

EquivalenceTable



Below you will find an overview of the required entry competencies for the M.Sc. Synthetic Biology program, based on the exit competencies of the B. Sc. Biology at TU Darmstadt.

Please complete the table, preferable digitally, as follows: Please add the modules, in which equivalent content was taught, in the middle column. . Please add a link to the respective module description/module handbook in the right column. Please do not submit module manuals in paper form or as CD. **Please also submit a CV (optional).**

Last Name: _____SHAJU_____

First Name: _____ANN MARIYA_____

Application No.: _____

Entry Competencies	Modules in which you have acquired this content and competencies.	Link to the corresponding module descriptions/module handbook.	ECTS
Basic knowledge of the following basic math and science subjects.			
Mathematics	I.) PERSPECTIVES OF SCIENCE <ul style="list-style-type: none"> • Module 1- Introduction to science and scientific methods <ul style="list-style-type: none"> ○ Formulation of a hypothesis ○ Testing of hypothesis ○ Formulation of theories • Module 2- Experimentation in science <ul style="list-style-type: none"> ○ Selection of a problem ○ Selection of variables, study area, and a suitable design ○ Necessity of units and dimensions <ul style="list-style-type: none"> ▪ Units of length, volume, area, concentration, temperature, pressure ○ Setting of hypothesis, Null- hypothesis and alternative hypothesis ○ Analysis, presentation and interpretation of data 	I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For I , II please refer page no: 61,62,63 of the above mentioned pdf file.	6

	<ul style="list-style-type: none"> ○ Testing of hypothesis, need of statistical tools ● Prepare CuSO₄. H₂O solution of different molarity using stock solution ● Determination of the area of different types of leaves using graph paper. <p>II.) METHODOLOGIES OF PLANT SCIENCE</p> <ul style="list-style-type: none"> ● Module 2- Biostatistics <ul style="list-style-type: none"> ○ Introduction, statistical terms and symbols ○ Sample; concept of sample, sampling methods ○ Collection and representation of data, graphic representation of data ○ Measures of central tendency: mean, mode, median ○ Measures of dispersion: standard deviation, standard error ○ Distribution patterns: normal distribution, binomial distribution, ○ t-test: introduction, uses, procedure ○ chi-square test: introduction, uses, procedure ● Collect numerical data and find out the central tendencies and prepare different types of graph ● Familiarize with situations requiring t-test, chi-square test. 		
Physics	<p>I.) METHODOLOGIES OF PLANT SCIENCE</p> <ul style="list-style-type: none"> ● Module 1- Biophysics <ul style="list-style-type: none"> ○ Principles and applications of colorimeter, spectrophotometer and centrifuge, Beer-Lambert's Law 	I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For I.) please refer page no: 62 of the above mention pdf file.	5.9

	<ul style="list-style-type: none"> ○ Separation methods: chromatography; thin layer, paper, column, electrophoresis; PAGE, Agarose gel electrophoresis ○ pH: concept of pH, methods to measure pH; pH paper and pH meter ○ Buffers: definition, functions of buffers in biological systems, use of buffers in biological research, examples of commonly used buffers <ul style="list-style-type: none"> ● Preparation of 0.1M sodium phosphate buffer (pH 6 and 7) ● Measurement of pH using pH meter ● Paper chromatography of plant pigments ● Electrophoresis of nucleic acids ● Column chromatography of plant pigments ● Determination of the concentration of a given solution of CuSO₄ using colorimetry. ● Western Blotting ● Haemocytometer ● PAGE <p>II.) PLANT PHYSIOLOGY</p> <ul style="list-style-type: none"> ● Module 1- Water relations- Physical aspects of absorption, water potential, gravity potential, pressure potential, OP, DPD, WP, TP ● Module 3- Photosynthesis- PAR, red drop, fluorescence, absorption and action spectra, concept of photosystems, Emerson enhancement effect. 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya . For II.) please refer page no: 57,58 of the above mentioned pdf file.</p>	
General Chemistry	<p>I.) GENERAL CHEMISTRY</p> <ul style="list-style-type: none"> ● Unit 1- Atomic Structure ● Unit 2- Concept of Equilibrium ● Unit 3- Nuclear Chemistry ● Unit 4- Analytical Chemistry- Basic Principle ● Unit 5- Laws of Thermodynamics. 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For I.) please refer page no: 79,80,83 of the above mention pdf file.</p>	9.2

	<ul style="list-style-type: none"> • Micro-scale chemistry- The volumetric analysis may be done by two-burette titration procedure. • Acidimetry and Alkalimetry experiments • Permanganometry experiments • Dichrometry experiments <p>II.) PLANT PHYSIOLOGY</p> <ul style="list-style-type: none"> • Module 1- water relation- starch-sugar conversion, active , potassium ion exchange. • Module 2- Mineral nutrition and mechanism of absorption- essential and non essential elements, macro and micro role , absorption of minerals, active and passive- carrier concept, ion exchange. • Module 3- Photosynthesis- cyclic and non cyclic photophosphorylation, carbon assimilation pathways, CAM, Blackmann’s law • Module 6- plant response to environment-Allelochemicals • Module 7- physiology of growth and development- Auxins, Giberillins, cytokinins, ethylene 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya . For II.) please refer page no: 57, 58 of the above mentioned pdf file.</p>	
Organic Chemistry	<p>I.) BASIC ORGANIC CHEMISTRY</p> <ul style="list-style-type: none"> • Unit 1- Purification of Organic Compounds • Unit 2- Stereochemistry of Organic Compounds • Unit 3- Mechanisms of Organic Reactions • Unit 4- Natural and Synthetic Polymers <p>II.) HETEROCYCLIC CHEMISTRY</p> <ul style="list-style-type: none"> • Unit 1- Heterocyclic Compounds <p>III.) ADVANCED BIO-ORGANIC CHEMISTRY</p> <ul style="list-style-type: none"> • Unit 1- Amino Acids and Proteins • Unit 2- Carbohydrates • Unit 3- Vitamins, Steroids, Hormones and Lipids • Unit 4- Chemistry in Medicine • Unit 5- Natural Products 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For I.) please refer page no: 81,82; for II.) refer page no: 84; for III.) refer page no: 86, 87; for IV.) refer page no:88 and for V.) refer page no: 89 of the above mention pdf file.</p>	10.5

