

## **General Foundation Papers**

Programme	B. Sc. Computer Science				
Course Code	CSC1FM105				
Course Title	Data Analysis and Visualisation Through Spread sheets				
Type of Course	<b>MDC</b>				
Semester	I				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	<ul style="list-style-type: none"> <li>● Basic understanding of computers</li> <li>● Familiarity with basic mathematical operations</li> </ul>				
Course Summary	This course provides a comprehensive introduction to Spreadsheets, focusing on understanding formulas, functions, data organization, analysis techniques, and data visualization. Participants will gain skills in spreadsheet management, data cleansing, analysis, and visualization using Excel's various tools and features.				

### Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will demonstrate proficiency in managing spreadsheets, including creating, formatting, and manipulating data within Excel workbooks. They will be able to effectively navigate Excel's interface and utilize toolbars.	U	P	Instructor-created exams / Quiz
CO2	Learners will understand the importance of data organization and cleansing in Excel. They will be able to import, export, filter, sort, validate, and remove duplicates from datasets. Students will develop skills to ensure data integrity and consistency, enhancing their ability to work with clean and organized data sets.	U	P	Instructor-created exams/ Home Assignments
CO3	Participants will acquire advanced data analysis skills like pivot	Ap	P	Instructor-created exams

	tables, what-if analysis, and goal seek. They will be able to apply various Excel functions and tools to perform complex calculations, analyze trends, and make informed decisions based on data analysis.			
CO4	Students will gain proficiency in data visualization techniques using Excel. They will be able to create a variety of charts, design pivot charts, dashboards for effective data analysis. Additionally, learners will be able to implement form controls for interactive data manipulation in their visualizations.	Ap	P	Instructor-created exams
CO5	Learners will develop skills in advanced features of Excel like macros, protect data sheets and workbooks, utilize split, freeze, and hide options effectively, incorporate add-ins for extended functionalities, and manage printing options in Excel for professional presentation of data.	Ap	P	Instructor-created exams
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)  # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P)  Metacognitive Knowledge (M)</p>				

### Detailed Syllabus:

Module	Unit	Content	Hrs (36+9)	Marks (50)
<b>I</b>	<b>Introduction to Excel &amp; Understanding Formulas, Functions</b>		<b>9</b>	<b>15</b>
	1	Features of Spreadsheet	1	
	2	Parts of Excel Window, Tool bars, Work sheet and Work book, Insertion and Deletion of cells, columns, rows	2	
	3	Formatting in Excel (Merge, Warp, Font Formatting, Number Formatting, Borders and Shading, Colouring)	2	
	4	Range, Autofill, Autosum, Relative, Absolute and Mixed Referencing in Excel, Linking data between worksheets	2	
	5	Formulas and Functions in Excel: Use of Formula Bar, Functions: SUM,ROUND, CEIL, FLOOR,IF, AND,	2	

		OR,AVERAGE, MIN, MAX ,COUNT, COUNTIF, SUMIF, VLOOKUP,HLOOKUP		
<b>II</b>	<b>Cleansing and Organising Data in Excel</b>		<b>9</b>	<b>10</b>
	6	Importance of Data Cleansing and Organisation	1	
	7	Data Import and Export	2	
	8	Filtering and Sorting	2	
	9	Data Validation and remove Duplicates	1	
	10	Group, Ungroup, Subtotal	2	
	11	Conditional Formatting – Highlight Cell Rules, Top/Bottom Rules	1	
<b>III</b>	<b>Advanced Techniques for Data Analysis</b>		<b>8</b>	<b>10</b>
	12	Features of Pivot table	1	
	13	Pivot Table creation	2	
	14	What-if Analysis	2	
	15	Goal Seek	2	
	16	Watch Window	1	
<b>IV</b>	<b>Data Visualisation Techniques</b>		<b>10</b>	<b>15</b>
	17	Creating Charts, Different types of charts	2	
	18	Formatting Chart Objects, Changing the Chart Type, Showing and Hiding the Legend, Showing and Hiding the Data Table	2	
	19	Pivot Chart	2	
	20	Dashboards	1	
	21	Form Controls	3	
<b>V</b>	<b>Open Ended Module: More about Excel</b>		<b>9</b>	
	<ol style="list-style-type: none"> <li>1. Recording and Running Macros</li> <li>2. Protecting Data Sheets and Workbooks</li> <li>3. Split, Freeze and Hide options</li> <li>4. Add-ins</li> <li>5. Printing options in Excel</li> </ol>			

