

| Days | Names   | Duration | Category        | Main Category               |
|------|---|----------|-----------------|-----------------------------|
| 1    | Introduction to National Center of Biotechnology Information (NCBI) | 18:01    | NCBI            | Bioinformatics Databases    |
| 1    | Sequence Analysis   | 17:59    | NCBI            | Bioinformatics Databases    |
| 1    | Sequence Retrieval from NCBI  | 16:16    | NCBI            | Bioinformatics Databases    |
| 2    | PubMed Central & ENTREZ   | 11:06    | NCBI            | Bioinformatics Databases    |
| 2    | FASTA (Sequence Format)   | 6:13     | Sequence Format | Bioinformatics File Formats |
| 2    | GenBank: Nucleotide Database on NCBI                                | 6:50     | NCBI            | Bioinformatics Databases    |
| 3    | GenBank (Sequence Annotation Format)                                | 7:08     | Sequence Format | Bioinformatics File Formats |
| 3    | FASTA vs. GenBank   | 18:26    | NCBI            | Bioinformatics Databases    |
| 3    | Gene Database: A Comprehensive Gene Database                        | 30:21:00 | NCBI            | Bioinformatics Databases    |
| 4    | NCBI Genomes & NCBI Assembly: Retrieval of Genomes                  | 36:14:00 | NCBI            | Bioinformatics Databases    |
| 4    | Gene File Format/Gene Transfer Format                               | 11:06    | Sequence Format | Bioinformatics File Formats |

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| 4 | BED (Gene Structure Format)  | 4:26     | Sequence Format | Bioinformatics File Formats  |
| 5 | RefSeq Database: Retrieval of Single Reference Sequences               | 11:15    | NCBI            | Bioinformatics Databases     |
| 5 | BLAST Database Searching   | 25:36:00 | NCBI            | Bioinformatics Databases     |
| 5 | Introduction to Molecular Modeling Database (MMDB)                     | 8:06     | NCBI            | Protein Databases & Analysis |
| 6 | Introduction to UCSC Genome Browser & SARS-CoV-2 Viral Genome          | 13:40    | UCSC            | Bioinformatics Databases     |
| 6 | Retrieve an Entire Genome & Retrieval of SARS-CoV-2 Viral Genome       | 9:40     | UCSC            | Bioinformatics Databases     |
| 6 | Retrieval of Genomic Data & Annotation of SARS-CoV-2 Viral Genome      | 5:29     | UCSC            | Bioinformatics Databases     |
| 7 | Introduction to UniProt  | 9:56     | UniProt         | Protein Databases & Analysis |
| 7 | UniProtKB & Protein Analysis   | 39:29:00 | UniProt         | Protein Databases & Analysis |
| 7 | Introduction to Protein Data Bank (PDB)                                | 6:44     | PDB             | Protein Databases & Analysis |
| 8 | Accurately Searching for a Protein Structure on PDB & Protein Analysis | 13:55    | PDB             | Protein Databases & Analysis |

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| 8  | Introduction to ENSEMBL                                       | 7:49     | ENSEMBL                                | Bioinformatics Databases      |
| 8  | Retrieval of a Gene-Protein-Chromosomal Region                | 18:01    | ENSEMBL                                | Bioinformatics Databases      |
| 9  | Introduction to InterPro                                      | 4:10     | InterPro                               | Protein Databases & Analysis  |
| 9  | InterPro - Protein Family Classification and Analysis         | 14:35    | InterPro                               | Protein Databases & Analysis  |
| 9  | Introducton to Phytozome                                      | 9:38     | Phytozome                              | Bioinformatics Databases      |
| 10 | Interpret Plant Genome Records                                | 9:06     | Phytozome                              | Bioinformatics Databases      |
| 10 | Download an Entire Plant Genome & Proteome                    | 26:41:00 | Phytozome                              | Bioinformatics Databases      |
| 10 | EMBOSS NEEDLE: Global Alignment of Sequences                  | 20:02    | Pairwise Sequence Alignment & Analysis | Sequence Alignment & Analysis |
| 11 | EMBOSS Water  | 9:10     | Pairwise Sequence Alignment & Analysis | Sequence Alignment & Analysis |
| 11 | Clustal Omega: Most Reliable Multiple Sequence Alignment Tool | 19:18    | Multiple Sequence Alignment & Analysis | Sequence Alignment & Analysis |
| 11 | Clustal Omega Alignment Format                                | 5:07     | Alignment Format                       | Bioinformatics File Formats   |

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| 12 | Jalview   | 13:42 | Multiple Sequence Alignment & Analysis     | Sequence Alignment & Analysis  |
| 12 | MEGA - Multiple Sequence Alignment                          | 4:23  | Multiple Sequence Alignment & Analysis     | Sequence Alignment & Analysis  |
| 12 | MEGA (Alignment Format)                                     | 5:32  | Alignment Format                           | Bioinformatics File Formats    |
| 13 | iTOL: Creating Publishable Phylogenetic Figures             | 13:42 | Phylogenetic Tree Building & Visualization | Phylogenetic Analysis          |
| 13 | Quick2D   | 4:33  | Secondary Structure Prediction             | Secondary Structure Prediction |
| 13 | Jpred: Prediction Secondary Structure of the Proteins       | 4:54  | Secondary Structure Prediction             | Secondary Structure Prediction |
| 14 | HMMER - Hidden Markov Model Based Protein Profiles Database | 13:16 | Protein Analysis                           | Protein Databases & Analysis   |
| 14 | SignalP: Prediction of Signal Peptides                      | 7:57  | Protein Analysis                           | Protein Databases & Analysis   |
| 14 | TargetP: Prediction of Protein Localization                 | 9:21  | Protein Analysis                           | Protein Databases & Analysis   |
| 15 | Gene Structure Display Server 2.0                           | 8:35  | Genomics Tools                             | Genomics Tools                 |
| 15 | Introduction to Python and its Intallation                  | 8:25  | Introduction                               | Python                         |

