

# USF Genomics Program

## USF Genomics Core (Genomics Equipment Core)



Located on the 3rd floor of IDRB. The ~3000 sq. ft. BSL2 laboratory space

## ❖ Next-Gen Sequencers and Single-Cell System



**Illumina - MiSeq System**

**12 – 15 million reads (v2)**

**22 – 25 million reads (v3)**

**Read Length:**

**2 x 75; 150; 250; 300**

**\$950 - \$1,600**



**NextSeq 550 System**

**~ 130 million reads (Mid)**

**~ 400 million reads (High)**

**Read Length:**

**2 x 75; 150; 300; or 1 x 75**

**\$1,500 - \$5,000**



**10x Chromium SC**

**Cell: 500 – 10,000**

**~3,000 genes per cell  
(medium)**

# USF GENOMICS CORE FACILITIES AND RESOURCES

## ❖ Instrumentation for Library-prep and Quantifications



Agilent 2200



Agilent 4200

TapeStation / Bioanalyzer



Roche LightCycler 96 System



M220 Focused-ultrasonicator



Qubit® 4 Fluorometer

## ❖ Instrumentation for Cell Culture

- ✓ **Class II Biosafety Cabinets x 4**
- ✓ **O<sub>2</sub>/CO<sub>2</sub> 3 Gas Incubators x 4**
- ✓ **Microscopes x 3**
- ✓ **Centrifuge x 3**
- ✓ **Refrigerators 4°C, -20°C and -80°C freezers**
- ✓ **Liquid nitrogen tank cell storage -120°C**

# USF Genomics Program

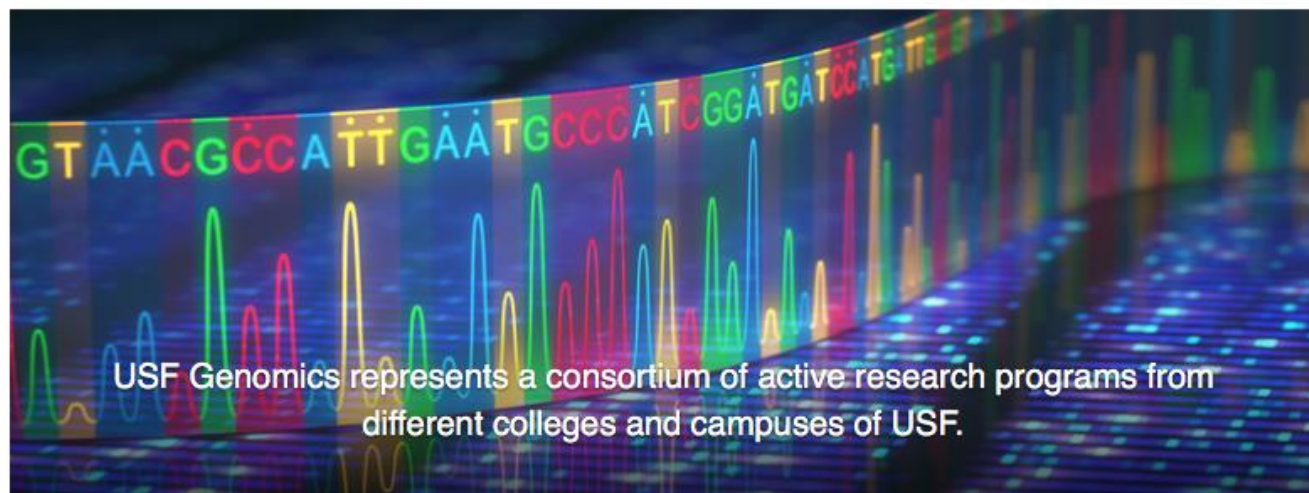
## USF Genomics Equipment Core (Genomics Core)

### Policies and Procedures

- 1) All USF faculty, staff, and students who wish to use the USF Genomics Equipment Core must take the USF Genomics Training Course (Laboratory): RNA-seq Illumina Sequencing Workshop.
- 2) Labor for sample preparation and analysis will not be provided by the USF Genomics Equipment Core, and thus all users must be trained in standard procedures. A core staff member will be available during an appointment with the USF Genomics Equipment Core to assist as necessary.



## USF Genomics

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USF Genomics represents a consortium of active research programs from different colleges and campuses of USF.