	<ul style="list-style-type: none"> Unit 6- Chromatographic Techniques. <p>IV.)</p> <ul style="list-style-type: none"> Tests for elements: Nitrogen, Halogen, Sulphur Study of reactions of common functional groups Qualitative analysis with a view to characterization of functional groups and identification of compounds Organic preparation involving halogenation, oxidation, reduction, acetylation, benzylation, hydrolysis, diazotization Isolation of an organic compound from a natural source. <p>V.)</p> <ul style="list-style-type: none"> Structure and properties of Organic compounds- virtual lab 		
Biochemistry	<p>I.) BIO-INORGANIC AND HETEROCYCLIC CHEMISTRY</p> <ul style="list-style-type: none"> Unit 2- Bioinorganic Chemistry- coupled reactions, biological oxidation reactions, Oxygen Carriers- Haemoglobin and myoglobin- structure and function-oxygen transport mechanism-hemocyanin, hemerythrin; electron carriers, photosynthesis Unit 3- Enzymes and Nucleic acids Unit 4- Chemistry and Agriculture <p>II.) ADVANCED BIO-ORGANIC CHEMISTRY</p> <ul style="list-style-type: none"> Unit 1- Amino acids and Proteins Unit 3- Vitamins, Steroids, Hormones, and Lipids. <p>III.) PLANT PHYSIOLOGY</p> <ul style="list-style-type: none"> MODULE 5- Respiration- aerobic and anaerobic, glycolysis, krebs cycle, electron transport system and oxidative photophosphorylation. ATPases- chemi osmotic hypothesis, RQ. 	I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya . For I.) please refer page no: 84,85; for II.) refer page no: 86; for III.) please refer page no: 58 of the above mention pdf file.	7.3

Entry Competencies	Modules in which you have acquired this content and competencies.	Link to the corresponding module descriptions/module handbook.	ECTS
Basics in Biosciences and in-depth knowledge in the following areas.			
Basics in Microbiology	<p>I.)MICROBIOLOGY</p> <ul style="list-style-type: none"> • Module 1- <ul style="list-style-type: none"> ○ Introduction, scope of Microbiology • Module 2- <ul style="list-style-type: none"> ○ Bacteria ○ Reproduction ○ Genetic recombination ○ Three Domains of Life. Mycoplasma-general characters. <p>II.)</p> <ul style="list-style-type: none"> • Preparation of bacterial smear • Grams staining • Isolation of microbes from soil • Virtual lab- Streak plate method, Isolation and identification of two bacterial unknowns 	I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya . For I.) please refer page no: 26; for II.) refer page no: 27 of the above mention pdf file.	5.3
Basics of Cell and Molecular Biology	<p>I.) CELL BIOLOGY</p> <ul style="list-style-type: none"> • Unit 1- Historical account of Cell Biology, Cell theory, Protoplasm theory • Unit 2- Cell <p>II.) MOLECULAR BIOLOGY</p> <ul style="list-style-type: none"> • Unit 1- Nucleic acids-structure of DNA and RNA- basic features, alternate forms of DNA- types and structure of RNA • Unit 2- Replication of DNA- Meselson-Stahl experiment - details of semiconservative replication of DNA. 	I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya . For I.) please refer page no: 51; for II.) refer page no: 52 of the above mention pdf file.	5.3