## References

1. "Excel 2019 Bible" by Michael Alexander and Richard Kusleika
2. "Excel Formulas & Functions For Dummies" by Ken Bluttman and Peter Aitken

3. “Excel with Microsoft Excel: Comprehensive & Easy Guide to Learn Advanced MS Excel” by Naveen Mishra

**Assessment Rubrics:**

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Final Exam

Programme	B. Sc. Computer Science				
Course Code	CSC2FM106				
Course Title	Digital Empowerment through Ethical Standards				
Type of Course	<b>MDC</b>				
Semester	II				
Academic Level	100 – 199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	3	3	-	-	45
Pre-requisites	Basic understanding of computers				
Course Summary	This course explores the evolution from pre-digital challenges to the current digital landscape, covering historical milestones, key technologies, and the vision of Digital India. It emphasizes the benefits and importance of digital revolution while addressing ethical and security considerations. Participants engage with digital tools for personal and professional growth and examine case studies on digital infrastructure, missions, and services to understand real-world applications.				

### Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Students will be able to analyze the challenges of the pre-digital age and comprehend the importance and benefits of digital revolution, facilitating a deeper understanding of technological evolution.	An	F	Instructor-created exams / Quiz
CO2	Participants will gain familiarity with key digital technologies like Cloud Computing, IoT, AI, and Blockchain, equipping them with the knowledge to identify their applications and potential benefits in different sectors.	U	C	Instructor-created exams/ Home Assignments
CO3	Students will develop insights into Digital India initiatives and emergence of Kerala as Digital Society	U	C	Instructor-created exams
CO4	Through exploration of digital tools	Ap	P	Instructor-

	for personal and professional growth, students will enhance their digital literacy and ability in utilizing tools for data sharing, online learning, networking, and content creation, empowering them to thrive in the digital age.			created exams
CO5	Learners will become aware of ethical and security considerations in the digital age, including privacy concerns, Intellectual Property Rights, key terminologies related to cyber security, and an introduction to cyber laws in India, fostering responsible digital citizenship.	U	C	Instructor-created exams
CO6	Students will analyze real-world case studies of digital infrastructure projects, digital missions, and digital services to demonstrate a comprehensive understanding of the practical applications and implications of digital technologies in various contexts, fostering critical thinking and strategic decision-making skills in digital transformation initiatives.	An	C	Instructor-created exams
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)  # - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P)  Metacognitive Knowledge (M)</p>				

### Detailed Syllabus:

Module	Unit	Content	Hrs	Marks
			<b>36+9</b>	<b>(50)</b>
<b>I</b>	<b>Transition to Digital World</b>		<b>7</b>	<b>8</b>
	1	Challenges of Pre-Digital Age	1	
	2	Importance and Benefits of Digital Revolution	2	
	3	Key concepts: digitization, digitalization, digital transformation	1	
	4	Introduction to Key Digital Technologies: Cloud Computing, IoT, AI, Block Chain	3	

<b>II</b>	<b>Perspective of Digital India &amp; Digital Innovations in Kerala</b>		<b>11</b>	<b>15</b>
	5	Understanding Digital India: Concept, Objectives, and Evolution	1	
	6	Overview of Digital Infrastructure: Broadband Connectivity, Digital Literacy, and Access to Information	2	
	7	Vision of Digital India: DigiLocker, E-Hospitals, e-Pathshala, BHIM, , e-Health Campaigns	3	
	8	Kerala-Emergence as Digital Society : Internet & Mobile Penetration in Kerala, 4 Pillars of Digital Emergence in Kerala (Akshaya Project, IT@School Project, Digital Infrastructure Availability, State Data Centre & allied Applications),	2	
	9	Role of K-DISC in Digital Empowerment	1	
	10	Kerala State IT Mission: Core IT Infrastructure, e-Governance Applications, Service Delivery Platforms,	2	
	<b>III</b>	<b>Digital Tools for Personal and Professional Growth</b>		<b>9</b>
11		Digital Tools for Data Sharing: Google Drive, Google Sheets	2	
12		Digital Tools for Data Sharing: Google Docs, Google Classroom	3	
13		Online learning platforms and resources (e.g., Coursera, Khan Academy, MOOCs, Duolingo)	2	
14		Networking Tools: LinkedIn	1	
15		Content Creation and Management: Canva	1	
<b>IV</b>	<b>Ethical and Security Considerations in the Digital Age</b>		<b>9</b>	<b>15</b>
	16	Understanding privacy in the digital age	1	
	17	Legal and ethical considerations in data collection and processing: Intellectual Property Rights (IPR)	2	
	18	Key Terminologies: Cyber Security, Cyber Crime, Cyber Attack, Cyber Espionage, Cyber Warfare	2	
	19	Authentication, Authorisation	1	
	20	Cyber Crimes and Classification	2	
	21	Introduction to Cyber Laws in India	1	
<b>V</b>	<b>Open Ended Module: Case Study (One from each set)</b>		<b>9</b>	
	1	Case Study on Digital Infrastructure Projects: (Bharat Broadband Network (BBNL) , Submarine Cable Project, Google Data Center)	3	
	2	Case Study on Digital Mission:	3	



