# Module Planning
# NGS Bioinformatics - Remote classrooms

## Module Title: Pathogen Variant Calling

➔ **Module Lead/Co-leads/Assistants** - Narender, Jon

➔ **Summary or objectives** – Choosing suitable reference for alignment, variant calling, variant annotation and identifying resistance conferring variants, calculating pairwise SNP difference, determining genetic relatedness and construct phylogenetic tree

➔ **List of learning outcomes specific for this module** <mark>(Please list 3 - 5 Learning Outcomes here; refer to How to writing learning outcomes</mark>)
➔ Identifying suitable reference for mapping
➔ Perform alignment to reference
➔ Variant calling from the alignment
➔ Annotating the variants with SNPeff
➔ Understanding the variant calls with IGV
➔ Generating pseudogenomes
➔ Calculating pairwise SNP difference
➔ Constructing phylogenetic tree

➔ **Total number of hours/days to be spent on this content:** 8 hours

➔ **Tools/software and resources to be used**
  ◆ Software: Trimmomatic, bwa, samtools,picard, bcftools, SNPeff, SNP-sites, SNP-dists, IGV, IQTree
  ◆ Description of datasets to be used: *Mycobacterium tuberculosis*
  ◆ Other resources, or readings

➔ **Overview of activities and exercises (**list specific practical activities which participants will do)
  Lecture: Mapping to reference, Variant calling and annotation, genetic relatedness and phylogeny
  Activity 1: mapping of the reads to reference
  Activity 2: Call variants
  Activity 3: filtering and annotation
  Activity 4: identify resistance variants
  Activity 5: analyze genetic relatedness
  Activity 6: generate phylogeny

Appendix *(include any guideline documents related to content development such as breaking down content for remote classroom format, how to write LO's, designing assignments etc…)*
*See links to other guidelines*
*-Overall trainer guideline and template documents will include information on lecture formats and recordings, contact sessions schedules, checklists, assignments and assessments, quizzes, feedback, audio-video conferencing, learning management platform, teaching assistants*