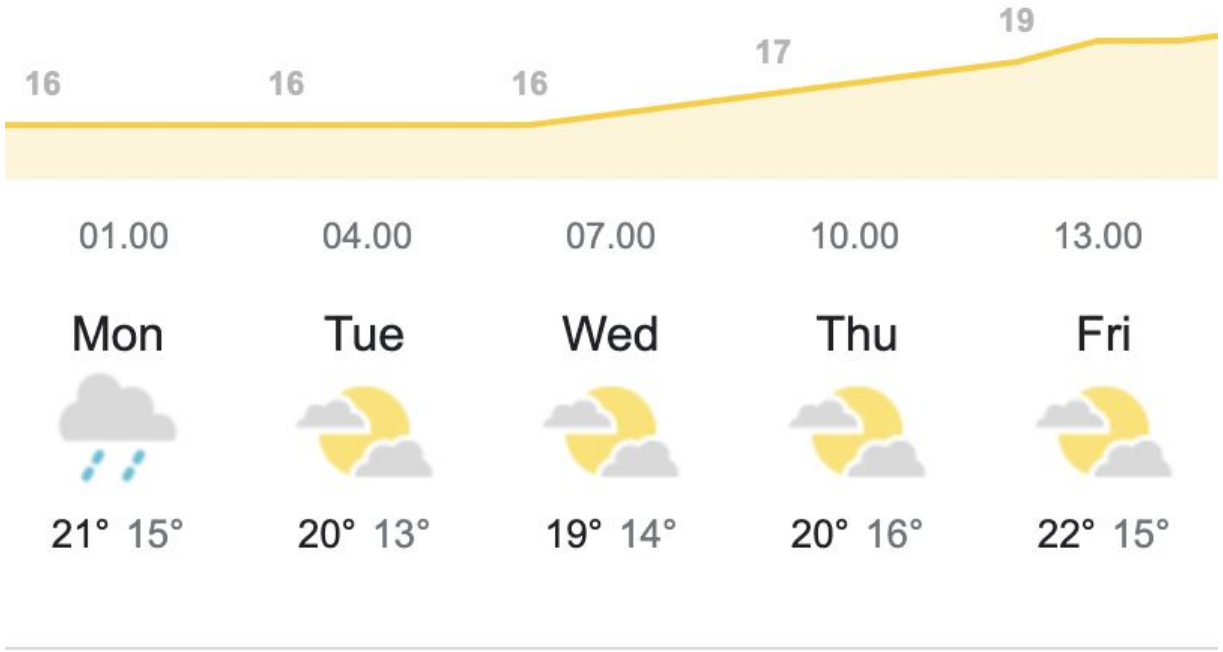
“Summer” course 2025



Summer course in analysis of high throughput sequencing data for population genetics

Organizers/Lecturers

Ida Moltke
BIO, UCPH

Anders Albrechtsen
BIO, UCPH

Shyam Gopalakrishnan
GLOBE, UCPH

Fernando Racimo
GLOBE, UCPH

Martin Sikora,
GLOBE, UCPH

Katia Bougiouri
GLOBE, UCPH

Jazmin Ramos Madrigal,
GLOBE, UCPH

Co-organizers and TAs

Sabhrina Aninta
(mostly online)

Harvinder Pawar
(mostly offline)

Shixu He
(mostly offline)

Nuno Martins
(mostly offline)

Marta Ciucani
(mostly offline)

Goal of this course

- Comprehensive introduction to a number of topics and common research tools used in analyses of **high throughput genetic data** for **population genetics**

- Go beyond the textbooks
  - Use of cutting edge approaches for NGS data analysis
  - Give hands-on experience with complex analysis and NGS data

- Networking

Intended learning outcomes

After the course you should be able to

- use population genetic theory to infer basic population genetics characteristics
- use NGS data incl. low depth for population genetic inference of
  - population structure
  - admixture
  - selection
  - demography
- interpret and discuss the results of own analyses and results in the scientific literature

Each day

- 2 teaching sessions
  - Morning (9:00 - 12:00) & afternoon (13:00 – 16:00)
  - Mixture of lectures and exercises
- Lunch (on your own)
  - 12:00 – 13:00pm
- Research talk
  - 16:15-17:00 (Monday 15:30-16:15)
- Social session
  - 17:00-18:00 (Monday 16:00-19:00)

Monday

Introduction to population genetics and NGS

- **Morning session:**
  Introduction to basic population genetic terms and concepts (Fernando)

