY AND ETHICS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	Minor	100-199	KU2DSCCAPC108	4 (4T +0 P)	4

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	-	30	70	100	2 Hrs

**Course Description:**

Cyber Security is the field of study that focuses on methods required to prevent computer systems and networks from leaking information, vandalizing hardware, software, or electronic data, and misdirecting the services they provide.

**Course Prerequisite: NIL**

**Course Outcomes:**

CO No.	Expected Outcome	Learning Domains
1	Students will demonstrate a comprehensive understanding of various aspects of digital security, including cybercrimes, social media privacy, end-point device security, and cyber security fundamentals	U, A
2	Students will grasp the concept of cyber security, including its associated issues and challenges	U, A
3	Students will be equipped to comprehend cybercrimes, including their characteristics, legal recourse, and procedures for reporting via available platforms	U, A

4	Students will comprehend the privacy and security implications of social media, grasp the reporting protocols for inappropriate content, recognize the legal framework surrounding online platforms, and adopt best practices for their usage.	U, A, E
5	Students will possess a comprehensive understanding of fundamental security principles concerning both computers and mobile devices.	A, An, E

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

## Mapping of Course Outcomes to PSOs

	PS O 1	PSO 2	PSO 3	PS O 4	PSO 5	PSO 6	PS O 7
CO 1	3			3			3
CO 2	3			3			2
CO 3	3			3			2
CO 4	3		2	3			3
CO 5	3		2	3			3

## COURSE CONTENTS

### Contents for Classroom Transaction:

<b>M O D U L E</b>	<b>U N I T</b>	<b>DESCRIPTION</b>	<b>HOURS</b>
<b>1</b>	MODULE 1: Introduction to Cyberspace and Web Technology		
	1	Introduction to Cyberspace	
		a) Definition of Cyberspace	
		b) Basic concepts of computer and web technology	
		c) Architecture of Cyberspace	



		d) Communication in Cyberspace	15
	2	Communication and Web Technology	
		a) Internet and World Wide Web	
		b) Advent of the Internet	
		c) Internet Infrastructure for Data Transfer and Governance	
		d) Internet Society	
	3	Regulation of Cyberspace	
		a) Laws Governing Cyberspace	
		b) International Regulations	
		c) Data Protection and Privacy Laws	
		d) Intellectual Property Rights	
		Cyber security	
	4	a) Understanding Cyber security	
		b) Principles of Cyber security	
		c) Cyber security Challenges	
	<b>MODULE 2: Cybercrime and Cyber law</b>		
		Introduction to Cyber Crimes	
	1	a) Definition of cyber crimes	
		b) Types of cyber crimes	
		c) Common Cyber Crimes	
		Cyber Attacks	
2	2	a) Zero-day and zero-click attacks	
		b) Social engineering attacks	
		c) Malware and ransomware attacks	15
		Cybercriminal Modus Operandi	

	3	a) Methods used by cybercriminals b) Reporting and Mitigation c) Reporting procedures for cyber crimes d) Remedial and mitigation measures	
	4	Organizations and Cyber Security	
	5	Cybercrime and offences according to Indian law	
	<b>MODULE 3: Social Media Overview and Security</b>		
3	1	Introduction to Social Networks	15
	2	Social Media	
		a) Types of Social Media	
		b) Social Media Features	
		c) Social Media Marketing	
d) Social Media Privacy			
3	Challenges, Opportunities, and Pitfalls		
4	Flagging and Reporting of Inappropriate Content		
	<b>MODULE 4: Digital Devices Security, Tools and Technologies for Cyber Security</b>		
4	1	Introduction to End-Point Device Security	15
		a) Mobile Phone Security	
		b) Password Policy	
	2	Security Patch Management	
	3	Data Backup	
	4	Third-Party Software Management	
	5	Cyber Security Best Practices	
	6	Host Firewall and Anti-virus	
		a) Management of Host Firewall and Anti-virus b) Wi-Fi Security	

	<b>Teacher Specific Module</b>	
	<i>The following may be demonstrated to students</i>	
<b>5</b>	<ol style="list-style-type: none"> <li>1. A simulation of various cyber attacks</li> <li>2. Creating and Hosting firewall</li> </ol>	15

**Essential Readings:**

1. Praveen Kumar Shukla, Surya PrakashTripathi, RitendraGoel"Introduction to Information Security and Cyber Laws" Dreamtech Press.
2. Cyber Crime Impact in the New Millennium, by R. C Mishra ,Auther Press. Edition 2010.
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by SumitBelapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
4. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson , 13th November, 2001)
5. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
6. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
7. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

**Suggested Readings:**

1. M. Stamp, "Information Security: Principles and Practice", Wiley.
2. David J. Loundy, "Computer Crime, Information Warfare, And Economic Espionage", Carolina Academic Press

**Assessment Rubrics:**

End Semester Evaluation		<b>70</b>
Theory		<b>70</b>
CCA		<b>30</b>
Continuous Evaluation (Theory)		<b>30</b>
a)	TestPaper-1	15
b)	Assignment	10
c)	Viva/seminar	5
Total		<b>100</b>

## KU2DSCCAP109: INTRODUCTION TO DATABASE MANAGEMENT SYSTEM

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCCAP109	4 (3T+ 1 P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs

### Course Description:

This course introduces the core principles and techniques required in the design and implementation of database systems. This course focus on relational database management systems, including database design theory: E-R modelling, data definition and manipulation languages, database security and administration.

