Online Practical Session Plan for BT Area

Course	Course Incharge	Batch	Plans for Practical
BIO 112 Microbiology	Sudeep Goswami	2019 (BT)	**Blended**
BT 302 Computational Biology	Utkarsh Raj	2018 (BT)	**Online Session**
BT 311 Genetic Engineering	Narayan Kumar	2018 (BT)	**Blended**
BT 352 Biochemical & Bioprocess Engineering	Soumyadeep Chakraborty	2018 (BT)	**Blended**
BT 401 Environmental Biology	Sudeep Goswami	2018 (BT)	**Blended**
BT 461 Immunology	Gaurav Gupta	2017 (BT)	**Blended**
BT 4131 Waste Water Management	Soumyadeep Chakraborty	2017 (BT)	**Blended**
BT 4111 Synthetic Biology	Sudeep Goswami	2017 (BT)	**Online Session**
BT 431 Perl & Bio-Perl	Sachidanada Swami	2017 (BT)	**Online Session**

BIO 112 Microbiology

(Sudeep Goswami)

List of Practical:

P1: Culturing of microbes Plating, Streaking, Dilution plating **(Completed)**

http://vlab.amrita.edu/?sub=3&brch=73&sim=213&cnt=1

https://www.youtube.com/watch?v=_1KP9zOtjXk

https://www.jove.com/video/3064/aseptic-laboratory-techniques-plating-methods.

P2: Enumeration of microbial community in air, soil and H_2O **(Completed)**

https://study.com/academy/lesson/bacterial-enumeration-definition-methods-example.html

https://www.jove.com/video/57932/isolation-analysis-microbial-communities-soil-rhizosphere-roots

P3: Characterization of microbes from waste waters **(Completed)**

http://vlab.amrita.edu/?sub=3&brch=76&sim=1109&cnt=1

https://www.youtube.com/watch?v=MlHhjo1SmJM

P4: Staining of microbes (Gram staining, Spore staining) **(Completed)**

http://vlab.amrita.edu/?sub=3&brch=73&sim=208&cnt=1

https://www.jove.com/science-education/10513/microscopy-and-staining-gram-capsule-and-endospore-staining

P5: Estimation of glucose **(Completed)**

http://vlab.amrita.edu/?sub=3&brch=63&sim=631&cnt=1

https://www.youtube.com/watch?v=NtqsWKRW7N8

P6: Estimation of protein **(Completed)**

https://www.youtube.com/watch?v=EyGVlgZoHaQ

https://www.jove.com/science-education/5688/photometric-protein-determination

P7: Growth curve and characteristics, (Optical density, Protein, CFU) **(Virtual Lab)**

http://vlab.amrita.edu/?sub=3&brch=73&sim=1105&cnt=1

https://www.youtube.com/watch?v=05Fl-hSwCzw

https://www.jove.com/science-education/10511/growth-curves-generating-growth-curves-using-colony-forming-units

P8: Enzymatic reactions for identifications of microbes **(Virtual Lab)**

http://vlab.amrita.edu/?sub=3&brch=73&sim=703&cnt=1

P9: Enzyme assays for extracellular enzymes (Cellulase, Xylanase) **(Onsite Lab based practical)**

https://www.researchgate.net/publication/307632401_Isolation_and_characterization_of_cellulase-_and_xylanase-producing_microbes_isolated_from_tropical_forests_in_Java_and_Sumatra

https://www.youtube.com/watch?v=EAICUCznjbw

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5451357/

P10: Isolation of DNA (Chromosome and Plasmid) **(Virtual Lab)**

http://mbvi-au.vlabs.ac.in/molecular-biology-1/Extraction_of_DNA_from_Fish_Fins/

https://www.youtube.com/watch?v=m1z7RxrjHOc

http://mbvi-au.vlabs.ac.in/molecular-biology-1/Agarose_Gel_Electrophoresis/

BT 302 Computational Biology

(Utkarsh Raj)

List of Practical

P1: Exploration of Nucleotide Sequence Databases (EMBL, Genebank and DDBJ etc.), ORF Prediction **(Completed)**

P2: Identification of Pathways using KEGG **(Completed)**

P3: Protein Sequence Databases (Swissprot, TrEMBL and PIR etc.) **(Completed)**

P4: Structural Databases (CATH, SCOP, PDB and MMDB etc.) and different biological databases **(Completed)**

P5: Pairwise and Multiple Sequence Alignment, Sequence Analysis (Blast, Fasta, ClustalW, Clustal Omega) **(Completed)**

