



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Reaccredited with 'A++' Grade (4th Cycle) by NAAC

VIRUDHUNAGAR

Quality Education with Wisdom and Values

OUTCOME BASED EDUCATION WITH CHOICE BASED CREDIT SYSTEM REGULATIONS AND SYLLABUS

(with effect from Academic Year 2024 - 2025)

V.V.Vanniaperumal College for Women, Virudhunagar, established in 1962, offers 13 UG Programmes (Aided), 15 UG Programmes (SF), 15 PG Programmes and 6 Ph.D. Programmes. The curricula for all these Programmes, except Ph.D. Programmes, have been framed as per the guidelines given by the University Grants Commission (UGC) & Tamil Nadu State Council for Higher Education (TANSCH) under Choice Based Credit System (CBCS) and the guidelines for Outcome Based Education (OBE).

The Departments of Commerce, English, History, Mathematics, Biochemistry and Tamil upgraded as Research Centres offer Ph.D. Programmes as per the norms and regulations of Madurai Kamaraj University, Madurai and do not come under the purview of CBCS.

A. CHOICE BASED CREDIT SYSTEM (CBCS)

The CBCS provides an opportunity for the students to choose Courses from the prescribed Courses. The CBCS is followed as per the guidelines formulated by the UGC. The performance of students is evaluated based on the uniform grading system. Computation of the Cumulative Grade Point Average (CGPA) is made to ensure uniformity in evaluation system.

List of Programmes in which CBCS/Elective Course System is implemented

UG PROGRAMMES

Arts & Humanities	:	History (E.M. & T.M.), English, Tamil
Physical & Life Sciences	:	Mathematics, Zoology, Chemistry, Physics, Biochemistry, Home Science - Nutrition and Dietetics, Costume Design and Fashion, Microbiology, Biotechnology, Computer Science, Information Technology, Data Science, Computer Applications and Computer Applications - Graphic Design
Commerce & Management	:	Commerce, Commerce (Computer Applications), Commerce (Professional Accounting), Business Administration

PG PROGRAMMES

Arts & Humanities	:	History, English, Tamil
Physical & Life Sciences	:	Mathematics, Physics, Chemistry, Zoology, Biochemistry, Home Science - Nutrition and Dietetics, Biotechnology, Computer Science, Computer Science (Data Science) and Computer Applications (MCA) *
Commerce & Management	:	Commerce, Business Administration (MBA) *

* AICTE approved Programmes

OUTLINE OF CHOICE BASED CREDIT SYSTEM – UG

1. Core Courses
2. Elective Courses
 - Generic Elective Courses
 - Discipline Specific Elective Courses (DSEC)
 - Non Major Elective Courses (NMEC)
3. Skill Enhancement Courses (SEC)
4. Environmental Studies (EVS)
5. Value Education
6. Self Study Courses (Online)
7. Extra Credit Courses (Self Study Courses) (Optional)

**List of Non Major Elective Courses (NME)
(2024-2025 onwards)**

UG PROGRAMMES

Name of the Course	Course Code	Semester	Department
Introduction to Tourism	24UHIN11	I	History (E.M)
Indian Constitution	24UHIN21	II	
சுற்றுலா ஓர் அறிமுகம்	24UHIN11	I	History (T.M)
இந்திய அரசியலமைப்பு	24UHIN21	II	
Popular Literature and Culture	24UENN11	I	English
Philosophy for Literature	24UENN21	II	
அடிப்படைத் தமிழ் இலக்கணம் - I எழுத்தறிதல்/ பேச்சுக்கலைத்திறன்	24UBTN11/ 24UTAN11	I	Tamil
அடிப்படைத்தமிழ் - மொழித் திறனறிதல் / பயன்முறைத் தமிழ்	24UBTN21/ 24UTAN21	II	
Basic Hindi - I	24UBHN11	I	Hindi

Basic Hindi - II	24UBHN21	II	
Practical Banking/ Financial Literacy-I	24UCON11/ 24UCON12	I	Commerce
Basic Accounting Principles/ Financial Literacy-II	24UCON21/ 24UCON22	II	
Practical Banking / Self-Employment and Startup Business	24UCON11/ 24UCCN11	I	Commerce C.A.
Basic Accounting Principles / Fundamentals of Marketing	24UCON21/ 24UCCN21	II	
Women Protection Laws	24UCPN11	I	Commerce Professional Accounting
Basic Labour Laws	24UCPN21	II	
Basics of Event Management	24UBAN11	I	Business Administration
Managerial Skill Development	24UBAN21	II	
Quantitative Aptitude -I	24UMTN11	I	Mathematics
Quantitative Aptitude - II	24UMTN21	II	
Physics for EveryDay Life	24UPHN11	I	Physics
Astrophysics	24UPHN21	II	
Food Chemistry	24UCHN11	I	Chemistry
Dairy Chemistry	24UCHN21	II	
Ornamental fish farming and Management	24UZYN11	I	Zoology
Biocomposting for Entrepreneurship	24UZYN21	II	
Foundations of Baking and Confectionery	24UHSN11	I	Home Science – Nutrition and Dietetics
Women’s Health and Wellness	24UHSN21	II	
Nutrition and Health	24UBCN11	I	Biochemistry
Life Style Diseases	24UBCN21	II	
Social and Preventive Medicine	24UMBN11	I	Microbiology
Nutrition & Health Hygiene	24UMBN21	II	
Herbal Medicine	24UBON11	I	Biotechnology
Organic Farming and Health Management	24UBON21	II	
Basics of Fashion	24UCFN11	I	Costume Design And Fashion
Interior Designing	24UCFN21	II	
Office Automation	24UCSN11	I	Computer Science
Introduction to HTML	24UCSN21	II	
Office Automation	24UITN11	I	Information

Basics of Internet	24UITN21	II	Technology
Fundamentals of Information Technology	24UDSN11	I	Data Science
Computer Fundamentals	24UDSN21	II	
Office Automation	24UCAN11	I	B.C.A.
Web Designing	24UCAN21	II	
Organic Farming	24UBYN11	I	Botany
Nursery and Landscaping	24UBYN12	I	
Mushroom Cultivation	24UBYN21	II	Botany
Medicinal Botany	24UBYN22	II	
Library and Information Science - I	24ULSN11	I	Library Science
Library and Information Science - II	24ULSN21	II	
Cadet Corps for Career Development I	24UNCN11	I	National Cadet Corps
Cadet Corps for Career Development II	24UNCN21	II	

B. OUTCOME BASED EDUCATION (OBE) FRAMEWORK

The core philosophy of Outcome Based Education rests in employing a student - centric learning approach to measure the performance of students based on a set of pre-determined outcomes. The significant advantage of OBE is that it enables a revamp of the curriculum based on the learning outcomes, upgrade of academic resources, quality enhancement in research and integration of technology in the teaching –learning process. It also helps in bringing clarity among students as to what is expected of them after completion of the Programme in general and the Course in particular. The OBE directs the teachers to channelize their teaching methodologies and evaluation strategies to attain the PEOs and fulfil the Vision and Mission of the Institution.

Vision of the Institution

The founding vision of the Institution is to impart Quality Education to the rural womenfolk and to empower them with knowledge and leadership quality.

Mission of the Institution

The mission of the Institution is to impart liberal education committed to quality and excellence. Its quest is to mould learners into globally competent individuals instilling in them life-oriented skills, personal integrity, leadership qualities and service mindedness.

B.1 Programme Educational Objectives, Programme Outcomes and Programme Specific Outcomes

It is imperative for the institution to set the Programme Educational Objectives (PEOs), Programme Outcomes (POs) and Course Outcomes (COs), consistent with its Vision and Mission statements. The PEOs and the POs should be driven by the mission of the institution and should provide distinctive paths to achieve the stated goals. The PEOs for each Programme have to fulfil the Vision and Mission of the Department offering the Programme.

Vision of the Department of Data Science

The Department of Computer Science is envisioned to create industry ready Computer Science students with ardour for personal growth.

Mission of the Department of Data Science

To create an environment conducive for transforming rural women students into eminent students prepared for a globalized technological era and to instil in them a passion to strive for perpetual personal uplift.

The students will be able to

PEO1	gain specialized knowledge and expertise to analyze data, provide inference and solution to analytical industry.
PEO2	acquire significant opportunities in various domains such as business analyst, consultancy, teaching and as entrepreneurial pursuit.
PEO3	inculcate value system and work in team to achieve the target solution through their critical thinking and competency holding the ethical values.

Programme Educational Objectives (PEOs) of B.Sc. Data Science

Key Components of Mission Statement	Programme Educational Objectives (PEOs)		
	PEO1	PEO2	PEO3
transforming rural women students		√	
eminent students	√	√	√
prepared for a globalized technological era		√	√
a passion to strive for perpetual personal uplift		√	√

B.1.2 Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

On successful completion of the Programme, the students will be able to

- 1 apply effectively the acquired knowledge and skill in the field of Arts, Physical Science, Life Science, Computer Science, Commerce and Management for higher studies and employment. (*Disciplinary Knowledge*)
- 2 articulate innovative thoughts and ideas proficiently in both in spoken and written forms. (*Communication Skills*)
- 3 identify, formulate and solve problems in real life situations scientifically / systematically by adapting updated skills in using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)
- 4 critically analyse, synthesize and evaluate data, theories and ideas to provide valid suggestions through assignments, case studies, Internship and projects for the fulfillment of the local, national and global developmental needs. (*Critical Thinking and Analytical Reasoning*)
- 5 use ICT in a variety of self-directed lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)
- 6 self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)
- 7 uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

B.1.3 Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each UG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme specific. It is mandatory that each PO should be mapped to the respective PSO.