<p>In-depth knowledge in Microbiology, Cell and Molecular Biology, Bioinformatics, Biochemistry or comparable to the extent of at least 24 ECTS in total</p>	<p>I.) MICROBIOLOGY</p> <ul style="list-style-type: none"> • Module 3- <ul style="list-style-type: none"> ○ Virus- General morphology and structure ○ Plant viruses- architecture of TMV ○ RNA viruses, DNA viruses ○ Brief account of virus replication • Module 4- <ul style="list-style-type: none"> ○ Applied Microbiology ○ Biogas production ○ Reconversion of waste products ○ Bioremediation ○ Antibiotics ○ Production of single cell protein and Probiotics • Preparation of bacterial smear • Grams staining • Isolation of microbes from soil • Streak plate method • Isolation and identification of bacterial unknowns. <p>II.) PHYCOLOGY</p> <ul style="list-style-type: none"> • Module 1- Introduction to Phycology and Classification of Algae- range of thallus structure and pigments in algae • Module 2- General characters of the major groups with special reference to structure, reproduction and life cycle of <ul style="list-style-type: none"> ○ Cyanophyceae ○ Chlorophyceae ○ Xanthophyceae ○ Bacillariophyceae ○ Phaeophyceae ○ Rhodophyceae • Module 3- Economic importance, algae as: pollution indicator and waste water treatment, commercial products, soil fertility, Nitrogen fixation, soil algae and symbiosis, food and medicine, diatoms and nanotechnology, cyanobacteria as a source of restriction endonuclease • Module 4- Algal culture, cultivation and preservation of micro- and macro-algae 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For I.) please refer to page no: 26,27 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For II .) please refer to page no: 27, 28 of the above mentioned pdf file.</p>	<p>26.2</p>
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	<ul style="list-style-type: none"> • Field visits of ecosystems rich in Algae • Make micro preparations of vegetative and reproductive structures of the types mentioned in syllabus • Identify algal specimens up to the genetic level by noting key characters • Algal Culturing: isolation and cultivation of microalgae and macroalgae using growth media • Familiarize the technique of algal collection and preservation. <p>III.) MYCOLOGY-</p> <ul style="list-style-type: none"> • MODULE 1- <ul style="list-style-type: none"> ○ Introduction, structure, life cycle, classification ○ Distinguishing characters of different classes of fungi with special reference to reproductive structures and life history <ul style="list-style-type: none"> ▪ Myxomycotina ▪ Mastigomycotina ▪ Zygomycotina ▪ Ascomycotina ▪ Basidiomycotina ▪ Deuteromycotina • MODULE 2- <ul style="list-style-type: none"> ○ Economic importance of fungi ○ Fungi of Agricultural importance ○ Fungal biotechnology • Identify the types by making suitable micropreparations • Isolation and culture of Oyster mushroom mycelium • Preparation of bed for mushroom cultivation • Staining of endomycorrhiza or fungus using trypan blue • Aseptic techniques and transfer of micro-organisms • Selective and differential media for identifying micro-organisms • Slide culture technique for fungi. <p>IV.) LICHENOLOGY</p> <ul style="list-style-type: none"> • Module 1- <ul style="list-style-type: none"> General account, structure, reproduction and life cycle 	<p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For III.) please refer to page no: 30,31 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For IV.) please refer to page no: 31 of</p>	
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	<p>V.) PLANT PATHOLOGY</p> <ul style="list-style-type: none"> • Module 1- History, Classification of plant diseases on the basis of causative organism and symptoms, Host-parasite interaction, defence mechanism, mechanism of infection, transmission and dissemination of diseases. • Module 2- Control of plant disease- Prophylaxis, Therapeutic- chemotherapy, Biological control • Module 3- Study of diseases with emphasis on symptoms, cause, disease cycle, control; Fungicides • Identify the diseases mentioned in syllabus with respect to causal organisms and symptoms • Herbarium preparation of various stages of one of the diseases mentioned • Preparation of fungicide • Cellulolytic fungi • Lignin degrading fungi • Role of enzymes in pathogenesis. <p>VI.) ANATOMY</p> <ul style="list-style-type: none"> • Module 1- Structure and composition of plant cells • Cell types and tissues • Primary structures • Stomatal types • Secondary structures <p>VII.) MICROTECHNIQUE</p> <ul style="list-style-type: none"> • Preservation of plant specimens, sectioning and mounting • Preparations and use of stains, fixatives, and mounting media • Preparation of smears and squash • Demonstration of microtome sectioning <p>VIII.) IMMUNOLOGY</p> <ul style="list-style-type: none"> • Module 8- Introduction to immunology, types of immunity, mechanism of innate immunity, biological effects of complements • Module 9- Antigens and antibodies, types of antigens, different classes of immunoglobins and functions 	<p>the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as: SYLLABUS- Ann Mariya. For V .) please refer to page no: 31,32 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For VI.) please refer to page no: 37,38 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For VII.) please refer to page no: 38 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For VIII.) please refer to page no: 114,115,116 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> • Module 10- Antigen antibody reaction, precipitation test, agglutination test, clinical applications of antigen antibody reaction, Widal, VDRL, HIV test (ELISA), Complement Fixation Test, and Coombs test. • Module 11- Immune response system, Primary and secondary lymphoid organs, cells of immune system- Leucocytes, lymphocytes, T&B cells, macrophages, plasma cells, memory cells, MHC, Antibody synthesis, monoclonal antibodies, Hybridoma technology, immune disorders- hypersensitivity, auto immunity & immunodeficiency, AIDS, Vaccines- major types of vaccines, recent trends in vaccine preparation. <p>IX.) -</p> <ul style="list-style-type: none"> • Preparation of Human Blood smear and identification of leucocytes • Qualitative analysis of Reducing sugar, Protein and Lipid • Action of salivary amylase on starch • Estimation of Haemoglobin • Identification of human blood groups <p>X.) PART 1- HUMAN GENETICS</p> <ul style="list-style-type: none"> • Module 1- Human normal chromosome complement, genetic disorders in man, chromosomal anomalies and examples, sex chromosomal anomalies-syndromes, ultra sound scanning and Fetoscopy Genetic Counselling, Eugenics • Module 2- Human blood groups and their inheritance pattern, Rh factor blood transfusion, DNA finger printing and applications, causes of human infertility, Human genome project. <p>XI.) PART 2- NUTRITION AND COMMUNITY HEALTH</p> <ul style="list-style-type: none"> • Module 3- Health and nutrition- concept of food and nutrition, food stuffs- carbohydrates, proteins, lipids- their sources and 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For IX.) please refer to page no: 118 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For X.) please refer to page no: 127, 128 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XI.) please refer to page no: 128,129 of the above mentioned pdf file.</p>	
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	<p>importance, vitamins- sources and importance and deficiency diseases, minerals- role in body functions and resources, lifestyle diseases, cardiovascular disorders</p> <ul style="list-style-type: none"> • Module 4- physical activity and health benefits, first aid and emergency care, health and safety in daily life. <p>XII.) PART 3- COMMUNITY HEALTH AND SANITATION</p> <ul style="list-style-type: none"> • Module 5- Public health and water quality, prevention of water borne diseases, faecal bacteria and pathogenic microorganisms transmitted by water, cholera and typhoid, determination of sanitary quality of drinking water • Module 6- public health and food borne diseases and their prevention- food poisoning caused by toxins produced by microbes and examples, food infection caused by growth of microorganisms in the human body after contaminated food has been eaten and example • Module 7- public health and diseases- emerging pathogens and diseases- Swine flue, bird flue, Reemerging pathogens and disease- TB, HIV and AIDS- cause and preventive measures. <p>XIII.) GENETICS</p> <ul style="list-style-type: none"> • Module 1- Origin and development of Genetics; Genetics as science, mendelian laws • Module 2- Exceptions to Mendelism • Module 3- Linkage of genes • Module 4- Determination of sex • Module 5- Quantitative inheritance • Module 6- Extra-chromosomal inheritance • Work out and record problems in monohybrid cross, dihybrid cross, and back cross, all types of mendelian ratios • Study of human karyotype and characteristic karyotypes and symptoms of syndromes 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XII.) please refer to page no: 129,130 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XIII.) please refer to page no: 48, 49 of the above mentioned pdf file.</p>	
