

# NGS - Genomic Data Analysis: Skill Workshop

Mar 3 - 7, 2026 (MKU-RUSA Supported)

Dept. of Genetics, School of Biological Sciences, MKU

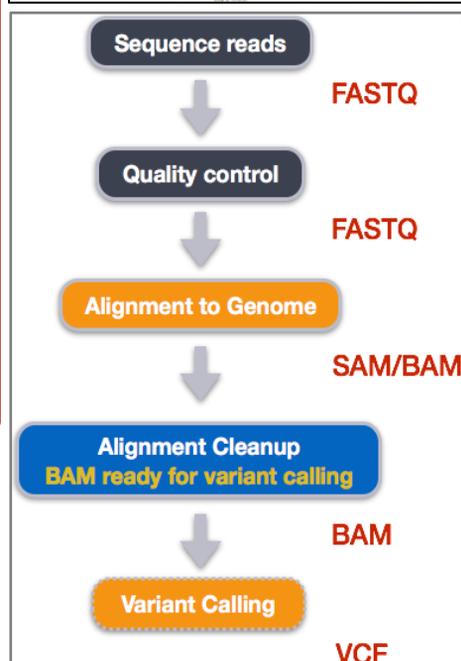
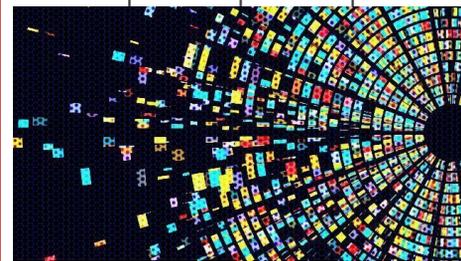
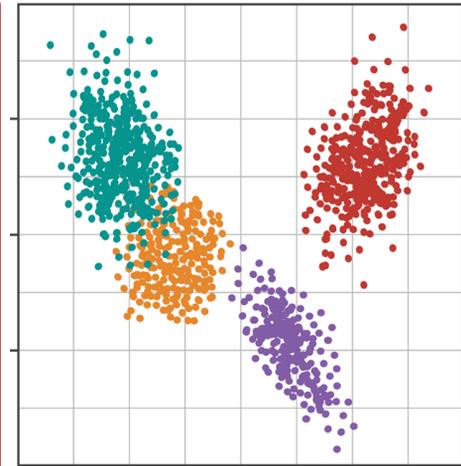
This MKU-RUSA Supported Skill workshop is designed as a preparative training for the Biologists, to get the skills of Computational Genomic Data Analysts. The focus includes NGS & other genomic data analysis including Transcriptome, Genome, Exome, SNP, Mutation & Functional Genomic Analysis. \* *Students from Govt. colleges & Institutions are encouraged to apply.*

Register Before 25<sup>th</sup> Feb 2026: Registration Link:

<https://forms.gle/ZzP7FXAUnAq6xBsi8>

## LEARNING TARGETS:

- NGS Platforms – Introduction, Types and their advantages and limitations – whole genome sequencing, whole exome sequencing, RNA-Seq, Oligo Array Profiles.
- Overview of Computing Environment: Brief exposure to Unix, R, Python, Colab, GitHub, Visual Studio, Conda, Nextflow, Docker
- NGS File formats - FASTA, FASTQ, BAM, SAM, VCF, BCF, BED.
- Data Preprocessing and Quality control: Demultiplexing, Adaptor/low quality read trimming, Merging of paired end sequences – Seqprep, Quality check and Quality filtering – FASTQC, Samtools, GATK (The Genome Analysis Toolkit)-Picard.
- Genome Alignment & Mapping: Retrieval & Pre – Processing of Reference Genomes, Genome Aligners – Principle / Tools - BWA, Bowtie2, MUMmer, HISAT2, STAR, TopHat2, RNA-Seq analysis.
- Variant Prediction Analysis – SnpEff: Genetic variant annotation and Functional Effect Prediction Toolbox, SnpSift – Variant Filtering, ENSEMBL - Variant Effect Predictor (VEP). Mutation Analysis – Mutationtaster, Mutscape, GATK-Mutect2, M-CAP, InMeRF, Mupro, i-mutant, Consurf, MutPred2, VarScan.
- Expression Analysis: Data normalization, Differential Gene Expression, Expression to Pathway Activation using Z score calculation, Hierarchical Clustering Using Dchip, Gene Set Enrichment Analysis, Single Cell RNA-Seq Analysis.



**ClinVar**  
Clinically relevant variation

CTGATGGTATGGGGCCCAAGAGATA  
AGGTACGGCTGTCATCACTTAGAC  
AGGGCTGGGATAAAAGTCAGGGC  
CATGGTGCATCTGACTCCTGAGGA  
CAGGTTGGTATCAAGGTACAAAG  
GCACTGACTCTCTGCCTATTGG