PROGRAMME SPECIFIC OUTCOMES

On completion of B.Sc. Data Science programme, the students will be able to

PO1 - *Disciplinary Knowledge*

PSO 1.a: apply the knowledge of mathematics, computer science, data science fundamentals to solve a wide range of data science applications.

PSO 1.b: use various application software elements to identify various analysis and design methodologies.

PO2 – *Communication Skills*

PSO 2.a: Communicate effectively on complex data problem by providing clear instructions and make remarkable inferences on the data providing apt solutions to business problems.

PSO 2.b: able to comprehend and write effective reports, design documentation and make effective presentations through better communication.

PO3 - *Scientific Reasoning and Problem Solving*

PSO 3: demonstrate the ability to create innovative solutions by applying scientific methods and tools.

PO4 - *Critical Thinking and Analytical Reasoning*

PSO 4: apply the technical and critical thinking skills in the fields of all advanced computer science and data science to find solutions for any complex research and business problems.

PO5 - *Digital Literacy, Self - directed and Lifelong Learning*

PSO 5.a: Create, select, and apply appropriate techniques, resources, and modern IT tools to demonstrate complex business problems through the creation of e-content.

PSO 5.b: acquire knowledge and pursue higher studies by engaging in independent and life-long learning or use their potential in their career or entrepreneurial endeavors.

PO6 - *Cooperation/Team Work and Multi-Cultural Competence*

PSO 6: function effectively as an individual, and as a member or leader in diverse teams of their allotted career works.

PO7 - *Moral and Ethical Awareness*

PSO 7: apply ethical principles and commit to professional ethics by being responsible in developing business solutions.

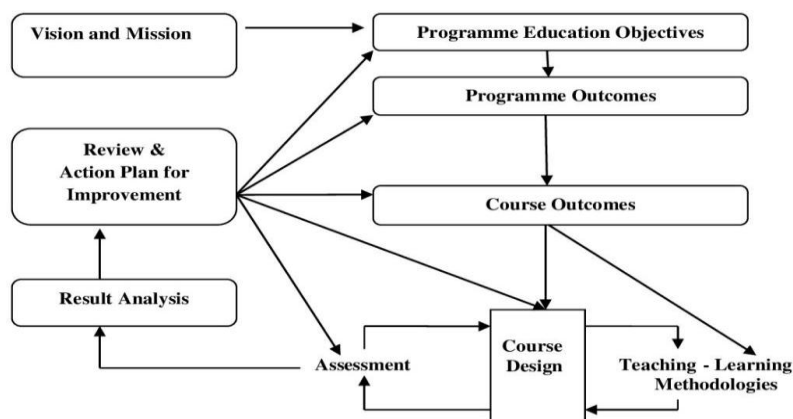
PO-PEO Mapping Matrix

Attainment of PEOs can be measured by a PO-PEO matrix. PEOs should evolve through constant feedback from alumnae, students, industry, management, *etc.* It is mandatory that each PEO should be mapped to at least one of the POs.

POs/PSOs \ PEOs	PEO1	PEO2	PEO3
PO1/PSO1.a	-	✓	✓
PO1/PSO1.b	✓	✓	✓
PO2/PSO2.a	✓	✓	-
PO2/PSO2.b	✓	✓	-
PO3/PSO3	-	✓	✓
PO4/PSO4.a	-	✓	✓
PO4/PSO4.b	✓	✓	-
PO5/PSO5	✓	✓	-
PO6/PSO6	-	✓	✓
PO7/PSO7	-	-	✓

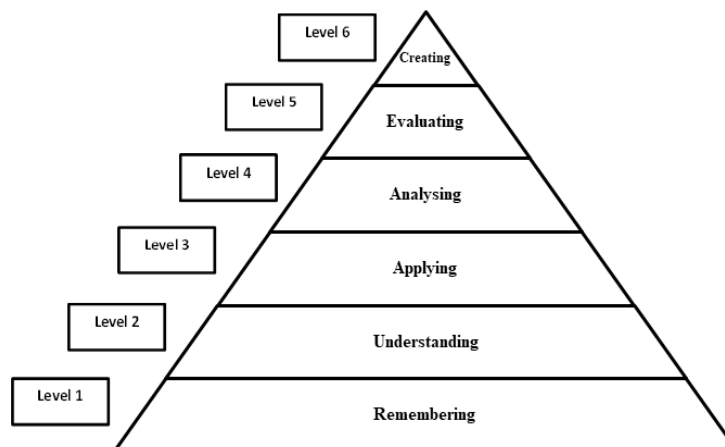
B.1.4 Course Outcomes (COs)

Course Outcomes are narrow statements restricted to the Course contents given in five units. Course Outcomes describe what students would be capable of, after learning the contents of the Course. They reflect the level of knowledge gained, skills acquired and attributes developed by the students after learning of Course contents. COs are measurable, attainable and manageable in number. COs contribute to attain POs in such a way that each CO addresses at least one of the POs and also each PO is reasonably addressed by adequate number of COs.



It is important to determine the methods of assessment. A comprehensive assessment strategy may be outlined using the revised Bloom's Taxonomy levels.

BLOOM'S TAXONOMY



CO – PO Mapping of Courses

After framing the CO statements, the COs framed for each Course is mapped with POs based on the relationship that exists between them. The COs which are not related to any of the POs is indicated with (-), signifying Nil. Measurement Mapping is based on Four Points Scale [High (H), Medium (M), Low (L) and Nil (-)]. For calculating weighted percentage of contribution of each Course in the attainment of the respective POs, the weights assigned for H, M and L are 3, 2 and 1 respectively.

CO-PO/PSO Mapping Table (Course Articulation Matrix)

PO/PSOs COs	PO1/ PSO1	PO2/ PSO2	PO3/ PSO3	PO4/ PSO4	PO5/ PSO5	PO6/ PSO6	PO7/ PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

ELIGIBILITY FOR ADMISSION

The Candidate should have passed the Higher Secondary Examination conducted by the Board of Higher Secondary Education, Tamil Nadu or any other examination accepted by Academic Council with Mathematics as one of the subjects in Higher Secondary Course.

DURATION OF THE PROGRAMME

The candidates shall undergo the prescribed Programme of study for a period of three academic years (six semesters).

MEDIUM OF INSTRUCTION

English

COURSES OFFERED

Part I	:	Tamil/Hindi Course
Part II	:	English
Part III	:	Core Courses
		Elective Courses <ul style="list-style-type: none"> • Generic Elective Courses • Discipline Specific Elective Courses
		Self Study Course - online
Part IV	:	Skill Enhancement Courses (SEC)
		Elective Course (NMEC)
		Environmental Studies Value Education
		Field Project/Internship
		Self Study Course - online
Part V	:	National Service Scheme/ Physical Education/ Youth Red Cross Society/ Red Ribbon Club/ Science Forum/ Eco Club/ Library and Information Science/ Consumer Club/ Health and Fitness Club/ National Cadet Corps/ Rotaract Club

B.2 EVALUATION SCHEME**B.2.1.PART II**

Components	Internal Assessment Marks	Summative Examination Marks	Total Marks
Theory	15	60	100
Practical	5	15	
Assignment	5	-	

Three Periodic Tests - Average of the best two will be considered

B.2.2.Part I & PART III - Core Courses, Elective Courses (Generic, DSEC)

Components	Internal Assessment Marks	External Examination Marks	Total Marks
Theory	25	75	100

INTERNAL ASSESSMENT**Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	K3 Level	5
Quiz	K1 Level	5
Total		25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Practical

Mode of Evaluation		Marks
Model Test	:	30
Record & Performance	:	10
Total		40

Two Model Tests - Average of the two will be considered

Question Pattern for Internal Tests**Duration: 2 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 4	Multiple Choice	4	4	1	4
B	5 -6	Internal Choice - Either ... or Type	3	3	7	21
C	8 -9	Internal Choice - Either... or Type	2	2	10	20
					Total	45*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION**Question Pattern****Duration: 3 Hours**

Section	Q. No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 -10	Multiple Choice	10	10	1	10
B	11 - 15	Internal Choice – Either ...or Type	5	5	7	35
C	16 - 18	Internal Choice – Either... or Type	3	3	10	30
					Total	75

PROJECT**Assessment by Internal Examiner Only****Internal Assessment****Distribution of Marks**

Mode of Evaluation	:	Marks
Project work and Report	:	60
Presentation and Viva –Voce	:	40
Total	:	100

B.2.3 PART IV - Skill Enhancement Courses, Non Major Elective Courses and Foundation Course