### About USF Genomics

Our projects integrate modern genomic approaches to understand and help develop solutions for some of the major challenges affecting global health and especially our Florida community. USF Genomics research projects are naturally interdisciplinary with studies that cross many boundaries of traditional scientific fields, integrating bioscience

### Upcoming Events

[USF Genomics Program - Microbiome Analysis Training - November 6-8, 2019](#)

[USF Genomics Annual Symposium: Personal Genomics - November 15, 2019](#)

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## USF Genomics Program Training

The USF Genomics Program offers three of training workshops, the RNA-seq Illumina Sequencing Laboratory Workshop, the RNA-seq Data Analysis Computational Workshop, and the Microbiome Analysis Training. The RNA-seq workshops are offered three times a year in February, May, and September. The first Microbiome Analysis Training will be offered in November 2019. These workshops are open to all in the USF community. The RNA-seq Illumina Sequencing Laboratory Workshop is required for access to use the USF Genomics Equipment Core (more information [here](#)).



RNA-seq Illumina Sequencing Laboratory Workshop



RNA-seq Data Analysis Computational Workshop



RNA-seq Workshop Registration



Microbiome Analysis Training Workshop

Hands-on Microbiome Training



Microbiome Analysis Training

Methods and Experimental Design: Considerations for Microbiome Studies



Microbiome Analysis Training Registration

# USF GENOMICS CORE FACILITIES AND RESOURCES

## ❖ Genomics Training Courses RNA Sequencing Workshops

### Laboratory Workshop – RNA-seq Library Preparation

Three Sessions 2019  
5<sup>th</sup> February 11 – 14  
6<sup>th</sup> May 6 – 9  
7<sup>th</sup> September 9 – 12

### Computational Workshop – RNA-seq Data Analysis

Three Sessions 2019  
5<sup>th</sup> February 15 – 20  
6<sup>th</sup> May 10 – 15  
7<sup>th</sup> September 13 – 18



### USF Genomics Program- Genomics Training Courses

Laboratory Workshop — Illumina RNA-seq Library Preparation  
Computational Workshop — RNA-seq Data Analysis

#### Laboratory

**Goal:** 4-day extensive hands-on training to enable you to confidently prepare high-quality sample libraries for sequencing



**Day 1**  
Illumina sequencing technology overview  
RNA sample Preparation

**Day 2**  
Library Prep (1): mRNA purification; 1<sup>st</sup>, 2<sup>nd</sup> strand cDNA synthesis

**Day 3**  
Library Prep (2): A-Tailing, ligation, PCR amplification, Beads Purification

**Day 4**  
qPCR quantification, Normalize & pool, Set-up Miseq run, Base-Space

**Introduction:** This training course includes presentations on technology theory and Practical experience with entire laboratory sample prep workflow. Experienced trainer will lead you using TapeStation, Miseq equipment. By the end of this training, you will be able to: complete Illumina library preparation process, set up a sequencing run using Illumina Miseq Control Software.

#### Computational

**Goal:** 4-day in-depth course will instruct participants on the theoretical and practical concepts related to RNA sequencing analysis, enabling to perform analyses independently.



**Day 1**  
Illumina Sequencing Refresher  
Linux for Bioinformatics

**Day 2**  
Introduction to RNA sequencing  
RNA-seq Alignment and Visualization

**Day 3**  
RNA-seq Alignment and Visualization  
Introduction to R and Bioconductor

**Day 4**  
Introduction to R and Bioconductor  
Expression and Differential Expression

**RNA-seq: TUXEDO Pipeline Hands-on**

#### Participants

- To maximize effectiveness, this training is limited to 6 participants of each time.
- A basic knowledge of biochemistry and molecular biology, familiarity with laboratory equipment usage are requisites.
- Participants will need to bring your own micropipettes (10µl, 200µl and 1000µl)
- If participants wish to include their own experimental samples, each participant can prep two samples.

#### Way to Apply

Online registration  
<https://goo.gl/forms/DINXXXV4Xvr1Snm1>

Phone Number: 813-974-6672

Email: [genomics@health.usf.edu](mailto:genomics@health.usf.edu)

Scan for Registration:



#### Topics:

- ❖ Module 1: A hands-on introduction to data analysis using Linux, designed for all computational skill levels;
- ❖ Module 2: Discussion of advantages and disadvantages of current sequencing technologies and their implications on data analysis.
- ❖ Module 3: Introduction to preprocessing raw reads, read mapping, visualization of mapped reads and and one proceeds with first hands-on analyses (QC, mapping, visualization).
- ❖ Module 4: Introduction to 'R' a programming language to perform statistical computing and visualization, and 'Bioconductor' an R based toolshed for analyzing genomic data.
- ❖ Module 5: Quantification of gene expression and predict differentially expressed genes, followed by a whole day hands-on RNA-Seq analysis pipeline.

