

**AUXILIUM COLLEGE (Autonomous)**  
(Accredited by NAAC with A+ Grade with a CGPA of 3.55 out of 4 in the 3rd Cycle)  
Gandhi Nagar, Vellore-632 006

**Department of Computer Applications (B.C.A.) - (UG)**

**OUTCOME BASED EDUCATION - 2020**

(Effective for the Batch of Students Admitted from 2020-2021)

**II YEAR - SKILL BASED ELECTIVE**

**USCSB420 - DESIGN AND ANIMATION**

Year/ Sem	Course Code	Title of the Course	Course Type	Course Category	H/ W	Credits	Marks
II/IV	USCSB420	Design and Animation	Practical	Skill Based Elective	2	2	25+35

**COURSE OBJECTIVES**

1. To provide knowledge about the latest computer animations like Photoshop and Flash.
2. Enables the students to develop and manage pictures, changing the colors, animation and different Tweening options.
3. Identify the categories of Tools and Identify each tools corresponding keyboard shortcut.
4. Design, Manipulate and customize palettes.
5. To create animated graphics, add sound and interactivity.

**COURSE SYLLABUS**

**Unit I**

**Hours: 6**

- 1.1 Introduction to Multimedia (K1)
- 1.2 The Elements of Multimedia System (K2)
- 1.3 Benefits of using Multimedia (K2)
- 1.4 Multimedia Platforms: Multimedia Hardware (K2)
- 1.5 System Software - Future Directions. (K1,K2)
- 1.6 Storage for Multimedia: Choice of Storage - Magnetic Media - Optical Media (K3)

**Unit II**

**Hours: 5**

- 2.1 Introduction - Bitmaps and Vectors (K1)
- 2.2 Toolbox: Selection tools - Painting tools - Editing tools - Retouching Tools (K2)
- 2.3 Colours setting (K3)
- 2.4 Layers: Working with Layers - Layer Styles - Locking Layers - Merging Layers (K2)
- 2.5 Managing Layers Components (K2)
- 2.6 Palettes(K1)

**Unit III**

**Hours :5**

- 1.1 Introduction flash (K1)



III / V	UECAA20	Resource Management Techniques	Theory	Core Elective	5	3	40+60
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### COURSE OBJECTIVES

1. It will enable the students to learn various research techniques and to find out the solution for the critical problems.
2. To acquiring, allocating and managing the resources.
3. To ensure that internal and external resources are used effectively on time and to budget.
4. To process preplanning, scheduling and allocating the resources to maximize efficiency.
5. To aim smoothing problems using PERT and CPM model.

### COURSE LEARNING OUTCOMES

The Learners will be able to

1. Identify the role of computer in Operational Research techniques.
2. Apply linear programming to solve real-life applications.
3. Analyze Transportation Model and Solve optimization problems using dual simplex method.
4. Describe Assignment Model and Travelling Salesman Problem, Sequencing problem
5. Use PERT and CPM for problems in project management

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	H	L	H	L	H
CO2	L	M	M	L	M	M
CO3	H	M	L	H	M	L
CO4	M	M	L	M	L	L
CO5	L	L	M	M	M	L

CO/PSO	PSO					
	1	2	3	4	5	6
CO1	H	M	L	H	M	H
CO2	M	H	H	L	H	M
CO3	H	M	L	M	H	M
CO4	H	L	H	M	H	H
CO5	L	M	H	H	L	H

Low - L, Medium - M, High – H

### COURSE SYLLABUS

**Unit I: Introduction and Mathematical Formulation****Hours: 15**

- 1.1 Operations research: Definition (K1, K2, K3, K4)
- 1.2 Scope, Characteristics (K1, K2, K3, K4)
- 1.3 Models of operations research: Iconic (K1, K2, K3, K4)
- 1.4 Analogue, Symbolic model (K1, K2, K3, K4)
- 1.5 Linear programming (K1, K2, K3, K4)
- 1.6 Formulation. (K1, K2, K3, K4)

**Unit II: Linear Programming****Hours: 15**

- 2.1 Linear Programming: Graphical method (problems: part I) (K1, K2, K3, K4)
- 2.2 Graphical method (problems: part II) (K1, K2, K3, K4)
- 2.3 Graphical method (problems: part III) (K1, K2, K3, K4)
- 2.4 Regular simplex Method (problems: part I) (K1, K2, K3, K4)
- 2.5 Regular simplex Method (problems: part II) (K1, K2, K3, K4)
- 2.6 Regular simplex Method (problems: part III) (K1, K2, K3, K4)