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| 15 | Comments   | 5:42     | Introduction     | Python |
| 16 | Basic Input and Output                                   | 15:37    | Introduction     | Python |
| 16 | Mathematical Operations                                  | 7:20     | Introduction     | Python |
| 16 | Strings  | 21:51    | Iterable Objects | Python |
| 17 | Dictionaries   | 10:57    | Iterable Objects | Python |
| 17 | Lists  | 28:47:00 | Iterable Objects | Python |
| 17 | Tuples   | 10:37:00 | Iterable Objects | Python |
| 18 | Sets   | 7:35     | Iterable Objects | Python |
| 18 | If-Else  | 9:19     | Control Flow     | Python |
| 18 | For Loop and Calculation of Molecular Weight of Proteins | 10:56    | Control Flow     | Python |
| 19 | While Loop and Biological Data Analysis                  | 9:37     | Control Flow     | Python |

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| 19 | Reading Files   | 13:45    | File Handling       | Python |
| 19 | Writing Files   | 7:17     | File Handling       | Python |
| 20 | Consolidate(merge) multiple DNA and Protein Sequences into one FASTA file | 9:24     | File Handling       | Python |
| 20 | OS  | 31:47:00 | File Handling       | Python |
| 20 | CSV (A special kind of file in Bioinformatics)                            | 8:41     | File Handling       | Python |
| 21 | Function  | 26:41:00 | Functions & Modules | Python |
| 21 | With  | 8:50     | Functions & Modules | Python |
| 21 | Error Handling  | 15:31    | Error Handling      | Python |
| 22 | Introduction to R in Bioinformatics & R Installation                      | 9:47     | Introduction        | R      |
| 22 | The R Studio Interface Explanation  | 6:23     | Introduction        | R      |
| 23 | Comments  | 4:16     | Introduction        | R      |

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| 23 | Sample & Replacement                   | 9:09 | Variables & Functions | R |
| 24 | Variable Declaration and Objects       | 5:24 | Variables & Functions | R |
| 24 | Built-in Functions & ARGS              | 4:31 | Variables & Functions | R |
| 25 | Write Your Own Functions And Arguments | 5:39 | Variables & Functions | R |
| 25 | Scripts                                | 7:36 | Variables & Functions | R |
| 26 | Attributes and Names                   | 4:46 | Vectors & Data Types  | R |
| 26 | Characters                             | 4:43 | Vectors & Data Types  | R |
| 27 | Doubles                                | 3:30 | Vectors & Data Types  | R |
| 27 | Logicals                               | 2:27 | Vectors & Data Types  | R |
| 28 | Factors                                | 6:40 | Vectors & Data Types  | R |
| 29 | Atomic Vectors                         | 2:42 | Vectors & Data Types  | R |

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| 29 | Integers                             | 3:23 | Vectors & Data Types | R |
| 30 | Dim & Dimensions                     | 5:46 | Vectors & Data Types | R |
| 30 | Coercion                             | 4:27 | Vectors & Data Types | R |
| 31 | Lists                                | 6:41 | Vectors & Data Types | R |
| 31 | Matrix & Matrices                    | 4:42 | Vectors & Data Types | R |
| 32 | Arrays                               | 3:42 | Vectors & Data Types | R |
| 32 | Class                                | 3:12 | Vectors & Data Types | R |
| 33 | Packages                             | 4:00 | Packages             | R |
| 33 | Getting Help with Help Packages      | 3:42 | Packages             | R |
| 34 | Install Bioinformatics Packages      | 5:25 | Packages             | R |
| 34 | Library & Initialization of Packages | 2:27 | Packages             | R |



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| 35 | Loading Biological Data                               | 7:55 | Biological Data Analysis | R |
| 35 | Zero Notation for Subsetting Biological Datasets      | 1:09 | Biological Data Analysis | R |
| 36 | Saving Biological Data                                | 5:26 | Biological Data Analysis | R |
| 36 | R Notation & Selecting Values from Biological Dataset | 4:09 | Biological Data Analysis | R |
| 37 | Data Frames   | 6:30 | Biological Data Analysis | R |
| 37 | Positive Integers for Subsetting Biological Dataset   | 5:25 | Biological Data Analysis | R |
| 38 | Negative Integers for Subsetting Biological Dataset   | 5:28 | Biological Data Analysis | R |
| 38 | Dollar Signs for Biological Dataset Subsetting        | 2:58 | Biological Data Analysis | R |
| 39 | Blank Spaces For Biological Data Subsetting           | 3:20 | Biological Data Analysis | R |
| 39 | Modifying Values in Existing Datasets                 | 7:06 | Biological Data Analysis | R |
| 40 | NA Values in Biological Dataset                       | 5:24 | Biological Data Analysis | R |

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| 40 | Figuring out NA Values in Biological Dataset       | 2:06  | Biological Data Analysis | R |
| 41 | Logical Subsetting in Biological Datasets          | 9:45  | Biological Data Analysis | R |
| 41 | If Else Statement                                  | 4:15  | Control Flow             | R |
| 42 | For Loops & Biological Data Binding                | 16:30 | Control Flow             | R |
| 42 | While Loops & Reading Multiple Biological Datasets | 16:16 | Control Flow             | R |