#### Participants

- Admittance to the course is limited to 15 participants.
- A basic knowledge of biochemistry and molecular biology, a basic familiarity with computer usage and a need for RNA sequence analysis for current ongoing research are recommended pre-requisites.
- Participants will need to have their own laptop to access the USF research Computing infrastructure for hands-on sessions.



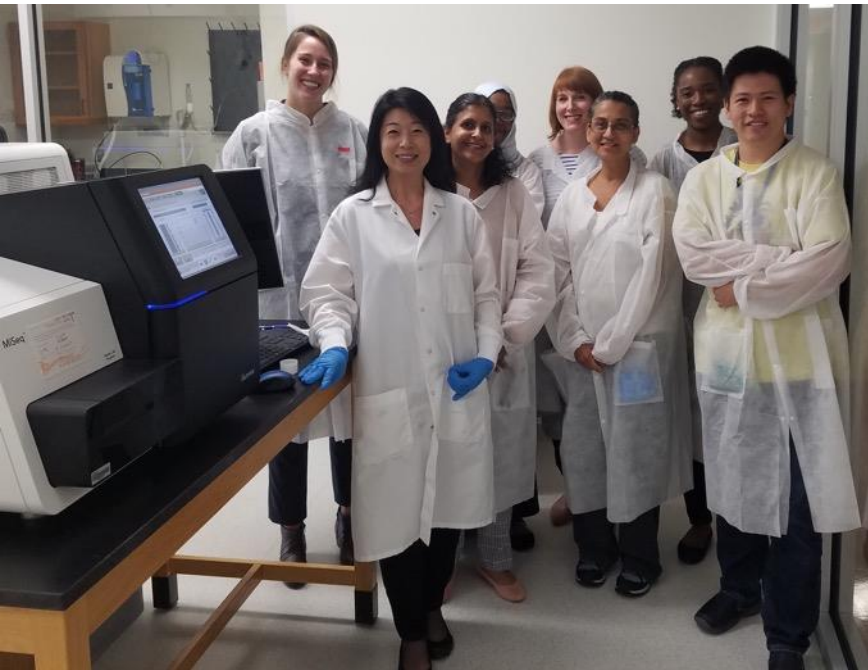
COLLEGE OF PUBLIC HEALTH  
UNIVERSITY OF SOUTH FLORIDA

Our Practice Is Our Passion



# USF GENOMICS CORE FACILITIES AND RESOURCES

## Laboratory Workshop – RNA Sequencing

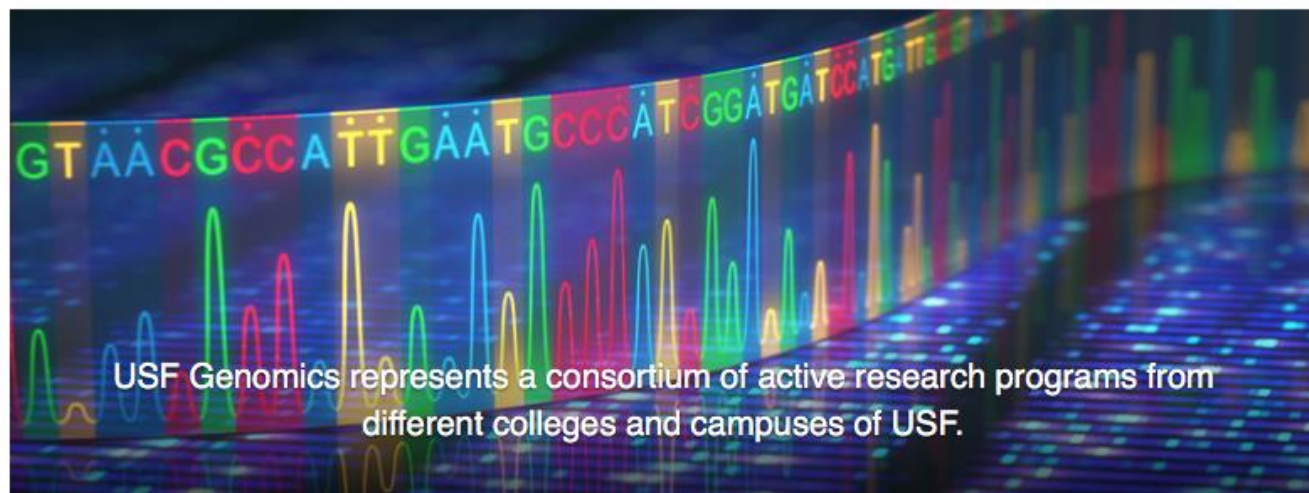


## USF Genomics Equipment Core (Genomics Core)

### Services:

- ❖ Whole-Genome Sequencing
- ❖ RNA Sequencing
- ❖ Gene Expression Profiling
- ❖ 16S rRNA Sequencing
- ❖ Metagenomics Sequencing
- ❖ Targeted Gene Sequencing
- ❖ Targeted Gene Expression Profiling
- ❖ miRNA & Small RNA Analysis
- ❖ Single-Cell Sequencing
- ❖ DNA, RNA Quantification