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	<p>XIV.) PLANT BREEDING</p> <ul style="list-style-type: none"> • MODULE 1- Introduction and objectives. • Module 2- Plant introduction, procedure, acclimatization • Module 3- Selection-mass, pure-line, clonal-genetic basis of selection • Module 4- Hybridization, cold treatment methods- intergeneric, interspecific, heterosis in plant breeding, genetics of heterosis use of apomixis in plant breeding • Module 5- mutation breeding and polyploid breeding, breeding for pest, disease and stress resistance. • Module 6- modern tools for plant breeding; genetic engineering and products of genetically modified crops • Emasculation and plant breeding <p>XV.) CELL BIOLOGY</p> <ul style="list-style-type: none"> • Unit 3- Chromosomes • Unit 4- Mutations • Unit 5- Stem cells; definition, sources and applications. <p>XVI.) MOLECULAR BIOLOGY</p> <ul style="list-style-type: none"> • Unit 3- Gene expression - concept of gene, definitions - the central dogma - details of transcription in procaryotes and eukaryotes - RNA processing, details of translation - genetic cod features • Unit 4- Control of gene expression – positive and negative control – operon model – lac operon, trp operon – attenuation • Unit 5- Genetic basis of cancer – oncogenes – tumor suppressor genes – metastasis • Problems based on DNA, RNA and Proteins <p>XVII.) - Evolution-Unit 1-introduction, origin of life- biochemical origin of life</p> <ul style="list-style-type: none"> • Unit 2-Neo Darwinism- reproductive isolation, Mutation, Genetic drift, hybridization and evolution, polyploidy and evolution, Mutation and evolution 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XIV.) please refer to page no: 49, 50 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XV.) please refer to page no: 52 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XVI.) please refer to page no: 52 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XVII.) please refer to page no: 52, 53 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> • Make acetocarmine squash preparation of onion root tip to identify mitotic stages • Study of mitotic Index of onion root tip cells • Study of meiosis in any flower bud by smear preparation of PMC's • Identification of Barr body • Identification of salivary gland chromosome • Identify and study photographs and diagrams of cell division anomalies • Plasmid isolation- virtual lab <p>XVIII.) -</p> <ul style="list-style-type: none"> • Biotechnology- Module 1- Plant tissue culture, principles- cellular totipotency, callus induction, organogenesis, and somatic embryogenesis, laminar air flow and autoclave, micropropagation, in vitro production of haploids- androgenesis, gynogenesis Module 2- Recombinant DNA Technology, gene cloning strategies, recombinant DNA construction, bacteriophage based vectors, Restriction endonucleases and ligases, different methods of gene transfer- chemically stimulated DNA uptake by protoplast, <i>Agrobacterium</i> mediated gene transfer. Module 3- production of human insulin, Bt Brinjal and Bt cotton, Golden rice, Flavr Savr tomato, Tissue engineering, Stem cell culture, production of disease/ stress resistant plants, Gene therapy, DNA fingerprinting • Preparation of nutrient medium, preparation of explants, inoculation • Extraction of DNA from plant tissue • Immobilization of whole cells or tissues in sodium alginate • Determination of appropriate flower bud containing uninucleate pollen for another culture using cytological techniques 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XVIII.) please refer to page no: 65,66 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> • Study of genetic engineering tools and techniques- PCR, DNA fingerprinting, Southern blotting • PCR • Transformation of host cells • 16s RNA Sequencing <p>XIX.) BIOINFORMATICS</p> <ul style="list-style-type: none"> • Module 1- <ul style="list-style-type: none"> ○ Introduction to Bioinformatics, scope and relevance, genome, transcriptome, proteome ○ Biological data bases <ul style="list-style-type: none"> ▪ Nucleotide sequence database ▪ Protein sequence database ▪ Organismal database ▪ Biodiversity database ○ Information retrieval from Biological database, sequence alignment types and tools: pair wise sequence alignment, multiple sequence alignment, use of BLAST, FASTA. • Module 2- <ul style="list-style-type: none"> ○ Genomics: DNA sequencing Sangers procedure - automation of DNA sequencing, genome sequence assembly, Genome projects - Major findings of the following genome projects – Human, <i>Arabidopsis thaliana</i>, Rice, <i>Haemophilus influenza</i>, Application of genome projects. ○ Proteomics: Protein sequencing– Edman degradation method, automation of sequencing, protein structure and modelling. • Module 3- <ul style="list-style-type: none"> ○ Molecular phylogeny and phylogenetic trees. ○ Molecular visualization - Rasmol 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XIX.) please refer to page no: 66,67 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> ○ Molecular docking and computer aided drug design. ● Familiarizing with the different data bank mentioned in the syllabus ● Molecular visualization using Rasmol ● Blast search ● Retrieving sequence data from Entrez ● Pair wise alignment of data using FASTA ● Visualizing secondary structure of a protein ● Designing a primer ● Genetic transformation and transgenics, gene and genome library, advances in microbial biotechnology, enzyme technology, Micro array Bioinformatics. <p>XX.) PLANT PHYSIOLOGY</p> <ul style="list-style-type: none"> ● Module 5- Respiration- Aerobic and Anaerobic, glycolysis, Krebs cycle, Electron transport system and oxidative phosphorylation. ATPases- chemi osmotic hypothesis- RQ – significance- factors- factors affecting respiration. ● Relation between transpiration and absorption ● Necessity of chlorophyll, light and carbon dioxide in photosynthesis <p>XXI.) BIOCHEMISTRY</p> <ul style="list-style-type: none"> ● Module 1- Water, Solutions and Ph ● Module 2- Chemistry of biological molecules ● Module 3- Enzymes ● General test for carbohydrates- Molischs test, Benedicts’s test, Fehling’s test ● Colour test for starch- Iodine test ● Colour test for proteins in solution, Biuret test, Million’s tests, Ninhydrin test. ● Detect the presence of any three major organic compounds in the given food stuff/ material viz. reducing/ non-reducing sugar/fat proteins/starch/ sucrose 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XX.) please refer to page no: 58 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya .For XXI.) please refer to page no: 58,59 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> • Action of various enzymes in plant tissues: peroxides, dehydrogenase • Estimation of proteins using colorimeter • Isolation of plant pigments by column chromatography • Construction of protein standard curve using Folin's Lowry method • Effect of substrate concentration on enzyme kinetics • XXII.) PART 1- HUMAN PHYSIOLOGY- Module 2- Respiration- Transport of oxygen and carbon dioxide in blood, respiratory disorders, CO poisoning, physiological effects of smoking • XXIII.) PHYTOCHEMISTRY- Module 1 - Introduction to phytochemical approaches organoleptic-microscopic-to study drug and aromatic plants. Module 2- Extraction and characterization technique Module 3- alkaloids, triterpenoids, phenolics, quinines, benzoquinones Module 6- introduction, methods in pharmacognosy-microscopy, use of secondary metabolites for protection against pathogens, herbivores. 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XXII.) please refer to page no: 112 of the above-mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XXIII.) please refer to page no: 74, 75 of the above-mentioned pdf file.</p>	
Methodological competences in Cell and Molecular Biology	<ul style="list-style-type: none"> I.) Module 4- Applied Microbiology <ul style="list-style-type: none"> ○ Production of single cell protein and Probiotics II.) Module 2 <ul style="list-style-type: none"> ○ Fungal biotechnology- Fundamental principles • Aseptic techniques and transfer of micro-organisms III.) <ul style="list-style-type: none"> • Module 1- origin and development of Genetics • Module 4- Determination of sex • Module 6- Extra- chromosomal inheritance • Study of human karyotype and study of characteristic karyotypes and symptoms of syndromes 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For I.) please refer page no: 27; for II.) refer to page no: 31; for III.) refer to page no: 48,49 of the above mentioned pdf file.</p>	14.0