		(Digital Literacy Missions in Kerala, SmartDubai Project, China's Digital Silk Road)		
	3	Case Study on Digital Services: (MyGov.in , Moodle LMS, Digital Payment Services)	3	

### References

1. "Digital India Importance Needs and Values" by S K Kaushal
2. "Cyber Security in India: Government, Law Enforcement and Corporate Sector" by Vipin M. Chaturvedi and Shivani Kapoor
3. "Information Security: Principles and Practices in Indian Context" by R.S. Pressman, G. Sharma, and G. Sridhar
4. "Introduction to Computer Security" by Michael Goodrich and Roberto Tamassia
5. <https://kdisc.kerala.gov.in/>
6. <https://itmission.kerala.gov.in/>

### Assessment Rubrics:

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Final Exam

Programme	B. Sc. Computer Science				
Course Code	CSC1MN106				
Course Title	Computer Fundamentals with MS Excel,SPSS				
Type of Course	<b>Minor</b>				
Semester	I				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	<ol style="list-style-type: none"> <li>1. Fundamental Mathematics Concepts</li> <li>2. Basic computer knowledge</li> </ol>				
Course Summary	The course provides enough understanding of computer fundamentals, MS Excel, and SPSS. Students learn basic computing concepts, data entry, manipulation, and analysis in Excel and statistical analysis techniques using SPSS.				

#### Course Outcomes (CO):

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand fundamental concepts and skills essential for understanding and operating a computer system	U	C	Instructor-created exams / Seminar Presentation/ Instructor-created exams/ Quiz
CO2	Execute fundamental data input and manipulation tasks in MS Excel	C	P	Assignment / Instructor-created exams
CO3	Perform essential data input and manipulation activities within SPSS.	C	P	Assignment / Instructor-created exams

CO4	Implement Data analysis using SPSS	Ap	P	Hands-on practical sessions
CO5	Implement Data analysis using MS EXCEL	Ap	P	Hands-on practical sessions
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)</p> <p># - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)</p>				

### Detailed Syllabus:

Module	Unit	Content	Hrs	Marks
<b>I</b>	<b>Introduction to computer system</b>		<b>12</b>	<b>19</b>
	1	Features, Limitations, Types	1	
	2	Number systems and character representation, Binary arithmetic	2	
	3	Basic components of computer -	2	
	4	Computer software types, Utility Program, Operating systems functions and types	2	
	5	Input and output devices ,Primary memory and secondary storage	2	
	6	Overview of Emerging Technologies: cloud computing, big data, data mining, mobile computing and embedded systems	2	
	7	Use of Computers in Education and Research: Data analysis, Heterogeneous storage, e-Library, Google Scholar, Domain specific packages such as SPSS, MATLAB, Mathematica etc	1	
<b>II</b>	<b>Introduction to Spread Sheet</b>		<b>10</b>	<b>18</b>
	7	MS Excel - Creating & Editing Worksheet, Formatting and Essential Operations	2	
	8	Formulas and Functions, Charts	2	
	9	Advanced features: Vlookup, Hlookup, Index, Address, Match, Offset, Transpose, Conditional Formatting, Data Sorting and Filtering	3	