## USF Genomics

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## Request Services

The USF Genomics Program has the capability to assist with both sample sequencing and computational analysis for research projects at USF.


[USF Genomics Core](#)

[USF Genomics Hub](#)

[Grant Resources](#)

## Equipment for NextGen Sequencing:

- Illumina - NextSeq-500
- Illumina - MiSeq System
- 10X GENOMICS- Single Cell Instrument - Chromium Controller

Instrumentation for library-prep and quality-assurance:

- Agilent - TapeStation 2200, TapeStation 4200 (DNA and RNA quality assessment)
- Invitrogen Qubit 2.0 fluorometer (DNA and RNA sample quantification)
- Roche - LightCycler 96 Real-time PCR Instrument (DNA library quantification)
- Covaris - M220 Focused Sonicator (DNA fragmentation)

## More Information

USF Genomics Core Policies and Procedures

USF Genomics Core Service Agreement

Sample Submission Sheet

USF Genomics Core Rate Sheet

RNAseq Protocols

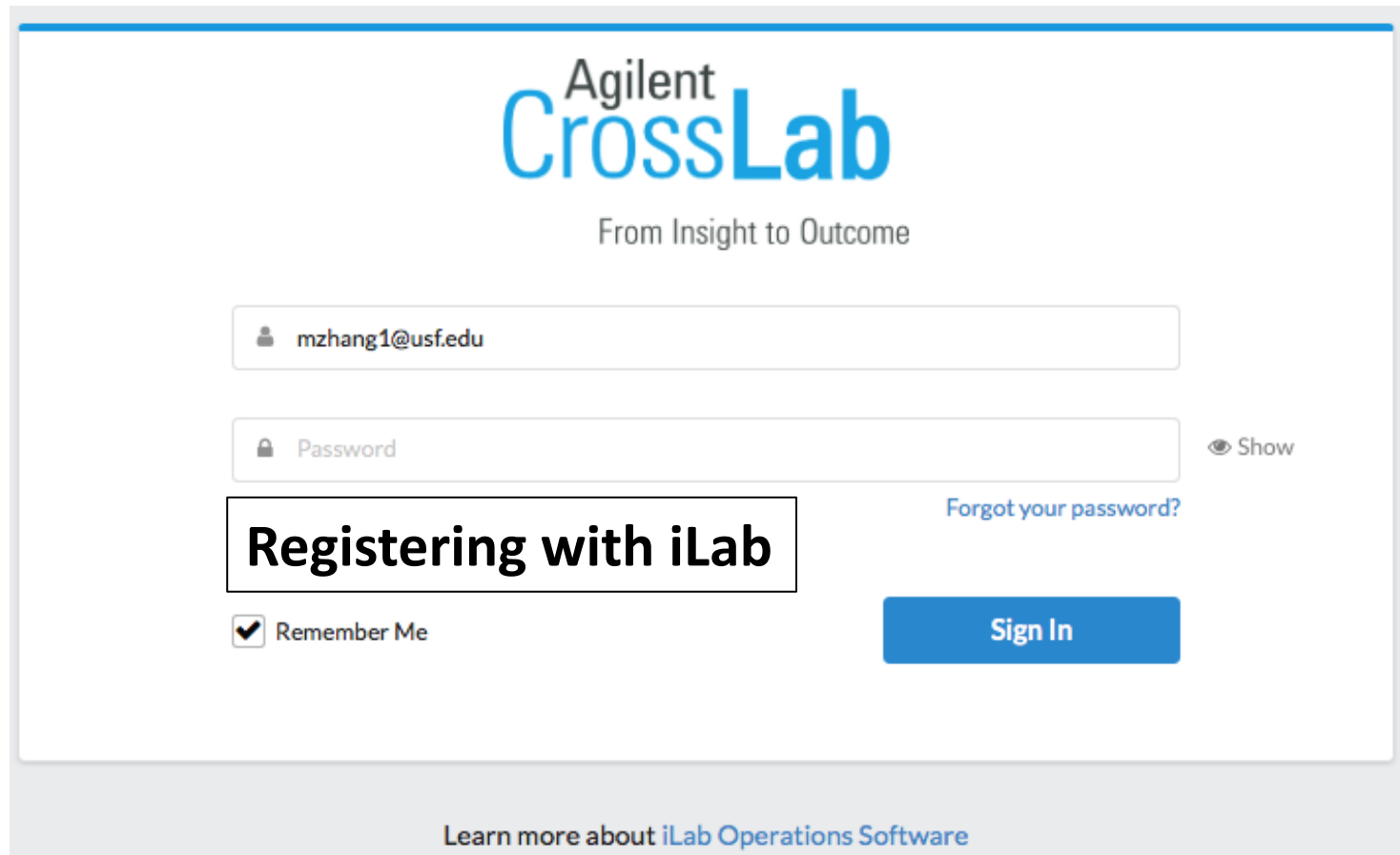
iLab

Certified Users can submit work requests to the USF Genomics Core laboratory facilities through iLab: [https://my.ilabsolutions.com/service\\_center/show\\_external/5175](https://my.ilabsolutions.com/service_center/show_external/5175)





# iLab Operation Software



The image shows the login and registration interface for Agilent CrossLab. At the top, the logo "Agilent CrossLab" is displayed in blue, with the tagline "From Insight to Outcome" below it. The interface includes a username input field containing "mzhang1@usf.edu", a password input field with a "Show" toggle, and a "Sign In" button. A "Forgot your password?" link is located to the right of the password field. A box labeled "Registering with iLab" is positioned over the "Remember Me" checkbox and the "Sign In" button. At the bottom, a link "Learn more about iLab Operations Software" is visible.

Agilent  
CrossLab

From Insight to Outcome

mzhang1@usf.edu

Password [Show](#)

[Forgot your password?](#)

**Registering with iLab**

☒ Remember Me [Sign In](#)

[Learn more about iLab Operations Software](#)

- 1) Accessing the URL by the USF Genomics Core
- 2) Click 'Register', bring you to the first step of the Registration
- 3) Verify the CAPTCHA requirement, agree to iLab's privacy and policies.



# Genomics Core

## About Our Core

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SOUTH FLORIDA[About Our Core](#)[Schedule Equipment](#)[Request Services](#)[View All Requests](#)[Reservations](#)[People](#)[Reporting](#)[Billing](#)[Time Entry](#)[Administration](#)

