UiT The Arctic University of Norway

FSK-2053 Data science & bioinformatics for fisheries and aquaculture

Course introduction

Kim Præbel
Research Group for Genetics
Norwegian College of Fishery Science
UiT The Arctic University of Norway, Tromsø
E-mail: kim.praebel@uit.no

Instructors

- Kim Præbel
- Daniel Kumazawa Morais
- Shripathi Bhat
- Anju Angelina Hembrom
- Vanessa Molin Paynter



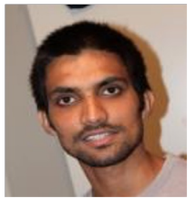



Foto: Arve Lynghammar

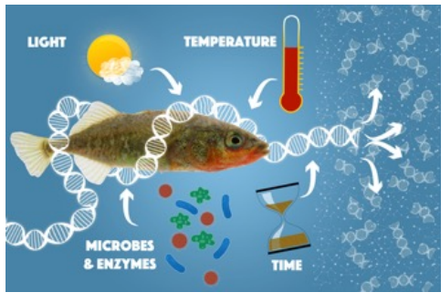
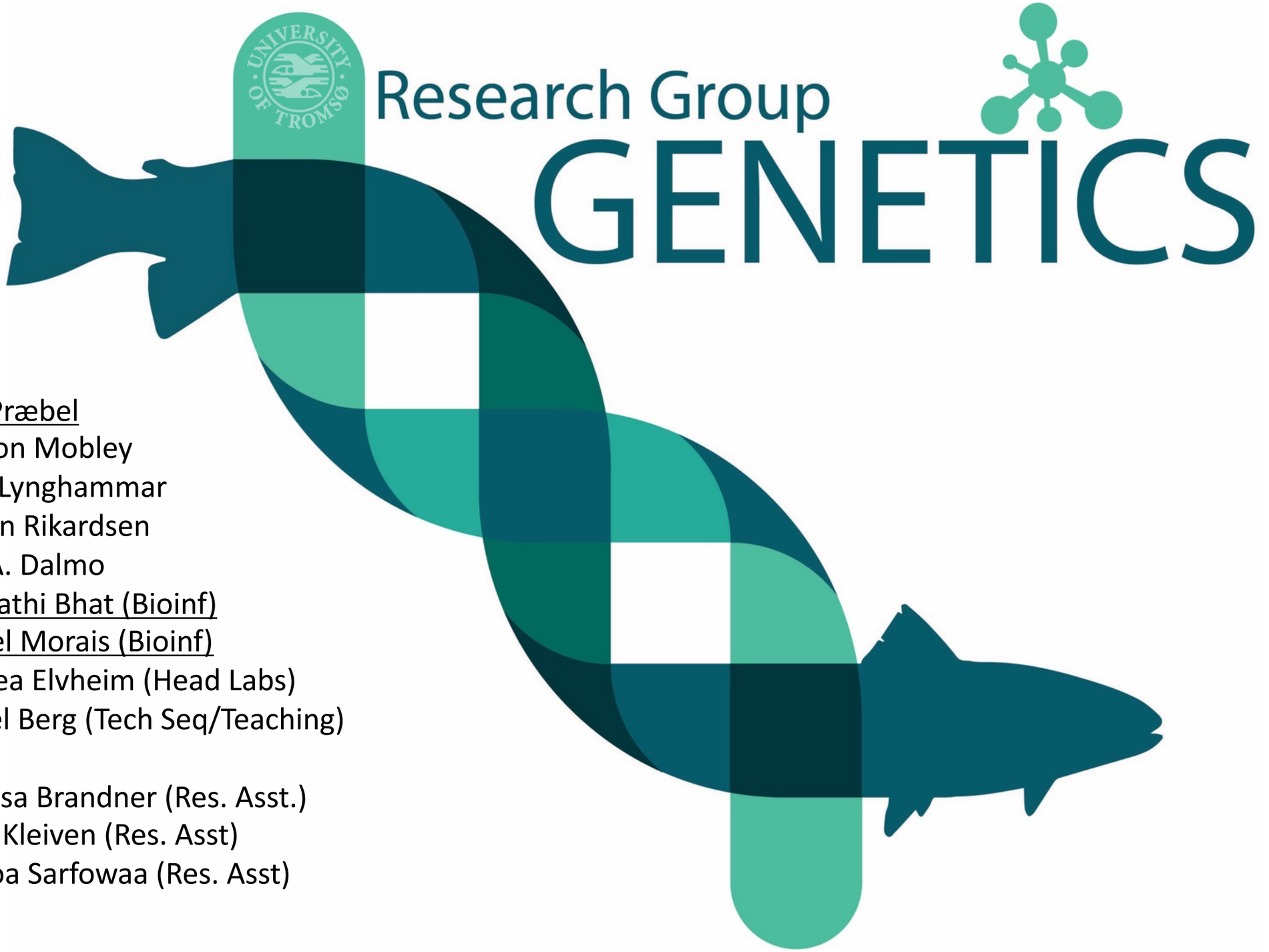



