



Programme

Advanced Genomics - Bioinformatics Workshop and Genome Annotation Jamborees

BecA-ILRI Hub, ILRI Campus, August 18-29, 2014

Time	Activity	Room	Trainers/resource person
Day 1: Monday 18 August 2014			
0800-0830	<i>Arrival and Registration</i>	JVC	Dedan Githae and Joyce Njuguna
0830-0900	<i>Welcome and Workshop Opening</i>	JVC	Josephine Birungi (<i>Technology Manager, BecA-Hub</i>) Wellington Ekaya (<i>Team Leader Capacity building</i>)
0900-0930	Lecture: Introduction to Bioinformatics	JVC	Erik Bongcam-Rudloff/Mark Wamalwa
LECTURE SESION 1: LINUX			
0930-1030	Lecture: Introduction to Linux	JVC	Mark Wamalwa
1030-1100	Tea/coffee		
1100-1230	Hands on session: Hands on command line Linux	JVC	Joyce Njuguna/Technical team
1230-1400	Lunch		
1400-1600	Lecture: More about Linux: managing data with the OS built in tools	JVC	Mark Wamalwa/Joyce Njuguna
1600-1630	Tea/coffee		
1630-1730	Participant presentations: Current and future projects with a possibility for collaboration with BecA / Poster presentations display	JVC	Participants



Time	Activity	Room	Trainers/resource person
Day 2: Tuesday 19 August 2014			
0830-0900	Outline of Day 2 activities	JVC	Mark Wamalwa / Joyce Njuguna
0900-0945	Lecture: Linux shell programming	JVC	Alan Orth
0945-1030	Hands on session: Applying Linux	JVC	Alan Orth
1030-1100	Tea/coffee		
1100-1230	Hands on session: Applying Linux	JVC	Alan Orth/ Technical team
1230-1400	Lunch		
LECTURE SESSION 2: BIOINFORMATICS DATA MANAGEMENT AND ANALYSIS			
1400-1445	Lecture: <ul style="list-style-type: none"> • Basics of bioinformatics • Bioinformatics resources for data management • Sequence analysis using EMBOSS tools 	JVC	Erik Bongcam-Rudloff/Isak Sylvén
1500-1530	Tea/coffee		
1530-1730	Hands on session: <ul style="list-style-type: none"> • Nucleotide and Protein sequence analysis • Sequence analysis using EMBOSS tools 	JVC	Erik Bongcam-Rudloff/Isak Sylvén



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Day 3: Wednesday 20 August 2014			
0830-0900	Outline of Day 4 activities	JVC	Mark Wamalwa / Joyce Njuguna
LECTURE SESSION 3: EMBnet's NGS ANALYSIS SUITE and the eBikit			
0900-1030	Lecture: Introduction to EMBnet's NGS analysis suite	JVC	Erik Bongcam-Rudloff
1030-1100	Tea/coffee	JVC	
1100-1300	Hands on session: EMBnet's NGS analysis suite	JVC	Erik Bongcam-Rudloff/Isak Sylvin
1300-1400	Lunch		
LECTURE SESSION 4: GENOMICS AND NGS TECHNOLOGIES			
1400-1530	Lecture: Overview of Next Generation Sequencing (NGS) Technologies and Sanger sequencing.	JVC	Manpreet Katari
1530-1600	Tea/coffee		
1600-1730	Lecture: Transcriptomics (RNA-SEQ) using Next Generation Sequencing (NGS) Technologies.	JVC	Manpreet Katari
Day 4: Thursday 21 August 2014			
0830-0900	Outline of Day 4 activities	JVC	Mark Wamalwa / Joyce Njuguna
LECTURE SESSION 5: Visualizing and Analyzing Whole Genomes			
0900-1000	Lecture: The Structure and Organization of Whole Genomes and the Problem of Repeats	JVC	Sarah Schaack