### Overview of Services

The USF Genomics Program is a consortium of active research programs from across the USF System united by the goal of harnessing the immense power of genomics research to develop innovative solutions to complex problems from health to ecology.

### USF Genomics Equipment Core

The USF Genomics Equipment Core is a NextGen Sequencing laboratory facility which consolidates resources and expertise to provide genomics laboratory training from library preparation to Next-Generation Sequencing. Certified users may reserve time in the USF Genomics Equipment Core to perform sample preparation, library prep, quality assessment, and sequencing. Completion of the [USF Genomics RNAseq Laboratory Training](#) is required to become a certified user of the core. The core offers assistance with experimental design, troubleshooting, and data analysis, but does not offer labor for these services.

#### Equipment Services:

- Illumina – NextSeq-550
- Illumina – MiSeq System
- 10X Genomics – Single Cell Instrument – Chromium Controller
- Agilent – TapeStation 2200, TapeStation 4150 (DNA and RNA quality assessment)
- Invitrogen Qubit 2.0 fluorometer (DNA and RNA sample quantification)
- Roche – LightCycler 96 Real-time PCR Instrument (DNA library quantification)
- Covaris – M220 Focused Sonicator (DNA fragmentation)

#### Consulting Services\* (offered for both laboratory and data-analysis, depending on project needs):

- Experimental design
- Grant-writing support
- Sequencing cost and budgeting
- Sequencing methods
- Sample preparation
- Troubleshooting

\* No billing for overall consulting time less than two hours.

### USF Omics Hub

The USF Omics Hub is the computational branch of the USF Genomics Core. The Hub consists of PhD-level computational biology consultants for genomics research projects. These consultants run Mac, Linux and Windows workstations and have access to USF's High-Performance Computing (HPC) cluster and a variety of both proprietary and open-source, command-line based analysis software. Data analyzed by the Hub are securely stored on a new HIPAA-compliant component of USF's HPC cluster. HPC infrastructure and hardware supporting USF Genomics and the USF Genomics Core Facility is managed by the USF Department of Research Computing.