- **Afternoon session:**
  Introduction to NGS data (Anders)

- **Research lecture:**
  Frederik Stæger, BIO, UCPH
  Understanding genetic architecture of disease in Greenland

- **Social:**
  Reception/social mixer

Tuesday

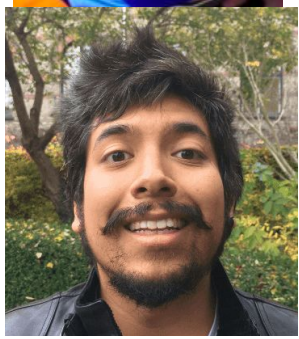
Analysis of NGS data and imputation

- **Morning session:**
  Estimation of allele frequencies, SNP calling and genotype calling, from NGS data (Anders)

- **Afternoon session:**
  Imputation (Shyam)

- **Research lecture:**
  Victor Moreno Mayar, GLOBE, UCPH
  A genomic history of Rapanui

- **Social:**
  Boat trip (sightseeing :-))



Wednesday

Population structure and gene flow

- **Morning session:**
  Inference of population structure and admixture (Ida)

- **Afternoon session:**
  D/f/F statistics and ancient gene flow (Martin)

- **Research lecture:**
  Martin Sikora, GLOBE, UCPH
  Ancient Pathogen Evolution and Epidemiology at regional and Continental scales

- **Social:**
  Relaxed gathering

Thursday

Local ancestry inference and selection

- **Morning session:**
  Local ancestry inference (Katia)

- **Afternoon session:**
  Detecting genomic regions under positive selection (Jazmin)

- **Research lecture:**
  Kirstine Ravn, CBMR, UCPH
  Tracing the evolutionary history of the CCR5-delta32 deletion via ancient and modern genomes

- **Social:**
  Relaxed gathering

Friday

PCA and demography

- **Morning session:**
  PCA and genome masking (Anders)

- **Afternoon session:**
  Demographic inference (Shyam)

- **Research lecture:**
  Kristine Bohmann,GLOBE, UCPH
  Vacuuming animal DNA from thin air

- **Social:**
  Relaxed gathering and farewell

Getting connected

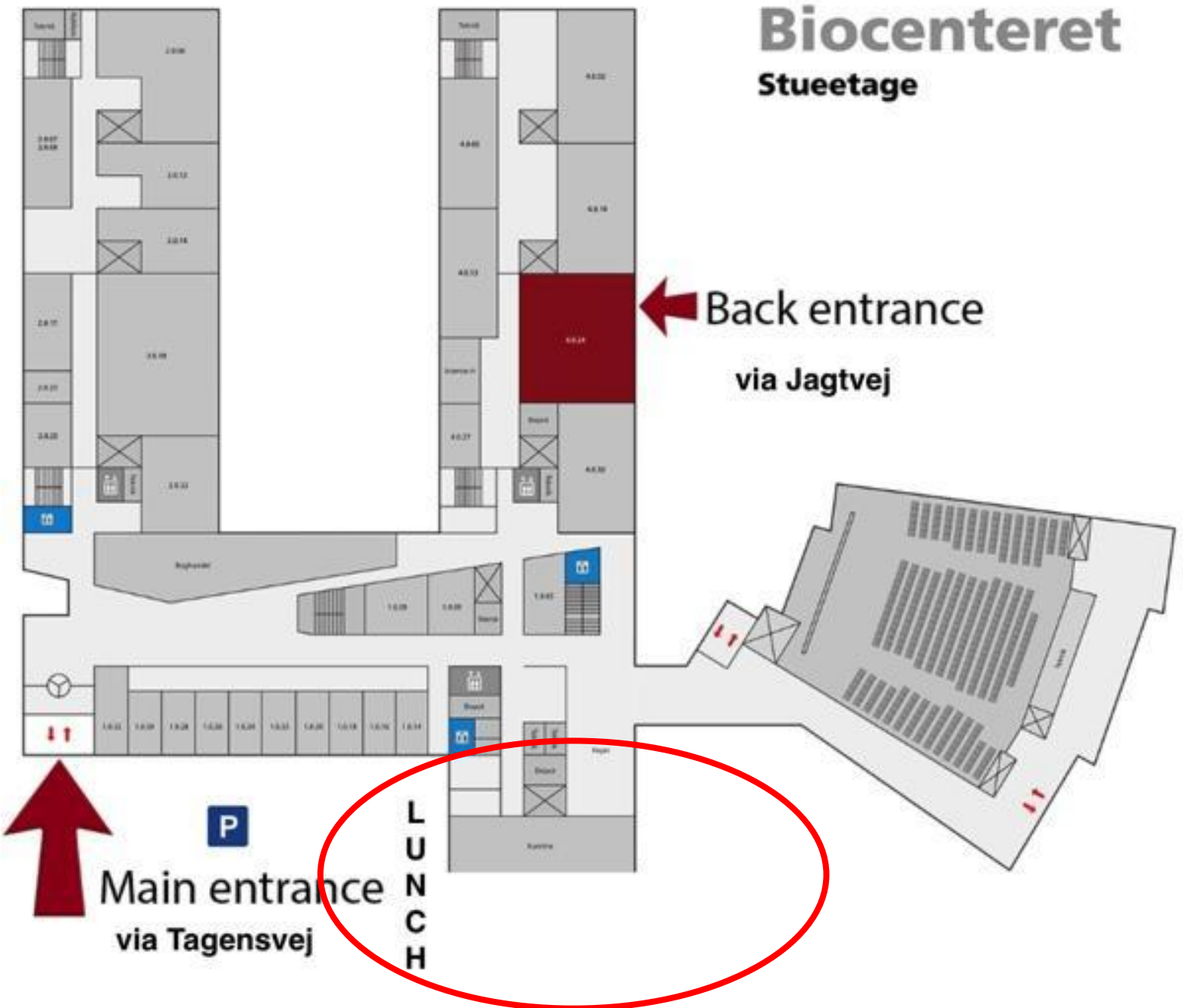
- **Wifi**
  - Eduroam
    You can connect via Eduroam (if you have an account)

