Genomic Science and Leadership Initiative

Fort Lewis College, Durango, CO

May 21 – 25, 2018

Presented by

Cold Spring Harbor Laboratory, Howard Hughes Medical Institute, J. Craig Venter Institute, University of Wyoming, Fort Lewis College

Instructors

Dr. Agnes Chan (JCVI); Dr. David Jackson and Tara Skopelitis (CSHL); Dr. Joslynn Lee (HHMI); Dr. Jennifer Lowell (FLC); Dr. Arron Shiffer (NAU); Dr. Anne Sylvester (UW)

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Detailed Agenda

Monday **May 21, 2018**	***Arrival***
4:00 / 5:00 PM	Arrive at Fort Lewis College (FLC) campus
5:00 PM	Check-in to Bader A Complex
6:00 PM	Welcome dinner
8:00 PM	Head back to Bader A complex
Tuesday **May 22, 2018**	***Workshop Day 1 - DNA Isolation from Water Sources***
7:00 - 8:00 AM	Breakfast
8:00 AM	Walk to Chemistry Hall
8:15 – 8:30 AM	Welcome, Jennifer Lowell, FLC Department of Public Health Opening Blessing by Clyde Benally, FLC Elder-in-Residence
8:30 - 9:00 AM	**Lecture/Discussion** Anne Sylvester, University of Wyoming ● Part 1: Water Quality Testing using Genomics ● Part 2: Lab Safety
9:00 AM - noon	**Wet-Lab** Tara Skopelitis, CSHL ● Lab 1: Pipette Practice ● Lab 2: Isolation of DNA from Water Samples
12:30 - 1:30 PM	**Lunch Break**
1:30 – 3:30 PM	**Wet-Lab** Dave Jackson, CSHL ● Lab 3: DNA Quantification Nanodrop ● Lab 4: Amplify DNA by Polymerase Chain Reaction **Lecture/Discussion** Sample Collection, Joslynn Lee, HHMI

3:30 - 5:30 PM	**Wet-lab** Agnes Chan, JCVI, Dave Jackson ● Lab 5: Agarose Gel Electrophoresis and Analysis ● DEMO: Nanopore MinION
5:30 - 6:00 PM	Break
6:00 - 8:00 PM	Dinner
8:00 PM	Head back to Bader A complex
Wednesday May 23, 2018	***Workshop Day 2 - Visit local area***
7:30 - 8:00 AM	Breakfast
8:15 - 9:30 AM	**Lecture/Discussion:** Agnes Chan, JCVI ● EPI2ME ● WIMP Nanopore MinION
9:30 - 10:00 AM	Tour FLC Geology and Engineering building
10:00 - 12:00 PM	Drive to Silverton
12:00 - 1:00 PM	Lunch in Silverton, Golden Block Pizza
1:00 - 3:00 PM	Walk around Silverton, drive to Gold King Mine area, Stop at Molas Pass and Baker's Bridge
3:00 - 4:00 PM	Drive back to FLC campus
4:00 - 4:30 PM	Break before dinner
5:30 – 7:00 PM	Dinner
7:00 – 8:00 PM	**Talk: Microbiome Research: Altering the human gut microbiome via Fecal Microbiome transplant and by using modified exercise and nutrition conditions,** Arron Shiffer, Northern Arizona University
8:00 PM	Head back to Bader A complex

Thursday **May 24, 2018**	***Workshop Day 3 - Decoding and Identification of DNA Sequences***
8:00 - 8:15 AM	Breakfast
8:15 - 8:45 AM	**Lecture/Discussion,** Agnes Chan, JCVI ● DNA Sequencing
8:45 - Noon	**Computer Lab,** Joslynn Lee, HHMI ● Lab 1: How to read a journal article ● Lab 2: Basics of Unix/Linux and Cloud Computing
Noon - 1:00 PM	Lunch/Break – FLC Campus Dining
1:00 - 2:00 PM	**Talk: Microbiome Research,** Jennifer Lowell, FLC Public Health
2:00 - 5:00 PM	**Computer Lab,** Joslynn Lee, HHMI and Arron Shiffer, NAU ● Lab 3: QIIME Analysis of 16S samples ● Lab 4: Compare to 2016 results
5:30 - 6:00 PM	Break
6:00 PM	Dinner at Les Sommerville's Home
Friday **May 25, 2018**	***Closing of Workshop and Departure***
8:00 - 9:00 AM	Breakfast
9:00 -11:00 AM	**Lecture/Discussion** Wrap Up ● Part 1: Closing Remarks from Organizers ● Part 2: Closing Blessing by Clyde Benally ● Part 3: Post-survey
11:00 AM - noon	Return to Bader A - Dorm Check-out Depart campus