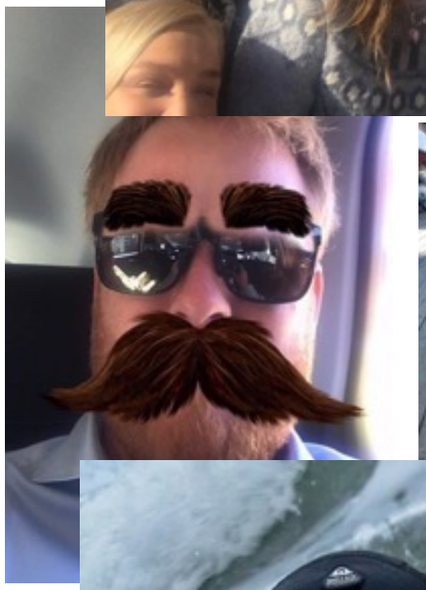

Foto: Audun Rikardsen



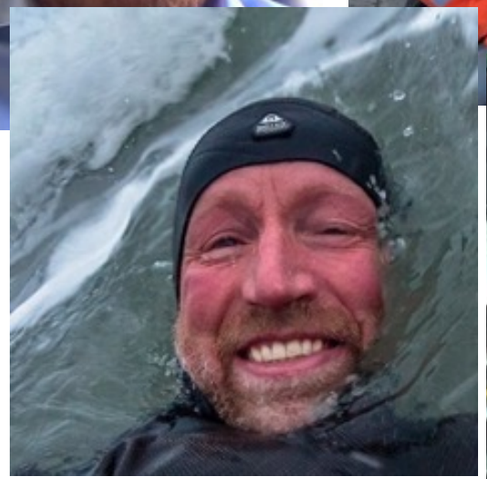
Kim Præbel
Kenyon Mobley
Arve Lynghammar
Audun Rikardsen
Roy A. Dalmo
Shripathi Bhat (Bioinf)
Daniel Morais (Bioinf)
Andrea Elvheim (Head Labs)
Kristel Berg (Tech Seq/Teaching)

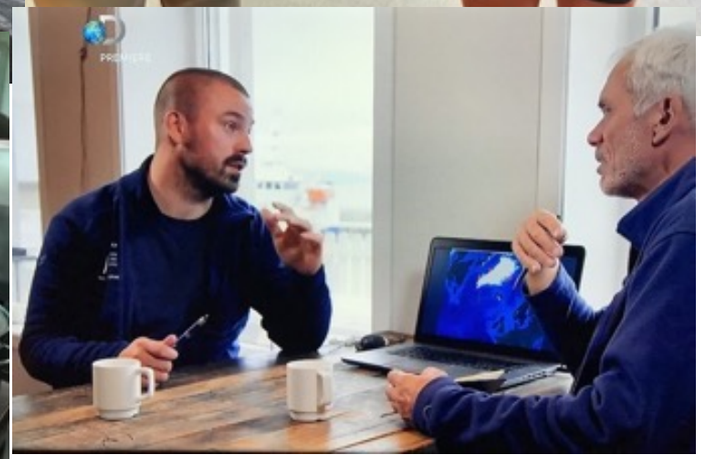
Melissa Brandner (Res. Asst.)
Stian Kleiven (Res. Asst)
Adwoa Sarfowaa (Res. Asst)

