Bachelor of Computer Application			
Programme/Class:		**Year:**3 rd	**Semester:**6 th
Subject Code: BCA-302 N		**Subject Title:** Introduction to Data science	
Course out comes:		On completion of the course, the student will be able to:	
CO 1:	Understand the concept of Data Science and its evolution		
CO 2:	Explore techniques for data cleaning, data integration and transformation processes.		
CO 3:	Learn to create visual representations of data using tools like box plots, pivot tables, and heat maps.		
CO4:	Understand the concept of generalization error and its importance in model evaluation.		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	
Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0			

Unit	Topic	No. of Lectures
I	Introduction to Data Science – Evolution of Data Science – Data Science Roles – Stages in a Data Science Project – Applications of Data Science in various fields – Data Security Issues.	10
II	Data Collection and Data Pre-Processing Data Collection Strategies – Data PreProcessing Overview – Data Cleaning – Data Integration and Transformation – Data Reduction – Data Discretization.	10
III	Exploratory Data Analytics Descriptive Statistics – Mean, Standard Deviation, Skewness and Kurtosis – Box Plots – Pivot Table – Heat Map – Correlation Statistics – ANOVA.	10
IV	Model Development Simple and Multiple Regression – Model Evaluation using Visualization – Residual Plot – Distribution Plot – Polynomial Regression and Pipelines – Measures for In-sample Evaluation – Prediction and Decision Making.	10
V	Model Evaluation Generalization Error – Out-of-Sample Evaluation Metrics – Cross Validation – Overfitting – Under Fitting and Model Selection – Prediction by using Ridge Regression – Testing Multiple Parameters by using Grid Search.	10

Suggested Readings:
- Raj, Pethuru, "Handbook of Research on Cloud Infrastructures for Big Data Analytics", IGI Global.
- Cathy O'Neil and Rachel Schutt, "Doing Data Science", O'Reilly.

Suggested equivalent online courses:
  ☐ https://onlinecourses.swayam2.ac.in/imb23_mg64/preview

This course can be opted as an elective by the students of following subjects: NONE

Bachelor of Computer Application			
Programme/Class:		**Year:**3 rd	**Semester:**6 th
Subject Code: BCA-304 N		**Subject Title:** Cloud Computing	
Course out comes:	On completion of the course, the student will be able to:		
CO 1:	Understand the key dimensions of the challenges and benefits of Cloud Computing.		
CO 2:	Describe the principles of Parallel and Distributed Computing and evolution of cloud computing from existing technologies		
CO 3:	Implement different types of Virtualization technologies and Service Oriented Architecture systems		
CO4:	Choose among various cloud technologies for implementing applications.		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	
Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0			

Unit	Topic	No. of Lectures
I	Introduction to Parallel and Distributed Computing; Introduction to Cloud Computing; Characteristics and benefits of cloud computing; Historical developments and evolution of cloud computing: Distributed Systems, Virtualization, Web 2.0, Service-oriented computing, Utility Computing; Cloud Computing Reference Model.	10
II	Introduction to virtualization; Characteristics of virtualized environments; Taxonomy of virtualization techniques; Virtualization and cloud computing; Pros and cons of 46 virtualization; Technology examples: Xen: paravirtualization, VMware: full virtualization, Microsoft Hyper-V.	10
III	Cloud Computing Architecture; Service models: Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS); Deployment models: Public, Private, Hybrid, Community; IaaS: Introduction to IaaS, Resource Virtualization i.e. Server, Storage and Network virtualization.	10
IV	PaaS: Introduction to PaaS, Cloud platform & Management of Computation and Storage; SaaS: Introduction to SaaS, Cloud Services, Web services, Web 2.0, Web OS; Case studies related to IaaS, PaaS and SaaS.	10

Unit				
V	Economics of the cloud; Open Challenges in Cloud Computing; Introduction to emerging computing paradigms and research challenges: Edge Computing, Mobile Cloud Computing, Fog Computing etc.; Introduction to IoT Cloud; Study on simulators related to cloud computing and emerging computing paradigms.			10

Suggested Readings:
- R. Buyya, C. Vecchiola, S. ThamaraiSelvi, Mastering Cloud Computing, McGraw Hill Education
- B. Sosinsky, Cloud Computing Bible, Wiley.