The members of the USF Genomics Hub are also the instructors for the [USF Genomics RNAseq Data Analysis Training](#). This hands-on workshop reviews theoretical and practical concepts related to RNA sequencing analysis, enabling participants to perform these analyses independently.

The consultants of the Hub are available for project-planning, periodic consultation and training, as well as longer-term collaboration on funded projects.

#### Data Analysis Computational Services\*:

- RNAseq Data Analysis
- Microbiome Data Analysis
- Whole-genome sequencing Data Analysis
- Epigenomic Data Analysis
- Phylogenetics

# Genomics Core

# Request Services



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- People
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- Billing
- Time Entry
- Administration

## ▼ Project Requests

- Sort manually
- Add a Service Project Template
- 

### USF Genomics Omics Hub Consultation Request (USF Omics Hub)

initiate request

Please initiate this request to consult and/or collaborate with the Core and USF Omics Hub on project-planning, sequencing, and/or data analysis.

### Initial USF Genomics Equipment Core Service Request (USF Genomics Equipment Core)

initiate request

Please initiate this request for access to our Core facility **if you have completed the laboratory portion** of our [USF Genomics RNAseq workshop](#). This form is **required** for all Core users.

- If you have not yet completed the training and you are gathering information for a future project, please submit a Hub consultation-request so that we can assess your needs.
- 
- For more general inquiries (such as Facilities and Resources information for grant applications, etc.), please email [usfgenomics@usf.edu](mailto:usfgenomics@usf.edu).

### Library Prep and QC Request (USF Genomics Equipment Core)

initiate request

Please indicate this request to perform library prep and quality control checks on samples

### Sample Quantification Request (USF Genomics Equipment Core)

initiate request

Please indicate this request to use the USF Genomics Core lab for sample preparation

### Sequencing Request (USF Genomics Equipment Core)

initiate request

Please indicate this request to perform sequencing

## ▼ Service list

- Sort manually
- Add a Service Template
-



## Genomics Core

## View All Requests

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▼ active requests

Searching within active requests: Results in this tab are restricted by Status ([show details](#))Please use the filter panels in the left-hand menu to drill down to requests of interest. You can also save filters to custom tabs! [Click here for more details.](#)

Agree

## ◀ Hide Filters

## ▼ Keywords

Go

## ▼ Status

- ☐ Draft (5)
- ☐ Proposed (1)
- ☐ Requested (1)
- ☐ Researcher In Agreement (2)

## ► Category

## ► Labels

## ► Assigned To

## ► Lab

## ► Owner

## ► Institution

## ► Payment Number

## ► Payment Method

## ► Request Date

## ► Start Date

## ► Due Date

## ► Completed Date

☒ Apply Filters☐ Reset Filters☐ Create Tab from Filters☐ Download Results as CSV

Displaying 9 out of 9 results. (Page 1 of 1)

date	for	service id	status	cost	
▶ Jan 24 (Jan 24 2020)	Amuza Lucky <a href="#">Cui, Liwang (USF) Lab</a>	GC-AL-6 Sequencing Request USF Genomics Equipment Core	Waiting for Core to Agree <div><div>▶ Agree</div><div>⊖ Disagree</div></div>	\$4,225.00 (\$4,225.00)	
▶ Jan 24 (Jan 24 2020)	Amuza Lucky <a href="#">Cui, Liwang (USF) Lab</a>	GC-AL-7 Initial Access Re...	Waiting for Financial Approval	\$0.00 (\$0.00)	
▶ Jan 23 (Jan 23 2020)	Zachary Graham <a href="#">Uddin, Monica (USF) Lab</a>	GC-ZG-[CID] Sequencing Request USF Genomics Equipment Core	Waiting to Submit to Researcher <div>▶ Submit</div>	\$0.00 (\$0.00)	
▶ Jan 23 (Jan 23 2020)	Justin Gibbons <a href="#">Admin (USF) Lab</a>	GC-JG-[CID] USF Omics Hub Req... USF Omics Hub	Waiting to Submit to Researcher <div>▶ Submit</div>	\$0.00 (\$0.00)	
▶ Jan 23 (Jan 23 2020)	Jenna Oberstaller <a href="#">Admin (USF) Lab</a>	GC-JO-[CID] Initial Access Re...	Waiting to Submit to Researcher <div>▶ Submit</div>	\$0.00 (\$0.00)	
▶ Jan 23 (Jan 23 2020)	Sarah Borgan <a href="#">Wildman, Derek (USF) Lab</a>	GC-SB-3 Sequencing Request USF Genomics Equipment Core	Waiting for Researcher Approval <div>⊖ Disagree</div>	\$0.00 (\$0.00)	
▶ Jan 23 (Jan 23 2020)	Jenna Oberstaller <a href="#">Admin (USF) Lab</a>	GC-JO-[CID] Library Prep and ... USF Genomics Equipment Core	Waiting to Submit to Researcher <div>▶ Submit</div>	\$0.00 (\$0.00)	

