Department of Computer Applications

Details of Lesson Plan

S.No.	Particulars	Details
1.	Course Name	Big Data Analytics using R
2.	Course Code	MCA-304
3.	Academic Year	2024-25
4.	Semester	3rd
5.	Number of Lesson plans	43
6.	Faculty Assigned	Ms. Amita Khanna

Faculty Signature

Lesson Plan No. 1	Course Name: Big Data Analytics using R Topic: Introduction to Big data analytics and Big Data	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Big data and Big data Analytics b. select the appropriate Big data and Big data Analytics model for different use-case scenarios. c. illustrate different types of Big data with examples. d. appreciate advantages of Big data and Big data Analytics its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data do the students use? where is your Big data has been stored? do you know the location of your Big data? Where is your bank data stored? - Introduce the concept of Big data and Big data Analytics. Show Figure on slide. - Introduce the formal definition of Big data and Big data Analytics by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Big data and Big data Analytics –structured, semi structured data and Big data etc. - Highlight the size of the Big data and Big data Analytics marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Big data and Big data Analytics and its Types- Introduce the concept of big data and digital data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Big Data Models - Introduce the concepts of Big Data Analytics with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Big Data . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers.

	a. Major players in Big Data Analytics b. Advantages of Big Data analytics c. Challenges in of Big Data analytics - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Big Data analytics. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Big Data analytics http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Big Data analytics concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Big Data analytics Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 1	Course Name: Big Data Analytics using R Topic: Big Data Characteristics and application	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Big data characteristics and application. b. select the appropriate Big data characteristics and application different use-case scenarios. c. illustrate different types of Big data characteristics and application. d. appreciate advantages of Big data characteristics and application
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data characteristics and application do the students use? where is your Big data characteristics and application has been stored? do you know the location of your Big data? Where is your bank data stored? - Introduce the concept of Big data characteristics and application. Show Figure on slide. Introduce the formal definition of Big data characteristics and application http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Big data characteristics and application - Highlight the size of the Big data characteristics and application marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Big data and Big data characteristics and application - Introduce the concept of big data characteristics and application etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Big Data characteristics and application - Introduce the concepts of Big Data characteristics and application with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Big Data characteristics and application .

	a. Major players in Big Data characteristics and application b. Advantages of Big Data characteristics and application c. Challenges in of Big Data characteristics and application - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Big Data characteristics and application. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Big Data characteristics and application http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Big Data characteristics and application and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Big Data a characteristics and application Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 3	Course Name: Big Data Analytics using R Topic: Big Data Storage	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Big data Storage b. select the appropriate Big data Storage for different use-case scenarios. c. illustrate different types of Big data Storage with examples. d. appreciate advantages of Big data Storage.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data Storage do the students use? where is your Big data Storage has been stored? do you know the location of your Big data Storage? Where is your bank data stored? - Introduce the concept of Big data Storage. Show Figure on slide. Introduce the formal definition of Big data Storage http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Big data Storage - Highlight the size of the Big data Storage marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Big data and Big data Analytics and its Types- Introduce the concept of big data Storage. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Big Data Models - Introduce the concepts of Big Data Storage with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Big Data Storage. - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Big Data Storage Advantages of Big Data Storage b. Challenges in of Big Data Storage -

	3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Big Data Storage Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Big Data Storage http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Big Data analytics concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Big Data Storage Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 4	Course Name: Big Data Analytics using R Topic: HDFS	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of HDFS for Big Data storage b. select the appropriate HDFS for Big Data storage for different use-case scenarios. c. illustrate different types of HDFS for Big Data storage with examples. d. appreciate advantages of HDFS for Big data Storage.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data Storage do the students use? where is your HDFS for Big data Storage has been stored? do you know the location of your HDFS for Big data Storage? Where is your bank data stored? - Introduce the concept of HDFS for Big data Storage. Show Figure on slide. Introduce the formal definition of HDFS for Big data Storage http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the HDFS for Big data Storage - Highlight the size of the HDFS for Big data Storage marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) HDFS - Introduce the concept of big data Storage HDFS . - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Types of HDFS - Introduce the concepts of HDFS for Big Data Storage with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of HDFS for Big Data Storage. - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in HDFS for Big Data Storage Advantages of HDFS for Big Data Storage

	b. Challenges in of HDFS for Big Data Storage - 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Big Data Storage Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on HDFS for Big Data Storage http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting HDFS for Big Data storage concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on HDFS for Big Data Storage Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 5	Course Name: Big Data Analytics using R Topic: Map Reduce and YARN	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Map Reduce and YARN b. select the appropriate Map Reduce and YARN for different use-case scenarios. c. illustrate different types of Map Reduce and YARN with examples. d. appreciate advantages of Map Reduce and YARN.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data Storage do the students use? where is your Map Reduce and YARN has been stored? do you know the location of your Map Reduce and YARN? Where is your bank data stored? - Introduce the concept of Map Reduce and YARN. Show Figure on slide. Introduce the formal definition of Map Reduce and YARN http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Map Reduce and YARN - Highlight the size of the Map Reduce and YARN - marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) HDFS - Introduce the concept of Map Reduce and YARN. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Types of Map reduce and YARN- Introduce the concepts of Map Reduce and YARN with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Map Reduce and YARN - Major players in Map Reduce and YARN Advantages of Map Reduce and YARN a. Challenges in of Map Reduce and YARN - 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Map Reduce and YARN Use Nearpod to collect responses and discuss the answers.

Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on HDFS for Map Reduce and YARN http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting HDFS for Big Data storage concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. Nearpod Quiz on HDFS for Map Reduce and YARN Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 6	Course Name: Big Data Analytics using R Topic: Map Reduce Programming Model	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Map Reduce Programming Model b. select the appropriate Map Reduce Programming Model for different use-case scenarios. c. illustrate different types of Big data with examples. d. appreciate advantages of Map Reduce Programming Model its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Big data do the students use? where is your Big data has been stored? do you know the location of your Big data? Where is your bank data stored? - Introduce the concept of Map Reduce Programming Model. Show Figure on slide. - Introduce the formal definition of Map Reduce Programming Model by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Map Reduce Programming Model –structured, semi structured data and Big data etc. - Highlight the size of the Map Reduce Programming Model marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Map Reduce Programming Model and its Types- Introduce the concept of big data and digital data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. e. Map Reduce Programming Model f. - Introduce the concepts of Map Reduce Programming Model examples. g. - Show figures to illustrate differences in the models and their ability to cater to different needs of Map Reduce Programming Model a . - Give example of a scientist needing large number of servers to