	<p>IV.)</p> <ul style="list-style-type: none"> • PLANT BREEDING <p>V.)</p> <ul style="list-style-type: none"> • CELL BIOLOGY <ul style="list-style-type: none"> ○ Mutations ○ Stem cells; sources and applications <p>VI.)</p> <ul style="list-style-type: none"> • MOLECULAR BIOLOGY- <ul style="list-style-type: none"> ○ Nucleic acids ○ Replication of DNA ○ Gene expression- genetic cod features ○ operon model-lac operon, trp operon ○ oncogenes- tumor suppressor genes- metastasis • problems based on DNA, RNA and Proteins <p>VII.)</p> <ul style="list-style-type: none"> • genetic drift, hybridization, polyploidy • Making acetocarmine squash preparation of onion root tip- identify mitotic stages • Study the mitotic index of onion root tip cells • Study of meiosis in any flower bud by smear preparation of PMC's • Identification of Barr body • Identification of Salivary gland chromosome • Study cell division anomalies like lagging chromosomes, chromosome bridge, aneuploidy, polyploidy • chromosomal patterns/ karyotype in auto-, allo-, and aneuploids • plasmid isolation • preparation of buffer stocks • determination of osmotic pressure of plant cell sap by plasmolytic method. <p>VIII.) Demonstration of tissue tension</p> <p>IX.)</p> <ul style="list-style-type: none"> • BIOTECHNOLOGY- <ul style="list-style-type: none"> ○ Module 1: Plant tissue culture ○ Module 2: Recombinant DNA technology-gene cloning-bacteriophage based vectors, restriction 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For IV.) please refer page no: 49, 50; for V.) refer page no: 52; for VI.) refer page no: 52; for VII.) refer page no: 52,53; for VIII.) refer page no: 58 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For IX.) please refer page no: 65,66 of the above mentioned pdf file.</p>	
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	<p>endonucleases and ligases-selection of transformants-using antibiotic resistances markers, methods of gene transfer, Chemically stimulated DNA uptake by protoplast, transduction, electroporation, microinjection, microprojectiles, <i>Agrobacterium</i> mediated gene transfer, gene banks</p> <ul style="list-style-type: none"> ○ Module 3: Production of human insulin, Bt Brinjal and Bt cotton, Flavr Savr tomato, Shikonin pigments <ul style="list-style-type: none"> ▪ Current trends in biotechnology ▪ Production of disease/ stress resistant plants, Gene therapy, DNA fingerprinting ● Preparation of explants ● Extraction of DNA from plant tissue ● Immobilization of whole cells or tissues in sodium alginate ● Determination of appropriate flower bud containing uninucleate pollen for anther Culture using cytological techniques ● Genetic engineering tools and techniques ● PCR ● Transformation of host cells ● 16s RNA sequencing X.) ● BIOINFORMATICS- Module 3- molecular phylogeny and phylogenetic trees, molecular visualization using Rasmol; molecular docking and computer aided drug design ● Retrieving sequence data from Entrez ● Pair wise alignment of data using FASTA 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For X.) please refer page no: 67 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> • Visualizing secondary structure of a protein • Designing a primer • Tissue culture and crop improvement, Genetic transformation and transgenics, advances in crop biotechnology molecular markers-molecular biology tools in plant breeding, gene and genome library, advances in microbial biotechnology, enzyme technology, advances in animal biotechnology-stem cell research, micro array bioinformatics <p>XI.)</p> <ul style="list-style-type: none"> • REPRODUCTIVE BIOLOGY- Module 4- Breeding <p>XII.)</p> <ul style="list-style-type: none"> • PHYTOCHEMISTRY- Module 1- introduction- phytochemical approaches-organoleptic-microscopic- to study drug and aromatic plants <p>XIII.)</p> <ul style="list-style-type: none"> • PART 2- IMMUNOLOGY- Identification of human blood groups – Estimation of Haemoglobin- Preparation of Human Blood smear and identification of leucocytes. 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XI.) please refer page no: 70; for XII.) refer page no: 74; for XIII.) refer page no: 118, 119 of the above mentioned pdf file.</p>	
<p>Relevant practical laboratory experience (min. 6 weeks)*</p>	<p>UG PRACTICALS</p> <p>I.)</p> <ul style="list-style-type: none"> • MICROBIOLOGY- <ul style="list-style-type: none"> ○ Preparation of bacterial smear ○ Grams staining ○ Isolation of microbes from soil- Streaking method ○ Virtual Lab Experiment- <ul style="list-style-type: none"> ▪ Gram Staining ▪ Streak plate method ▪ Isolation and identification of two bacterial unknowns <p>II.)</p> <ul style="list-style-type: none"> • PHYCOLOGY- <ul style="list-style-type: none"> ○ Field visit to any one of the ecosystems rich in 	<p>UG PRACTICALS</p> <p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For I.) please refer page no: 27; for II.) refer page no: 28 of the above mentioned pdf file.</p>	<p>26.7 (excluding external practicals)</p>