  - KU guest
    Create a guest account with your mobile number

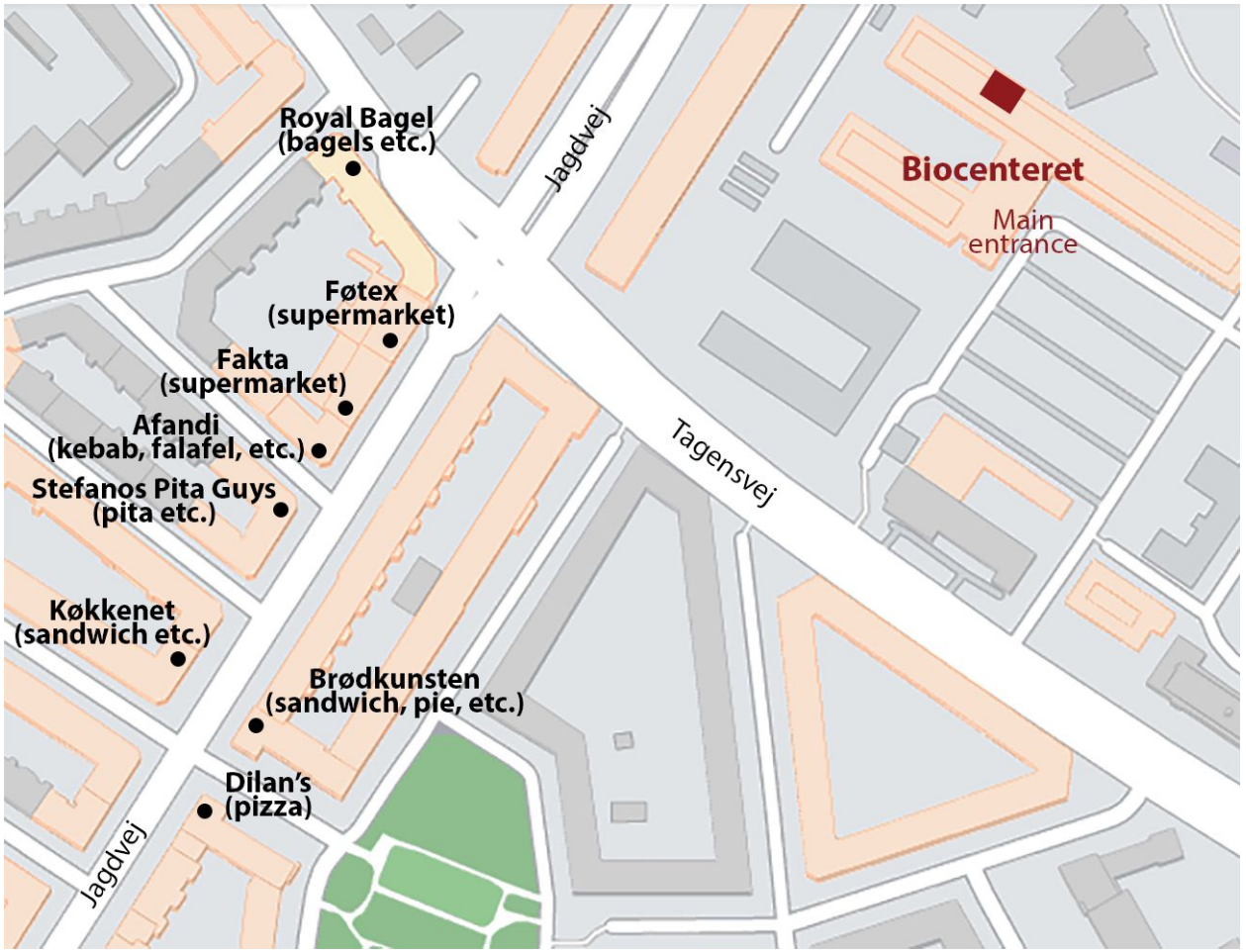