	10	Pivot table & Pivot Chart	2	
	11	Linking and Consolidation	1	
<b>III</b>	<b>Introduction to SPSS</b>		<b>12</b>	<b>18</b>
	12	Features – Data View – Variable View – Output Viewer Window – Syntax Editor Window -	2	
	13	Open data file , Save , import from other data source ,data entry , labelling for dummy numbers	2	
	14	Recode in to same variable, Recode in to different variable, Transpose of data, Insert variables and cases	2	
	15	Merge variables and cases, Split, Select cases, Compute total scores	2	
	16	Table looks – Changing column - font style and sizes	2	
	17	Diagrammatic representation	2	
<b>IV</b>	<b>Data Analysis Using Ms Excel &amp; SPSS</b>		<b>12</b>	<b>15</b>
	18	Estimation of mean, median and mode- Standard deviation and coefficient of variation.	3	
	19	Descriptive statistics, Parametric tests t-test (paired or unpaired), ANOVA (one-way- two way)	3	
	20	Pearson rank correlation, Linear regression	2	
	21	Non parametric tests: Mann Whitney U test, Wilcoxon signed rank test .	2	
	22	Kruskall Wallis test ,Chi- Square test5x	2	

<b>V</b>	<b>Hands-on Word Processor and Presentation Tool:</b>		<b>30</b>	
	<b>Practical Applications, Case Study and Course Project</b>			
		<p>EXCEL</p> <ol style="list-style-type: none"> <li>1. Create a chart</li> <li>2. Measures of Central Tendency &amp; Descriptive Statistics</li> <li>3. Parametric Tests T-Test</li> <li>4. Correlation &amp; Linear Regression</li> <li>5. Chi- Square Test</li> </ol> <p>SPSS</p> <ol style="list-style-type: none"> <li>6. Descriptive Statistics</li> <li>7. Paired –Samples T Test</li> <li>8. One-Way ANOVA</li> <li>9. Correlation &amp; Linear Regression</li> <li>10. Chi- Square Test</li> </ol>	20	
		<p>Case study:</p> <p>Data analysis study on publically available biological data like bacterial growth analysis.</p>		

Reference Books:

1. A. Goel, Computer Fundamentals, Pearson Education, 2010.
2. P. Aksoy, L. DeNardis, Introduction to Information Technology, Cengage Learning, 2006
3. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers, 2007
4. Excel Functions and Formulas Paperback by Bernd Held
5. Microsoft Excel 2010 Data Analysis and Business Modeling Paperback by Winsto
6. Jeremy J. Foster (2001). Data analysis using SPSS for windows. New edition. Versions 8-10. Sage publications. London.
7. Michael S. Louis – Beck (1995). Data analysis an introduction, Series: quantitative applications in 1

8. the social sciences. Sage, Publications. London.

**Mapping of COs with PSOs and POs :**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO1	PO2	PO3	PO4	PO5	PO6
CO 1	2	2	1	-	2	3						
CO 2	-	-	2	-	2	3						
CO 3	-	-	2	-	2	3						
CO 4	-	-	2	-	2	3						
CO 5	-	-	2	-	2	3						

**Correlation Levels:**

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

**Assessment Rubrics:**

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

**Mapping of COs to Assessment Rubrics :**

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓	✓	✓
CO 5	✓	✓	✓	✓

Programme	B. Sc. Computer Science				
Course Code	CSC2MN106				
Course Title	Fundamentals of System Software, Networks and DBMS				
Type of Course	<b>Minor</b>				
Semester	II				
Academic Level	100-199				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Basic understanding of computer operation  Basic Science fundamentals				
Course Summary					
The course covers essential concepts in operating systems, network protocols, and database management systems, providing foundational knowledge for computer science and IT careers.					

**Course Outcomes (CO): .**

CO	CO Statement	Cognitive Level*	Knowledge Category#	Evaluation Tools used
CO1	Understand System Software principles	U	C	Instructor-created Exams / Assignment/ Viva Voce
CO2	Understand basic concepts of operating systems functions	U	C	Instructor-created Exams / Assignment/ Viva Voce
CO3	Interpret the concepts of data communications system and its components	An	C	Instructor-created Exams / Assignment/ Viva Voce

CO4	Acquire a good understanding of the architecture and functioning of Database Management Systems.	U	C	Instructor-created Exams / Assignment/ Viva Voce
CO5	Construct basic SQL queries to retrieve and manipulate data as required.	C	P	Practical/Exam/ Assignments
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)</p> <p># - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)</p>				