	<p>Algae to experience algal diversity.</p> <ul style="list-style-type: none"> ○ Make micro preparation of vegetative and reproductive structures and make labelled sketches of the specimens observed. ○ Identify the algal specimens up to the generic level by noting their key characters. ○ Algal Culturing: isolation and cultivation of microalgae and macroalgae using suitable growth media ○ Familiarize the technique of algal collection and preservation and submit at least 5 algal specimens. <p>III.)</p> <ul style="list-style-type: none"> ● MYCOLOGY- <ul style="list-style-type: none"> ○ Make suitable micro preparations and make labelled sketches ○ Isolation and culture of Oyster mushroom mycelium ○ Preparation of bed for mushroom cultivation ○ Staining of endomycorrhiza or fungus using Trypan Blue ○ Aseptic techniques and transfer of micro-organisms ○ Selective and differential media for identifying micro-organisms ○ Slide culture for fungi <p>IV.)</p> <ul style="list-style-type: none"> ● PLANT PATHOLOGY <ul style="list-style-type: none"> ○ Identify the diseases mentioned in the syllabus with respect to causal organisms and symptoms ○ Submit herbarium preparations of various stages of any of the diseases mentioned in the syllabus ○ Students should be trained to prepare the 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For III.) please refer page no: 31; for IV.) refer page no: 32 of the above mentioned pdf file.</p>	
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	<p>fungicide-Bordeaux mixture, Tobacco decoction.</p> <p>V.)</p> <ul style="list-style-type: none"> • BRYOLOGY- <ul style="list-style-type: none"> ○ Make micro preparations of the types mentioned. Study vegetative and reproductive structures <p>VI.)</p> <ul style="list-style-type: none"> • PTERIDOLOGY- <ul style="list-style-type: none"> ○ Make micro preparations to study stelar structure and sporangia of the mentioned types. Identify at sight, noting the morphology. <p>VII.)</p> <ul style="list-style-type: none"> • ANATOMY- <ul style="list-style-type: none"> ○ Cell types and tissues ○ Non-living inclusions- starch grains, cystolith, raphides, aleurone grains ○ Primary structure of stem, root and leaf- Dicots and Monocots ○ Stomatal types- anomocytic, anisocytic, paracytic, diacytic and grass type ○ Secondary structure of dicot stem and root ○ Anomalous secondary structure of <i>Bignonia</i> stem and <i>Dracaena</i> stem ○ Maceration of wood elements <p>VIII.)</p> <ul style="list-style-type: none"> • MICROTECHNIQUE- <ul style="list-style-type: none"> ○ Familiarize preparation and use of stains, fixatives and mounting media ○ Preparation of smears and squash ○ Demonstration of microtome sectioning ○ Preparation of single stained hand sections <p>IX.)</p> <ul style="list-style-type: none"> • ANGIOSPERM MORPHOLOGY- <ul style="list-style-type: none"> ○ Based on the theory topics 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For V.) please refer page no: 35; for VI.) refer page no:35; for VII.) refer page no: 38; for VIII.) refer page no: 38; for IX.) refer page no: 39 of the above mentioned pdf file.</p>	
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	<p>X.)</p> <ul style="list-style-type: none"> • ANGIOSPERM SYSTEMATICS AND ECONOMIC BOTANY- <ul style="list-style-type: none"> ○ Identification of aestivation and placentation types ○ Identify the families mentioned in the syllabus by noting their key, vegetative and floral characters. Describe the floral parts, draw the L.S., floral diagram and write the floral formula ○ Study the finished products of plants mentioned in the syllabus of economic botany with special reference to the morphology, botanical name and family ○ Identify and describe the ethnobotanical use of the items mentioned in the syllabus ○ Prepare and submit herbarium of 25 plants ○ Molecular taxonomy ○ ICBN <p>XI.)</p> <ul style="list-style-type: none"> • ECOTOURISM- <ul style="list-style-type: none"> ○ Estimation of CO₂, Cl₂, and salinity of water samples (Titremetry) ○ Determination of pH of soil and water ○ Assessment of diversity, abundance, and frequency of plant species by quadrant method ○ Study of the most probable number (MPN) of coliform bacteria in water samples ○ EIA studies in degraded areas ○ Identification of pollutant to respective pollution types ○ Study of anatomical, morphological, physiological adaptation of plants to the environment 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For X.) refer page no: 41,42; for XI.) please refer page no: 45 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> ○ Biological Oxygen Demand ○ Chemical Oxygen Demand of wastewater <p>XII.)</p> <ul style="list-style-type: none"> ● GENETICS- <ul style="list-style-type: none"> ○ Work out and record the problem: <ul style="list-style-type: none"> ▪ Monohybrid, dihybrid cross and back crosses ▪ All types of modified Mendelian ratios mentioned in the syllabus ○ Study of human karyotype and study of characteristic karyotype and symptoms of the syndromes mentioned in syllabus <p>XIII.)</p> <ul style="list-style-type: none"> ● PLANT BREEDING <ul style="list-style-type: none"> ○ Emasculation and bagging ○ Comparison of percentage of seed germination and the effect of any one chemical on the rate of elongation of radicle in any three crop seeds <p>XIV.)</p> <ul style="list-style-type: none"> ● CELL BIOLOGY AND MOLECULAR BIOLOGY <ul style="list-style-type: none"> ○ Problems based on DNA, RNA, and Proteins <p>XV.)</p> <ul style="list-style-type: none"> ● EVOLUTION <ul style="list-style-type: none"> ○ Make acetocarmine squash preparation of onion root tip to identify mitotic stages ○ Study the Mitotic Index of onion root tip cells ○ Study of meiosis in any flower bud by smear preparation of PMC's ○ Identification of Barr body ○ identification of salivary gland chromosome ○ identify and study diagrams of cell division anomalies like lagging 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya .For XII.) please refer page no:49; for XIII.) refer page no: 50; for XIV.) refer page no:52; for XV.) refer page no: 52,53 of the above mentioned pdf file.</p>	
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	<p>chromosomes, chromosome bridge, aneuploidy, polyploidy. Study the chromosomal patterns/ karyotype in auto-, allo-, and aneuploids</p> <ul style="list-style-type: none"> ○ lignin staining ○ preparation of buffer stocks ○ plasmid isolation <p>XVI.)</p> <ul style="list-style-type: none"> ● PLANT PHYSIOLOGY <ul style="list-style-type: none"> ○ Determination of osmotic pressure of plant cell sap by plasmolytic method ○ Compare the stomatal indices of hydrophytes, xerophytes, mesophytes ○ Separation of plant pigments by thin layer chromatography (TLC) and paper chromatography ○ Measurement of photosynthesis by Willmott's blubber/ Hydrilla plant experiment/ any suitable method ○ Estimation of plant pigments by colorimeter ○ Papaya petiole osmoscope ○ Demonstration of tissue tension ○ Relation between transpiration and absorption ○ Necessity of chlorophyll, light and carbondioxide in photosynthesis ○ Simple respiroscope ○ Respirometer and measurement of R.Q ○ Fermentation ○ Measurement of transpiration rate using Ganong's photometer/ Farmer's Potometer <p>XVII.)</p> <ul style="list-style-type: none"> ● BIOCHEMISTRY <ul style="list-style-type: none"> ○ General test for carbohydrates- Molischs 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya- For XVI.) please refer page no: 58; for XVII.) refer page no: 59 of the above mentioned pdf file.</p>	