### Course Prerequisite: NIL

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the concept of database management system and identify its advantages over manual file keeping	U
2	Understand the need of data modelling and identify the advantages and disadvantages among the models	U
3	Able to write queries using SQL to manipulate data	A
4	Apply the knowledge of data types and other functions in data storage and retrieval	A

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

### Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3		2	2			
CO 2	3	3	2				2
CO 3	2	3					
CO 4	2	3	3			3	2

## COURSE CONTENTS

### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
		<b>MODULE TITLE: Database Concepts</b>	
1	1	Introduction – purpose of Database, Applications of Database, DBMS, DBMS software	15
	2	View of Data, Data Models- Hierarchical, network and relational models	
	3	Attributes, tuples, relations and domain in relational model, Simplified DBMS Structure	
	4	Database Administrator, Data Base Users	
		<b>MODULE TITLE: E-R Model, Relational Algebra and Normalization</b>	
2	1	E-R model basic concepts, E-R diagram, Simple E-R diagram.	15
	2	Keys; Candidate key. Super key, Primary key, Foreign key	
	3	Relational algebra operations – Selection, projection, union, intersection, difference, cross product	
	4	Functional dependency, Normalization- Introduction, Normal forms – 1NF, 2NF and 3NF	
		<b>MODULE TITLE: Structured Query Language (SQL)</b>	
3	1	Introduction to SQL, Data Types in SQL, Database languages, Integrity Constraints- Primary key, not null, foreign key and unique.	15
	2	DDL Commands- Create, alter and drop	
	3	DML Commands- Insert, select, update and delete	
	4	DCL Commands- Grant and revoke	
		<b>MODULE TITLE: SQL Operators and Functions</b>	
4	1	SQL Operators- Arithmetic, relational and logical operators, Like operator	15
	2	Aggregate functions- sum(), avg(), min(), max(), count(),	

	Character functions- length (), upper (), lower (), initcap(),	
3	Order by clause, group by clause, having clause, sub query	
4	View and Sequence, Join Operations- inner and outer join	

	<b>Teacher Specific Module</b>	
	<i>Directions</i>	
5	<ol style="list-style-type: none"> <li>1. Draw ER diagram for Library management system</li> <li>2. Create a table <b>Student</b> with fields rollno, name, gender and mark with rollno as primary key. <ol style="list-style-type: none"> <li>a) Insert five records into the table.</li> <li>b) Display all boy students with their name.</li> <li>c) Find the Average mark.</li> <li>d) Display the rollno, name and mark of a student with highest mark.</li> <li>e) Add one more field place.</li> </ol> </li> <li>3. Create a table <b>Employee</b> with fields empid, ename, salary, department and DOB with empid as primary key. <ol style="list-style-type: none"> <li>a) Insert five records into table.</li> <li>b) Display the employees who got salary more than Rs. 6000 and less than 10000.</li> <li>c) Create a view named “Empview” with fields empid, ename and DOB. Display the view.</li> <li>d) Display the empid and salary of all employees in descending order of their salary.</li> <li>e) Display the name of department.</li> </ol> </li> <li>3. Create table <b>Loan</b> with fields loanno , cname, cid and bname with loanno as primary key. <ol style="list-style-type: none"> <li>a) Insert five records into the table.</li> <li>b) Display the cname for cid=2.</li> <li>c) Add one more field amount to loan table. Update amount field.</li> <li>d) Display loanno and cname of a customer who is residing in Kunnur city.</li> <li>e) Display all information from loan table for loanno 2, 8 and 10.</li> </ol> </li> </ol>	15

4. Create a table **Department** with fields dno, ename, salary, dname and place with dno as primary key.
  - a) Insert five records into the table.
  - b) Rename the field place with city.
  - c) Display the employees who got salary more than 10000 and less than 20000.
  - d) Display the total salary of the organization.
  - e) Create a view named “Eview” with field dno, ename and salary. Display the view.
  
5. Create a table **Book** with fields id, title, price and author with id as primary key.
  - a) Insert five records into the table.
  - b) Display the title and author of all books written by “Balaguruswami”.
  - c) Display the details of books where the second letter of their title is ‘a’.
  - d) Delete the details of book having the highest price.
  - e) Display the name of Author and number of books.
  