B.2.3.1 FOUNDATION COURSE**INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	K2 Level	5
Quiz	K1 Level	5
Total	:	25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 3	Internal Choice - Either ...or Type	3	3	5	15
B	4	Internal Choice – Either ...or Type	1	1	10	10
Total						25*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION

Mode of Evaluation	Marks
Summative Examination	50
Online Quiz (Multiple Choice Questions - K2 Level)	25
Total	75

Question Pattern**Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 7	Internal Choice – Either... or Type	2	2	10	20
Total						50

B.2.3.2 Skill Enhancement Course - Entrepreneurial skills**INTERNAL ASSESSMENT ONLY****Distribution of Marks**

Mode of Evaluation	Marks
Periodic Test	15
Assignment	5
Quiz	5
Model Examinations	60
Online Quiz (Multiple Choice Questions - K2 Level)	15
Total	100

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 3)	Internal Choice – Either Or Type	3	3	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					30

Two Periodic Tests - Better of the two will be considered

Two Assignments - Better of the two will be considered

Question Pattern for Model Examination**Duration: 2 Hours**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1-5)	Internal Choice – Either Or Type	5	5	6	30
B Q. No.(6- 8)	Internal Choice – Either Or Type	3	3	10	30
Total					60

B.2.3.3 Skill Enhancement Courses/ Non Major Elective Courses**INTERNAL ASSESSMENT****Distribution of Marks****Theory**

Mode of Evaluation		Marks
Periodic Test	:	15
Assignment	K3 Level	5
Quiz	K2 Level	5
Total	:	25

Three Periodic Tests - Average of the best two will be considered

Two Assignments - Better of the two will be considered

Three Quiz Tests - Best of the three will be considered

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 3	Internal Choice - Either ...or Type	3	3	5	15
B	4	Internal Choice – Either ...or Type	1	1	10	10
Total						25*

*The total marks obtained in the Periodic Test will be calculated for 15 marks

SUMMATIVE EXAMINATION

Mode of Evaluation	Marks
Summative Examination	: 50
Online Quiz (Multiple Choice Questions - K2 Level)	: 25
Total	: 75

Question Pattern**Duration: 2 Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 7	Internal Choice – Either... or Type	2	2	10	20
Total						50

B.2.4 PART IV- ENVIRONMENTAL STUDIES / VALUE EDUCATION**INTERNAL ASSESSMENT ONLY****Evaluation Pattern**

Mode of Evaluation	Marks
Periodic Test	: 15
Assignment (Based on the Listed activities) - K3 Level	: 10
Online Quiz (Multiple Choice Questions - K2 Level)	: 25
Poster Presentation - K3 Level	10
Report on Student's Awareness creation on Environmental Protection / Ethical Values - K3 Level	10
Model Examination	: 30
Total	: 100

Three Assignment - Best of the three will be considered

Question Pattern for Periodic Tests**Duration: 1 Hour**

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q. No.(1- 3)	Internal Choice – Either Or Type	3	3	6	18
B Q. No.(4)	Internal Choice – Either Or Type	1	1	12	12
Total					30

Two Periodic tests - Better of the two will be considered

*The total marks obtained in the Periodic Test will be calculated for 15 marks

Question Pattern for Model Examination**Duration: 2 ½ Hours**

Section	Q.No.	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A	1 - 5	Internal Choice - Either ... or Type	5	5	6	30
B	6 - 8	Internal Choice – Either... or Type	3	3	10	30
Total						60*

*The total marks obtained in the Model Examination will be calculated for 30 marks

B.2.5 PART IV- Internship/ Field Project

Internship / Field Project is compulsory for II year UG Science Students

- **Internship:** A designated activity that carries one credit involving not less than 15 days of working in an organization under the guidance of an identified mentor
- **Field Project:** Students comprising of maximum 5 members in a team need to undertake project that involve conducting surveys inside/outside the college premises and collection of data from designated communities or natural places.
- Assessment by Internal Examiner only

Mode of Evaluation		Marks
Onsite Learning/Survey	:	50
Report	:	25
Viva-Voce	:	25
Total		100

B.2.6 SELF STUDY COURSE**B.2.6 .1 PART III - Core & Elective Courses Quiz – Online**

- Assessment by Internal Examiner only
- Question Bank is prepared by the Faculty Members of the Departments for all the Core and Elective Courses offered in all the Semesters.
- No. of Questions to be taken 700.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in VI Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
Total	:	100

Two Periodic Tests - Better of the two will be considered

B.2.6 .2 PART IV - Practice for Competitive Examinations – Online

Assessment by Internal Examiner only

- Question Bank prepared by the Faculty Members of the respective Departments will be followed.
- Multiple Choice Question pattern is followed.
- Online Test will be conducted in V Semester for 100 Marks.
- Model Examination is conducted after two periodic tests.

Subject wise Allotment of Marks

Subject		Marks
Tamil	:	10
English	:	10
History	:	10
Mathematics	:	10
Current affairs	:	10
Commerce, Law & Economics	:	10
Physical Sciences	:	10
Life Sciences	:	15
Computer Science	:	5
Food and Nutrition	:	5
Sports and Games	:	5
Total	:	100

Distribution of Marks

Mode of Evaluation		Marks
Periodic Test	:	25
Model Examination	:	75
Total	:	100

Two Periodic Tests - Better of the two will be considered

B.2.7. Part V – Extension Activities**INTERNAL ASSESSMENT ONLY****Distribution of Marks**

Mode of Evaluation		Marks
Attendance	:	5
Performance	:	10
Report/Assignment/Project/Camp/Practical	:	10
Total	:	25*

*The marks obtained will be calculated for 100 marks

B.2.8 EXTRA CREDIT COURSES (OPTIONAL)**2.8.1 Extra Credit Course offered by the Department.**

Assessment by Internal Examiner Only (To be conducted along with the III Periodic Test)

Distribution of Marks

Mode of Evaluation		Marks
Quiz (Multiple Choice Questions)	:	25
Model Examination	:	75
Total	:	100

Question Pattern for Model Examination

Section	Types of Question	No. of Questions	No. of Questions to be answered	Marks for each Question	Total Marks
A Q.No.(1-5)	Internal Choice- Either or Type	5	5	7	35
B Q.No.(6-9)	Internal Choice- Either or Type	4	4	10	40
				Total	75

2.8.2 Extra credit Course offered by MOOC (Massive Open Online Course)

- The Courses shall be completed within the first V Semesters of the Programme.
- The allotment of credits is as follows (**Maximum of 10 credits**)

4weeks Course - 1 credit

8 weeks Course - 2 credits

12 weeks Course - 3 credits

ELIGIBILITY FOR THE DEGREE

- The candidate will not be eligible for the Degree without completing the prescribed Courses of study, lab work, *etc.*, and a minimum Pass marks in all the Courses.
 - No Pass minimum for Internal Assessment.
 - Pass minimum for External Examination is 27 marks out of 75 marks for Core Courses, Elective Courses (Generic Elective, DSEC Courses)
 - Pass minimum for External Examination is 18 marks out of 50 marks for Skill Enhancement Courses and Non Major Elective Courses (NMEC).
 - The aggregate minimum pass percentage is 40.
 - Pass minimum for External Practical Examination is 21 marks out of 60 marks.
 - Pass minimum for Ability Enhancement Compulsory Courses is 40 marks.
 - Pass minimum for Self Study Courses is 40 marks.
 - Attendance
 - For UG, PG Programmes,
 - a) The students who have attended the classes for 76 days (85%) and above are permitted to appear for the Summative Examinations without any condition.
 - b) The students who have only 60-75 days (66% - 84%) of attendance are permitted to appear for the Summative Examinations after paying the required fine amount and fulfilling other conditions according to the respective cases.
 - c) The students who have attended the classes for 59 days and less – upto 45 days (50% - 65%) can appear for the Summative Examinations only after getting special permission from the Principal.
 - d) The students who have attended the classes for 44 days or less (<50%) cannot appear for the Summative Examinations and have to repeat the whole semester.
 - For Part V in UG Programmes, the students require 75 % of attendance to get a credit.
 - For Certificate, Diploma, Advanced Diploma and Post Graduate Diploma Programmes, the students require 75% of attendance to appear for the Theory/Practical Examinations.
- These rules come into effect from 2023-2024 onwards.

B.2 ASSESSMENT MANAGEMENT PLAN

An Assessment Management Plan that details the assessment strategy both at the Programme and the Course levels is prepared. The continuous assessment is implemented using an assessment rubric to interpret and grade students.

B.3.1 Assessment Process for CO Attainment

Assessment is one or more processes carried out by the institution that identify, collect and prepare data to evaluate the achievement of Course Outcomes and Programme Outcomes. Course Outcome is evaluated based on the performance of students in the Continuous Internal Assessments and in End Semester Examination of a Course. Target levels of attainment shall be fixed by the Course teacher and Heads of the respective departments.

Direct Assessment (Rubric based) - Conventional assessment tools such as Term Test, Assignment, Quiz and End Semester Summative Examination are used.

Indirect Assessment – Done through Course Exit Survey.