Request Services

Reservations

Reporting

Billing

Agilent CrossLab | iLab Operations Software

Search... Min Zhang Help Sign Out

# Genomics Core

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◀ Hide Filters

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Go

▼ Status

► Organization

► Created By

► Date Added

✓ Apply Filters  
↺ Reset Filters

Merge Drafts View Charges New Billing Event

Displaying 0 out of 0 results. (Page 1 of 1)

Name	Created By	Status	Date Added	Value (# of charges)	Actions
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**Request Services Through iLab**

iLab Certified User Training



## How to Submit a Sequencing Service Request:

### **Sequencing Service Request**

[genomics@usf.edu](mailto:genomics@usf.edu)

- Initial contact us through website
- Submit Sample Sheet
- Quotation makes, Sign Agreement
- Schedule Working Date

### **Library Prep Sequencing (DIY) 4 ~ 5 Days**

- Quantification of Sample by TapeStation
- Library Preparation
- Library Quantification by qPCR
- Sequencing Run

### **Data Report Invoice**

- Sequencing QC
- Send Summary Report
- Send FASTQ Data Download Link
- Send Invoice

## What We Can Provide:

### ❖ Consultation

Experimental design, Sample preparation, Method, Reagent kit, Troubleshooting

### ❖ Genomics Training Courses

### ❖ Sequencing Services

### ❖ Grant-writing Support

### ❖ Collaboration

# Sequencing Kits We Recommend to Use:

Illumina Library-Prep Kits and Indexes Would be Recommended

Sequencing Data QC,  
Index Distribution QC,  
FASTQ Data Generation



Illumina BaseSpace  
Sequence HUB

❖ RNA Sequencing: TruSeq® Stranded mRNA Library Prep  
(48 Samples) 20020594

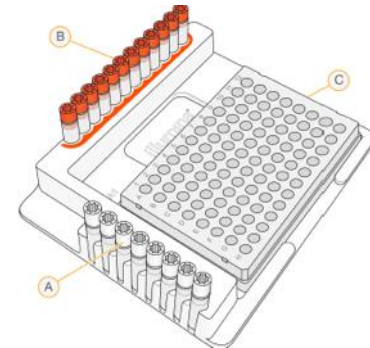


❖ 16S rRNA Sequencing:

Index PCR: Nextera XT Index kit (2 Primers N7xx, S5xx) from the Index Kit

Amplicon PCR: 16S Amplicon PCR Primers (Forward, Reverse)