**Unit III: Linear Programming****Hours: 15**

- 3.1 Linear programming: Big 'M' method (problems part I) (K1, K2, K3, K4)
- 3.2 Big 'M' method (problems part II) (K1, K2, K3, K4)
- 3.3 Big 'M' method (problems part III) (K1, K2, K3, K4)
- 3.4 Duality (problems part I) (K1, K2, K3, K4)
- 3.5 Duality (problems part II) (K1, K2, K3, K4)
- 3.6 Duality (problems part III) (K1, K2, K3, K4)

**Unit IV: Transportation Model****Hours: 15**

- 4.1 Transportation Problem (K1, K2, K3, K4)
- 4.2 Initial basic feasible solution using North West Corner rule(K1, K2, K3, K4)
- 4.3 Initial basic feasible solution using least cost method and Vogel's approximation method (K1, K2, K3, K4)
- 4.4 Degeneracy, Unbalanced Transportation problem (K1, K2, K3, K4)
- 4.5 Maximization problem(K1, K2, K3, K4)
- 4.6 Test of Optimality using MODI method (K1, K2, K3, K4)

**Unit V: Assignment Model****Hours: 15**

- 5.1 Assignment problems (K1, K2, K3, K4)
- 5.2 Minimal assignment problems (K1, K2, K3, K4)
- 5.3 Unbalanced Assignment problems (K1, K2, K3, K4)
- 5.4 Restricted Assignment problems (K1, K2, K3, K4)
- 5.5 Maximization problem in Assignment (K1, K2, K3, K4)
- 5.6 Maximization problems in Assignment Problems (K1, K2, K3, K4)

**Book for Study:**

1. Prem Kumar Gupta and D.S. Hira, "Operations Research", Sixth Edition, S. Chand, 2014.
2. Vittal P. R - Introduction to Operations Research, 1<sup>st</sup> Edition - Margham Publishers – 1999.

3. Prof. V. Sundharesan, “Resource Management Techniques”, 7<sup>th</sup> Edition, AR Publications, 2015.

### Books for Reference:

1. Hamdy A. Taha, “Operation Research - An Introduction”, 9<sup>th</sup> Edition, Pearson, 2014.
2. Charnes A. Cooper W. and A. Henderson A., “Introduction to Linear Programming”, John Wiley and Sons, 1953.

### OER:

1. [https://www.brainkart.com/subject/Resource-Management-Techniques\\_176/](https://www.brainkart.com/subject/Resource-Management-Techniques_176/)
2. [https://books.google.co.in/books?id=OtUxEAAQBAJ&printsec=copyright&redir\\_e\\_sc=y#v=onepage&q&f=false](https://books.google.co.in/books?id=OtUxEAAQBAJ&printsec=copyright&redir_e_sc=y#v=onepage&q&f=false)

## SEMESTER V

### UECAB20 - Elective I B: Cloud Computing

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / V	UECAB20	Elective I B: Cloud Computing	Theory	Elective	5	3	40+60

### COURSE OBJECTIVES

1. Discuss the fundamental concepts in cloud computing technologies.
2. Understand the various technologies.
3. Explain the architecture and concept of different cloud models: IaaS, PaaS, SaaS
4. Analyze the fundamental and Cloud Deployment Models Course Outcomes.
5. Understand the concepts of Challenges in Cloud security.

### COURSE LEARNING OUTCOMES

The Learners will be able to

1. Understand the fundamental concepts in cloud computing technologies.
2. Analyze and integrate the cloud enabling services.
3. Analyze the architecture and concept of different cloud models: IaaS, PaaS, SaaS.
4. Understand and familiar with the deployment models.
5. Comprehend the Cloud Data Security concepts and how they are addressed with the security mechanisms.

CO/PO	PO					
	1	2	3	4	5	6
CO1	M	M	M	H	M	L
CO2	H	L	L	M	L	L
CO3	M	M	L	M	L	L
CO4	M	M	H	L	L	L

<b>CO5</b>	L	M	L	M	M	M
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<b>CO/PSO</b>	<b>PSO</b>					
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>
<b>CO1</b>	H	H	M	H	L	M
<b>CO2</b>	M	H	H	M	L	M
<b>CO3</b>	H	M	H	M	H	H
<b>CO4</b>	L	H	H	M	H	L
<b>CO5</b>	H	H	M	L	M	H