6. Create a table **Depositor** with fields accno, cust\_name, branch and balance with accno as primary key. Create another table **Borrower** with fields loanno and accno.
  - a) Insert five records into both tables.
  - b) Write the queries using various aggregate functions on balance field.
  - c) Display the branch and count of depositors according to their branch (use group by clause)
  - d) Display the name of customers who have an account and loan. (use inner join)
  - e) Write the queries to perform left outer and right outer join.



**Essential Readings:**

1. Database System Concepts by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan
2. Fundamentals of Database Systems by RamezElmasri and Shamkant B. Navathe, 7<sup>th</sup> Edition, Pearson
3. SQL Performance Explained by Markus Winand
4. Learning SQL by Alan Beaulieu

**Assessment Rubrics:**

<b>Evaluation Type</b>		<b>Marks</b>
End Semester Evaluation		<b>65</b>
Theory		<b>50</b>
Practical		<b>15</b>
CCA		<b>35</b>
Continuous Evaluation (Theory)		<b>25</b>
a)	Test Papers	12
b)	Assignment	8
c)	Viva/Seminar	5
Continuous Evaluation (Practical)		<b>10</b>
a)	Lab Skills and Punctuality	3
b)	Observation Book	2
c)	Test Papers	5
Total		<b>100</b>

## KU2DSCCAP110: ETHICAL HACKING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100-199	KU2DSCCAP110	4 (3T + 1P)	5

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
3	2	-	35	65	100	1.5 Hrs

### Course Description:

Ethical hacking is a process of detecting vulnerabilities in an application, system, or organization's infrastructure that an attacker can use to exploit an individual or organization. They use this process to prevent cyberattacks and security breaches by lawfully hacking into the systems and looking for weak points.

### Course Prerequisite: NIL

### Course Outcomes:

CO No.	Expected Outcome	Learning Domains
1	Understand the fundamental concepts of ethical hacking, including its principles and methodologies.	U
2	Demonstrate proficiency in using various ethical hacking tools and techniques for information gathering, scanning, and enumeration.	U
3	Apply ethical hacking principles to identify and exploit vulnerabilities in systems and networks.	U, A
4	Analyze and evaluate legal and ethical considerations in ethical hacking practices.	U, A, An

*\*Remember (R), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C)*

## Mapping of Course Outcomes to PSOs

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7
CO 1	3			2			
CO 2	3	2					
CO 3	3	3	2				
CO 4	2	3	2				

## COURSE CONTENTS

### Contents for Classroom Transaction:

M O D U L E	U N I T	DESCRIPTION	HOURS
<b>1</b>	MODULE 1: Introduction to Ethical Hacking		15
	1	Ethical hacking definition, Hacker types, threats and attacks, vulnerabilities	
	2	Terminologies in hacking	
	3	Ethics and laws in hacking	
	4	Need of Ethical hacking, Roles and responsibilities	
<b>2</b>	<b>MODULE 2:</b>		15
	1	Information Gathering: Information gathering techniques	
	2	Foot printing and reconnaissance: definitions and techniques	
	3	Tools and methodologies for information gathering	
	4	Legal and ethical considerations	

	<b>MODULE 3:</b>		
<b>3</b>	1	Scanning and Enumeration: Port Scanning Techniques, Service Enumeration	15
	2	Vulnerability Scanning	
	3	Network Mapping	
	4	Enumerating Systems and Services	

	<b>MODULE 4:</b>		
<b>4</b>	1	Password Cracking Techniques	15
	2	Privilege Escalation	
	3	Executing applications	
	4	Hacking operating systems, Trojans and backdoors	

	<b>Teacher Specific Module</b>		
<b>5</b>	<i>Directions</i>		15
	<p>Familiarise various free open source tools</p> <ol style="list-style-type: none"> <li>1. Shodan, Nikto, Google Dorks for information gathering</li> <li>2. Nmap for network mapping and port scanning</li> <li>3. Hydra for password brute forcing</li> <li>4. John The Ripper for cracking hashes</li> <li>5. Metasploit framework</li> </ol>		

**Essential Readings:**

1. The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy, Patrick Engebretson
2. Gray Hat Hacking: The Ethical Hacker's Handbook, Allen Harper, Daniel Regalado, Ryan Linn, Stephen Sims, BrankoSpasojevic, and Linda Martinez.
3. Penetration Testing: A Hands-On Introduction to Hacking" by Georgia Weidman

**Suggested Readings:**

1. The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws", Dafydd Stuttard and Marcus Pinto.
2. The Hacker Playbook 3: Practical Guide To Penetration Testing, Peter Kim

**Assessment Rubrics:**

<b>Evaluation Type</b>		<b>Marks</b>
End Semester Evaluation		<b>65</b>
Theory		<b>50</b>
Practical		<b>15</b>
CCA		<b>35</b>
Continuous Evaluation (Theory)		<b>25</b>
a)	Test Papers	12
b)	Assignment	8
c)	Viva/Seminar	5
Continuous Evaluation (Practical)		<b>10</b>
a)	Lab Skills and Punctuality	3
b)	Observation Book	2
c)	Test Papers	5
<b>Total</b>		<b>100</b>