

Sr. No	Lecture Title	Description	Category	Duration
Segment 1: Introduction to R Language & Installation				
1	Introduction to R in Bioinformatics & R Installation	<ul style="list-style-type: none"> • A detailed introduction to R language and importance of R language in Bioinformatics. • Describes the procedure of installation of R. 	Introduction	9:47
2	The R User Interface	<ul style="list-style-type: none"> • Introduction to R studio and basic description of R studio interface. • Describes windows and tabs of R studio in details. 	Introduction	6:23
3	Comments	<ul style="list-style-type: none"> • Introduction to comments in R language. • Describes purpose and advantages of adding comments in R language. • Describes different ways to add comments in R script. 	Introduction	4:16

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Segment 2: Introduction to Functions & Variables in R				
1	Variable Declaration & Objects	<ul style="list-style-type: none"> • Description of Declaraing variables in R. • Describes mathematical operators that can be applied on variables. 	Variables & Functions	5:24
2	Functions	<ul style="list-style-type: none"> • Introduction to built-in functions in R. • Describes syntax to write the functions in R. • Example code for using different built-in functions of R. 	Variables & Functions	4:31
3	Sample & Replacement	<ul style="list-style-type: none"> • Description of Sample and replacement in R. • Describes built-in function of R for sample and replacement. • Example code to sample out values randomly and getting independent values by using 'replace' parameter. 	Variables & Functions	9:09
4	Write Your Own Functions & Arguments	<ul style="list-style-type: none"> • Introduction to user-defined functions and its purpose. • Describes the syntax to write a function in R. • Example code to write the functions in R. 	Variables & Functions	5:39
5	Scripts	<ul style="list-style-type: none"> • Introduction to scripts in R and its importance. • Procedure to create a script in R. • Example code to write a script and describes how it run. 	Variables & Functions	7:36

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Segment 3: Introduction to Packages & Data Types in R				
1	Packages	<ul style="list-style-type: none"> • Introduction to Packages and their purpose in R language. • Accessing packages from Cran R-project website. • Retrieving information related to a particular package in R repository. 	Packages	4:00
2	Install Packages	<ul style="list-style-type: none"> • Procedure to access the packages within R language. • Discuss different methods to install packages such as comman-line, or through CRAN repository. 	Packages	5:25
3	Library & Initialize Packages	<ul style="list-style-type: none"> • Description of Libraries in R language. • Procedure to initialize packages. • Discuss methods to initialize packages such as command-line or through package tab. 	Packages	2:27
4	Getting Help with Help Pages	<ul style="list-style-type: none"> • Description of getting help with help pages in R. • Describes syntax for particular function for getting help. • Describes functions with help commands for their functionality. 	Packages	3:42
5	Atomic Vectors	<ul style="list-style-type: none"> • Introduction to atomic vectors in R language. • Example code for creating atomic vectors. • Uses of atomic vectors in R language. 	Vectors & Data Types	2:42
6	Doubles	<ul style="list-style-type: none"> • Introduction to doubles in R language. • Describes double atomic vectors and initializing numeric values in R. • Example code to declare the atomic vectors and store multiple values in it. 	Vectors & Data Types	3:30
7	Integers	<ul style="list-style-type: none"> • Introduction to integers in R language. • Declaring integers in RStudio. • Finding datatype of an already existing integers. 	Vectors & Data Types	3:23
8	Characters	<ul style="list-style-type: none"> • Introduction to character datatype in R language. • Describes the use of character datatype in R. • Utilization of variables and storing them into single and multiple character values. 	Vectors & Data Types	4:43

