Scientist A - Bioinformatics

Name of the post	Subject	Syllabus
Scientist A - Bioinformatics	**Bioinformatics**	**Core Biology & Math Foundations. Biochemistry & Molecular Biology:** Biomolecules, Metabolism, Gene Expression (Transcription/Translation), Cell Biology.Mathematics & Statistics: Biostatistics, Essential Math (Calculus, Linear Algebra), Probability. **Computer Science & Programming Fundamentals:** Computer Organization, Data Structures & Algorithms, Linux OS.**Programming:** R, Python, Web Programming (for tools).**Scripting:** Shell Scripting (grep, awk, sed). **Biological Databases**: GenBank, SwissProt, PDB, KEGG, Gene Ontology (access, retrieval, submission).**Sequence Analysis:** BLAST, Pairwise & Multiple Sequence Alignment, Scoring Matrices (PAM, BLOSUM).**Genomics & Proteomics:** Genome Assembly, Gene Prediction, Proteome Analysis, Microarrays. **Phylogenetics:** Molecular Phylogenetics & Tree Building. **Structural Bioinformatics:** Protein Structure Prediction, Molecular Modeling, Docking.**Systems Biology:** Networks, Pathway Analysis.
	Life Science	**Molecules & Their Interactions:** Biomolecules (carbs, lipids, proteins, nucleic acids), chemical bonds, biophysical chemistry, bioenergetics. **Cellular Organization:** Cell structure, organelles, membrane transport, cytoskeleton. **Fundamental Processes:** DNA replication, transcription, translation, cell cycle, respiration, photosynthesis, cell signaling. **Inheritance Biology (Genetics):** Mendelian genetics, linkage, mutations, gene regulation, molecular basis. **Developmental Biology:** Embryonic development, cell differentiation, morphogenesis. **Plant Physiology:** Photosynthesis, respiration, nutrient uptake,

		hormones. **Animal Physiology:** Organ systems (nervous, circulatory, digestive, etc.), homeostasis, reproduction. **Evolution & Behavior:** Darwinism, speciation, phylogeny, molecular evolution, behavior. **Ecological Principles:** Ecosystems, biodiversity, population ecology, biogeography, conservation.
	Agriculture	General Agriculture-All basic courses (Agronomy, Genetics & Plant Breeding, Soil Science & Agricultural Chemistry, Plant Physiology, Plant Pathology, Agricultural Economics & Agricultural Marketing, Statistics, Plant Biotechnology , Plant Biochemistry)
	Biotechnology	Biochemistry: Biomolecules (carbs, lipids, proteins, nucleic acids), Metabolism, Enzymes, Photosynthesis, Respiration.Cell Biology: Cell structure, dynamics, signaling, membrane transport.Microbiology: Microbial diversity, culture, growth, antibiotics, human-microbe interactions. Genetics: Mendelian genetics, DNA replication, gene expression, mutations, linkage, mapping. Biophysics &Instrumentation: Principles, basic math, data analysis, use of equipment (spectroscopy, electrophoresis).
	Molecular Biology	**Foundations & Biomolecules:** Introduction to cells, biomolecules (DNA, RNA, Proteins, Amino Acids), cellular structures, and basic biochemistry. **Central Dogma:** DNA structure, replication (prokaryotic/eukaryotic), transcription (RNA synthesis), and translation (protein synthesis).**Gene Regulation:** Operons, prokaryotic/eukaryotic control mechanisms, chromatin structure, and post-transcriptional/translational modifications. **Molecular Techniques:** PCR, DNA Sequencing, Southern/Northern/Western Blotting, Electrophoresis, Chromatography, Spectroscopy, Calorimetry. **Recombinant DNA & Genetic Engineering**: Vectors,

		gene cloning, genetic modification, and creating transgenics. **Advanced/Applied Areas:** Genomics, Proteomics, Bioinformatics (BLAST, alignments, modeling), Molecular Evolution, Nanobiotechnology, and Bioethics.