CO Assessment Rubrics

For the evaluation and assessment of COs and POs, rubrics are used. Internal assessment contributes 40% and End Semester assessment contributes 60% to the total attainment of a CO for the theory Courses. For the practical Courses, internal assessment contributes 50% and Semester assessment contributes 50% to the total attainment of a CO. Once the Course Outcome is measured, the PO can be measured using a CO-PO matrix.

CO Attainment Direct

CO Attainment

Course Outcomes of all Courses are assessed and the CO – wise marks obtained by all the students are recorded for all the assessment tools. The respective CO attainment level is evaluated based on set attainment rubrics.

Target Setting for Assessment Method

For setting up the target of internal assessment tools, 55% of the maximum mark is fixed as target. For setting up the target of End Semester Examination, the average mark of the class shall be set as target.

Formula for Attainment for each CO

Attainment = Percentage of students who have scored more than the target marks

$$\text{Percentage of Attainment} = \frac{\text{Number of Students who scored more than the Target}}{\text{Total Number of Students}} \times 100$$

Attainment Levels of COs

Assessment Methods	Attainment Levels	
Internal Assessment	Level 1	50% of students scoring more than set target marks in Internal Assessment tools
	Level 2	55% of students scoring more than set target marks in Internal Assessment tools
	Level 3	60% of students scoring more than set target marks in internal Assessment tools
End Semester Summative Examination	Level 1	50% of students scoring more than average marks in End Semester Summative Examination
	Level 2	55% of students scoring more than average marks in End Semester Summative Examination
	Level 3	60% of students scoring more than average marks in End Semester Summative Examination

Indirect CO Attainment

At the end of each Course, an exit survey is conducted to collect the opinion of the students on attainment of Course Outcomes. A questionnaire is designed to reflect the views of the students about the Course Outcomes.

Overall CO Attainment= 75% of Direct CO Attainment + 25 % of Indirect CO Attainment

In each course, the level of attainment of each CO is compared with the predefined targets. If the target is not reached, the Course teacher takes necessary steps for the improvement to reach the target.

For continuous improvement, if the target is reached, the Course teacher can set the target as a value greater than the CO attainment of the previous year.

B.3.2 Assessment Process for Overall PO Attainment

With the help of CO against PO mapping, the PO attainment is calculated. PO assessment is done by giving 75% weightage to direct assessment and 25% weightage to indirect assessment. Direct assessment is based on CO attainment, where 75% weightage is given to attainment through End Semester Examination and 25% weightage is given to attainment through Internal assessments. Indirect assessment is done through Graduate Exit Survey and participation of students in Co-curricular/ Extra-curricular activities.

PO Assessment Tools

Mode of Assessment	Assessment Tool	Description
Direct Attainment (Weightage -75%)	CO Assessment	This is computed from the calculated CO Attainment value for each Course
Indirect Attainment (Weightage - 25%)	Graduate Exit Survey 10%	At the end of the Programme, Graduate Exit Survey is collected from the graduates and it gives the opinion of the graduates on attainment of Programme Outcomes
	Co-curricular/ Extra-curricular activities 15%	For participation in Co-curricular/Extra-curricular activities during the period of their study.

Programme Articulation Matrix (PAM)

Course Code	Course Title	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Average Direct PO Attainment								
Direct PO Attainment in percentage								

Indirect Attainment of POs for all Courses

Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Graduate Exit Survey							
Indirect PO Attainment							

Attainments of POs for all Courses

Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7
Direct Attainment (Weightage - 75%)							
Indirect Attainment (Weightage - 25%)							
Overall PO Attainment							

**Overall PO Attainment= 75% of Direct PO Attainment +
25% of Indirect PO Attainment (Graduate Exit Survey
& Participation in Co- curricular and
Extra-curricular Activities)**

Expected Level of Attainment for each of the Programme Outcomes

Pos	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

Level of PO Attainment

Graduation Batch	Overall PO Attainment (in percentage)	Whether Expected Level of PO is Achieved? (Yes/No)

B.3.3 Assessment Process for PEOs

The curriculum is designed so that all the Courses contribute to the achievement of PEOs. The attainment of PEOs is measured after 5 years of completion of the Programme only through indirect methods.

Target for PEO Attainment

Assessment Criteria	Target (UG)	Target (PG)
Record of Employment	15% of the class strength	30% of the class strength
Progression to Higher Education	50% of the class strength	5% of the class strength
Record of Entrepreneurship	2% of the class strength	5% of the class strength

Attainment of PEOs

Assessment Criteria & Tool	Weightage
Record of Employment	10
Progression to Higher Education	20
Record of Entrepreneurship	10
Feedback from Alumnae	30
Feedback from Parents	10
Feedback from Employers	20
Total Attainment	100

$$\text{Percentage of PEO Attainment from Employment} = \frac{\text{Number of Students who have got Employment}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Higher Education} = \frac{\text{Number of Students who pursue Higher Education}}{\text{Target}} \times 100$$

$$\text{Percentage of PEO Attainment from Entrepreneurship} = \frac{\text{Number of Students who have become Entrepreneurs}}{\text{Target}} \times 100$$

Expected Level of Attainment for each of the Programme Educational Objectives

Pos	Level of Attainment
Attainment Value $\geq 70\%$	Excellent
$60\% \leq$ Attainment Value $< 70\%$	Very Good
$50\% \leq$ Attainment Value $< 60\%$	Good
$40\% \leq$ Attainment Value $< 50\%$	Satisfactory
Attainment Value $< 40\%$	Not Satisfactory

Level of PEO Attainment

Graduation Batch	Overall PEO Attainment (in percentage)	Whether Expected Level of PEO is Achieved? (Yes/No)

C. PROCESS OF REDEFINING THE PROGRAMME EDUCATIONAL OBJECTIVES

The college has always been involving the key stakeholders in collecting information and suggestions with regard to curriculum development and curriculum revision. Based on the information collected the objectives of the Programme are defined, refined and are inscribed in the form of PEOs. The level of attainment of PEOs defined earlier will be analysed and will identify the need for redefining PEOs. Based on identified changes in terms of curriculum, regulations and PEOs, the administrative system like Board of Studies, Academic Council and Governing Body may recommend appropriate actions. As per the Outcome Based Education Framework implemented from the Academic Year 2020 -2021, the following are the Programme Structure, the Programme Contents and the Course Contents of B.Sc. Data Science Programme.



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BACHELOR OF SCIENCE DATA SCIENCE (UG) 2032

Outcome Based Education with Choice Based Credit System

Programme Structure - Allotment of Hours and Credits

For those who joined in the Academic Year 2024-2025 and after

Components	Semester						Total Number of Hours (Credits)
	I	II	III	IV	V	VI	
Part I : Tamil /Hindi	6 (3)	6 (3)	6 (3)	6 (3)	-	-	24 (12)
Part II : English	6 (3)	6(3)	6 (3)	6 (3)	-	-	24 (12)
Part III : Core Courses, Elective Courses & Self Study Course							
Core Course	5 (5)	5 (5)	5 (5)	5 (5)	5 (4)	5 (4)	30 (28)
Core Course	-	-	-	-	5 (4)	5 (4)	10 (8)
Core Course	-	-	-	-	5 (4)	5(4)	10(8)
Core Course Practical	5(3)	5 (3)	5(3)	4 (3)	4 (3)	5 (3)	28(18)
Core Course Project	-	-	-	-	1 (3)	-	1 (3)
Elective Course (DSEC)	-	-	-	-	5(3)	5 (3)	10 (6)
Elective Course (DSEC Practical)	-	-	-	-	3(2)	3(2)	6(4)
Elective Course I (Allied)	4 (4)	4 (4)	4 (4)	4 (4)	-	-	16(16)
Elective Course I Practical I(Allied)	-	-	-	-	-	-	-
Elective Course II(Allied)	-	-	-	-	-	-	-
Elective Course II Practical II(Allied)	-	-	-	-	-	-	-
Self Study Course	-	-	-	-	-	0 (1)	0 (1)
Part IV : Skill Enhancement Courses, Elective Courses, Environmental Studies, Value Education, Self Study Course & Internship/ Field Project							
SEC	2 (2)	-	1 (1)	2 (2)	-	-	5(5)
SEC	-	2 (2)	2 (2)	2 (2)	-	2 (2)	8 (8)
Elective Course(NME)	2 (2)	2	-	-	-	-	4 (4)
Value Education	-	-	-	-	2	-	2 (2)
Environmental Studies	-	-	1 (0)	1	-	-	2 (2)
Self Study Course	-	-	-	-	0 (1)	-	0 (1)
Internship/ Field Project	-	-	-	-	0	-	0 (1)
Part V : Extension Activities	-	-	-	-	-	0	0 (1)
Total	30 (22)	30 (22)	30(21)	30 (24)	30 (27)	30(24)	180 (140)
Extra Credit Course (Self Study Course)	-	-	-	-	0(2)	-	0(2)