	run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. h. Major players in Map Reduce Programming Model i. Advantages of Map Reduce Programming Model j. Challenges in of Map Reduce Programming Model - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – k. Give different use-cases and make students select appropriate Map Reduce Programming Model Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Big Data analytics http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework l. Create your video log highlighting Map Reduce Programming Model - concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. m. Nearpod Quiz on Map Reduce Programming Model 2. 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 7	Course Name: IBM Big data Strategy Analytics using R Topic: IBM IBM Big data Strategy Strategy	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of IBM IBM Big data Strategy Strategy b. select the appropriate IBM IBM Big data Strategy Strategy model for different use-case scenarios. c. illustrate different types of IBM Big data Strategy with examples. d. appreciate advantages of IBM IBM Big data Strategy Strategy its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which IBM Big data Strategy do the students use? where is your IBM Big data Strategy has been stored? do you know the location of your IBM Big data Strategy? Where is your bank data stored? - Introduce the concept of IBM IBM Big data Strategy Strategy. Show Figure on slide. - Introduce the formal definition of IBM IBM Big data Strategy Strategy by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the IBM IBM Big data Strategy Strategy –structured, semi structured data and IBM Big data Strategy etc. - Highlight the size of the IBM IBM Big data Strategy Strategy marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) IBM IBM Big data Strategy Strategy and its Types- Introduce the concept of IBM Big data Strategy and digital data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. IBM Big data Strategy Models - Introduce the concepts of IBM Big data Strategy Analytics with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of IBM Big data Strategy . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily

	provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in IBM Big data Strategy Analytics b. Advantages of IBM Big data Strategy analytics c. Challenges in of IBM Big data Strategy analytics - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate IBM Big data Strategy analytics. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on IBM Big data Strategy analytics http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting IBM Big data Strategy analytics concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on IBM Big data Strategy analytics Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 8	Course Name: Introduction to Infosphere Big Insights and Big sheets Analytics using R Topic: Introduction to Infosphere Big Insights and Big sheets	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Introduction to Infosphere Big Insights and Big sheets b. select the appropriate Introduction to Infosphere Big Insights and Big sheets model for different use-case scenarios. c. illustrate different types of Introduction to Infosphere Big Insights and Big sheets with examples. d. appreciate advantages of Introduction to Infosphere Big Insights and Big sheets its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Introduction to Infosphere Big Insights and Big sheets do the students use? where is your Introduction to Infosphere Big Insights and Big sheets has been stored? do you know the location of your Introduction to Infosphere Big Insights and Big sheets? Where is your bank data stored? - Introduce the concept of Introduction to Infosphere Big Insights and Big sheets. Show Figure on slide. - Introduce the formal definition of Introduction to Infosphere Big Insights and Big sheets by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Introduction to Infosphere Big Insights and Big sheets –structured, semi structured data and Introduction to Infosphere Big Insights and Big sheets etc. - Highlight the size of the Introduction to Infosphere Big Insights and Big sheets marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Introduction to Infosphere Big Insights and Big sheets and its Types- Introduce the concept of Introduction to Infosphere Big Insights and Big sheets and digital data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk

	- Introduce concept of virtualization and improving resource utilization. Introduction to Infosphere Big Insights and Big sheets Models - Introduce the concepts of Introduction to Infosphere Big Insights and Big sheets Analytics with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Introduction to Infosphere Big Insights and Big sheets . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the Big Insights and Big sheets in a fraction of the cost without need to buy physical servers. a. Major players in Introduction to Infosphere Big Insights and Big sheets Analytics b. Advantages of Introduction to Infosphere Big Insights and Big sheets analytics c. Challenges in of Introduction to Infosphere Big Insights and Big sheets analytics - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Introduction to Infosphere Big Insights and Big sheets analytics. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Introduction to Infosphere Big Insights and Big sheets analytics http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Introduction to Infosphere Big Insights and Big sheets analytics concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Introduction to Infosphere Big Insights and Big sheets analytics

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 9	Course Name: Design of HDFS using R Topic: Design of HDFS	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Design of HDFS b. select the appropriate Design of HDFS model for different use-case scenarios. c. illustrate different types of Design of HDFS with examples. d. appreciate advantages of Design of HDFS its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Design of HDFS do the students use? where is your Design of HDFS has been stored? do you know the location of your Design of HDFS? Where is your bank data stored? - Introduce the concept of Design of HDFS. Show Figure on slide. - Introduce the formal definition of Design of HDFS by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Design of HDFS –structured, semi structured data and Design of HDFS etc. - Highlight the size of the Design of HDFS marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Design of HDFS and its Types- Introduce the concept of Design of HDFS etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Design of HDFS Models - Introduce the concepts of Design of HDFS with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Design of HDFS . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Design of HDFS b. Advantages of Design of HDFS c. Challenges in of Design of HDFS

	- Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Design of HDFS. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Design of HDFS http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Design of HDFS concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Design of HDFS Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No.10	Course Name: Big Data analytics Using R Topic: Command Line Interface	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Command Line Interface b. select the appropriate Command Line Interface model for different use-case scenarios. c. illustrate different types of Command Line Interface with examples. d. appreciate advantages of Command Line Interface its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Command Line Interface do the students use? where is your Command Line Interface has been stored? do you know the location of your Command Line Interface? Where is your bank data stored? - Introduce the concept of Command Line Interface. Show Figure on slide. - Introduce the formal definition of Command Line Interface by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Command Line Interface –structured, semi structured data and Command Line Interface etc. - Highlight the size of the Command Line Interface marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Command Line Interface and its Types- Introduce the concept of Command Line Interface etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Command Line Interface Models - Introduce the concepts of Command Line Interface with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Command Line Interface . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers.

