## Genomics Technology Core

More info: <https://dnacore.missouri.edu/>

The Genomics Technology Core (GTC) provides genomic services to investigators throughout the University of Missouri System, external academic researchers, and commercial entities. The GTC is an institutional resource to educate, train, and assist researchers in the use of sequencing technologies with the focus toward implementation of emerging genomic technologies to enhance future research capabilities. The GTC is located in the Christopher S. Bond Life Sciences Center on the University of Missouri campus.

Sanger Sequencing and Fragment Analysis Services accommodate both single sample users and high-throughput projects. The GTC utilizes a 3730xl 96-capillary DNA Analyzer to provide high throughput capacity at minimal cost to investigators. DNA sequencing is performed with dye terminator chemistry providing >1,100 bases of sequence. In addition, the 3730 DNA Analyzer is capable of size determination of DNA fragments, such as, microsatellites (random 2-6 base pair repeats) and AFLPs (amplified fragment length polymorphisms), providing a robust and high throughput method for analysis of genetic variation.

**Metagenomic/16S Sequencing Services**

The GTC applies Illumina NGS technology to the study of complex bacterial communities. Both a whole genome shotgun approach and taxonomical identification by targeting of the V4 hypervariable regions of the 16S rRNA gene are available. Bacterial 16S ribosomal DNA amplicon libraries are constructed by amplification of the hypervariable region of the 16s rRNA with primers flanked by Illumina standard adapter sequences. Barcoding allows for the pooling of up to 96 samples. These services are offered in collaboration with the MU Metagenomics Center that can provide extraction services and the Bioinformatics and Analytics Core that provides an analysis of 16S sequence data using the standard QIIME2 pipeline that provides graphical and tabular summaries, and meta-statistics. Custom targeted amplicon approaches are also available.

**Ilumina Next-Generation Sequencing Services**

The GTC provides services in high-throughput DNA sequencing which includes staff experience in the construction of libraries for amplicons, small RNA analysis, transcriptome profiling (RNA-Seq), ChIP-Seq, epigenome, and whole genome analysis. Core staff can offer technical guidance in sample preparation with >2,000 library constructs generated annually. The GTC maintains Illumina NovaSeq 6000 and MiSeq instruments, as well as necessary ancillary equipment for all sequence preparation and quality control.

**10x Genomic Single Cell Services**

Services in single cell library preparation are available using the 10x Genomics Chromium system. The Chromium System provides for the massive partitioning and barcoding of single cells using >1,000,000 unique barcodes. At the heart of the Chromium System is 10x GemCode™ Technology. Partitioning events occur on a microfluidic chip in the presence of barcoded gel

beads and oil to create GEMs (Gel Bead in Emulsion). As many as 10,000 cells per sample are encapsulated in nano-liter scale GEMs. Final amplification and library construction will be performed in bulk after GEMs are broken. Resulting libraries are compatible with Illumina sequencing platforms.

**Fragment Analysis Services**

The Genomics Technology Core, using the ABI 3730xl DNA Analyzer, has the capability to rapidly size DNA fragments, such as microsatellites (random two to six base pair repeats) and AFLPs (amplified fragment length polymorphisms). The ABI 3730xl DNA Analyzer allows for the use of a fluorescence-based detection system that automates the process. Fluorescent dyes are incorporated into the DNA fragment using fluorescence-labeled primers. An internal lane standard that ranges from 20-600 bases (Genescan 600 LIZ) is added to each sample for precise sizing of each fragment adjusting for lane-to-lane variation. A distinct advantage to the fluorescence-based system is the availability of four dyes allowing the multiplexing of multiple samples in a single lane. Eight samples can reliably be multiplexed in each well of a 96-well plate allowing hundreds of loci to be analyzed in a single day.

**Enzyme Freezer Program**

The Genomics Technology Core maintains stocks of common molecular biology reagents for purchase from several vendors. Substantial cost savings and convenient access to products for campus researchers are the primary benefits of the Enzyme Freezer Program.