DSEC: Discipline Specific Elective Course

SEC: Skill Enhancement Course

NMEC : Non Major Elective Course



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B.Sc. DATA SCIENCE – 2032

PROGRAMME CONTENT

SEMESTER I

S. No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/ Hindi	24UTAG11/ 24UHDG11	6	3	3	25	75	100	
2.	Part II	English	24UENG11	6	3	3	25	75	100	
3.	Part III	Core Course - 1	Python Programming	24UDSC11	5	5	3	25	75	100
4.		Core Course -2 Practical I	Python Programming Practical	24UDSC11P	5	3	3	40	60	100
5.		Elective Course 1	Numerical Methods	24UDSA11	4	4	3	25	75	100
6.	Part IV	NME -1	Fundamentals of Information Technology	24UDSN11	2	2	2	25	75	100
7		SEC – 1 Foundation Course	Problem Solving Techniques	24UDSF11	2	2	2	25	75	100
Total				30	22				700	

B.Sc. DATA SCIENCE
SEMESTER II

S. No.	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/ Hindi	24UTAG21/ 24UHDG21	6	3	3	25	75	100	
2.	Part II	English	24UENG21	6	3	3	25	75	100	
3.	Part III	Core Course – 3	Data Structures and Algorithms	24UDSC21	5	5	3	25	75	100
4.		Core Course -4 Practical II	Data Structures and Algorithms Practical	24UDSC21P	5	3	3	40	60	100
5.		Elective Course -2	Mathematical Statistics	24UDSA21	4	4	3	25	75	100
6.	Part IV	NME – 2	Computer Fundamentals	24UDSN21	2	2	2	25	75	100
7		SEC – 2	Advanced Excel Practical	24UDSS21P	2	2	2	40	60	100
Total				30	22				700	

**B.Sc. DATA SCIENCE
SEMESTER III**

S. No.	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/ Hindi	24UTAG31/ 24UH DG31	6	3	3	25	75	100	
2.	Part II	English	24UENG31	6	3	3	25	75	100	
3.	Part III	Core Course – 5	Data Science	24UDSC31	5	5	3	25	75	100
4.		Core Course -6 Practical III	Data Science Practical	24UDSC31P	5	3	3	40	60	100
5.		Elective Course-3	Operational Research	24UDSA31	4	4	3	25	75	100
6.	Part IV	SEC -3	E-Commerce	24UDSS31	1	1	2	100	-	100
7		SEC – 4	Data Mining and Warehousing	24UDSS32	2	2	2	25	75	100
			Environmental Studies	24UGES41	1	-	-	-	-	-
Total				30	21				700	

B.Sc. DATA SCIENCE
SEMESTER IV

S. No.	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part I	Tamil/ Hindi	24UTAG41/ 24UHGD41	6	3	3	25	75	100	
2.	Part II	English	24UENG41	6	3	3	25	75	100	
3.	Part III	Core Course - 7	Object Oriented Programming with Java	24UDSC41	5	5	3	25	75	100
4.		Core Course -8 Practical IV	Object Oriented Programming with Java Practical	24UDSC41P	4	3	3	40	60	100
5.		Elective Course -4	Introduction to Linear Algebra	24UDSA41	4	4	3	25	75	100
6.	Part IV	SEC - 5	Cyber Forensics	24UDSS41	2	2	2	25	75	100
7		SEC - 6	PHP Programming Practical	24UDSS41P	2	2	2	40	60	100
			Environmental Studies	24UGES41	1	2	2	25	75	100
Total				30	24				700	

**B.Sc. DATA SCIENCE
SEMESTER V**

S. No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part III	Core Course - 9	Relational Database Management System	24UDSC51	5	4	3	25	75	100
2.		Core Course - 10	Operating System	24UDSC52	5	4	3	25	75	100
3.		Core Course - 11	Machine Learning	24UDSC53	5	4	3	25	75	100
4.		Core Course –12 Practical V	Relational Database Management System Practical	24UDSC51P	4	3	3	40	60	100
5.		Core Course Project	Project	24UDSC54PR	1	3	-	100	-	100
6.		Elective Course DSEC-1	Natural Language Processing / Cloud Computing / NOSQL	24UDSE51/ 24UDSE52/ 24UDSE53	5	3	3	25	75	100
7.		Elective Course DSEC-2 Practical-I	Natural Language Processing using Python/ Cloud Computing Practical/ NoSQL Practical	24UDSE51P/ 24UDSE52P/ 24UDSE53P	3	2	3	40	60	100
8.	Part IV		Value Education	24UGVE51	2	2	2	100	-	100
9.		Self Study Course	Practice for Competitive Examinations - Online	24UGCE51	-	1	-	100	-	100
10.		Internship/ Field Project	Internship/ Field Project	24UDSI51G	-	1	-	-	-	100
				Total	30	27				1000
		Extra Credit Course	AI Tools	24UDSO51	-	2	3	100	-	100

B.Sc. DATA SCIENCE
SEMESTER VI

S. No	Components	Title of the Course	Course Code	Hours Per Week	Credits	Exam. Hours	Marks			
							Int.	Ext.	Total	
1.	Part III	Core Course - 13	Internet of Things	24UDSC61	5	4	3	25	75	100
2.		Core Course - 14	Artificial Intelligence	24UDSC62	5	4	3	25	75	100
3.		Core Course – 15	Essentials of Interactive Design	24UDSC63	5	4	3	25	75	100
4.		Core Course - 16 Practical VI	IoT Practical	24UDSC61P	5	3	3	40	60	100
5.		Elective Course DSEC-3	Big Data Analytics / Data Visualization Techniques / Social Networks Analysis	24UDSE61/ 24UDSE62/ 24UDSE63	5	3	3	25	75	100
6.		Elective Course DSEC-4 Practical -II	Big Data Analytics Practical / Data Visualization Using Python / Social Networks Analysis Practical	24UDSE61P/ 24UDSE62P/ 24UDSE63P	3	2	3	40	60	100
7.		Self Study Course	Core Courses Quiz- Online	24UDSQ61	-	1	-	100	-	100
8.	Part IV	SEC- 7	Visualization using PowerBI	24UDSS61	2	2	2	25	75	100
9.	Part V		Extention Activities		-	1	-	100	-	100
Total					30	24				900



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B.Sc. Data Science

(for those who join in 2024-2025)

Semester I	PYTHON PROGRAMMING	Hours/Week: 5	
Core Course - 1		Credits: 5	
Course Code 24UDSC11		Internal 25	External 75

Course Outcomes:

On completion of the course, students will be able to

- CO1:** describe fundamental concepts in Python Programming. [K1]
- CO2:** interpret the concepts of basic Python, functions, operations on files and string manipulation. [K2]
- CO3:** infer looping, control statements and representation of complex data using lists, tuples and dictionaries. [K2]
- CO4** apply the concepts of basic programming, functions, strings, modules and file handling in Python programs. [K3]
- CO5:** determine the methods to develop Python programs utilizing control statements, jump statements, list, tuples and dictionaries. [K3]

UNIT I

Basics of Python Programming: History of Python – Features of Python – Literal Constants - Variables and Identifiers - Data Types – Input operations- Comments – Indentation – Operators and Expressions – Type conversions. (15 Hours)

UNIT II

Decision Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Basic Loop Structures/Iterative Statements: while loop, for loop - nested loops- : break, continue and pass statements.

(15 Hours)

UNIT III

Functions and Modules : Function Declaration and Definition – Function Call – Variable Scope and its Lifetime-Return Statement - More on Defining Function - Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments- Recursion.

Modules: The from import statement– Name of the Modules – Making your own modules.

Python Strings Revisited : Concatenating, Appending and Multiplying Strings - String are Immutable – Built-in String Methods and Functions – Comparison Strings.

(15 Hours)

UNIT IV

Data Structures: Lists: Access values in List- Updating values in Lists- Nested lists –Cloning Lists - Basic list operations - List Methods. **Tuples:** Creating Tuples - Accessing values in a Tuples, Updating Tuples - Deleting Elements in Tuple – Nested Tuples– Advantages of Tuples over Lists. **Dictionaries:** Creating a Dictionaries, Adding and Modifying an item in a Dictionaries – Modifying an entry – Deleting items – Built-in Dictionary Functions and Methods - Difference between Lists and Dictionaries.

(15 Hours)

UNIT V

File Handling: Types of Files - Opening and Closing Files -Reading and Writing Files: write() and writelines() Methods- append() Method – read() and readlines() Methods – Opening Files with keyword – Splitting words – some other useful File Methods - File Positions- Renaming and deleting files.

(15 Hours)

SELF-STUDY:

Jump Statements: break, continue and pass statements.

TEXT BOOK

Reema Thareja. (2017). *Python Programming using problem solving approach*, 1st Edition, Oxford University Press.

Unit	Chapters	Sections
I	3	3.1, 3.2,,3.5-3.9.3.11,3.12,3.16
II	4	4.2 – 4.4
III	5, 6	5.2-5.6 ,5.10, 5.11.1-5.11.3 6.1, 6.2,6.4,6,8
IV	8	8.2.1- 8.2.6 , 8.4.1,8.4.3-8.4.6, 8.4.9,8.4.16,8.6.1-8.6.4 , 8.6.8 - 8.6.9
V	7	7.3-7.7

REFERENCE BOOKS

1. Vamsi Kurama. *Python Programming: A Modern Approach*, Pearson Education.
2. Mark Lutz. *Learning Python*, Orielly.
3. Adam Stewarts. *Python Programming, Online*.
4. Fabio Nelli. *Python Data Analytics*, APress.
5. Kenneth A. Lambert. *Fundamentals of Python – First Programs*, CENGAGE Publication.