- **Login to exercises**

  We will distribute usernames and passwords

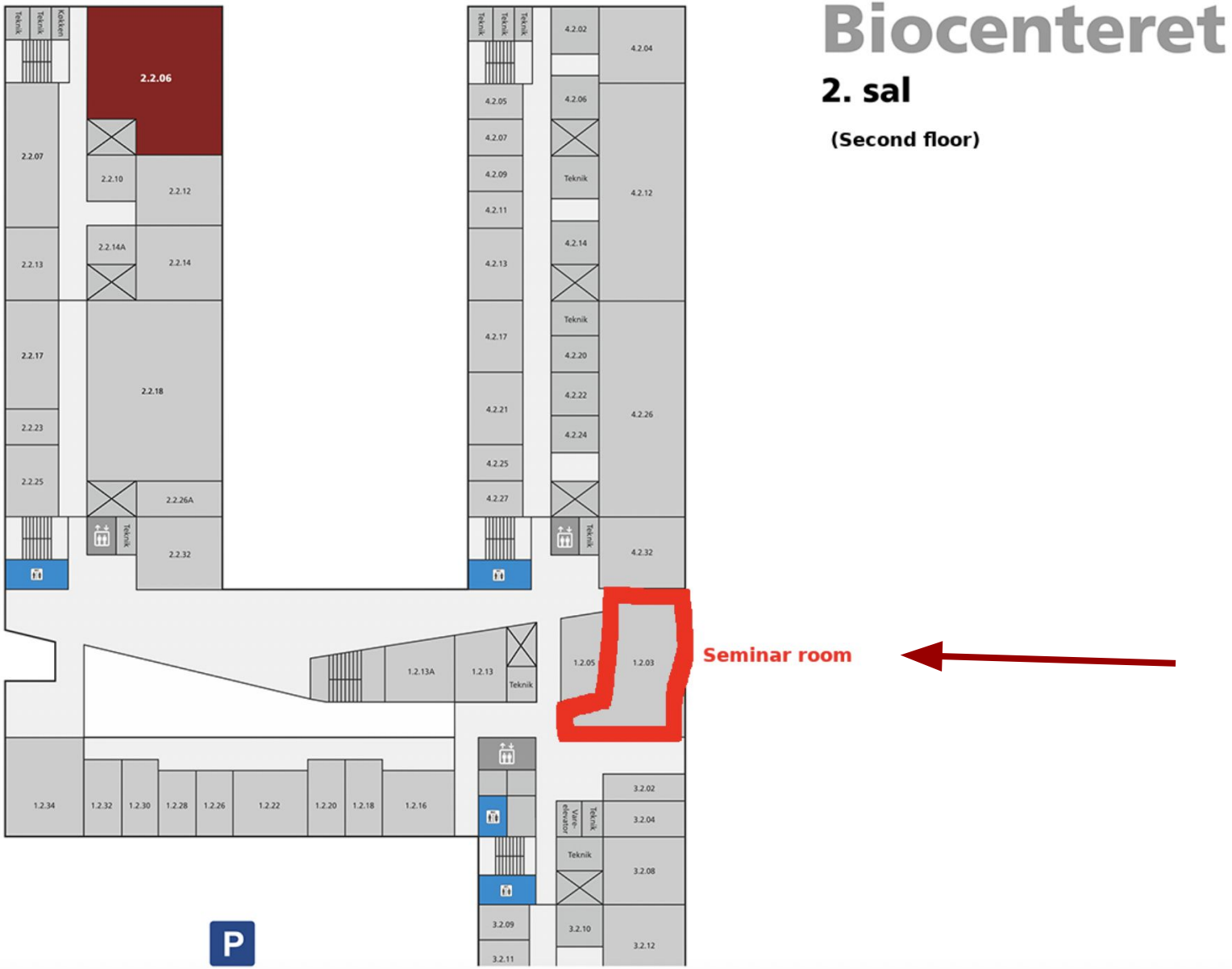