P6: Biological Visualization and editing tools (Chimera, SPDBV) **(Completed)**

P7: Primer Designing (Primer3 Plus, Gene Runner) **(Completed)**

P8: Identification of the active site/cavities in a protein 3D structure using different tools/software **(Completed)**

P9: Calculation of Physiochemical properties from a protein sequence **(Online Mode)**

- Online free software

P10: Protein Secondary using JPred, PredictProtein and RaptorX **(Online Mode)**

- Online free software

P11: Tertiary Structure Prediction with structure validation using PROCHECK, ERRAT, Verify-3D, PROVE **(Online Mode)**

- Online free software

P12: Multiple Template Selection, Protein Modeling using Modeller **(Online Mode)**

- Free software installed on system

P13: Loop Modeling, Structure Analysis and Energy Minimization **(Online Mode)**

- Free software installed on system

P14: Protein Ligand Docking and Ligand Protein Interaction analysis **(Online Mode)**

- Free software installed on system

BT 311 Genetic Engineering

(Narayan Kumar)

List of Practical

P1: Genomic DNA and Plasmid DNA isolation **(Completed)**

P2: Polymerase chain reaction using the isolated DNA as template **(Completed)**

P3: Competent Cell preparation and transformation by heat sock method **(Completed)**

P4: Blue white screening of recombinant transformed cell **(Completed)**

P5: Restriction digestion of genomic DNA **(Completed)**

P6: Restriction digestion of gene of interest from plasmid DNA and clone into *E.coli* BL21(DE3) **(Virtual Lab)**

https://dnalc.cshl.edu/resources/animations/restriction.html

P7: Electrocompetent Cell preparation and transformation by electroporation **(Onsite Lab based practical)**

P8: Restriction Fragment length polymorphism **(Virtual Lab)**

http://www.bch.cuhk.edu.hk/vlab/genetic/vl_detail.html

BT 352 Biochemical & Bioprocess Engineering

(Soumyadeep Chakraborty)

List of Practical:

P1: Kinetic analysis of an enzyme catalysed reaction: hydrolysis of sucrose by amylase. **(Completed)**

P2: Isolation / purification of alcohol dehydrogenase from yeast cells: Cell disintegration followed by fractional precipitation. **(Completed)**

P3: Immobilization of an enzyme by entrapment. **(Completed)**

P4: Bioconversion of sucrose to ethanol using immobilized yeast cells. **(Completed)**

P5: Study of an anaerobic microbial process: bioconversion of sucrose to ethanol by Saccharomyces cerevisiae. **(Completed)**

P6: Study of an aerobic microbial process: production of baker's yeast **(Modified form)** **(Virtual Lab)**

- Estimation of growth kinetic parameters in batch fermentation
  http://209.211.220.205/model/egk/theory.html

P7: Kinetics of thermal death of microorganisms: sterilization of media. **(Virtual Lab)**

- Simultaneous measurement of specific growth / death rate of micro organisms
  http://209.211.220.205/model/edr/theory.html

P8: Sterilization of air through fibrous filter. **(Onsite Lab based practical)**

P9: Estimation of mixing time in an agitated vessel. **(Modified Practical to be offered)** **(Virtual Lab)**

- Bioreactor- Basics
  http://209.211.220.205/model/bb/theory.html
- Control Characteristics of pH Controller
  http://209.211.220.205/model/ccph/theory.html

P10: Determination of volumetric oxygen transfer coefficient (k_{La}) for an aerated / agitated vessel. **(Virtual Lab)**

- Determination of Volumeteric Mass Transfer Co-efficient (Dynamic method)
  http://209.211.220.205/model/dm/theory.html
- Determination of Volumeteric Mass Transfer Co-efficient (Oxygen balance method)
  http://209.211.220.205/model/obm/theory.html

BT 401 Environmental Biotechnology

(Sudeep Goswami)

List of Practical:

P1: Determination of total bacterial population in sewage by standard plate count technique. **(Completed)**

https://www.jove.com/science-education/10507/serial-dilutions-and-plating-microbial-enumeration

P2: Determination of total bacteria population in drinking water by membrane filtration method **(Completed)**

https://www.jove.com/science-education/10213/isolation-of-fecal-bacteria-from-water-samples-by-filtration

https://www.youtube.com/watch?v=i0433lTS908

P3: Detection of coliform in water samples **(Completed)**

https://www.youtube.com/watch?v=DYDDwE-HhCM

P4: Determination of total dissolved solids of water **(Completed)**

https://study.com/academy/lesson/total-dissolved-solids-tds-water-conductivity.html

https://www.jove.com/science-education/10015/turbidity-and-total-solids-in-surface-water