WEB RESOURCES

1. <https://www.programiz.com/python-programming>
2. https://www.w3schools.com/python/python_intro.asp
3. <https://www.geeksforgeeks.org/python-programming-language/>
4. [https://en.wikipedia.org/wiki/Python_\(programming_language\)](https://en.wikipedia.org/wiki/Python_(programming_language))

Course Code 24UDSC11	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	3	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	3	2	2	-
CO3	3	3	3	2	3	2	3	3	2	-
CO4	3	3	3	3	3	3	3	3	3	1
CO5	3	3	3	3	3	3	3	3	3	1

Strong (3) Medium (2) Low (1)

Mrs. P. Aruna Devi
Head of the Department

Mrs. S.Veni
Course Designer



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B.Sc. Data Science

(for those who join in 2024-2025)

Semester I	PYTHON PROGRAMMING PRACTICAL	Hours/Week: 5	
Core Course -2 Practical I		Credits: 3	
Course Code 24UDSC11P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: write Python programs using I/O statements and various operators of Python. [K2]

CO2: draw flow chart and write programs with various program structures of Python, functions and modules. [K2]

CO3: demonstrate data representation using Arrays, Strings, List, Tuple, Dictionaries and Files in Python. [K3]

CO4: demonstrate various programs with different inputs and complete the record work. [K3]

CO5: explore the uses of Python compound data in real life. [K3]

Write Python Programs for the following

1. variables, constants, I/O statements in Python.
2. Operators in Python.
3. Conditional Statements.
4. Loops.
5. Jump Statements.
6. Functions.
7. Recursion.
8. Arrays.
9. Strings.
10. Modules.
11. Lists.
12. Tuples.
13. Dictionaries.
14. File Handling.

Course Code 24UDSC11P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	3	1	1	2	2	2	1	1	-
CO2	3	3	1	1	2	2	2	1	1	-
CO3	3	3	3	2	2	3	2	3	1	1
CO4	3	3	2	2	2	3	2	2	1	1
CO5	3	3	3	3	3	3	2	3	1	1

Strong (3) Medium (2) Low (1)

Mrs. P. Aruna Devi
Head of the Department

Mrs. S.Veni
Course Designer



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B.Sc. Data Science (for those who join in 2024-2025)

Semester I	NUMERICAL METHODS	Hours/Week: 4	
Elective Course 1		Credits: 4	
Course Code 24UDSA11		Internal 25	External 75

Course Outcomes

On completion of the course the students will be able to

CO1: Recall the fundamental concepts of algebraic, transcendental and simultaneous equations. [K1]

CO2: Derive the solutions of equations by various iterative methods. [K2]

CO3: Find the missing data by using interpolation and inverse interpolation methods. [K2]

CO4: Perform numerical differentiation and integration to find the derivatives and integral value numerically. [K3]

CO5: Apply Taylor series method, Picard's method, Euler's and Runge-kutta methods to obtain the solution of the initial value problems. [K3]

UNIT I

Algebraic and Transcendental Equations:

Introduction-Errors in numerical computation-Iteration method-Bisection method-Regula-Falsi method-Newton-Raphson method-Horner's method.

(12 hours)

UNIT II

Simultaneous Equations:

Introduction-Simultaneous equations-Back substitution-Gauss Elimination method-Gauss –Jordan Elimination method-Calculation of Inverse of a matrix- Crout's method-Iterative methods-Gauss-Jacobi Iteration method-Gauss seidal Iteration method-Newton Raphson's method for simultaneous equations.

(12 hours)

UNIT III**Interpolation:**

Introduction- Newton's interpolation Formulae-Central difference Interpolation formulae-Gauss forward Interpolation Formula, Gauss backward Interpolation Formula, Lagrange's Interpolation formula - Divided differences-Newton's divided difference formula-Inverse Interpolation.

(12 hours)

UNIT IV**Numerical Differentiation and Integration:**

Introduction-Derivates using Newton's forward difference formula-Derivates using Newton's backward difference formula- Numerical Integration-Newton-cotes quadrature formula-Trapezoidal Rule-Simpson's one third rule-Simpson's 3/8th rule.

(12 hours)

UNIT V**Numerical Solution of Ordinary Differential Equations:**

Introduction-Taylor series method-Picard's method-Euler's method-Runge- kutta method of second, third, fourth order- Predictor & corrector methods-Milne's method.

(12 hours)

TEXT BOOK:

Arumugam. S, A.Thangapandi Issac. A, Somasundaram. A, *Numerical Methods*, Second Edition, SCITECH publications. Reprint, December 2013.

Unit	Chapter	Section
I	3	3.0 - 3.6
II	4	4.0 - 4.8, 4.10
III	7	7.0 - 7.2((i), (ii) and related problems), 7.3, 7.4,7.5, 7.6
IV	8	8.0 - 8.2,8.5 (excluding Weddles rule, Booles rule, Romberg's method and related problems)
V	10	10.0 - 10.2, 10.3(excluding modified Euler's method & its related problems),10.4 - 10.6

REFERENCE BOOK:

Mathews J.H. Numerical Method for Maths, Science and Engineering: PHI, New Delhi,2001.

Web Resources: <https://27x37.files.wordpress.com/2011/05/mcgraw-hill-numerical-methods-using-matlab.pdf>

Course Code 24UDSA11	PO1	PO2	PO3	PO4	PO5	PO 6	PO7
CO1	3	2	1	3	1	1	-
CO2	3	2	1	3	2	1	-
CO3	3	1	1	3	2	1	-
CO4	3	2	1	3	2	1	-
CO5	2	2	1	3	2	1	-

Strong (3) Medium (2) Low (1)

Dr. M.C.Maheswari
Head of the Department

K.Muthulakshmi
Course Designer



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VIRUDHUNAGAR

Quality Education with Wisdom and Values

B.Sc. Data Science

(for those who join in 2024-2025)

Semester I	FUNDAMENTALS OF INFORMATION TECHNOLOGY	Hours/Week: 2	
NME – 1		Credits: 2	
Course Code 24UDSN11		Internal 25	External 75

Course Outcomes:

On completion of the course, students will be able to

CO1: outline concepts of number system computer and its hardware component. [K1]

CO2: discuss computer software, memory and networks. [K1]

CO3: interpret internet protocols, number system conversions, computer architecture and basics of information technology. [K2]

CO4 describe input and output devices of computer, computer languages, browsers, types of memory. [K2]

CO5: illustrate working with different software, computers, usage of I/O devices and storage of data in computer. [K3]

UNIT I

Basics of Information Technology: Introduction – Information Technology-Definition - Information Technology for Business – Basic Concepts of Information Technology – Technological Trends in IT – Career Overview: Information Technology – Applications of Information Technology - Information Technology law. **Introduction to Computers:** Introduction – The Computer Defined – Characteristics of a Computer – Limitations of Computers – Generation of Computers – Difference between the Generations of Computers – Classification of Computers – Applications/Uses of Computers in different fields. (6 Hours)

UNIT II

Basic Anatomy of the Computer – The Parts of a Computer System – Basic Functional Units of a Computer - Memory Classifications – Secondary Memory – DVD – Input Devices - Output Devices – Data Representation – Programming Languages – Difference between machine, assembly and High-

level language – Software – Computer Viruses – Types of Viruses – Categories of Viruses.

(6 Hours)

UNIT III

Number Systems: Introduction – Number system – Representation of Number system – Number Base Conversions – r's Complement – 2's Complement - Comparison of 1's Complement and 2's Complement – (r-1)'s Complement.

(6 Hours)

UNIT IV

Data Processing: Data Processing Concepts – Data Processing Cycle – Computer Processing Operations – Data Processing System – Data Organization. **Data Communication and Computer Networks:** Data Communication – Computer Networks – The Uses of a Network – Types of Networks – Difference between LAN, MAN, WAN – Intranet and Extranet – How Networks are structured.

(6 Hours)

UNIT V

Internet and its Applications: History of Internet – Internet – Uses of Internet – Advantages of Internet – History of WWW – Web – Difference between internet and web – Internet Service Provider – Internet Services – Internet Addressing – Internet Protocol – Domain Name Addressing – Web Browser – URL – Domain Name System – E-mail – Functions of e-mail – Advantages of e-mail – Disadvantages of e-mail.

(6 Hours)

TEXT BOOK

Dr. P. Rizwan Ahmed (2017). *Introduction to Information Technology*, Margham Publications, Chennai.

UNIT	CHAPTER	SECTION
I	1,2	1.1 – 1.8, 2.1-2.8
II	2	2.9 – 2.21, 2.24 – 2.26
III	4	4.1 – 4.8
IV	5,6	5.1 – 5.5, 6.1 – 6.7
V	7	7.1 – 7.15, 7.24 – 7.27

REFERENCE BOOKS

1. Alexis Leon, Mathews Leon, Leena Leon (2013). *Introduction to Information Technology*, Vijay Nicole Imprints Pvt. Ltd.

2. Deepak Bharihoke (2010), *Fundamental of Information Technology*, Excel Books, New Delhi.
3. Bansal (2002), *Fundamentals of Information Technology*, efficient offset printers.