#### Detailed Syllabus:

Module	Unit	Content	Hrs	Marks
<b>I</b>			<b>11</b>	<b>18</b>
	<b>1</b>	Overview of System software and Application Software	1	
	<b>2</b>	System Software Components: operating systems, compilers, and device drivers.	1	
	<b>3</b>	Compilers: Classification of programming languages and language processors	2	
	<b>4</b>	Types of Operating System	3	
	<b>5</b>	Functions of Operating System	<b>3</b>	
<b>II</b>		<b>Computer networks</b>	<b>12</b>	<b>18</b>
	<b>6</b>	Goals of networking	1	
	<b>7</b>	network topologies	1	
	<b>8</b>	types of networks (LAN, MAN and WAN)	1	
	<b>9</b>	Communication Media-Guided (Twisted Pair, Coaxial Cable and Fiber Optic) and	2	
	<b>10</b>	Communication Media -Unguided (microwave, satellite)	2	
	<b>11</b>	Network OSI model- 7 layers	3	



	12	Internet Layer- 5 layers	2	
<b>III</b>	Database Management Systems		<b>12</b>	<b>18</b>
	13	Introduction to DB and DBMS:Definition	1	
	14	Advantages of DBMS	1	
	15	Three schema architecture of DBMS(External,Conceptual and internal)	1	
	16	Data Independence: Logical data independence and Physical data independence	2	
	17	Structure of Database Management System	2	
	18	Data models (Relational Model,Network Model. c. The Hierarchical Model. Object-Oriented Model)	5	
<b>IV</b>	<b>Structured query language - Create, insert, select, update, delete, alter, drop commands</b>		<b>10</b>	<b>16</b>
	19	DML	2	
	20	DDL	3	
	21	Constraints	2	
	22	Operators and functions	3	
<b>V</b>	<b>Practical Applications, Case Study and Course Project</b>		<b>30</b>	
	1	<p><b>1. Create Database:</b></p> <ul style="list-style-type: none"> <li>● Write a SQL query to create a new database in MySQL.</li> </ul> <p><b>2. Create Table:</b></p> <ul style="list-style-type: none"> <li>● Create tables with various data types for columns such as INT, VARCHAR, DATE, etc.</li> <li>● Include constraints such as PRIMARY KEY, FOREIGN KEY, UNIQUE, NOT NULL, etc.</li> </ul> <p><b>3. Insert Data:</b></p> <ul style="list-style-type: none"> <li>● Insert records into tables using the INSERT INTO statement.</li> <li>● Practice inserting data into tables with</li> </ul>	20	

different data types.

**4. Retrieve Data:**

- Write SELECT queries to retrieve data from tables.
- Retrieve specific columns using SELECT.
- Filter rows using the WHERE clause.

**5. Update Data:**

- Update existing records in a table using the UPDATE statement.
- Modify records based on specific conditions using the WHERE clause.

**6. Delete Data:**

- Delete records from a table using the DELETE statement.
- Remove records based on specific conditions using the WHERE clause.

**7. Sorting and Filtering:**

- Sort the result set using ORDER BY clause.
- Filter records using various conditions such as equality, comparison operators, and logical operators.

**8. Grouping and Aggregation:**

- Group rows using GROUP BY clause.
- Use aggregate functions like COUNT(), SUM(), AVG(), MIN(), and MAX().

**9. String Functions:**

- Use string functions like CONCAT(), SUBSTRING(), UPPER(), LOWER(), etc.
- Manipulate string data in SELECT queries.

**10. Date and Time Functions:**

- Use date and time functions like DATE(),

		<p>NOW(), YEAR(), MONTH(), DAY(), etc.</p> <ul style="list-style-type: none"> <li>● Work with date and time data in SELECT queries.</li> </ul> <p><b>11. Mathematical Functions:</b></p> <ul style="list-style-type: none"> <li>● Use mathematical functions like ROUND(), CEIL(), FLOOR(), ABS(), etc.</li> <li>● Perform mathematical operations on numeric data in SELECT queries.</li> </ul> <p><b>12. Conditional Functions:</b></p> <ul style="list-style-type: none"> <li>● Use conditional functions like IF(), CASE statement, etc.</li> <li>● Implement conditional logic in SELECT queries.</li> </ul>		
		<p><b>Case study:</b></p> <ol style="list-style-type: none"> <li><b>1. Library Management System:</b> Track books, borrowers, and transactions, facilitating library operations efficiently.</li> <li><b>2. Student Information System:</b> Manage student records, courses, grades, and attendance for academic institutions.</li> <li><b>3. Employee Database System:</b> Store employee details, salaries, and performance evaluations, streamlining HR processes for companies.</li> </ol>	10	