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0930-1100	Hands on session: Visualizing Whole Genomes/Using Genome Browsers	JVC	Sarah Schaack/Maureiq Ojwang
1100-1130	Tea/coffee		
1130-1230	Hands on session continued	JVC	Sarah Schaack/Maureiq Ojwang
1230-1400	Lunch		
1400-1530	Lecture: WGS Project on <i>Busseola fusca</i>	JVC	Sarah Schaack
1530-1600	Tea/coffee		
1600-1730	Hands on session: Running RepeatModeler on <i>B. fusca</i>	JVC	Sarah Schaack
Day 5: Friday 22 August 2014			
0830-0900	Outline of Day 5 activities	JVC	Mark Wamalwa / Joyce Njuguna
LECTURE SESSION 6: Analysing Non-Genic Regions of Genomes			
0930-1030	Lecture: Characterizing the Non-Coding DNA, Transposable Elements and Endogenous Viruses	JVC	Sarah Schaack
1030-1100	Tea/coffee	JVC	
1100-1300	Hands on session: Identifying, Characterizing, and Quantifying Non-coding and Repetitive DNA	JVC	Sarah Schaack/Maureiq Ojwang
1300-1400	Lunch		
1400-1500	Lecture: Using Command-line BLAST for Repeat Identification	JVC	Sarah Schaack
1500-1530	Tea/coffee	JVC	
1530-1730	Hands on session: Using Command-line BLAST to identify Interesting Repeats and Potential Cases of Horizontal Transfer in <i>B. fusca</i>	JVC	Sarah Schaack/Maureiq Ojwang
1800-2000	Barbecue Dinner	Ndama	



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Day 6: Saturday 23 August 2014			
0950-1000	Outline of day 6 activities	JVC	Mark Wamalwa/ Joyce Njuguna
LECTURE SESSION 7: CLC GENOMICS			
1000-1130	Lecture: Introduction to CLC Genomics Workbench	JVC	Joyce Njuguna/Dedan Githae
1130-1330	Hands on session: <ul style="list-style-type: none"> • Reference Assembly • De novo Assembly of Paired Data 	JVC	Joyce Njuguna/Dedan Githae
1330-1400	Lunch		
1700	Depart for the weekend to resume on Monday		



Time	Activity	Room	Trainers/resource person
Day 7: Monday 25 August 2014			
0830-0900	Outline of day 7 activities	JVC	Mark Wamalwa/ Joyce Njuguna
LECTURE SESSION 8: GENOMICS AND NGS TECHNOLOGIES CONTINUED			
0900-1030	Lecture: <ul style="list-style-type: none"> Algorithms behind assembly of short reads (Velvet and AbySS) and mapping short reads to the genome (Bowtie and BWA etc). 	JVC	Dr. Manpreet Katari, NYU
1030-1100	Tea/coffee	JVC	
1100-1230	Hands on session: <ul style="list-style-type: none"> NGS data analysis and computation (quality control, assembly & variant Calling etc.) Working with the output: introduction to Sam tools and IGV 	JVC	Manpreet Katari/Technical team
1230-1400	Lunch		
LECTURE SESSION 9: INTERGRATED DATA SETS			
1400-1530	Lecture: <ul style="list-style-type: none"> Statistical Analysis of RNA-seq data. Normalizing your data. Introduction to Basic Statistics to determine differentially Expressed genes (Cuffdiff) Correlation and clustering of data (looking at heatmaps) Using MeV to analyze RNA-seq data 	JVC	Manpreet Katari
1530-1600	Tea/coffee		

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1600-1730	Hands on session: <ul style="list-style-type: none"> Mapping an example dataset to a reference genome with tophat. Visualisation of mapped reads, Quantitation of reads against genes. Differential expression analysis with DESeq/edgeR 	JVC	Manpreet Katari / Technical team
Day 8: Tuesday 26 August 2014			
0830-0900	Outline of day 8 activities	JVC	Mark Wamalwa/Joyce Njuguna
LECTURE SESSION 10: GENOME ANNOTATION			
0900-0930	Lecture: Introduction to the Genome Sequencing Project for <i>Finger Millet</i>	JVC	Damaris Odeny
0930-1000	Lecture: <ul style="list-style-type: none"> Transcript and Protein Sequence Annotation e.g. at UniProt Gene finding 	JVC	Mark Wamalwa
1000-1030	Lecture: <ul style="list-style-type: none"> Introduction to Maker annotation pipelines 	JVC	Isak Sylvin
1030-1100	Tea / coffee	JVC	
1030-1230	Hands on session Maker tutorial <ul style="list-style-type: none"> Gene finding using Maker annotation tool 	JVC	Isak Sylvin/Mark Wamalwa/Maureiq Edith
1230-1330	Lunch		
LECTURE SESSION 11: GENE HUNTING/TRANSCRIPTOME ANNOTATION			
1400-1530	Lecture and Demo: Genome sequence data submission to public resource at the NCBI	JVC	Isak Sylvin/Maureiq Edith/Technical team
1530-1600	Tea / coffee	JVC	
1600-1730	Hands on session continued	JVC	Isak Sylvin/Maureiq Edith/Technical team