Logistics

Workshop Location

Institute: Fort Lewis College

URL: https://www.fortlewis.edu

Address: 1000 Rim Drive, Durango, CO 81301

Phone: (877) 352-2656

Accommodation

Dorm: Bayer A Building

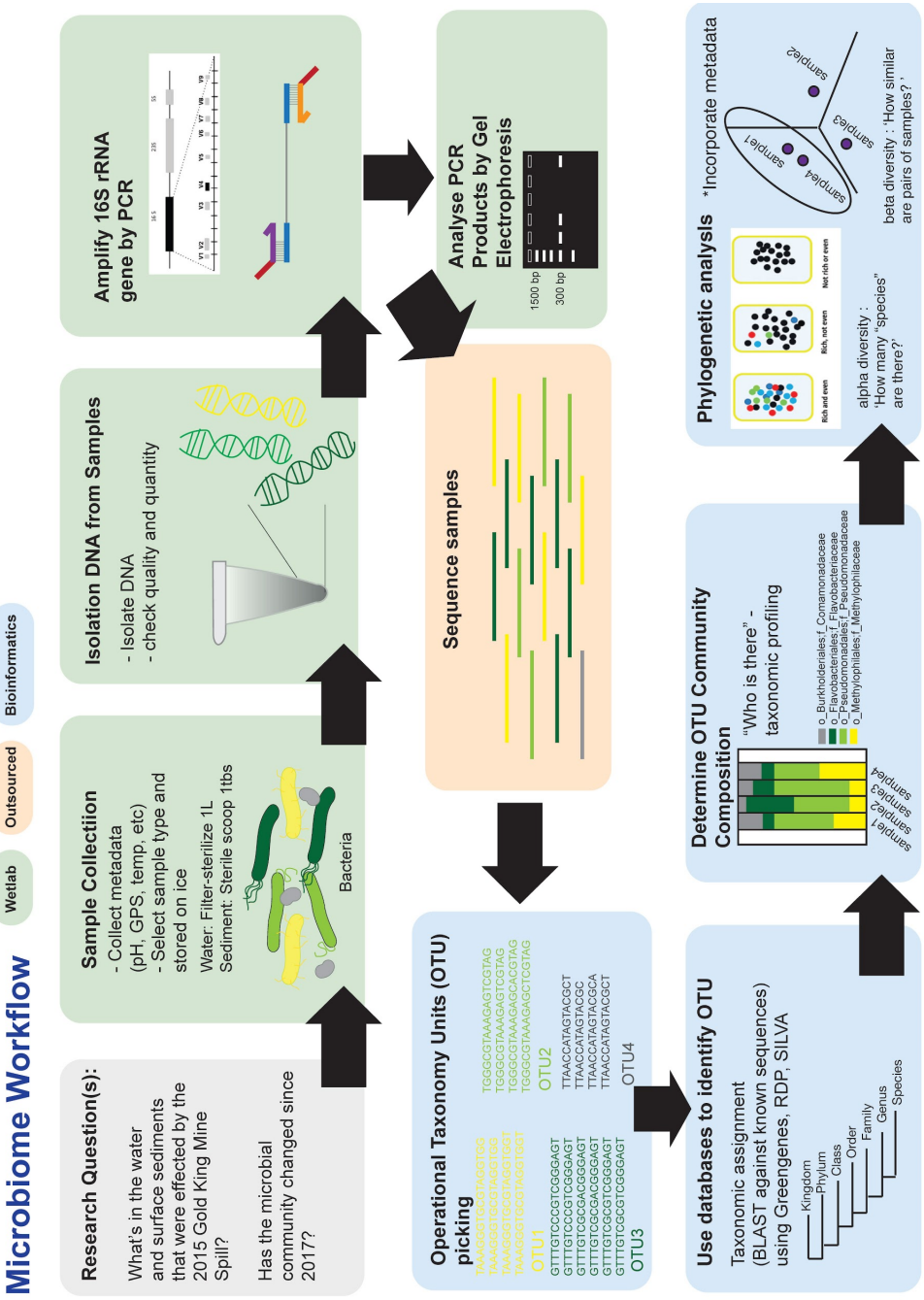
Address: 1000 Rim Drive, Durango, CO 81301

Phone: (877) 352-2656

Check-In Date: Monday 21 May 2017

Check-Out Date: Friday 25 May 2017

Number of Nights: 4


Microbiome Workflow
Wetlab
Outsourced
Bioinformatics
Research Question(s):
What's in the water and surface sediments that were effected by the 2015 Gold King Mine Spill?
Has the microbial community changed since 2017?
Sample Collection
- Collect metadata (pH, GPS, temp, etc)
- Select sample type and stored on ice
Water: Filter-sterilize 1L
Sediment: Sterile scoop 1tbs
Bacteria
Isolation DNA from Samples
- Isolate DNA
- check quality and quantity
Amplify 16S rRNA gene by PCR
Analyse PCR Products by Gel Electrophoresis
1500 bp
300 bp
Sequence samples
Operational Taxonomy Units (OTU) picking
OTU1
OTU2
OTU3
OTU4
Use databases to identify OTU
Taxonomic assignment (BLAST against known sequences) using Greengenes, RDP, SILVA
Kingdom
Phylum
Class
Order
Family
Genus
Species
Determine OTU Community Composition
"Who is there" - taxonomic profiling
o_Burkholderiales;f_Comamonadaceae
o_Flavobacteriales;f_Flavobacteriaceae
o_Pseudomonadales;f_Pseudomonadaceae
o_Methylophilales;f_Methylophilaceae
sample1
sample2
sample3
sample4
Phylogenetic analysis
*Incorporate metadata
alpha diversity : 'How many 'species" are there?'
Rich and even
Rich, not even
Not rich or even
beta diversity : 'How similar are pairs of samples? '