Course Code 24UDSN11	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	2	2	3	2	2	2	2	2	-
CO2	2	2	2	2	2	2	3	2	2	-
CO3	2	2	2	2	2	2	2	3	2	-
CO4	3	3	2	3	3	3	3	2	3	1
CO5	3	3	2	2	3	3	3	3	3	1

Strong(3) Medium (2) Low (1)

Mrs. P. Aruna Devi
Head of the Department

Mrs. S. Rajapriya
Mrs. V. Subhasini
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B.Sc. Data Science

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Semester I	PROBLEM SOLVING TECHNIQUES	Hours/Week: 2	
SEC - 1 Foundation Course		Credits: 2	
Course Code 24UDSF11		Internal 25	External 75

Course Outcomes:

On completion of the course, the students will be able to

- CO1 : familiarize with basics of computer, programming languages, data, flowchart and program. [K1]
- CO2 : realize the hardware components, software, steps in programming, concepts of programming and data structures. [K1]
- CO3 : explain the need for data, different programming languages, programming structures and modules for problem solving. [K2]
- CO4 : identify the use of hardware, software and the relationship between the program steps and flow of data in the program. [K2]
- CO5 : explore various programming languages, programming structures to manipulate data and the use of flowcharts to write programs for the solution of a problem. [K2]

UNIT I

Introduction to Digital Computer: Introduction – Von Neumann Concept – Storage – Programming Languages – Translators – Hardware and Software – Operating Systems.

(6 Hours)

UNIT II

An Introduction to Computers and Programming: Creating Computer Program the Program Development Cycle - Basic Programming Concepts - Data Processing and Output. **Developing a Program:** Coding, Documenting and Testing a Program – Structured Programming.

(6 Hours)

UNIT III

Selection Structures: Making Decisions: Relational and Logical Operators – Selecting from Several Alternatives - Applications of Selection Structures. **Repetition Structures: Looping:** Types of Loop – The For Loop. (6 Hours)

UNIT IV

Arrays: List and Tables: One Dimensional Arrays - Strings as Arrays of Characters - Two Dimensional Arrays. **Program Modules and Subprograms and Functions:** Data Flow Diagrams, Arguments and Parameters. (6 Hours)

UNIT V

Program Modules and Subprograms and Functions: More about Subprograms – Functions – Recursion. **Sequential Data Files:** An Introduction to Data Files - Modifying Sequential files. (6 Hours)

TEXT BOOKS

1. E. Balagurusamy. *Introduction to Computing and Problem Solving using Python*, 1st Edition, McGraw Hill Education (India) Private Limited
2. Stewart Venit, Elizabeth Drake. (2014). *Prelude to Programming: Concepts and Design*, 5th Edition, Pearson Publishers.

BOOK	UNIT	CHAPTERS	SECTIONS
I	I	1	1.1-1.7
II	II	1	1-3
		2	3,5
	III	3	2,4,5
		4	2,3
	IV	6	1,4,5
		7	1
	V	7	2,3,4
		8	1,2

REFERENCE BOOKS

1. Karl Beecher. (2017). *Computational Thinking: A Beginner's Guide to Problem-Solving and Programming*, BCS Learning & Development Ltd.
2. Johan Sannemo. (2018). *Principles of Algorithmic Problem Solving*, KTH Royal Institute of Technology.

WEB RESOURCES

1. <https://www.codesansar.com/computer-basics/problem-solving-using-computer.htm>
2. <http://www.nptel.iitm.ac.in/video.php?subjectId=106102067>
3. http://utubersity.com/?page_id=876

Course Code 24UDSF11	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO7
CO1	3	2	1	3	2	2	1	2	2	2
CO2	2	2	-	1	2	2	1	2	2	1
CO3	3	1	-	1	3	3	2	2	1	3
CO4	2	1	2	2	1	2	1	3	2	1
CO5	3	3	2	2	3	3	1	2	2	3

Strong (3) Medium (2) Low (1)

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VIRUDHUNAGAR

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B.Sc. Data Science (for those who join in 2024-2025)

Semester II	DATA STRUCTURES AND ALGORITHMS	Hours/Week: 5	
Core Course – 3		Credits: 5	
Course Code 24UDSC21		Internal 25	External 75

Course Outcomes:

On completion of the course, students will be able to

- CO1:** describe various data structures, its asymptotic notations and its time and space complexities. [K1]
- CO2:** interpret the concepts of array, linked list, trees and graphs. [K2]
- CO3:** infer searching and sorting techniques, greedy method, dynamic programming and backtracking [K2]
- CO4** apply searching and sorting techniques, operations on array, linked list, trees and graphs. [K3]
- CO5:** determine the methods for solving problems using greedy method, dynamic programming and backtracking. [K3]

UNIT I

Arrays and ordered Lists Abstract data types – asymptotic notations – complexity analysis- **Linked lists:** Linked lists – Insertion and deletion - Circular linked list - doubly linked lists.

(15 Hours)

UNIT II

Stacks, Queues, Recursion: stacks – Queues – Circular Queues – Arithmetic Expressions; Polish Notations. **Trees:** Binary Trees – Binary Tree Traversal – Binary Tree Representations – Binary Search Trees - threaded Binary Trees - Application of trees (Sets).

(15 Hours)

UNIT III

Graphs and Their Applications: Representation of Graphs - Shortest Paths – Operations on Graphs – Traversing a Graph - Minimum Spanning Trees. **Searching and Sorting** Sorting – Bubble Sort - Insertion Sort - Selection Sort - Merge Sort – Shell Sort – Radix Sort. Searching – Linear search, Binary search. (15 Hours)

UNIT IV

Greedy Method and Dynamic programming Greedy Method: Knapsack problem– Job Sequencing with deadlines – Optimal storage on tapes. General method — All pairs shortest path – Single source shortest path – Search Techniques for Graphs – DFS – Connected Components – Bi-Connected Components. (15 Hours)

UNIT V

Backtracking General Method – 8-Queen’s – Sum Of Subsets – Graph Colouring – Hamiltonian Cycles – Branch And Bound: General Method – Travelling Sales Person Problem. (15 Hours)

SELF-STUDY:

Greedy Method: Multistage Graph Forward Method

TEXT BOOKS

1. Seymour Lipshutz (2011),Schaum’s Outlines - Data Structures with C, Tata McGraw Hill publications.
2. Ellis Horowitz and SartajSahni (2010), Fundamentals of Computer Algorithms, Galgotia Publications Pvt., Ltd.

Unit	Book	Chapter	Section
I	1	2	2.5, 2.6, 2.8
		5	5.2, 5.7, 5.8, 5.10, 5.11
II	1	6	6.2, 6.11, 6.14, 6.6
		7	7.2, 7.4, 7.8, 7.7, 7.24
III	1	8	8.3, 8.4, 8.6, 8.7, 8.9
		4	4.7, 4.8, 4.9
		9	9.3 – 9.8
IV	2	4	4.2, 4.4, 4.6
		5	5.3, 5.4
		6	6.2, 6.3, 6.4
V	2	7	7.2 – 7.5
		8	8.1, 8.3

REFERENCE BOOKS

1. Gregory L.Heileman(1996), Data Structures, Algorithms and Object-Oriented Programming, McGraw Hill International Edition, Singapore.
2. A.V.Aho, J.D. Ullman, J.E.Hopcraft(2000). Data Structures and Algorithms, Addison Wesley Publication.
3. Ellis Horowitz and SartajSahni, Sanguthevar Raja sekaran (2010) ,Fundamentals of Computer Algorithms, Galgotia Publications Pvt.Ltd.

WEB RESOURCES

1. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
2. <https://www.programiz.com/dsa>
3. <https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>

Course Code 24UDSC21	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	3	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	3	2	2	-
CO3	3	3	3	2	3	2	3	3	2	-
CO4	3	3	3	3	3	3	3	3	3	1
CO5	3	3	3	3	3	3	3	3	3	1

Strong (3) Medium (2) Low (1)

Mrs. P. Aruna Devi
Head of the Department

Mrs. T.Chitra
Course Designer



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VIRUDHUNAGAR

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B.Sc. Data Science

(for those who join in 2024-2025)

Semester II	DATA STRUCTURES AND ALGORITHMS PRACTICAL	Hours/Week: 5	
Core Course -4 Practical II		Credits: 3	
Course Code 24UDSC21P		Internal 40	External 60

Course Outcomes:

On completion of the course, students will be able to

- CO1:** write the programs to perform operations on array, linked list, stack, queue, tree traversal. [K2]
- CO2:** perform various searching and sorting techniques. [K2]
- CO3:** apply operation on data structures, searching and sorting techniques, greedy method, dynamic programming and backtracking [K3]
- CO4:** develop programs to find optimal solutions for the problems using greedy method, dynamic programming methods and backtracking. [K3]
- CO5:** determine the methods for solving problems using greedy method, dynamic programming and backtracking. [K3]

Develop programs for the following concepts

1. Stack operations
2. Queue operations
3. Linked list Operations
4. Array operations
5. Tree traversal operations
6. Search an element in an array using linear search.
7. Search an element in an array using binary search
8. Sort the given set of elements using Merge Sort.