	a. Major players in Command Line Interface b. Advantages of Command Line Interface c. Challenges in of Command Line Interface - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Command Line Interface. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Command Line Interface http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Command Line Interface concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Command Line Interface Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 11	Course Name: Big Data Analytics using R Topic: Hadoop File System Interface	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Hadoop File system Interfaces b. select the appropriate Hadoop File system Interfaces model for different use-case scenarios. c. illustrate different types of Hadoop File system Interfaces with examples. d. appreciate advantages of Hadoop File system Interfaces its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Hadoop File system Interfaces do the students use? where is your Hadoop File system Interfaces has been stored? do you know the location of your Hadoop File system Interfaces? Where is your bank data stored? - Introduce the concept of Hadoop File system Interfaces. Show Figure on slide. - Introduce the formal definition of Hadoop File system Interfaces by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Hadoop File system Interfaces –structured, semi structured data and Hadoop File system Interfaces etc. - Highlight the size of the Hadoop File system Interfaces marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Hadoop File system Interfaces and its Types- Introduce the concept of Hadoop File system Interfaces and digital data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Hadoop File system Interfaces Models - Introduce the concepts of Hadoop File system Interfaces Analytics with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Hadoop File system Interfaces . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily

	provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Hadoop File system Interfaces Analytics b. Advantages of Hadoop File system Interfaces analytics c. Challenges in of Hadoop File system Interfaces analytics - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Hadoop File system Interfaces analytics. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Hadoop File system Interfaces analytics http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Hadoop File system Interfaces analytics concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Hadoop File system Interfaces analytics Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 12	Course Name: Big Data Analytics using R Topic: Data Ingest with flume and Scoop & Hadoop archives	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Data ingest with Flume and Scoop & Hadoop Archives b. select the appropriate Data ingest with Flume and Scoop & Hadoop Archives model for different use-case scenarios. c. illustrate different types of Data ingest with Flume and Scoop & Hadoop Archives with examples. d. appreciate advantages of Data ingest with Flume and Scoop & Hadoop Archives its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Data ingest with Flume and Scoop & Hadoop Archives do the students use? where is your Data ingest with Flume and Scoop & Hadoop Archives has been stored? do you know the location of your Data ingest with Flume and Scoop & Hadoop Archives? Where is your bank data stored? - Introduce the concept of Data ingest with Flume and Scoop & Hadoop Archives. Show Figure on slide. - Introduce the formal definition of Data ingest with Flume and Scoop & Hadoop Archives by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Data ingest with Flume and Scoop & Hadoop Archives –structured, semi structured data and Data ingest with Flume and Scoop & Hadoop Archives etc. - Highlight the size of the Data ingest with Flume and Scoop & Hadoop Archives marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Data ingest with Flume and Scoop & Hadoop Archives and its Types- Introduce the concept of Data ingest with Flume and Scoop & Hadoop Archives etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization.

	Data ingest with Flume and Scoop & Hadoop Archives Models - Introduce the concepts of Data ingest with Flume and Scoop & Hadoop Archives with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Data ingest with Flume and Scoop & Hadoop Archives . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Data ingest with Flume and Scoop & Hadoop Archives b. Advantages of Data ingest with Flume and Scoop & Hadoop Archives c. Challenges in of Data ingest with Flume and Scoop & Hadoop Archives - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Data ingest with Flume and Scoop & Hadoop Archives. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Data ingest with Flume and Scoop & Hadoop Archives http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Data ingest with Flume and Scoop & Hadoop Archives concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data ingest with Flume and Scoop & Hadoop Archives Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 13	Course Name: Big Data Analytics using R Topic: Hadoop I/O	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Hadoop I/O b. select the appropriate Hadoop I/O model for different use-case scenarios. c. illustrate different types of Hadoop I/O with examples. d. appreciate advantages of Hadoop I/O its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Hadoop I/O do the students use? where is your Hadoop I/O has been stored? do you know the location of your Hadoop I/O? Where is your bank data stored? - Introduce the concept of Hadoop I/O. Show Figure on slide. - Introduce the formal definition of Hadoop I/O by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Hadoop I/O – structured, semi structured data and Hadoop I/O etc. - Highlight the size of the Hadoop I/O marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Hadoop I/O and its Types- Introduce the concept of Hadoop I/O etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Hadoop I/O Models - Introduce the concepts of Hadoop I/O with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Hadoop I/O . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Hadoop I/O b. Advantages of Hadoop I/O c. Challenges in of Hadoop I/O - Security

	- National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Hadoop I/O. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Hadoop I/O http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Hadoop I/O concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Hadoop I/O Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 14	Course Name: Big Data Analytics using R Topic: Anatomy of a Map Reduce Job Run	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Anatomy of a Map Reduce Job Run b. select the appropriate Anatomy of a Map Reduce Job Run model for different use-case scenarios. c. illustrate different types of Anatomy of a Map Reduce Job Run with examples. d. appreciate advantages of Anatomy of a Map Reduce Job Run its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Anatomy of a Map Reduce Job Run do the students use? where is your Anatomy of a Map Reduce Job Run has been stored? do you know the location of your Anatomy of a Map Reduce Job Run? Where is your bank data stored? - Introduce the concept of Anatomy of a Map Reduce Job Run. Show Figure on slide. - Introduce the formal definition of Anatomy of a Map Reduce Job Run by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Anatomy of a Map Reduce Job Run –structured, semi structured data and Anatomy of a Map Reduce Job Run etc. - Highlight the size of the Anatomy of a Map Reduce Job Run marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Anatomy of a Map Reduce Job Run and its Types- Introduce the concept of Anatomy of a Map Reduce Job Run etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Anatomy of a Map Reduce Job Run Models - Introduce the concepts of Anatomy of a Map Reduce Job Run with examples. - Show figures to illustrate differences in the models and their

	ability to cater to different needs of Anatomy of a Map Reduce Job Run . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Anatomy of a Map Reduce Job Run b. Advantages of Anatomy of a Map Reduce Job Run c. Challenges in of Anatomy of a Map Reduce Job Run - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Anatomy of a Map Reduce Job Run. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Anatomy of a Map Reduce Job Run http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Anatomy of a Map Reduce Job Run concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Anatomy of a Map Reduce Job Run Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 15	Course Name: Big Data Analytics using R Topic: Map Reduce and Its Types	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Map Reduce and its Types b. select the appropriate Map Reduce and its Types model for different use-case scenarios. c. illustrate different types of Map Reduce and its Types with examples. d. appreciate advantages of Map Reduce and its Types its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Map Reduce and its Types do the students use? where is your Map Reduce and its Types has been stored? do you know the location of your Map Reduce and its Types? Where is your bank data stored? - Introduce the concept of Map Reduce and its Types. Show Figure on slide. - Introduce the formal definition of Map Reduce and its Types by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Map Reduce and its Types –structured, semi structured data and Map Reduce and its Types etc. - Highlight the size of the Map Reduce and its Types marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Map Reduce and its Types and its Types- Introduce the concept of Map Reduce and its Types etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Map Reduce and its Types Models - Introduce the concepts of Map Reduce and its Types with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Map Reduce and its Types . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers.