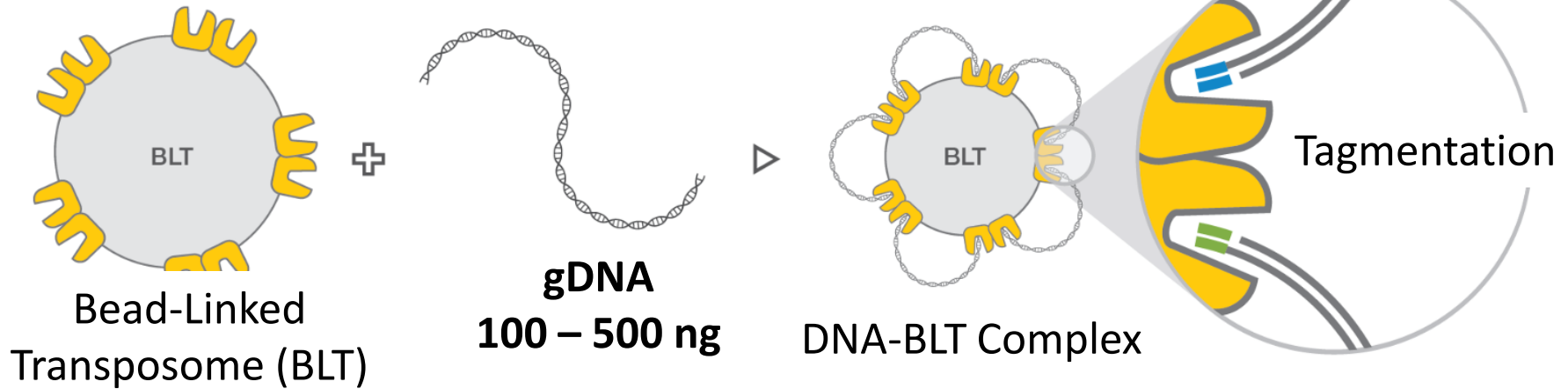
2x KAPA HiFi HotStart ReadyMix



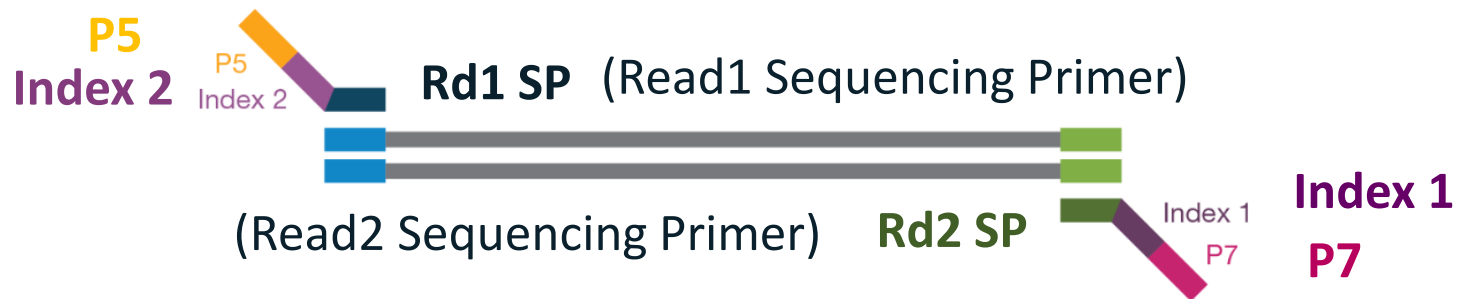
❖ Metagenomics Sequencing

Nextera DNA Flex Library Prep Kit, Nextera DNA CD Indexes (24 Indexes, 24 Samples)

# Metagenomics Sequencing Nextera DNA Flex Workflow



↓ PCR amplification



↓



**Sequencing-ready fragment (~600 bp)**  
**NextSeq 500/550 High Output Kit v2.5 (300 cycles)**

## ❖ Grant-writing Support and Collaboration

### We Can Help You:

- ✓ Providing support letter and core facilities/resources
- ✓ Estimates the cost
- ✓ Preliminary data generation
- ✓ Find the collaborators

#### USF GENOMICS CORE FACILITIES AND RESOURCES

**Laboratory:** The USF Genomics Core laboratory facilities are on the 3rd floor of the Interdisciplinary Research Building (IDRB) in the USF Research Park. The ~3000 sq. ft. of laboratory space is equipped for cell biological and molecular biological experiments. The USF Genomics Core facility offers/encourages one-on-one consultation with a team of experienced bench and computational scientists on experimental design, sample preparation and data analysis for USF researchers.

The USF Genomics Core laboratory facilities house the following instrumentation:

##### Next-Gen Sequencers:

1. Illumina - NextSeq-550
2. Illumina - Miseq
3. Single Cell RNA-seq instrument - 10x Chromium

##### Instrumentation for library-prep and quality-assurance:

1. Covaris M220 - DNA fragmentation
2. Agilent TapeStation 2200 - DNA and RNA quality assessment
3. Roche LightCycler 96 qPCR System – DNA library quantification
4. Invitrogen Qubit 2.0 fluorometer – DNA and RNA sample quantitation
5. Bio-Red thermal cycler - PCR
6. Bench top centrifuges, heat blocks, vortexers

##### Instrumentation for cell culture:

1. Class II Biosafety Cabinets x 3
2. O<sub>2</sub>/CO<sub>2</sub> Incubators x 4
3. Microscopes x 3
4. Centrifuges x 3
5. Refrigerators 4°C, -20°C and -80°C freezers
6. Liquid nitrogen tank cell storage -120°C

**Computational:** The USF Genomics Core computational facilities are on the 4<sup>th</sup> floor of the IDRB and comprise a 1400 sq. ft. Genomics Core computational consultants run many Mac, Linux and Dell workstations and have access to USF's High-Performance Computing (HPC) cluster and a variety of both proprietary and open-source, command-line based analysis software. Data generated from the Core sequencers, as well as any data to be analyzed by the Core, are securely stored on HIPAA-compliant architecture of USF's HPC cluster. HPC infrastructure and hardware supporting USF Genomics and the USF Genomics Core Facility is managed by the USF Department of Research Computing.



# USF Genomics Program

## USF Genomics Core (Genomics Equipment Core)

Thanks!