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Day 9: Wednesday 27 August 2014			
0830-0900	Outline of the day 9 activities	JVC	Mark Wamalwa/Joyce Njuguna
LECTURE SESSION 12: METAGENOMICS AND METAGENOME ANALYSIS			
0900-1000	Lecture: Metagenomics data analysis current state-of-the-art WGS analysis workflows (from annotation to comparative analysis)	JVC	Mark Wamalwa
1030-1100	Tea / coffee	JVC	
1030-1230	Hands on session: <ul style="list-style-type: none"> Introduction to metagenomics analysis software MEGAN, metAmos 	JVC	Mark Wamalwa/Technical team
1230-1400	Lunch		
LECTURE SESSION 13: GENOTYPING BY SEQUENCING (GBS)			
1400-1530	Lecture: <ul style="list-style-type: none"> Overview of GBS SNP markers and consideration in breeding. Application of GBS Overview of Genome-Wide Association Studies 	JVC	Paliwal, Rajneesh
1530-1600	Tea /coffee	JVC	
1600-1730	Hands on Session: <ul style="list-style-type: none"> GBS Practical Introduction to TASSEL and GAPIT 	JVC	Paliwal, Rajneesh/Mark Wamalwa

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Day 10: Thursday 28 August 2014			
0830-0900	Outline of day 10 activities	JVC	Mark Wamalwa/Joyce Njuguna
LECTURE SESSION 14: MULTIPLE SEQUENCE ANALYSIS AND PHYLOGENETICS			
0900-1000	Lecture: Multiple Sequence Alignment (MSA) and phylogenetic methods	JVC	Gordon Harkins
1000-1030	Tea/coffee	JVC	
1030-12:30	Hands on session: MSA and Phylogenetic tree construction	JVC	Gordon Harkins/Leendert Cloete
1230-1400	Lunch	JVC	
1400-1500	Hands on session: MSA and Phylogenetic tree construction	JVC	Gordon Harkins/Leendert Cloete
1500-1530	Tea/ coffee	JVC	
LECTURE SESSION 15: BAYESIAN PHYLOGENETIC ANALYSIS			
1530-1730	Lecture <ul style="list-style-type: none"> • Introduction to Bayesian phylogenetic analysis • Markov chain Monte Carlo sampling • Comparison of MrBayes and BEAST • Strict molecular clocks and relaxed molecular clocks • Calibrating estimates of rates and divergence times 	JVC	Gordon Harkins



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Day 11: Friday 29 August 2014			
0830-0900	Outline of day 11 activities	JVC	Mark Wamalwa/Joyce Njuguna
0900-1000	Hands on session: <ul style="list-style-type: none"> Phylogenetic analysis using BEAST Creating and manipulating input files Interpreting BEAST output 	JVC	Gordon Harkins/Leendert Cloete
1000-1030	Tea/ coffee	JVC	
1030-1230	Continued Hands on session: <ul style="list-style-type: none"> Phylogenetic analysis using BEAST Creating and manipulating input files Interpreting BEAST output 	JVC	Gordon Harkins/Leendert Cloete / Mark Wamalwa
1230-1400	Lunch		
1400-1500	Hands on session: <ul style="list-style-type: none"> Phylogenetic analysis using BEAST continued 	JVC	Gordon Harkins/Leendert Cloete / Mark Wamalwa
1500-1530	Tea/ coffee	JVC	
1530-1630	Final Session Closing Remarks and Certificates:		Josephine Birungi
1900 - 2100	Dinner	Fogo Gaucho	