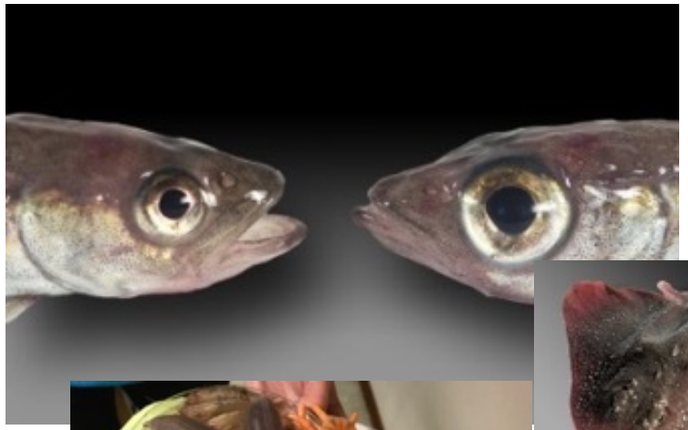


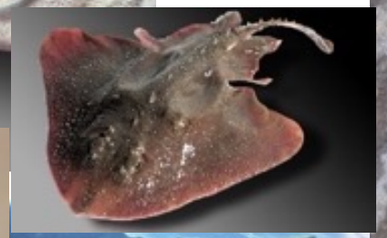











Photos:
Audun Rikardsen
Kim Præbel
Karl Øystein Gjelland
Kimmo K. Kahilainen
www…