	a. Major players in Map Reduce and its Types b. Advantages of Map Reduce and its Types c. Challenges in of Map Reduce and its Types - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Map Reduce and its Types. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Map Reduce and its Types http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Map Reduce and its Types concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Map Reduce and its Types Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 16	Course Name: Big Data Analytics using R Topic: Map Reduce Features	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Map Reduce Map Reduce Features b. select the appropriate Map Reduce Map Reduce Features model for different use-case scenarios. c. illustrate different types of Map Reduce Map Reduce Features with examples. d. appreciate advantages of Map Reduce Map Reduce Features its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Map Reduce Map Reduce Features do the students use? where is your Map Reduce Map Reduce Features has been stored? do you know the location of your Map Reduce Map Reduce Features? Where is your bank data stored? - Introduce the concept of Map Reduce Map Reduce Features. Show Figure on slide. - Introduce the formal definition of Map Reduce Map Reduce Features by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Map Reduce Map Reduce Features –structured, semi structured data and Map Reduce Map Reduce Features etc. - Highlight the size of the Map Reduce Map Reduce Features marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Map Reduce Map Reduce Features Map Reduce Features- Introduce the concept of Map Reduce Map Reduce Features etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Map Reduce Map Reduce Features Models - Introduce the concepts of Map Reduce Map Reduce Features with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Map Reduce Map Reduce

	Features . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Map Reduce Map Reduce Features b. Advantages of Map Reduce Map Reduce Features c. Challenges in of Map Reduce Map Reduce Features - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Map Reduce Map Reduce Features. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Map Reduce Map Reduce Features http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Map Reduce Map Reduce Features concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Map Reduce Map Reduce Features Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 17	Course Name: Big Data Analytics using R Topic: Introduction and Overview to R programming	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Introduction and Overview to R Programming b. select the appropriate Introduction and Overview to R Programming model for different use-case scenarios. c. illustrate different types of Introduction and Overview to R Programming with examples. d. appreciate advantages of Introduction and Overview to R Programming its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Introduction and Overview to R Programming do the students use? where is your Introduction and Overview to R Programming has been stored? do you know the location of your Introduction and Overview to R Programming? Where is your bank data stored? - Introduce the concept of Introduction and Overview to R Programming. Show Figure on slide. - Introduce the formal definition of Introduction and Overview to R Programming by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Introduction and Overview to R Programming –structured, semi structured data and Introduction and Overview to R Programming etc. - Highlight the size of the Introduction and Overview to R Programming marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Introduction and Overview to R Programming Map Reduce Features- Introduce the concept of Introduction and Overview to R Programming etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Introduction and Overview to R Programming Models -

	Introduce the concepts of Introduction and Overview to R Programming with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Introduction and Overview to R Programming . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Introduction and Overview to R Programming b. Advantages of Introduction and Overview to R Programming c. Challenges in of Introduction and Overview to R Programming - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Introduction and Overview to R Programming. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Introduction and Overview to R Programming http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Introduction and Overview to R Programming concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Introduction and Overview to R Programming Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 18	Course Name: Big Data Analytics using R Topic: Installation of R studio	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Installation to R studio b. select the appropriate Installation to R studio model for different use-case scenarios. c. illustrate different types of Installation to R studio with examples. d. appreciate advantages of Installation to R studio its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Installation to R studio do the students use? where is your Installation to R studio has been stored? do you know the location of your Installation to R studio? Where is your bank data stored? - Introduce the concept of Installation to R studio. Show Figure on slide. - Introduce the formal definition of Installation to R studio by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Installation to R studio –structured, semi structured data and Installation to R studio etc. - Highlight the size of the Installation to R studio marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Installation to R studio Map Reduce Features- Introduce the concept of Installation to R studio etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Installation to R studio Models - Introduce the concepts of Installation to R studio with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Installation to R studio . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Installation to R studio

	b. Advantages of Installation to R studio c. Challenges in of Installation to R studio - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Installation to R studio. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Installation to R studio http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Installation to R studio concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Installation to R studio Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 19	Course Name: Big Data Analytics using R Topic: Data types and Functions of R Programming	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Data Types and Functions of R Programming b. select the appropriate Data Types and Functions of R Programming model for different use-case scenarios. c. illustrate different types of Data Types and Functions of R Programming with examples. d. appreciate advantages of Data Types and Functions of R Programming its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Data Types and Functions of R Programming do the students use? where is your Data Types and Functions of R Programming has been stored? do you know the location of your Data Types and Functions of R Programming? Where is your bank data stored? - Introduce the concept of Data Types and Functions of R Programming. Show Figure on slide. - Introduce the formal definition of Data Types and Functions of R Programming by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Data Types and Functions of R Programming –structured, semi structured data and Data Types and Functions of R Programming etc. - Highlight the size of the Data Types and Functions of R Programming marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Data Types and Functions of R Programming Map Reduce Features- Introduce the concept of Data Types and Functions of R Programming etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Data Types and Functions of R Programming Models -

	Introduce the concepts of Data Types and Functions of R Programming with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Data Types and Functions of R Programming . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Data Types and Functions of R Programming b. Advantages of Data Types and Functions of R Programming c. Challenges in of Data Types and Functions of R Programming - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Data Types and Functions of R Programming. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Data Types and Functions of R Programming http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Data Types and Functions of R Programming concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data Types and Functions of R Programming Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 20	Course Name: Big Data Analytics using R Topic: Data Structures in R Programming	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Data Structures in R Programming b. select the appropriate Data Structures in R Programming model for different use-case scenarios. c. illustrate different types of Data Structures in R Programming with examples. d. appreciate advantages of Data Structures in R Programming its types
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Data Structures in R Programming do the students use? where is your Data Structures in R Programming has been stored? do you know the location of your Data Structures in R Programming? Where is your bank data stored? - Introduce the concept of Data Structures in R Programming. Show Figure on slide. - Introduce the formal definition of Data Structures in R Programming by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Data Structures in R Programming –structured, semi structured data and Data Structures in R Programming etc. - Highlight the size of the Data Structures in R Programming marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Data Structures in R Programming Map Reduce Features- Introduce the concept of Data Structures in R Programming etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Data Structures in R Programming Models - Introduce the concepts of Data Structures in R Programming with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Data Structures in R Programming .

	- Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Data Structures in R Programming b. Advantages of Data Structures in R Programming c. Challenges in of Data Structures in R Programming - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Data Structures in R Programming. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Data Structures in R Programming http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Data Structures in R Programming concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data Structures in R Programming Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 21	Course Name: Big Data Analytics using R Topic: Data Transformation and Tables	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Data Transformation and Tables b. select the appropriate Data Transformation and Table for different use-case scenarios. c. illustrate different types of Data Transformation and Tables with examples. d. appreciate advantages of Data Transformation and Tables.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Data Transformation and Tables do the students use? where is your Data Transformation and Tables has been stored? do you know the location of your Data Transformation and Tables? Where is your bank data stored? - Introduce the concept of Data Transformation and Tables. Show Figure on slide. - Introduce the formal definition of Data Transformation and Tables by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Data Transformation and Tables –structured, semi structured data and Data Transformation and Tables etc. - Highlight the size of the Data Transformation and Tables marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Data Transformation and Tables Data Transformation and Tables- Introduce the concept of Data Transformation and Tables etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Data Transformation and Tables Models - Introduce the concepts of Data Transformation and Tables with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Data Transformation and Tables . - Give example of a scientist needing large number of servers to

	run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Data Transformation and Tables b. Advantages of Data Transformation and Tables c. Challenges in of Data Transformation and Tables - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Data Transformation and Tables. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Data Transformation and Tables http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Data Transformation and Tables concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Data Transformation and Tables Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 22	Course Name: Big Data Analytics using R Topic: Control Structures	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Control Structures b. select the appropriate Data Transformation and Table for different use-case scenarios. c. illustrate different types of Control Structures with examples. d. appreciate advantages of Control Structures.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Control Structures do the students use? where is your Control Structures has been stored? do you know the location of your Control Structures? Where is your bank data stored? - Introduce the concept of Control Structures. Show Figure on slide. - Introduce the formal definition of Control Structures by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Control Structures –structured, semi structured data and Control Structures etc. - Highlight the size of the Control Structures marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Control Structures Control Structures- Introduce the concept of Control Structures etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Control Structures Models - Introduce the concepts of Control Structures with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Control Structures . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Control Structures b. Advantages of Control Structures c. Challenges in of Control Structures

	- Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Control Structures. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Control Structures http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Control Structures concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Control Structures Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 23	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R b. select the appropriate Reading and Getting Data into R for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R with examples. d. appreciate advantages of Reading and Getting Data into R.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R do the students use? where is your Reading and Getting Data into R has been stored? do you know the location of your Reading and Getting Data into R? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R. Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R –structured, semi structured data and Reading and Getting Data into R etc. - Highlight the size of the Reading and Getting Data into R marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Reading and Getting Data into R- Introduce the concept of Reading and Getting Data into R etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Reading and Getting Data into R Models - Introduce the concepts of Reading and Getting Data into R with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R .

	- Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R b. Advantages of Reading and Getting Data into R c. Challenges in of Reading and Getting Data into R - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 24	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using CSV Files	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using CSV Files b. select the appropriate Reading and Getting Data into R Using CSV Files for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using CSV Files with examples. d. appreciate advantages of Reading and Getting Data into R Using CSV Files.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using CSV Files do the students use? where is your Reading and Getting Data into R Using CSV Files has been stored? do you know the location of your Reading and Getting Data into R Using CSV Files? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using CSV Files. Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using CSV Files by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using CSV Files –structured, semi structured data and Reading and Getting Data into R Using CSV Files etc. - Highlight the size of the Reading and Getting Data into R Using CSV Files marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using CSV Files Reading and Getting Data into R Using CSV Files- Introduce the concept of Reading and Getting Data into R Using CSV Files etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization.

	Reading and Getting Data into R Using CSV Files Models - Introduce the concepts of Reading and Getting Data into R Using CSV Files with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using CSV Files . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using CSV Files b. Advantages of Reading and Getting Data into R Using CSV Files c. Challenges in of Reading and Getting Data into R Using CSV Files - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using CSV Files. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using CSV Files http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using CSV Files concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using CSV Files Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 25	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using XML Files	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using XML Files b. select the appropriate Reading and Getting Data into R Using XML Files for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using XML Files with examples. d. appreciate advantages of Reading and Getting Data into R Using XML Files.
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using XML Files do the students use? where is your Reading and Getting Data into R Using XML Files has been stored? do you know the location of your Reading and Getting Data into R Using XML Files? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using XML Files. Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using XML Files by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using XML Files –structured, semi structured data and Reading and Getting Data into R Using XML Files etc. - Highlight the size of the Reading and Getting Data into R Using XML Files marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using XML Files Reading and Getting Data into R Using XML Files- Introduce the concept of Reading and Getting Data into R Using XML Files etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using XML Files Models - Introduce the concepts of Reading and Getting Data into R Using XML Files with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using XML Files . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using XML Files b. Advantages of Reading and Getting Data into R Using XML Files c. Challenges in of Reading and Getting Data into R Using XML Files - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using XML Files. Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using XML Files http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using XML Files concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using XML Files

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 26	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using JSON Files	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using JSON Files b. select the appropriate Reading and Getting Data into R Using JSON Files for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using JSON Files with examples. d. appreciate advantages of Reading and Getting Data into R Using JSON Files .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using JSON Files do the students use? where is your Reading and Getting Data into R Using JSON Files has been stored? do you know the location of your Reading and Getting Data into R Using JSON Files ? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using JSON Files . Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using JSON Files by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using JSON Files –structured, semi structured data and Reading and Getting Data into R Using JSON Files etc. - Highlight the size of the Reading and Getting Data into R Using JSON Files marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using JSON Files Reading and Getting Data into R Using JSON Files - Introduce the concept of Reading and Getting Data into R Using JSON Files etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using JSON Files Models - Introduce the concepts of Reading and Getting Data into R Using JSON Files with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using JSON Files . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using JSON Files b. Advantages of Reading and Getting Data into R Using JSON Files c. Challenges in of Reading and Getting Data into R Using JSON Files - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using JSON Files . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using JSON Files http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using JSON Files concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using JSON Files

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 27	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using Web data	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using Web Data b. select the appropriate Reading and Getting Data into R Using Web Data for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using Web Data with examples. d. appreciate advantages of Reading and Getting Data into R Using Web Data .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using Web Data do the students use? where is your Reading and Getting Data into R Using Web Data has been stored? do you know the location of your Reading and Getting Data into R Using Web Data ? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using Web Data . Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using Web Data by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using Web Data –structured, semi structured data and Reading and Getting Data into R Using Web Data etc. - Highlight the size of the Reading and Getting Data into R Using Web Data marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using Web Data Reading and Getting Data into R Using Web Data - Introduce the concept of Reading and Getting Data into R Using Web Data etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using Web Data Models - Introduce the concepts of Reading and Getting Data into R Using Web Data with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using Web Data . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using Web Data b. Advantages of Reading and Getting Data into R Using Web Data c. Challenges in of Reading and Getting Data into R Using Web Data - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using Web Data . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using Web Data http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using Web Data concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using Web Data