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	<p>test, Benedict's test, Fehling's test</p> <ul style="list-style-type: none"> ○ Colour test for starch-iodine test ○ Colour test for proteins in solution. Biuret test, Million's test, Ninhydrin test ○ Detect the presence of any three major organic compounds in the given food stuff/ material viz. reducing / non-reducing sugar/ fat proteins/ starch/ sucrose ○ Action of various enzymes in plant tissues: peroxides, dehydrogenase ○ Estimation of protein using colorimeter ○ Isolation of plant pigments by column chromatography ○ Construction of protein standard curve using Folin's Lowry method ○ Effect of substrate concentration on enzyme kinetics <p>XVIII.)</p> <ul style="list-style-type: none"> ● PERSPECTIVE OF SCIENCE <ul style="list-style-type: none"> ○ Prepare $\text{CuSO}_4 \cdot \text{H}_2\text{O}$ solution of different molarity using a stock solution ○ Determination of the area of different types of leaves using graph paper <p>XIX.)</p> <ul style="list-style-type: none"> ● METHODOLOGIES OF PLANT SCIENCE <ul style="list-style-type: none"> ○ Preparation of 0.1M sodium phosphate buffer (pH 6 and 7) ○ Measurement of pH using pH meter ○ Paper chromatography of plant pigments ○ Electrophoresis of nucleic acids ○ Column chromatography of plant pigments ○ Determination of concentration of a given 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XVIII.) please refer page no: 62; for XIX.) refer page no: 62 of the above mentioned pdf file.</p>	
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	<p>solution of CuSO₄ using colorimetry</p> <ul style="list-style-type: none"> ○ Western Blotting ○ Haemocytometer ○ PAGE ○ XX.) BIOSTATICS- <ul style="list-style-type: none"> ▪ Collect numerical data and find out the central tendencies and prepare different types of graph mentioned in the syllabus ▪ Familiarize with situations requiring t-test, chi-square test <p>XXI.)</p> <ul style="list-style-type: none"> ● GENERAL INFORMATICS- <ul style="list-style-type: none"> ○ Gather information and pictures on a given topic using internet. Make a list of the sites visited for the purpose. ○ Prepare a project report using MS-WORD based on the information and pictures gathered from the internet ○ Prepare a worksheet using a set of data collected and find out the SUM, MEAN, MEDIAN, and MODE using EXCEL ○ Prepare suitable tables/ charts/ graphs based on the data using EXCEL ○ Prepare a powerpoint presentation <p>XXII.)</p> <ul style="list-style-type: none"> ● BIOTECHNOLOGY <ul style="list-style-type: none"> ○ Preparation of nutrient medium- Murashige and Skoog medium, sterilization, preparation of explants, inoculation ○ Extraction of DNA from plant tissue ○ Immobilization of whole cells or tissues in sodium alginate 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XX.) please refer page no: 63; for XXI.) refer page no: 63; for XXII.) refer page no: 66 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> ○ Determination of appropriate flower bud containing uninucleate pollen for anther culture using cytological techniques ○ Study of genetic engineering tools and techniques(southern blotting, DNA fingerprinting, PCR) ○ PCR ○ Transformation of host cells ○ 16s RNA Sequencing <p>XXIII.)</p> <ul style="list-style-type: none"> ● BIOINFORMATICS <ul style="list-style-type: none"> ○ Familiarizing with the different data bank mentioned in the syllabus ○ Molecular visualization using Rasmol ○ Blast search ○ Retrieving sequence data from Entrez ○ Pair wise alignment of data using FASTA ○ Visualizing secondary structure of a protein ○ Designing a primer <p>XXIV.)</p> <ul style="list-style-type: none"> ● HORTICULTURE <ul style="list-style-type: none"> ○ Tongue grafting, budding (“T” and patch) and air layering ○ Identification of different garden tools and their uses ○ List out the garden components ○ Preparation of potting mixture in the given proportion <p>XXV.)</p> <ul style="list-style-type: none"> ● REPRODUCTIVE BIOLOGY <ul style="list-style-type: none"> ○ Identification of C.S. of anther, embryo sac and embryo ○ Identification of various anther types- monothealous, dithealous ○ Identification of placentation types 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XXIII.) please refer page no:67; for XXIV.) please refer page no: 70; for XXV.) refer page no: 70 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> ○ Observation of pollen and locating pollen pore ○ Pollen germination study <p>XXVI.)</p> <ul style="list-style-type: none"> ● NURSERY MANAGEMENT <ul style="list-style-type: none"> ○ Preparation of potting mixture ○ Preparation of Tobacco/Neem decoction ○ Familiarization of common fertilizers and manures ○ Familiarization of common cut flowers and leaves used in flower arrangements ○ Different flower arrangement types <p>XXVII.)</p> <ul style="list-style-type: none"> ● PHYTOCHEMISTRY AND PHARMACOGNOSY <ul style="list-style-type: none"> ○ Estimation of saponification value of fats/ oils ○ Estimation of Iodine value of fats and oils ○ Extraction of caffeine from Tea <p>XXVIII.)</p> <ul style="list-style-type: none"> ● VOLUMETRIC ANALYSIS- <ul style="list-style-type: none"> ○ Micro-scale chemistry: the volumetric analysis may be done by two-burette titration procedure ○ Acidimetry and Alkalimetry ○ Permanganometry ○ Dichrometry <p>XXIX.)</p> <ul style="list-style-type: none"> ● ORGANIC CHEMISTRY PRACTICALS- <ul style="list-style-type: none"> ○ Test for elements- Nitrogen, Halogen and Sulphur ○ Study of reactions of common functional groups ○ Qualitative analysis with a view to characterization of functional groups and identification of the compounds 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XXVI.) please refer to page no: 71, 72; for XXVII.) refer page no: 75; for XXVIII.) refer page no: 83; for XXIX.) refer page no: 88 of the above mentioned pdf file.</p>	
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	<ul style="list-style-type: none"> ○ Organic preparation involving halogenation, nitration, oxidation, reduction, acetylation, benzylation, hydrolysis, diazotization ○ Isolation of an organic compound from a natural source <p>XXX .)</p> <ul style="list-style-type: none"> ● HUMAN PHYSIOLOGY AND IMMUNOLOGY- <ul style="list-style-type: none"> ○ Preparation of Human Blood smear and identification of leucocytes ○ Qualitative analysis of Reducing Sugar, Protein and Lipid ○ Action of Salivary amylase on Starch ○ Estimation of Haemoglobin ○ Identification of human blood groups, A, AB, B, and O, Rh factor ○ Instruments – Sphygmomanometer, stethoscope, Measurement of blood pressure using Sphygmomanometer <p>EXTERNAL PRACTICALS</p> <p>XXXI.)</p> <ul style="list-style-type: none"> ● I have done an internship on “Microbiological Quality Evaluation of Coconut Products (IS/USFDA – BAM)” at Microbiology Lab of CDB Institute of Technology (CIT) under the Coconut Development Board, Ministry of Agriculture, Government of India and has exposure under ISO/ IEC 17025:2005 Quality systems implemented in the Board’s Quality Testing Laboratory 	<p>I am attaching pdf along with this form, named as : SYLLABUS- Ann Mariya. For XXX.) please refer page no: 118,119 of the above mentioned pdf file.</p>	
	<p>XXXI.)</p> <ul style="list-style-type: none"> ● I have done an internship on “Microbiological Quality Evaluation of Coconut Products (IS/USFDA – BAM)” at Microbiology Lab of CDB Institute of Technology (CIT) under the Coconut Development Board, Ministry of Agriculture, Government of India and has exposure under ISO/ IEC 17025:2005 Quality systems implemented in the Board’s Quality Testing Laboratory 	<p>I am attaching pdf along with this form, named as : External Practicals - Ann Mariya. For XXXI.) please refer page no: 1, 2 for of the above mentioned pdf file.</p>	

