Omics Data Science Bootcamp

August 5 - 9, 2024

Course Objectives:
The main purpose of this bootcamp is to introduce current practices for analyzing common omics datasets generated by two widely used technologies – next-generation sequencing (NGS-omics) and mass spectrometry (MS-omics), within the context of transcriptomics, metabolomics, microbiomics, and multi-omics integration. The lectures are accompanied with live demo and hands-on practices using our user-friendly web tools.

Expected Outcome:
After taking the course, you will be able to

- Develop a good knowledge of the key concepts and approaches in omics data analysis.
- Understand the subtleties or uniqueness of common omics data analysis workflows.
- Perform effective omics data analysis using XiaLab omics tools (community / pro) through web interface.

  ** With the progress in AI technologies, programming is quickly becoming unnecessary for most bioinformatics tasks. Therefore, we focus on teaching concepts and workflows. If you are already familiar with R, we are happy to answer your questions related to using the underlying R packages of XiaLab omics tools.*

Target Audience:
Senior undergraduates, graduate students, postdoctoral fellows, researchers and clinicians who are interested in omics data analysis.

Prerequisite:
Good understanding of basic statistics and molecular biology.

Course Materials:

- Desktop/laptop computers with good internet connection
- Slides and Recordings (lecture and lab demo) will be available after each lecture.
- AI Omics Assistant & Reading Materials – available in your home directory https://www.xialab.ca/users/UserLogin.xhtml

Instructor:
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Teaching Assistants:

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Course Schedule:

Daily 9:30 am - 4:30 pm with 1-hour lunch break

Topics	Time	Lecture	Lab
1. Key concepts, patterns and workflows	Morning	Common data formats, statistics and visualization techniques	Prepare Data Inputs, Work Tour of XiaLab Tools
	Afternoon	Dealing with NGS and MS omics data	
2. Transcriptomics	Morning	RNAseq data analysis in model species	ExpressAnalyst
	Afternoon	RNAseq data analysis in non-model species, gene expression meta-analysis	
3. Metabolomics	Morning	Targeted metabolomics data analysis	MetaboAnalyst
	Afternoon	LC-MS untargeted metabolomics data analysis	
4. Microbiomics	Morning	Marker gene data analysis	MicrobiomeAnalyst
	Afternoon	Shotgun metagenomics data analysis	
5. Biological networks & multi-omics	Morning	Knowledge-driven multi-omics integration & network analysis	miRNet & OmicsNet
	Afternoon	Data-driven multi-omics integration	OmicsAnalyst