9	Logicals	<ul style="list-style-type: none"> • Introduction to logicals in R language. • Example code to store the logicals in variables. 	Vectors & Data Types	2:27
10	Attributes & Names	<ul style="list-style-type: none"> • Description of attributes and names in R language. • Describes the use of attributes and names function in R. • Describes script to use these functions. 	Vectors & Data Types	4:46
11	Dim & Dimensions	<ul style="list-style-type: none"> • Introduction to Dim, a built-in function in R programming. • Creating data in a dimension and changing atomic vector's data into multi-dimensional data. • Importance of dim() function in Bioinformatics. 	Vectors & Data Types	5:46
12	Matrix & Matrices	<ul style="list-style-type: none"> • Introduction to Matrices in R language. • Purpose of matrix(), a built-in function in R programming. • Describes matrix initiation, customization of matrix rows and columns matrix layout. 	Vectors & Data Types	4:42
13	Arrays	<ul style="list-style-type: none"> • Introduction to arrays datatype in R programming language. • Different way of creating dimensions and multi-dimensions. • Describes kind of function to use for creating dimensional data depends upon the kind of analysis one is working on. 	Vectors & Data Types	3:42
14	Class	<ul style="list-style-type: none"> • Introduction classes in R programming language. • Use of built-in function class() in R programming. • Describe how classes in R represents data's classification. 	Vectors & Data Types	3:12
15	Factors	<ul style="list-style-type: none"> • Introduction to factors in R programming. • Importance of built-in function factor() in R language. • Describes script to categorize data using factor() function in R. 	Vectors & Data Types	6:40
16	Coercion	<ul style="list-style-type: none"> • Introduction to coercion in R language. • Describes to coerce integer data type to character data type using built-in functions in R. • Describes script to coerce one data type to another to make the function work properly. 	Vectors & Data Types	4:27

17	Lists	<ul style="list-style-type: none">• Introduction to List data type in R language.• Describes how to work with lists in R programming.• Describes script for creating and retrieving lists in R programming.	Vectors & Data Types	6:41
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Segment 4: Control Flow & Biological Data Pre-processing in R				
1	If Else Statements	<ul style="list-style-type: none"> • Introduction to if-else statements in R. • Describes the syntax of if-else statement. • Describes script to utilize these conditional statements in R programming. 	Control Flow	4:15
2	For Loops & Biological Data Binding	<ul style="list-style-type: none"> • Introduction to for loop in R programming language. • Describes the syntax of for loop and its uses. • Describes script to bind multiple CSV files into a single data frame utilizing for loop. 	Control Flow	16:30
3	While Loops & Reading Multiple Biological Datasets	<ul style="list-style-type: none"> • Introduction to while loop in R programming language. • Describes the syntax of while loop and its uses. • Describes script to read multiple files using the while loop and how it can be utilized to analyse data in Bioinformatics. 	Control Flow	16:16
4	Data Frames	<ul style="list-style-type: none"> • Introduction to data frames in R programming language. • Describes characteristics of data frames. • Creating 2-D table of required data using built-in functions of data frame. 	Biological Data Analysis	6:30
5	Loading Biological Data	<ul style="list-style-type: none"> • Importing the biological data in R programming. • Different ways to import loading biological data. • Better visualization of data sets by loading data into R environment. 	Biological Data Analysis	7:55
6	Saving Biological Data	<ul style="list-style-type: none"> • Describes to save CSV file from R using built-in functions of R. • Getting working directive of the file. • Changing working directive of R files. 	Biological Data Analysis	5:26
7	R Notiation & Selecting Values from Biological Dataset	<ul style="list-style-type: none"> • Introduction to R Notation system. • Describes methods for selecting values from biological datasets. • Basic method to introspect data and use it for different analysis. 	Biological Data Analysis	4:09
8	Positive Integers for Subsetting Biological Dataset (DataFrame)	<ul style="list-style-type: none"> • Introduction to positive interger for extracting data from dataset in R. • Describes different ways to extract values and save them in new data frame. 	Biological Data Analysis	5:25
9	Negative Integers for Subsetting Biological Dataset (DataFrame)	<ul style="list-style-type: none"> • Introduction to negative integers for extracting data from dataset. • Describes different ways to extract values and save them in new data frame. 	Biological Data Analysis	5:28

10	Zero Notation for Subsetting Biological Dataset (DataFrame)	<ul style="list-style-type: none"> • Introduction to zero notation for extracting values from datasets in R. • Describes different ways to extract data utilizing zero notation. 	Biological Data Analysis	1:09
11	Blank Spaces for Biological Data Subsetting	<ul style="list-style-type: none"> • Introduction to R notation system and blank spaces to extract data from datasets. • Describes script to extract data from datasets using blank spaces. • Advantages of blank spaces notation in R. 	Biological Data Analysis	3:20
12	Dollar Signs for Biological Data Subsetting	<ul style="list-style-type: none"> • Introduction to R notation system and dollar signs notation. • Describes script to extract data from data frames using dollar signs. 	Biological Data Analysis	2:58
13	Modifying Values in Existing DataFrames/Datasets	<ul style="list-style-type: none"> • Introduction to R notation system. • Describes script to modify values and creating new values using R notation system. 	Biological Data Analysis	7:06
14	NA Values in Biological Datasets	<ul style="list-style-type: none"> • Introduction to NA values in R datasets. • Finding NA values in R datasets. • Describes script to insert NA values in datasets using stats operations. 	Biological Data Analysis	5:24
15	Figuring Out NA Values in Biological Datasets	<ul style="list-style-type: none"> • Introduction to NA values in R datasets. • Describes to figure out NA values using built-in functions. 	Biological Data Analysis	2:06
16	Logical Subsetting in Biological Datasets	<ul style="list-style-type: none"> • Introduction to logical subsetting in R language and its uses. • Describes various logical operators and their syntax. • Describes script for logical subsetting and its importance in analyzing data in Bioinformatics. 	Biological Data Analysis	9:45