### References

- 1 P. K Sinha, Fundamentals of Computers
2. D. M Dhamdhere, Operating System: A concept based Approach
3. Behrouz A Forouzan, Data Communication & Networking, MC Graw Hill
4. "Learning MySQL: Get a Handle on Your Data" by Seyed M.M. (Saied) Tahaghoghi and Hugh E. Williams.

### Mapping of COs with PSOs and POs:

	PSO 1	PSO 2	PSO 3	PSO 4	PS O5	PS O6	PO 1	PO 2	PO 3	PO 4	PO 5	P O 6
CO 1	-	2	1	-	1	3						
CO 2	-	2	1	-	1	3						
CO 3	-	2	1	-	1	3						
CO 4	-	2	1	-	1	3						
CO 5	-	2	1	-	1	3						
CO 6	-	-	2	-	1	3						

**Correlation Levels:**

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

**Assessment Rubrics:**

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)
- Final Exam (70%)

**Mapping of COs to Assessment Rubrics:**

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓	✓		✓
CO 2	✓	✓		✓
CO 3	✓	✓		✓
CO 4	✓	✓		✓
CO 5	✓	✓		✓
CO 6	✓	✓		✓

Programme	B. Sc. Computer Science				
Course Code	CSC3MN206				
Course Title	Python Programming				
Type of Course	<b>Minor</b>				
Semester	III				
Academic Level	200-299				
Course Details	Credit	Lecture per week	Tutorial per week	Practical per week	Total Hours
	4	3	-	2	75
Pre-requisites	Have an understanding about algorithms and flowchart				
Course Summary	This course covers fundamentals of Python programming and teaches essential tools for data manipulation and analysis				

**Course Outcomes (CO):**

CO	CO Statement	Cognitive Level*	Knowledge	Evaluation Tools used
CO1	Understand the basic concepts of Python programming	U	C	Instructor- created exams / Quiz
CO2	Apply problem- solving skills using different control structures and loops	Ap	P	Coding Assignments/ Code reading and review
CO3	Implement simple Python programs to solve basic computational problems and GUI	Ap	P	Coding Assignments/ exams

	applications			
CO4	Analyze the various data structures and operations on it using Python	An	P	Instructor-created exams / Case studies
CO5	Apply modular programming using functions	Ap	C	Instructor- created exams / Quiz
CO6	Identify the necessary Python packages in the domain and create simple programs with it	U, Ap	C, P	Coding
<p>* - Remember (R), Understand (U), Apply (Ap), Analyse (An), Evaluate (E), Create (C)</p> <p># - Factual Knowledge(F) Conceptual Knowledge (C) Procedural Knowledge (P) Metacognitive Knowledge (M)</p>				

**Detailed Syllabus:**

Module	Unit	Content	Hrs	Marks
I		Problem solving strategies	12	15
	1	Problem analysis – formal definition of problem	1	
	2	Top- down design – breaking a problem into sub problems	2	
	3	Overview of the solution to the sub problems by writing step by step procedure (algorithm)	2	
	4	Representation of procedure by flowchart	1	
	5	Implementation of algorithms – use of procedures to achieve modularity.	2	

	6	Examples for algorithms and flow charts - At least ten problems Starting with non-numerical examples, and numeric problems like factorial, largest	4	
II	<b>Introduction to Python</b>		<b>13</b>	<b>19</b>
	7	Variables, Data types	2	
	8	Expressions and Statements, Evaluation of Expressions	2	
	9	Operators and Operands, Order of precedence, Boolean Expressions and logical operators, String Operations	2	
	10	Control statements, Conditional and alternative executions, Nested Conditionals, Recursion	2	
	11	Iteration - Multiple Assignment, While Statement	2	
	12	Tables, Two Dimensional Tables	2	
	13	Encapsulation and generalization, Local Variables	1	
III	<b>Introduction to NumPy</b>		<b>12</b>	<b>18</b>
	14	The Basics of NumPy Arrays, Computation on NumPy Arrays: Universal Functions	3	
	15	Aggregations: Min, Max, and Everything in Between	2	
	16	Computation on Arrays: Broadcasting, Comparisons, Masks, and Boolean Logic.	2	
	17	Fancy Indexing, Sorting Arrays	2	
	18	Structured Data: NumPy's Structured Arrays.	2	
	<b>Functions</b>		<b>8</b>	<b>18</b>
		Functions, Calling functions, Type conversion and coercion, composition of functions	2	