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 28	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using Databases	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using Databases b. select the appropriate Reading and Getting Data into R Using Databases for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using Databases with examples. d. appreciate advantages of Reading and Getting Data into R Using Databases .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using Databases do the students use? where is your Reading and Getting Data into R Using Databases has been stored? do you know the location of your Reading and Getting Data into R Using Databases ? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using Databases . Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using Databases by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using Databases –structured, semi structured data and Reading and Getting Data into R Using Databases etc. - Highlight the size of the Reading and Getting Data into R Using Databases marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using Databases Reading and Getting Data into R Using Databases - Introduce the concept of Reading and Getting Data into R Using Databases etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using Databases Models - Introduce the concepts of Reading and Getting Data into R Using Databases with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using Databases . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using Databases b. Advantages of Reading and Getting Data into R Using Databases c. Challenges in of Reading and Getting Data into R Using Databases - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using Databases . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using Databases http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using Databases concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using Databases

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 28	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using Databases	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using Databases b. select the appropriate Reading and Getting Data into R Using Databases for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using Databases with examples. d. appreciate advantages of Reading and Getting Data into R Using Databases .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using Databases do the students use? where is your Reading and Getting Data into R Using Databases has been stored? do you know the location of your Reading and Getting Data into R Using Databases ? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using Databases . Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using Databases by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using Databases –structured, semi structured data and Reading and Getting Data into R Using Databases etc. - Highlight the size of the Reading and Getting Data into R Using Databases marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using Databases Reading and Getting Data into R Using Databases - Introduce the concept of Reading and Getting Data into R Using Databases etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using Databases Models - Introduce the concepts of Reading and Getting Data into R Using Databases with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using Databases . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using Databases b. Advantages of Reading and Getting Data into R Using Databases c. Challenges in of Reading and Getting Data into R Using Databases - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using Databases . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using Databases http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using Databases concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using Databases

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 29	Course Name: Big Data Analytics using R Topic: Reading and Getting data into R Using Excel Files	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Reading and Getting Data into R Using Excel Files b. select the appropriate Reading and Getting Data into R Using Excel Files for different use-case scenarios. c. illustrate different types of Reading and Getting Data into R Using Excel Files with examples. d. appreciate advantages of Reading and Getting Data into R Using Excel Files .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Reading and Getting Data into R Using Excel Files do the students use? where is your Reading and Getting Data into R Using Excel Files has been stored? do you know the location of your Reading and Getting Data into R Using Excel Files ? Where is your bank data stored? - Introduce the concept of Reading and Getting Data into R Using Excel Files . Show Figure on slide. - Introduce the formal definition of Reading and Getting Data into R Using Excel Files by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Reading and Getting Data into R Using Excel Files –structured, semi structured data and Reading and Getting Data into R Using Excel Files etc. - Highlight the size of the Reading and Getting Data into R Using Excel Files marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Reading and Getting Data into R Using Excel Files Reading and Getting Data into R Using Excel Files - Introduce the concept of Reading and Getting Data into R Using Excel Files etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Reading and Getting Data into R Using Excel Files Models - Introduce the concepts of Reading and Getting Data into R Using Excel Files with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Reading and Getting Data into R Using Excel Files . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Reading and Getting Data into R Using Excel Files b. Advantages of Reading and Getting Data into R Using Excel Files c. Challenges in of Reading and Getting Data into R Using Excel Files - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Reading and Getting Data into R Using Excel Files . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Reading and Getting Data into R Using Excel Files http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Reading and Getting Data into R Using Excel Files concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Reading and Getting Data into R Using Excel Files

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 31	Course Name: Big Data Analytics using R Topic: Exploratory data analysis	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Exploratory data analysis b. select the appropriate Exploratory data analysis for different use-case scenarios. c. illustrate different types of Exploratory data analysis with examples. d. appreciate advantages of Exploratory data analysis .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Exploratory data analysis do the students use? where is your Exploratory data analysis has been stored? do you know the location of your Exploratory data analysis ? Where is your bank data stored? - Introduce the concept of Exploratory data analysis . Show Figure on slide. - Introduce the formal definition of Exploratory data analysis by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Exploratory data analysis –structured, semi structured data and Exploratory data analysis etc. - Highlight the size of the Exploratory data analysis marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Exploratory data analysis Exploratory data analysis - Introduce the concept of Exploratory data analysis etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Exploratory data analysis Models - Introduce the concepts of Exploratory data analysis with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Exploratory data analysis . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers.

	a. Major players in Exploratory data analysis b. Advantages of Exploratory data analysis c. Challenges in of Exploratory data analysis - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Exploratory data analysis . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Exploratory data analysis http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Exploratory data analysis concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Exploratory data analysis Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 32	Course Name: Big Data Analytics using R Topic: Mean and Median	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Mean and Median b. select the appropriate Mean and Median for different use-case scenarios. c. illustrate different types of Mean and Median with examples. d. appreciate advantages of Mean and Median .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Mean and Median do the students use? where is your Mean and Median has been stored? do you know the location of your Mean and Median ? Where is your bank data stored? - Introduce the concept of Mean and Median . Show Figure on slide. - Introduce the formal definition of Mean and Median by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Mean and Median –structured, semi structured data and Mean and Median etc. - Highlight the size of the Mean and Median marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Mean and Median Mean and Median - Introduce the concept of Mean and Median etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Mean and Median Models - Introduce the concepts of Mean and Median with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Mean and Median . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Mean and Median b. Advantages of Mean and Median c. Challenges in of Mean and Median

	- Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Mean and Median . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Mean and Median http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Mean and Median concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Mean and Median Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 33	Course Name: Big Data Analytics using R Topic: Standard Deviation	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Standard Deviation b. select the appropriate Standard Deviation for different use-case scenarios. c. illustrate different types of Standard Deviation with examples. d. appreciate advantages of Standard Deviation .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Standard Deviation do the students use? where is your Standard Deviation has been stored? do you know the location of your Standard Deviation ? Where is your bank data stored? - Introduce the concept of Standard Deviation . Show Figure on slide. - Introduce the formal definition of Standard Deviation by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Standard Deviation –structured, semi structured data and Standard Deviation etc. - Highlight the size of the Standard Deviation marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Standard Deviation Standard Deviation - Introduce the concept of Standard Deviation etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Standard Deviation Models - Introduce the concepts of Standard Deviation with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Standard Deviation . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Standard Deviation b. Advantages of Standard Deviation

	c. Challenges in of Standard Deviation - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Standard Deviation . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Standard Deviation http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Standard Deviation concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Standard Deviation Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 34	Course Name: Big Data Analytics using R Topic: Correlation	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Correlation b. select the appropriate Correlation for different use-case scenarios. c. illustrate different types of Correlation with examples. d. appreciate advantages of Correlation .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Correlation do the students use? where is your Correlation has been stored? do you know the location of your Correlation ? Where is your bank data stored? - Introduce the concept of Correlation . Show Figure on slide. - Introduce the formal definition of Correlation by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Correlation – structured, semi structured data and Correlation etc. - Highlight the size of the Correlation marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Correlation Correlation - Introduce the concept of Correlation etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Correlation Models - Introduce the concepts of Correlation with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Correlation . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Correlation b. Advantages of Correlation c. Challenges in of Correlation - Security - National Laws on Data Storage

	- Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Correlation . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Correlation http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Correlation concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Correlation Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 35	Course Name: Big Data Analytics using R Topic: Covariance	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Covariance b. select the appropriate Covariance for different use-case scenarios. c. illustrate different types of Covariance with examples. d. appreciate advantages of Covariance .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Covariance do the students use? where is your Covariance has been stored? do you know the location of your Covariance ? Where is your bank data stored? - Introduce the concept of Covariance . Show Figure on slide. - Introduce the formal definition of Covariance by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Covariance – structured, semi structured data and Covariance etc. - Highlight the size of the Covariance marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Covariance Covariance - Introduce the concept of Covariance etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Covariance Models - Introduce the concepts of Covariance with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Covariance . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Covariance b. Advantages of Covariance c. Challenges in of Covariance - Security - National Laws on Data Storage

	- Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Covariance . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Covariance http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Covariance concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Covariance Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 37	Course Name: Big Data Analytics using R Topic: Random Forest and Decision Trees	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Random Forest and Decision Trees b. select the appropriate Random Forest and Decision Trees for different use-case scenarios. c. illustrate different types of Random Forest and Decision Trees with examples. d. appreciate advantages of Random Forest and Decision Trees .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Random Forest and Decision Trees do the students use? where is your Random Forest and Decision Trees has been stored? do you know the location of your Random Forest and Decision Trees ? Where is your bank data stored? - Introduce the concept of Random Forest and Decision Trees . Show Figure on slide. - Introduce the formal definition of Random Forest and Decision Trees by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Random Forest and Decision Trees –structured, semi structured data and Random Forest and Decision Trees etc. - Highlight the size of the Random Forest and Decision Trees marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Random Forest and Decision Trees Random Forest and Decision Trees - Introduce the concept of Random Forest and Decision Trees etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Random Forest and Decision Trees Models - Introduce the concepts of Random Forest and Decision Trees with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Random Forest and

	Decision Trees . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Random Forest and Decision Trees b. Advantages of Random Forest and Decision Trees c. Challenges in of Random Forest and Decision Trees - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Random Forest and Decision Trees . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Random Forest and Decision Trees http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Random Forest and Decision Trees concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Random Forest and Decision Trees Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 38	Course Name: Big Data Analytics using R Topic: Normal and Binomial distributions	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Normal and Binomial Distributions b. select the appropriate Normal and Binomial Distributions for different use-case scenarios. c. illustrate different types of Normal and Binomial Distributions with examples. d. appreciate advantages of Normal and Binomial Distributions .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Normal and Binomial Distributions do the students use? where is your Normal and Binomial Distributions has been stored? do you know the location of your Normal and Binomial Distributions ? Where is your bank data stored? - Introduce the concept of Normal and Binomial Distributions . Show Figure on slide. - Introduce the formal definition of Normal and Binomial Distributions by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Normal and Binomial Distributions –structured, semi structured data and Normal and Binomial Distributions etc. - Highlight the size of the Normal and Binomial Distributions marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Normal and Binomial Distributions Normal and Binomial Distributions - Introduce the concept of Normal and Binomial Distributions etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Normal and Binomial Distributions Models - Introduce the concepts of Normal and Binomial Distributions with examples. - Show figures to illustrate differences in the models and their

	ability to cater to different needs of Normal and Binomial Distributions . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Normal and Binomial Distributions b. Advantages of Normal and Binomial Distributions c. Challenges in of Normal and Binomial Distributions - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Normal and Binomial Distributions . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Normal and Binomial Distributions http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Normal and Binomial Distributions concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Normal and Binomial Distributions Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 39	Course Name: Big Data Analytics using R Topic: Time series Analysis	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Time Series analysis b. select the appropriate Time Series analysis for different use-case scenarios. c. illustrate different types of Time Series analysis with examples. d. appreciate advantages of Time Series analysis .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Time Series analysis do the students use? where is your Time Series analysis has been stored? do you know the location of your Time Series analysis ? Where is your bank data stored? - Introduce the concept of Time Series analysis . Show Figure on slide. - Introduce the formal definition of Time Series analysis by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Time Series analysis –structured, semi structured data and Time Series analysis etc. - Highlight the size of the Time Series analysis marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Time Series analysis Time Series analysis - Introduce the concept of Time Series analysis etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Time Series analysis Models - Introduce the concepts of Time Series analysis with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Time Series analysis . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Time Series analysis

	b. Advantages of Time Series analysis c. Challenges in of Time Series analysis - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Time Series analysis . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Time Series analysis http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Time Series analysis concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Time Series analysis Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 40	Course Name: Big Data Analytics using R Topic: Linear and Multiple Regression	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Linear and Multiple Regression b. select the appropriate Linear and Multiple Regression for different use-case scenarios. c. illustrate different types of Linear and Multiple Regression with examples. d. appreciate advantages of Linear and Multiple Regression .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Linear and Multiple Regression do the students use? where is your Linear and Multiple Regression has been stored? do you know the location of your Linear and Multiple Regression ? Where is your bank data stored? - Introduce the concept of Linear and Multiple Regression . Show Figure on slide. - Introduce the formal definition of Linear and Multiple Regression by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Linear and Multiple Regression –structured, semi structured data and Linear and Multiple Regression etc. - Highlight the size of the Linear and Multiple Regression marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Linear and Multiple Regression Linear and Multiple Regression - Introduce the concept of Linear and Multiple Regression etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource utilization. Linear and Multiple Regression Models - Introduce the concepts of Linear and Multiple Regression with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Linear and Multiple Regression .

	- Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Linear and Multiple Regression b. Advantages of Linear and Multiple Regression c. Challenges in of Linear and Multiple Regression - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Linear and Multiple Regression . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Linear and Multiple Regression http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Linear and Multiple Regression concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Linear and Multiple Regression Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 41	Course Name: Big Data Analytics using R Topic: Creating data for analytics through designed experiments	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Creating data for analytics through designed experiments b. select the appropriate Creating data for analytics through designed experiments for different use-case scenarios. c. illustrate different types of Creating data for analytics through designed experiments with examples. d. appreciate advantages of Creating data for analytics through designed experiments .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Creating data for analytics through designed experiments do the students use? where is your Creating data for analytics through designed experiments has been stored? do you know the location of your Creating data for analytics through designed experiments ? Where is your bank data stored? - Introduce the concept of Creating data for analytics through designed experiments . Show Figure on slide. - Introduce the formal definition of Creating data for analytics through designed experiments by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Creating data for analytics through designed experiments –structured, semi structured data and Creating data for analytics through designed experiments etc. - Highlight the size of the Creating data for analytics through designed experiments marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Creating data for analytics through designed experiments Creating data for analytics through designed experiments - Introduce the concept of Creating data for analytics through designed experiments etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Creating data for analytics through designed experiments Models - Introduce the concepts of Creating data for analytics through designed experiments with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Creating data for analytics through designed experiments . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Creating data for analytics through designed experiments b. Advantages of Creating data for analytics through designed experiments c. Challenges in of Creating data for analytics through designed experiments - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Creating data for analytics through designed experiments . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Creating data for analytics through designed experiments http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Creating data for analytics through designed experiments concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Creating data for analytics through designed experiments

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 42	Course Name: Big Data Analytics using R Topic: Creating data for analytics through active learning	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Creating data for analytics through active learning b. select the appropriate Creating data for analytics through active learning for different use-case scenarios. c. illustrate different types of Creating data for analytics through active learning with examples. d. appreciate advantages of Creating data for analytics through active learning .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Creating data for analytics through active learning do the students use? where is your Creating data for analytics through active learning has been stored? do you know the location of your Creating data for analytics through active learning ? Where is your bank data stored? - Introduce the concept of Creating data for analytics through active learning . Show Figure on slide. - Introduce the formal definition of Creating data for analytics through active learning by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Creating data for analytics through active learning –structured, semi structured data and Creating data for analytics through active learning etc. - Highlight the size of the Creating data for analytics through active learning marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Creating data for analytics through active learning Creating data for analytics through active learning - Introduce the concept of Creating data for analytics through active learning etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Creating data for analytics through active learning Models - Introduce the concepts of Creating data for analytics through active learning with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Creating data for analytics through active learning . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Creating data for analytics through active learning b. Advantages of Creating data for analytics through active learning c. Challenges in of Creating data for analytics through active learning - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Creating data for analytics through active learning . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Creating data for analytics through active learning http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Creating data for analytics through active learning concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Creating data for analytics through active learning

	Spend 5 minutes to evaluate student assimilation of the lesson contents

Lesson Plan No. 43	Course Name: Big Data Analytics using R Topic: Creating data for analytics through reinforcement learning	Course No.: MCA-304

Objectives	At the end of the lesson the student shall be able to: a. articulate the concept of Creating data for analytics through reinforcement learning b. select the appropriate Creating data for analytics through reinforcement learning for different use-case scenarios. c. illustrate different types of Creating data for analytics through reinforcement learning with examples. d. appreciate advantages of Creating data for analytics through reinforcement learning .
Teaching Aids (if any)	a. Video of Facebook data center b. Use of Nearpod tool for online quiz
Teaching Development	1. **Introduction** (5 minutes) - Ask questions. which Creating data for analytics through reinforcement learning do the students use? where is your Creating data for analytics through reinforcement learning has been stored? do you know the location of your Creating data for analytics through reinforcement learning ? Where is your bank data stored? - Introduce the concept of Creating data for analytics through reinforcement learning . Show Figure on slide. - Introduce the formal definition of Creating data for analytics through reinforcement learning by NIST http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf - Highlight the important characteristics of the Creating data for analytics through reinforcement learning –structured, semi structured data and Creating data for analytics through reinforcement learning etc. - Highlight the size of the Creating data for analytics through reinforcement learning marketplace and rapid adoption by businesses globally through some statistics. 2. **Development** (30 minutes) Creating data for analytics through reinforcement learning Creating data for analytics through reinforcement learning - Introduce the concept of Creating data for analytics through reinforcement learning etc. - Show video of Facebook Data Center https://www.youtube.com/watch?v=_r97qdyQtIk - Introduce concept of virtualization and improving resource

	utilization. Creating data for analytics through reinforcement learning Models - Introduce the concepts of Creating data for analytics through reinforcement learning with examples. - Show figures to illustrate differences in the models and their ability to cater to different needs of Creating data for analytics through reinforcement learning . - Give example of a scientist needing large number of servers to run a simulation (gene sequencing), which can be easily provisioned on the cloud in a fraction of the cost without need to buy physical servers. a. Major players in Creating data for analytics through reinforcement learning b. Advantages of Creating data for analytics through reinforcement learning c. Challenges in of Creating data for analytics through reinforcement learning - Security - National Laws on Data Storage - Vendor Lock-in - Energy Efficiency (Give example of energy consumption in large data centers) - Resource Utilization 3. Exercise (5 minutes) – Give different use-cases and make students select appropriate Creating data for analytics through reinforcement learning . Use Nearpod to collect responses and discuss the answers.
Closure	1. Summarize the Lesson Learning Outcomes and get affirmation from students on these. 2. Suggested Reading - Original NIST Paper on Creating data for analytics through reinforcement learning http://faculty.winthrop.edu/domanm/csci411/Handouts/NIST.pdf 3. Homework - Create your video log highlighting Creating data for analytics through reinforcement learning concepts and submit on Google classroom. Spend 5 minutes to wrap up and consolidate the learnings
Evaluation	1. Reflective Questions (What, Why, Who?). Allow students to answer and discuss. 2. Nearpod Quiz on Creating data for analytics through reinforcement learning

	Spend 5 minutes to evaluate student assimilation of the lesson contents