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Segment 5: Biological Data Visualization via ggplot2 in R				
1	Introduction to ggplot2 for Biological Datasets	<ul style="list-style-type: none"> • A detailed introduction to ggplot2 package in R programming. • Describes different ways to install ggplot2 package. • Describes how ggplot2 can be utilized for the visualization to represent the particular dataset 	Data Visualization: ggplot2	10:46
2	ggplot2: Key components	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R. • Describes different components and functions of ggplot2 package. • Describes the type of graphics to map against a particular dataset. 	Data Visualization: ggplot2	8:25
3	ggplot2: Human Mitochondrial Proteome & Aesthetics (Size, Shape, Color)	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes mapping of Biological datasets utilizing ggplot2 package. • Using mitochondrial proteome dataset to visualize data utilizing different functions and components of ggplot2 library. 	Data Visualization: ggplot2	26:02
4	ggplot2: Facetting of Human Genome	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes facetting of biological dataset using ggplot2 library. • Describes facetting functions and applying these functions to facet datasets. • Analyzing results of facetting for a particular dataset. 	Data Visualization: ggplot2	22:25
5	ggplot2: Smooth Out the Biological Data	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes smoothing out the biological data in ggplot2 package. • Describes parameters to smooth out the dataset. 	Data Visualization: ggplot2	8:43
6	ggplot2: Boxplots for Human Mitochondrial Proteome	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Creating different boxplots to visualize the biological dataset. 	Data Visualization: ggplot2	7:55
7	ggplot2 :Histograms for Human Mitochondrial Pattern Finding	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes histograms in ggplot2 library or R. • Utilization of geom_histogram() function to visualize biological dataset. 	Data Visualization: ggplot2	6:02
8	ggplot2: Frequency Plots for Human Mitochondrial Information Frequency Mining	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes the frequency polygons in ggplot2 package. • Describes the utilization of geom_freqpoly() function to visualize biological dataset. 	Data Visualization: ggplot2	6:12
9	ggplot2: Bar Charts Human Mitochondrial Knowledge Mining	<ul style="list-style-type: none"> • Introduction to ggplot2 library in R programming. • Describes the use of bar charts in ggplot2 library. • Describes to utilize the geom_bar() function to visualize the biological dataset. 	Data Visualization: ggplot2	10:43

10	ggplot2 - Scaling and Limiting Data Visualization	<ul style="list-style-type: none"> • Description of ggplot2 package in R. • Visualize data utilizing different functions and components of ggplot2 library. • Scaling and limiting biological data visualization using various functions of ggplot2 	Data Visualization: ggplot2	3:53
11	ggplot2 - Changing Labels and Finalizing Visualization	<ul style="list-style-type: none"> • Description of ggplot2 package in R. • Visualize data utilizing different functions and components of ggplot2 library. • Changing labels and Finalizing visualizations. 	Data Visualization: ggplot2	8:41
12	ggtree - Phylogenetic Tree Visualization	<ul style="list-style-type: none"> • Introduction to ggtree package in R. • Generating phylogenetic tree using ggtree library. • Describes different functions, formats and parameters for generating phylogenetic tree. 	Data Visualization: ggplot2	5:41
13	ggplot2 - Saving the Visualizations in High Resolution		Data Visualization: ggplot2	
14	Volcano Plot Visualization - Finding Differentially Expressed Genes	<ul style="list-style-type: none"> • Applications of Volcano Plot • Visualization of Differentially Expressed Gene Datasets 	Data Visualization: ggplot2	
15	Heatmap Visualization - Plotting Distances Between Samples	<ul style="list-style-type: none"> • Constructions and applications of distance matrix datasets 	Data Visualization: ggplot2	
16	PCA Plot - Visualizations of Principle Components	<ul style="list-style-type: none"> • Construction of PC components and plotting PCA plot 		