IV	19			
	20	Mathematical functions, User-defined Functions, Parameters and Arguments.	2	
	21	Strings and Lists – string traversal and comparison with List operations with Examples,	2	
	22	Tuples and dictionaries – Operations and Examples.	2	
	<b>Hands-on Data Structures: Practical Applications, Case Study and Course Project</b>		<b>30</b>	
<b>Design programs from the concepts listed below. Select the topics and programs suited for your domain</b>				
V	1	<ul style="list-style-type: none"> <li>• Program to demonstrate basic data types in python</li> <li>• Program to demonstrate operators in python.</li> <li>• A cashier has currency notes of denominations 10, 50, and 100. If the amount to be withdrawn is input through the keyboard using input () function in hundreds, find the total number of currency notes of each denomination the cashier will have to give to the withdrawer.</li> <li>• Program to demonstrate list and tuple in python.</li> <li>• A library charges a fine for every book returned late. For first 5 days the fine is 50 paisa, for 6-10 days fine is one rupee and above 10 days fine is 5 rupees. If you return the book after 30 days your membership will be cancelled.</li> <li>• Write a program to accept the number of days the member is late to return the</li> </ul>		



		<p>book and display the fine or the appropriate message</p> <ul style="list-style-type: none"> <li>• Write a Program for checking whether the given number is an even number or not.</li> <li>• Write a Python program to print Fibonacci series.</li> <li>• Write function to compute gcd and lcm of two numbers.</li> <li>• Using a for loop, write a program that prints out the decimal equivalents of <math>1/2</math>, <math>1/3</math>, <math>1/4</math>.</li> <li>• Write a program to calculate overtime pay of 10 employees. Overtime is paid at the rate of</li> <li>• Rs.12.00 per hour for every hour worked above 40 hours. Assume that employee do not work for fractional part of an hour</li> <li>• Write a function reverse to reverse a list without using the reverse function.</li> </ul>		
	2	<p><b>Case study(Examples):</b></p> <ul style="list-style-type: none"> <li>● Design a basic calculator application in Python that can perform addition, subtraction, multiplication, and division.</li> <li>● Analysis of Antibiotic Resistance - Utilize publicly available datasets on antibiotic resistance in bacteria. Use NumPy to perform basic statistical analysis, such as calculating mean, median, and standard deviation of minimum inhibitory concentrations (MICs) for different antibiotics</li> </ul>		

Reference Books:

1. Downey, A. et al., How to think like a Computer Scientist: Learning with Python, John Wiley,2015
2. Lambert K. A., Fundamentals of Python - First Programs, Cengage Learning India, 2015
3. Sprankle , M., Problem Solving & Programming Concepts, Pearson India

**Mapping of COs with PSOs and POs :**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PO 1	PO2	PO3	PO4	PO5	PO6
CO 1	-	1	2	3	2	2						
CO 2	-	1	2	2	-	-						
CO 3	-	-	2	3	2	2						
CO 4	-	-	2	2	3	3						
CO 5	-	-	3	3	3	3						
CO 6	-	-	2	3	3	3						

**Correlation Levels:**

Level	Correlation
-	Nil
1	Slightly / Low
2	Moderate / Medium
3	Substantial / High

**Assessment Rubrics:**

- Quiz / Assignment/ Quiz/ Discussion / Seminar
- Midterm Exam
- Programming Assignments (20%)

- Final Exam (70%)

**Mapping of COs to Assessment Rubrics :**

	Internal Exam	Assignment	Project Evaluation	End Semester Examinations
CO 1	✓			✓
CO 2	✓	✓	✓	✓
CO 3	✓		✓	✓
CO 4	✓	✓	✓	✓
CO 5	✓			✓
CO 6	✓			✓