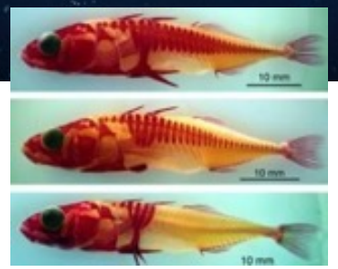


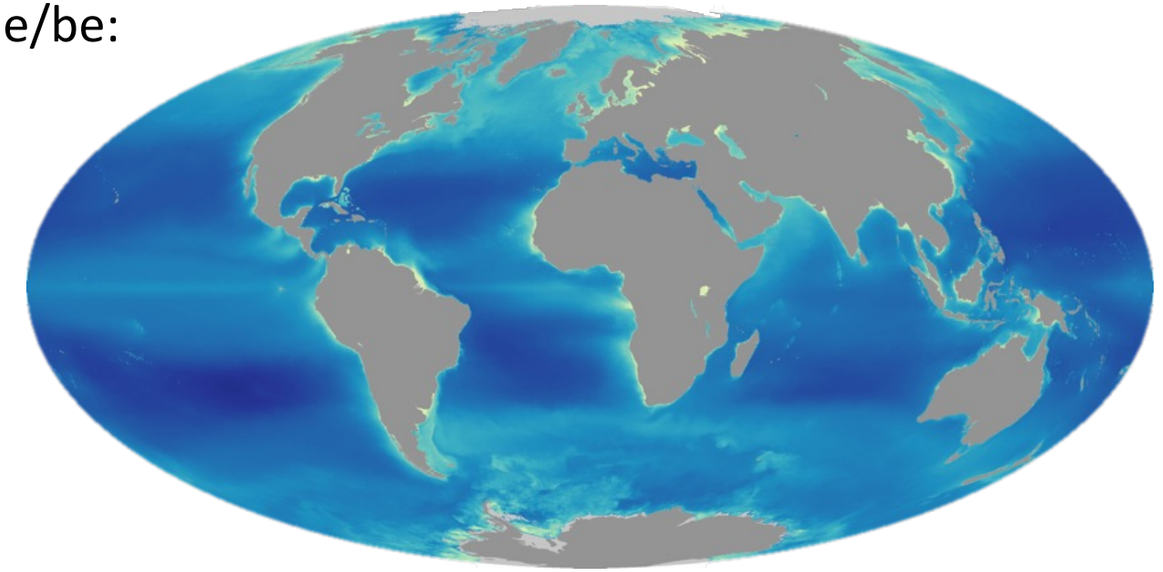

Photo: Kim Præbel

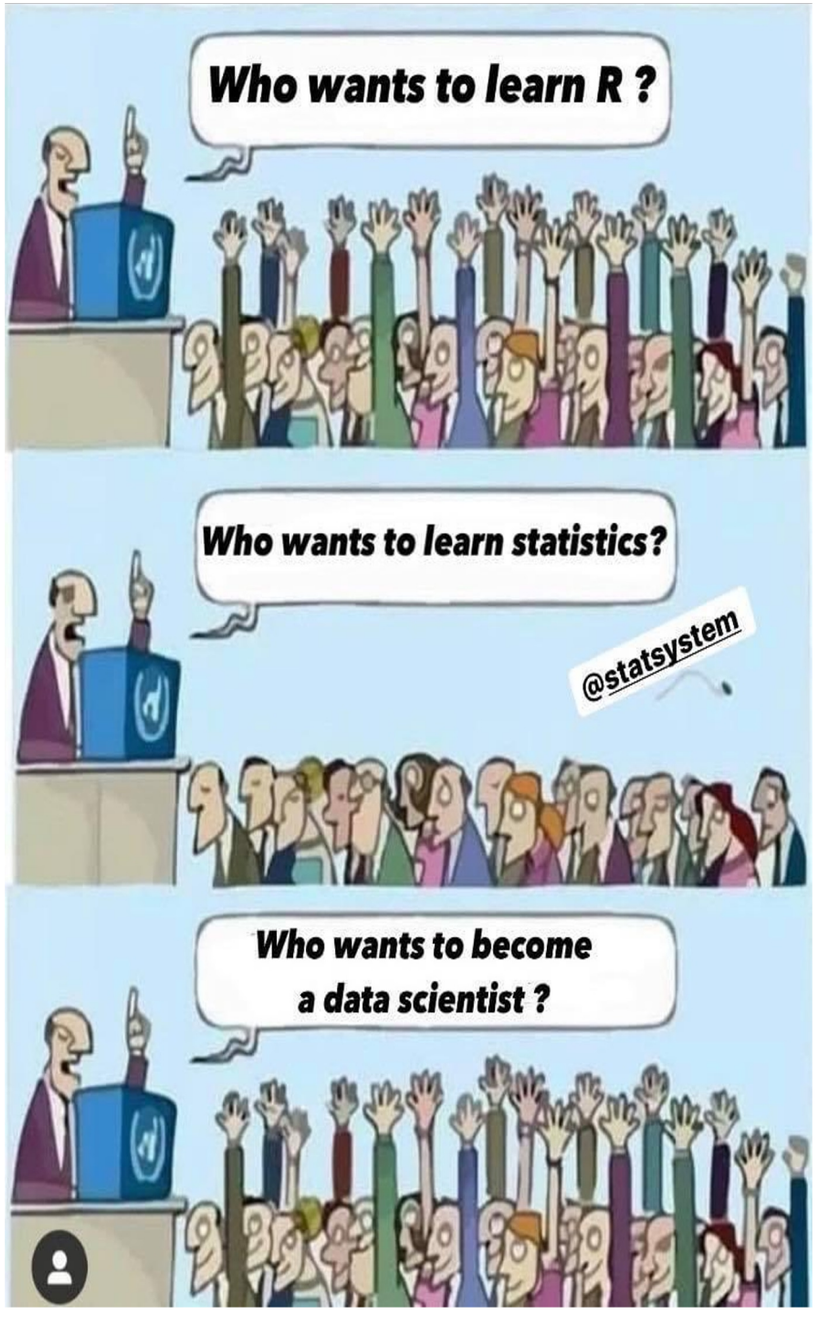
«We are flying across the cosmos on Spaceship Earth with no planetary instrumentation panel to measure the state of our life support system, or a flight plan to collaboratively strategize about how our everyday choices and routines shape where we are going together.»

https://medium.com/@davidedjensen_99356/digital-planet-20-priorities-3778bf1dbc27 , 7/1-2020

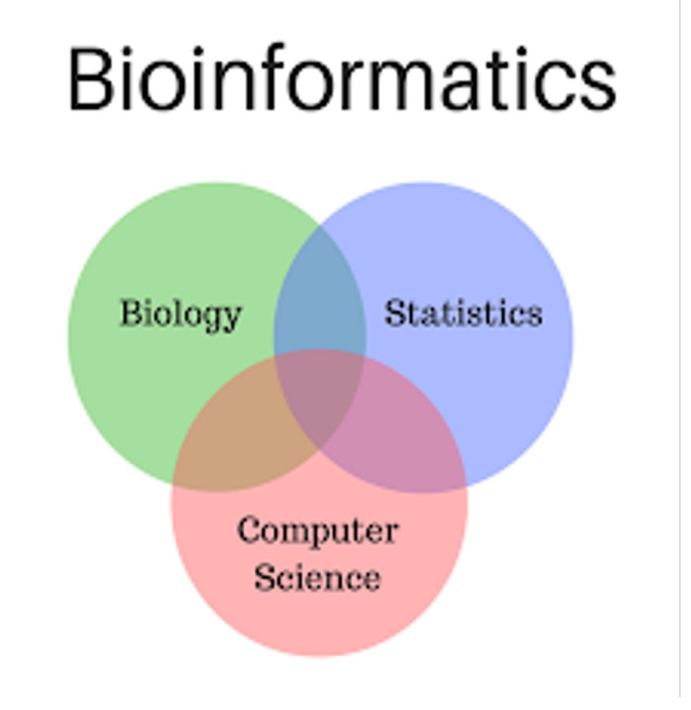
A planetary biological control panel needs to provide/be:

- **High resolution in time and space**
- **High taxonomical resolution**
- **Fast, precise, and repeatable results**
- **Cost-effective and scalable**