Suggested equivalent online courses:
 https://nptel.ac.in/courses/106105167

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:
Continuous Internal Evaluations hall be based on allotted Assignment and Class Tests. The marks shall

Internal Assessment	Marks	
Class Interaction	5	
Quiz/Assignments	5	
Seminar/Presentation	5	
Unit Test/Class Test	15	
Total	30	

Bachelor of Computer Application			
Programme/Class:		**Year:**3 rd	**Semester:**6 th
Subject Code: BCA-306 N		**Subject Title:** Internet of Things	
Course out comes:		On completion of the course, the student will be able to:	
CO 1:	Comprehensive Understanding of IoT Fundamentals		
CO 2:	Proficiency in IoT Network Engineering		
CO 3:	Data and Analytics Expertise for IoT		
CO4:	Application of IoT Across Industries		
Credits:4		**Core Compulsory**	
Max. Marks: 30 + 70		**Min. Passing Marks: 40**	
Tot al No. of Lectures-Tutorials-Practical(in hours per week): 4-0-0			

Unit	Topic	No. of Lectures
I	Introduction to IoT: Genesis of IoT, IoT and Digitization, IoT Challenges, Comparing IoT architectures, a simplified IoT architecture, The core IoT functional Stack, IoT data management and compute stack.	10
II	Engineering for IoT Networks: Sensors, Actuators, Smart Objects, Sensor Networks, IoT Access Technologies, IP as the IoT Network Layer, Applications protocols for IoT.	10

III	Data and Analytics for IoT: An introduction to data analytics for IoT, Machine Learning, Big data analytics tools and technology, edge streaming analytics, network analytics	10
VI	Cloud storage models and Communication APIs of IoT Systems,IoT Security Challenges, IoT System's Security Practices	10
V	IoT in Industry: Manufacturing, Oil and Gas, Utilities, Smart and Connected Cities, Transportation, Mining, Public Safety.	10

Suggested Readings:
- D. Hanes, G. Salgueiro, P. Grossetete, R. Barton, J. Henry, IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things, CISCO.
- Rajkamal, Internet of Things, McGraw Hill Education.
- Arshdeep Bahga, Vijay Madisetti, " Internet of Things (A Hands-on-Approach)", University Press India Pvt. Ltd.

Suggested equivalent online courses:
   https://nptel.ac.in/courses/106105166

This course can be opted as an elective by the students of following subjects: NONE

Suggested Continuous Evaluation Methods:
Continuous Internal Evaluations hall be based on allotted Assignment and Class Tests. The marks shall

	Internal Assessment	**Marks**	
	Class Interaction	5	
	Quiz/Assignments	5	
	Seminar/Presentation	5	
	Unit Test/Class Test	15	
	Total	30	

Bachelor of Computer Application			
Programme/Class:		**Year:**3 rd	**Semester:**6 th
Subject Code: BCA-308 P		**Subject Title: Major Project**	
Course out comes:		On completion of the course, the student will be able to:	
CO 1:	Identify the complex Programming problems for software project and applying technical knowledge to solve the problems.		
CO 2:	Understanding the systematic process & sound technical knowledge about the project		
CO 3:	Demonstrate different methodologies for making projects and documentation/report writing.		
CO4:	Design software solutions to various problems used for societal benefits.		
Credits:6		**Core Compulsory**	
Max. Marks: 200		**Min. Passing Marks: 100**	
Tot al No. of Lectures-Tutorials-Practical(in hours per week): 0-0-12			
Unit	**Topic**		**No. of Lectures**

I	Project work is part of the BCA program which will provide students with handson experience in developing quality software applications. During the development of the project, a student shall involve himself in all the stages of the software development life cycle (SDLC) like requirements analysis, systems design, software development/coding, testing and documentation, with an overall emphasis on the development of reliable software systems. The primary emphasis of the project work is to understand and gain the knowledge of the principles of software engineering practices, and develops good understanding of SDLC. Every student shall undertake Project work in the V semester starting with the project synopsis and culminating with the project report in the VI semester. Students are encouraged to choose a project, of six months' duration either at place of work or any other location. It is advised to students to develop their project for solving problems of software industry or any research organization. Topics selected, should be appropriate enough to justify as a BCA project.	12hrs per week

Suggested Readings:
-

Suggested equivalent online courses:

This course can be opted as an elective by the students of following subjects: NONE