**Low – L, Medium – M, High – H**

## **COURSE SYLLABUS**

### **Unit I**

**Hours:15**

- 1.1 Introduction to Cloud Computing: Cloud Computing in Nutt shell (K2, K4)
- 1.2 Roots of Cloud Computing- Types of Clouds (K4, K6)
- 1.3 Features of a Cloud (K5)
- 1.4 Cloud Infrastructure Management (K4, K6)
- 1.5 Challenges and Risks (K4, K6)
- 1.6 Migrating in to a Cloud. (K4)

### **Unit II**

**Hours: 15**

- 1.1 Integration as a Service-Introduction (K2)
- 1.2 Onset of Knowledge Era- Evolution of SaaS (K4, K5)
- 1.3 Challenges (K4, K5)
- 1.4 Approaching the SaaS Integration- New Integration Scenarios (K4)
- 1.5 Integration Methodologies-SaaS Integration Services (K4, K5)
- 1.6 B2B Services. (K4, K6)

### **Unit III**

**Hours: 15**

- 3.1 Cloud Service Models: Infrastructure as a Service (IaaS): Introduction to IaaS, Resource Virtualization (K2, K4)
- 3.2 Server, Storage, Network. (K2, K4)
- 3.3 Case studies (K4, K5)
- 3.4 Platform as a Service (PaaS): Introduction to PaaS (K2, K4)
- 3.5 Cloud platform & Management (K2, K3)

3.6 Computation, Storage. (K3, K4)

**Unit IV**

**Hours: 15**

- 4.1 Cloud Deployment Models: Introduction (K2)
- 4.2 Public Deployment Model (K2, K4, K5)
- 4.3 Private Deployment Model (K2, K4, K5)
- 4.4 Virtual Private Deployment Model (K4, K5)
- 4.5 Hybrid Deployment Model (K4, K5)
- 4.6 Community Deployment Model. (K4, K5)

**Unit V**

**Hours: 15**

- 5.1 Scientific Applications for Cloud Environments (K2, K4, K5)
- 5.2 Building Content Delivery Networks Using Clouds (K2, K3, K4)
- 5.3 Cloud Challenges: Organizational Readiness and Change management in cloud (K2, K4)
- 5.4 Data Security in the Cloud (K4, K5)
- 5.5 Legal Issues in Cloud Computing (K4)
- 5.6 Production Readiness for Cloud Services. (K4, K5)

**Book for Study:**

- 1. Rajkumar Buyya, James Broberg and Andrzej M.goscinski, “Cloud Computing: Principles and Paradigms”, John Wiley & Sons,2010.

**Books for Reference:**

- 1. Antony T. Velte, Toby J.Velte, Robert Elsenpeter, “Cloud Computing: A Practical Approach”, Tata McGraw- Hill Pub, 2010.
- 2. Haley beard, “Cloud Computing best practices for managing and measuring processes for on-demand computing, applications and Data centers in the cloud with SLAs”, Emereo Pvt. Limited,2009.

**OER:**

- 1. <http://www.mb.net/resources/cloud-computing-resources.aspx>.
- 2. [https://www.tutorialspoint.com/cloud\\_computing/cloud\\_computing\\_tutorial.pdf](https://www.tutorialspoint.com/cloud_computing/cloud_computing_tutorial.pdf)

**SEMESTER V/VI**

**USCSG520 –SKILL BASED ELECTIVE: R PROGRAMMING**

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
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III / VI	USCSG520	Skill Based Elective: R Programming	Theory with Practical	Skill Based Elective	2	2	40+60
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## COURSE OBJECTIVES

1. Understand the usage of R programming interactive environment.
2. Understand R programming language includes functions, arrays and dataframes.
3. Describe the statistical computing includes programming in R, reading and accessing data in R.
4. Understand the concept of Meta Programming.
5. Build a simple sorting algorithm.

## COURSE SYLLABUS

### Unit I

**Hours: 6**

- 1.1 Introduction to R and R Studio. (K1, K2)
- 1.2 Basic Objects: Vector. (K2)
- 1.3 Matrix, Array. (K2, K3)
- 1.4 Lists. (K2)
- 1.5 Data Frames. (K3)
- 1.6 Functions. (K2, K3)

### Unit II

**Hours: 6**

- 1.1 Basic Expressions: Assignment Expressions. (K1, K2)
- 1.2 Conditional Expressions. (K3, K4)
- 1.3 Loop Expressions. (K3, K4)
- 1.4 Basic Objects: Object Functions (K2, K3)
- 1.5 Logical Functions. (K2, K3)
- 1.6 Math functions (K2, K3)

### Unit III

**Hours: 6**

- 1.1 Numeric Methods Statistical function. (K2, K3)
- 1.2 Family Functions. (K2, K3)
- 1.3 Working with Strings. (K2, K3)
- 1.4 Working with Data. (K2, K3)
- 1.5 Meta programming. (K2)
- 1.6 Object Oriented Programming. (K2, K3, K4)

### Unit IV

**Hours: 6**

1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n.
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.