9. Sort the given set of elements using Quick sort.
10. Search the Kth smallest element using Selection Sort
11. Find the Optimal solution for the given Knapsack Problem using Greedy Method.
12. Find all pairs shortest path for the given Graph using Dynamic Programming method
13. Find the Single source shortest path for the given Travelling Salesman problem using Dynamic Programming method
14. Find all possible solution for an N Queen problem using backtracking method
15. Find all possible Hamiltonian Cycle for the given graph using backtracking method

Web Resource

<https://www.geeksforgeeks.org/learn-data-structures-and-algorithms-dsa-tutorial/>

Course Code 24UDSC21P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	3	2	3	2	2	2	2	2	2	-
CO2	3	2	3	2	2	2	3	2	2	-
CO3	3	3	3	2	3	2	3	3	2	-
CO4	3	3	3	3	3	3	3	3	3	1
CO5	3	3	3	3	3	3	3	3	3	1

Strong (3) Medium (2) Low (1)

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Mrs. T.Chitra
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Semester II	MATHEMATICAL STATISTICS	Hours/Week:4	
Elective Course- 2		Credits: 4	
Course Code 24UDSA21		Internal 25	External 75

COURSE OUTCOMES

On completion of the course, the students will be able to CO1: define the basic concepts in statistics. [K1]

CO2: explain various statistical methods and techniques in solving problems. [K2]

CO3: infer the data to draw conclusion in probability. [K2]

CO4: apply the statistical methods and theory of probability to solve real life problems. [K3]

CO5: calculate some statistical constants to get the regression analysis. [K3]

Unit I

Measures of Central Value: Types of Averages - Arithmetic Mean – Median – Mode. (12 Hours)

Unit II

Skewness, Moments & Kurtosis: Introduction, Skewness Defined, Tests of Skewness, Measures of Skewness, Moments, Kurtosis.

(12 Hours)

Unit III

Correlation Analysis: Types of Correlation, Methods of Studying Correlation, Karl Pearson's coefficient of correlation, Interpreting Coefficient of Correlation, Coefficient of Correlation and Probable Error, Rank Correlation.

Regression Analysis: Regression Lines, Regression Equations, Deviation taken from Arithmetic Means of X and Y- Deviation taken from Assumed Means (Except Graphing Regression Lines).

(12 Hours)

Unit IV

Association of Attributes: Consistency of Data – Association and Disassociation – Methods of Studying Association – Criteria of Independence.

(12 Hours)

Unit V

Probability & Expected Value: Calculation of Probability, Theorems of Probability, conditional Probability, Bayes Theorem, Mathematical Expectation.

(12 Hours)

Text Book

Dr. S. P. Gupta, (Revised Edition 2010), *Statistical Methods*, Sultan Chand & Sons.

Unit	Volume	Chapter	Pages
I	I	7	180–218
II	I	9	330–370 (Up to Problem No:40)
III	I	10	381–394 (Up to Problem No:11)
			399–411 (Up to Problem No:22)
	I	11	439-451
IV	I	12	481-499
V	I I	1	759–792 (Up to Problem No:59)

REFERENCE BOOKS:

1. Dr. Arumugam.S, Mr.Thangapandi Isaac.A, (2016), *Statistics*, New Gamma Publishing House.
2. S.C.Gupta, V.K.Kapoor, (2001), *Elements of Mathematical Statistics*, Sultan Chand & Sons.

Web Resources

Web resources from NDL Library, E-content from open-source libraries

Course Code 24UDSA21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	3	3	3	1	2
CO2	3	3	3	3	3	1	2
CO3	3	3	3	3	3	1	2
CO4	3	2	3	3	3	3	2
CO5	3	2	3	2	3	3	2

Strong (3) Medium (2) Low (1)

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S.Swathi Sundari
Course Designer



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Semester II	COMPUTER FUNDAMENTALS	Hours/Week: 2	
NME – 2		Credits: 2	
Course Code 24UDSN21		Internal 25	External 75

Course Outcomes:

- CO1: recognize the functional units of computer system, representation of data and programming languages [K1]
- CO2: outline the working of word processing, spreadsheet and power point presentation. [K1]
- CO3: describe the basics of data representation, word document, excel sheet, chart preparation and power point presentation. [K2]
- CO4: illustrate the various options in document formatting and chart formatting, multimedia options in power point presentation. [K2]
- CO5: experiment the representation of data, word processing, spreadsheet, and power point. [K3]

UNIT I

Data Representation: Representation of Characters in Computers – Representation of Integers – Representation of Fractions – Hexadecimal representation of Numbers – Decimal to Binary Conversion. **Input/Output Units:** Traditional Computer Input/Output Units - Other Input Technologies – Computer Output devices.

(6 Hours)

UNIT II

Word Processing: Creating a New Word Document – Saving a Word Document – Apply Basic Formatting - Applying Bulleted and Numbered List – Using Cut, Copy and Paste Commands - Using Find, Replace and GoTo Commands – **Working with Graphics:** Working with Basic Graphic Objects – Capturing a Screenshot – Removing Background from an Image.

(6 Hours)

UNIT III

Spreadsheets: Creating a New Excel Workbook – Saving an Excel Workbook – Adding Data to Cells Adding Data using the AutoFill Feature – Modifying Cells, Rows, Columns and Worksheet – Hiding and Unhiding Rows and Columns – Wrapping Text – Changing Number Formats – Adding Border to Cells – Applying Conditional Formatting – Inserting Data Bars – Renaming a Worksheet.

(6 Hours)

UNIT IV

Working with Tables and Charts: Working with Tables – Creating a Pivot Table – Working with Excel Sparklines and Slicers – Working with Charts – Working with Formulas.

(6 Hours)

UNIT V

PowerPoint: Creating a Presentation – Saving a Presentation – Adding and Removing Slides – Adding a Title and Subtitle to a Slide – Adding Text to a Slide using Textboxes – Changing the Layout of a Slide – Applying Background to Slide – Applying Themes to a Presentation – Working with Audio Clips and Videos.

(6 Hours)

TEXT BOOKS

1. V.Rajaraman, Neeharika Adabala (2015). “Fundamentals of Computers” Sixth Edition, PHI Learning Private Limited.
2. Kogent Learning Solutions Inc. (2015). “Office 2013 in Simple Steps”, Dreamtech Press.

BOOK	UNIT	CHAPTER	PAGE No.
I	I	2	16-26
		3	31-48
II	II	2	24-41, 46-54
		3	61-70, 74-76
	III	128-154, 158	
	IV	6	163-192
		7	193-202
	V	8	217-227
		9	243-251, 255-269

REFERENCE BOOKS

1. Peter Norton, Introduction to Computers, Tata McGraw Hill.
2. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, Microsoft 2003, TataMcGraw Hill.

WEB RESOURCES

1. <https://www.udemy.com/course/office-automation-certificate-course/>
2. <https://www.javatpoint.com/automation-tools>

PO/CO Course Code 24UDSN21	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3	2	2	2	2	-	-
CO2	3	2	2	2	2	-	-
CO3	3	3	2	2	3	1	-
CO4	3	1	1	2	3	2	-
CO5	3	3	1	2	3	2	-

Strong (3) Medium (2) Low (1)

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Semester II	ADVANCED EXCEL PRACTICAL	Hours/Week: 2	
SEC - 2		Credits: 2	
Course Code 24UDSS21P		Internal 40	External 60

Course Outcomes:

On completion of the course, students will be able to

- CO1:** write programs to develop worksheets with advanced excel function. [K2]
- CO2:** write programs to develop worksheets with lookup functions, what if analysis, charts, pivot table and visualize as pivot charts. [K2]
- CO3:** build worksheets using advanced concepts and completion of the record work. [K3]
- CO4:** demonstrate formatting, mathematical, logical, decision making, statistical and advanced filtering concepts. [K3]
- CO5:** perform referencing, lookup, what-if scenarios and data analysis with pivot tables and visualize the results as charts. [K3]

Develop worksheets for the following concepts

1. Absolute and Relative Referencing
2. Logical Functions
3. Decision Making
4. Conditional Formatting
5. Statistical Functions
6. Mathematical Functions
7. Data & Time functions
8. What If Analysis
9. Look Up Functions
10. Match and Index Lookup Function

11. Advanced Filtering
12. Chart Design and Sparklines
13. Pivot Table Design and Pivot Charts

Course Code 24UDSS21P	PO1		PO2		PO3	PO4	PO5		PO6	PO7
	PSO 1.a	PSO 1.b	PSO 2.a	PSO 2.b	PSO 3	PSO 4	PSO 5.a	PSO 5.b	PSO 6	PSO 7
CO1	2	2	3	2	2	2	3	2	2	-
CO2	2	2	3	2	2	2	3	2	2	-
CO3	2	2	3	2	2	2	3	2	2	-
CO4	2	2	3	2	2	2	3	2	2	-
CO5	3	2	3	3	3	3	3	3	3	1

Strong (3) Medium (2) Low (1)

Mrs. P. Aruna Devi
Head of the Department

Ms. A. Dhivya
Course Designer