P5: Bacteriological examination of water by multiple tube fermentation test **(Completed)**

https://microbeonline.com/probable-number-mpn-test-principle-procedure-results/

https://www.youtube.com/watch?v=uPZ_YFWUzoE

https://www.epa.gov/sites/production/files/2015-12/documents/9131.pdf

P6: Determination of biological oxygen demand of sewage sample **(Completed)**

http://vlab.amrita.edu/index.php?sub=3&brch=272&sim=1430&cnt=2

https://www.youtube.com/watch?v=h4fCkhb4Y5I

https://www.jove.com/science-education/10016/dissolved-oxygen-in-surface-water

P7: Isolation of bacteriophages from sewage. **(Completed)**

https://slideplayer.com/slide/9078904/

P8: Isolation of xenobiotic degrading bacteria by selective enrichment technique **(Onsite Lab based practical)**

https://www.ijcmas.com/vol-4-2/Preeti%20Singh,%20et%20al.pdf

https://www.hindawi.com/journals/bmri/2016/5798593/

P9: Estimation of nitrate in drinking water. **(Onsite Lab based practical)**

https://www.bioscience.com.pk/topics/microbiology/item/226-nitratase-test-nitrate-reduction-denitrification

P10: Estimation of heavy metals in water/soil by Atomic absorption spectrophotometry. **(Onsite Lab based practical)**

https://www.youtube.com/watch?v=JOqTaAA5T1Q

https://www.jove.com/video/59519/atomic-absorbance-spectroscopy-to-measure-intracellular-zinc-pools

BT 461 Immunology

(Gaurav Gupta)

List of Practical

P1: Identification of human blood groups. **(Completed)**

P2: To separate serum/ plasma and leucocytes from the blood sample. **(Completed)**

P3: To perform Total Leukocyte Count (TLC) of the given blood sample. **(Completed)**

P4: To perform Differential Leukocyte Count (DLC) of the given blood sample **(Completed)**

P5: To perform Immunoprecipitation **(Completed)**

P6: To perform immunodiffusion by Ouchterlony method. **(Completed)**

P7: To demonstrate single radial immunodiffusion (SRID) technique **(Onsite Lab based practical)**

https://www.youtube.com/watch?v=Bn-w6P_9TUA

P8: To perform Dot ELISA **(Onsite Lab based practical)**

https://www.slideshare.net/ghoshroneet/dot-elis-asat1

P9: To perform ELISA **(Virtual Lab)**

http://vlab.amrita.edu/?sub=3&brch=69&sim=721&cnt=1

http://vlab.amrita.edu/?sub=3&brch=69&sim=696&cnt=1

http://vlab.amrita.edu/?sub=3&brch=69&sim=699&cnt=1

BT 4131 Waste Water Management

(Soumyadeep Chakraborty)

List of Practical

P1: Wastewater collection and sampling **(Completed)**

P2: Wastewater characteristics **(Completed)**

P3: pH, Temperature and DO **(Completed)**

P4: Determination of Solids (TS, TDS, TSS) **(Completed)**

P5: Determination of Solids (FS, VS, Settleable solids) **(Completed)**

P6: Dissolved Oxygen, Chemical Oxygen Demand **(Completed)**

P7: Biological Oxygen Demand **(Completed)**

P8: Test for Ammonia and Chlorine **(Onsite Lab based practical)**

P9: Test for Phosphate **(Onsite Lab based practical)**

P10: Test for Total Kjeldahl Nitrogen **(Onsite Lab based practical)**

P11: Biological Monitoring **(Virtual Lab)**

- Bacterial Population Growth
  http://vlab.amrita.edu/index.php?sub=3&brch=272&sim=1485&cnt=1

BT 4111 Synthetic Biology

(Narayan Kumar)

List of Practical

P1: Design Grammars and Build Part Libraries **(Completed)**

P2: Design a synthetic DNA molecule **(Completed)**

P3: DNA-ligand interaction and modelling **(Completed)**

P4: Metabolic Pathway Prediction and Design **(Online Mode)**

- Online instruction with free database KEGG (**https://www.genome.jp/kegg/**)

P5: Drug-Design and Drug-Docking **(Online Mode)**

- Online instruction with free software Autodock, MGL Tools and Vina.

BT 431 Perl & Bio-perl

(Sachidanada Swami)

80% practical have been completed and the remaining **20%** can be conducted in online mode and free software are installed on students PC.