**Unit V****Hours: 6**

1. Write a function that computes the running total of a list.
2. Write a function that tests whether a string is a palindrome.
3. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort.
4. Implement linear search.
5. Implement binary search.
6. Implement Matrices Addition, Subtraction and Multiplication

**Books for Study:**

1. Kun Ren, "Learning R. Programming, Packt Publishing" - ebooks Account, October 28, 2016.
2. Dr. Mark Gardener, "Beginning R: The Statistical Programming Language", Paperback, 2013.

**Books for Reference:**

1. Colin Gillespie, Robin Lovelace, "Efficient R Programming: A Practical Guide to Smarter Programming", O'Reilly Media, 1<sup>st</sup> Edition (October 25, 2016); eBook (2017-04-10).
2. Daniel Navarro, "Learning Statistics with R", lulu.com (2015); eBook (University of Adelaide, 2018. Updated Continuously)

**OER:**

1. [https://www.jmc.edu/econtent/ug/3202\\_R%20PROGRAM.pdf](https://www.jmc.edu/econtent/ug/3202_R%20PROGRAM.pdf)
2. [http://www.tutorialspoint.com/r/r\\_tutorial.pdf](http://www.tutorialspoint.com/r/r_tutorial.pdf)
3. [https://cran.r-project.org/doc/contrib/Paradis-rdebuts\\_en.pdf](https://cran.r-project.org/doc/contrib/Paradis-rdebuts_en.pdf)

## SEMESTER V/VI

### USCSF620 - SKILL BASED ELECTIVE: DATA ANALYTICS USING DATA VISUALIZATION TOOLS

Year /Sem	Course Code	Title of the Course	Course Type	Course Category	H/W	Credits	Marks
III / VI	USCSF620	Skill Based Elective: Data Analytics using Data Visualization	Theory with Practical	Skill Based Elective	2	2	40+60

#### COURSE OBJECTIVES

1. To understand and extend the current state of the art in data visualization.
- 4 To Understand the different data format and its graphical representation
2. To Identify the various data visualizations tools in the market and its features.
3. To provide skills present data effectively through chart, map and dashboard.
4. To Develop skills to present data effectively through chart, map and dashboard.

#### COURSE SYLLABUS

##### UNIT I

**Hours: 5**

- 1.1 Data Visualization: Introduction. (K1)
- 1.2 Benefits of Data Visualization. (K2)
- 1.3 Data Visualization Tools. (K2)
- 1.4 Features. (K2)
- 1.5 Data access from data sources. (K2)

##### UNIT II

**Hours: 5**

- 2.1 Data Transformation. (K1, K2)
- 2.2 Types of charts. (K2)
- 2.3 Bar Chart. (K1, K2)
- 2.4 Pie Chart. (K2)
- 2.5 Data Tables. (K2)
- 2.6 Scatter Chart. (K2)

##### UNIT III

**Hours: 5**

- 3.1 Time series Chart. (K2)
- 3.2 Score card. (K2)
- 3.3 Scatter Chart. (K2)
- 3.4 Bullet Chart. (K2)
- 3.5 Area Chart. (K2)
- 3.6 Heat Map. (K2)

#### **UNIT IV**

**Hours: 8**

1. Create a bar chart for the given data.
2. Create a pie chart for the given data.
3. Create a scatter chart for the given data.
4. Create a time series chart for the given data.

#### **UNIT V**

**Hours: 7**

5. Create a bullet chart for the given data.
6. Create area chart for the given data.
7. Create a heat map for the given data.

#### **Book for Study:**

1. Nathan Yau Visualize This: The FlowingData Guide to Design, Visualization, and Statistics Wiley, 1st Edition 2011.

#### **Books for Reference:**

1. Cole Nussbaumer Knaflic Storytelling with Data: A Data Visualization Guide for Business Professionals John Wiley & Sons 2015.

#### **L) OER**

1. [https://www.tutorialspoint.com/tableau/tableau\\_tutorial.pdf](https://www.tutorialspoint.com/tableau/tableau_tutorial.pdf)
2. <https://www.pdfdrive.com/tableau-books.html>
3. <http://projanco.com/Library/Learning%20Tableau%202019%20Tools%20for%20Business%20Intelligence,%20data%20prep,%20and%20visual%20analytics.pdf>