	<p>XXXII.)</p> <ul style="list-style-type: none"> I have done two months internship training on “Computer Aided Drug Designing (CADD)” at UniBiosys Biotech Research Labs and have also completed a research project entitled “Identification of potential inhibitors of blood cancer: A molecular docking study”. <p>XXXIII.)</p> <ul style="list-style-type: none"> I have completed an internship on topic “Molecular Characterisation of bacteriophages isolated from aquaculture environment fish pathogens” at PVT Merit Biolabs and has been associated with following area <ul style="list-style-type: none"> Isolation of <i>Vibrio cholerae</i> from fish sample using Morphological and Molecular techniques like Gram’s staining, Motility, DNA extraction, Agarose gel electrophoresis, PCR analysis and Sequencing Isolation and identification of bacteriophage from aqua culture. NABL lab visit and experience. I am currently working as a trainee at PVT MERIT BIOLABS. 	<p>I am attaching pdf along with this form, named as : External Practicals - Ann Mariya .For XXXII.) please refer page no: 3,4 of the above mentioned pdf file.</p> <p>I am attaching pdf along with this form, named as : Project Ann Mariya , which includes my research project entitled: “Identification of potential inhibitors of blood cancer: A molecular docking study”. Please refer page no: 1 -32 of the above mentioned pdf.</p> <p>I am attaching pdf along with this form, named as : External Practicals - Ann Mariya .For XXXIII.) please refer page no: 5,6 of the above mentioned pdf file.</p>	
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* If you cannot demonstrate at least 6 weeks of relevant practical laboratory experience as part of your undergraduate degree, you will need to demonstrate this separately (e.g. through an external placement).