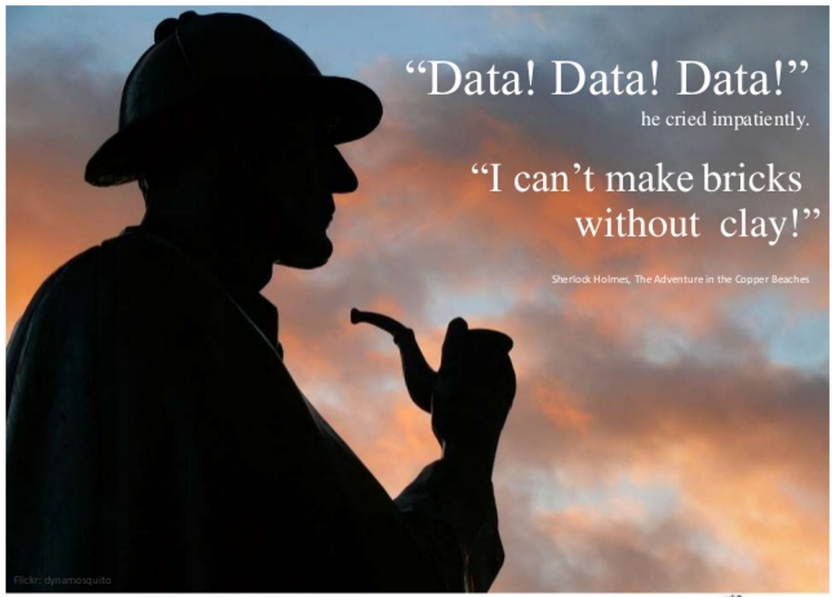

Who wants to learn R ?
Who wants to learn statistics?
@statsystem
Who wants to become
a data scientist ?


Data Science
Domain knowledge
Statistics
Computer Science


Bioinformatics
Biology
Statistics
Computer Science

A skill for the present and for the future!

- Data Science is currently one of the most appreciated skills, both in industry and academic environments
- Essential for research, but also for management positions
- Master Programme in Fisheries & Aquaculture advanced courses:
  - Bioinformatics for aquatic biology & aquaculture
  - Aquatic molecular ecology



Course overview - Objective

To learn how modern data science tools can be used to solve problems and provide solutions for fisheries, aquaculture, and biology

Photos:
K. Præbel

Course overview - Learning outcomes (see Canvas)

Knowledge

- understands the foundations of data science and its potential applications in biology, fisheries, and aquaculture
- has broad knowledge of the importance of genetic and biodiversity information for the management of natural ecosystems, fisheries and aquaculture
- has knowledge on organizing and structuring different kinds of data to facilitate the analysis and inferring useful information

Skills

- can write simple scripts to analyze and visualize data
- can retrieve public data from on-line data repositories
- can analyze genetic sequences using bioinformatics tools
- can access remote servers and computing resources

Competence

- can implement data science approaches to solve practical problems
- can apply data science as a leveraging tool to address current societal challenges
- can exchange opinions and experiences with others with a background in the field, thereby contributing to the development of good practice

Photos:
K. Præbel

Course overview - Structure

- Data Science:

- Data ingestion and handling (accessing databases)
- Data visualization (generating graphics)
- Data modelling and interpretation (inferring patterns and decision-making)

- Bioinformatics:

- Sequences and biological databases
- Phylogenetics and evolution
- Analysis of population differentiation

Practical component:

- Hands-on sessions in R using own laptops (Data Science)
- Remote access to our Linux servers (Bioinformatics)

Applications in fisheries & aquaculture management - Invited speakers: Alf-Martin Søllund (BarentsWatch), Tara Zeynep Baris (HUB Ocean/Ocean Data Platform), Jon-Ivar Westgaard (Institute of Marine Research)

Photos:
K. Præbel

Course overview - Assessment

The assessment consists of two parts - each counting 50 % of the final grade.

Part 1: Four exercises in computer format, either development of short scripts or reporting results of data analyses

The deadline for Wiseflow submission: 13.05.2023 at 14:00

Part 2: Written home exam consisting of solving practical problems

The deadline for Wiseflow submission: 26.05.2023 at 14:00

- The students will get feedback on their 4 exercises and the written home exam - both parts must be passed in order to pass the course

- The grading scale is A - F, where F is fail
- There will not be a re-sit examination for students that did not pass the ordinary examination

UiT The Arctic University of Norway

Thank you for you attention

Research Group GENETICS

@UiTGenetics

Norwegian College of Fishery Science

Email: kim.praebel@uit.no

@kpraebel

Praebel