Lunch options I



Lunch options II

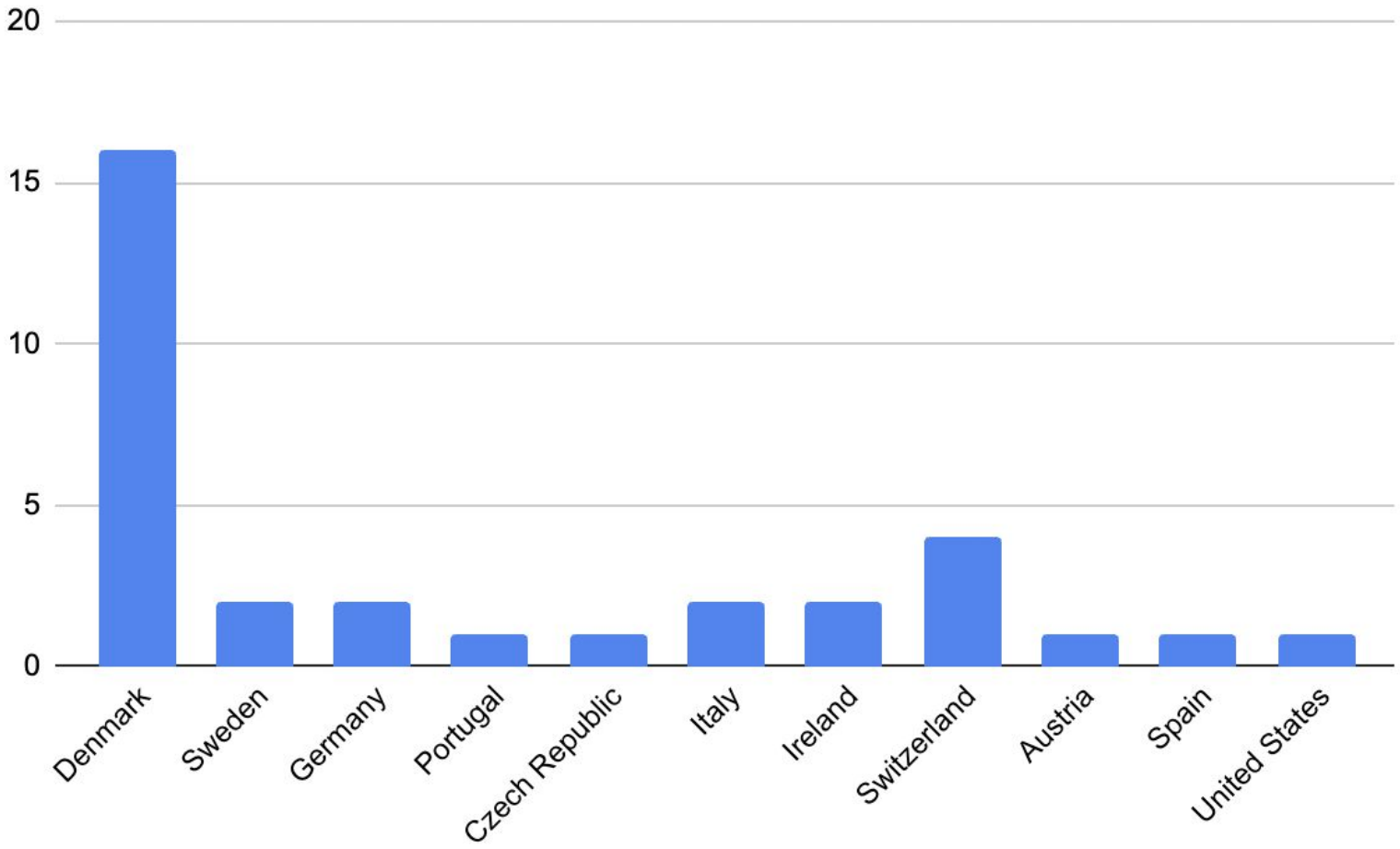


Afternoon research lectures



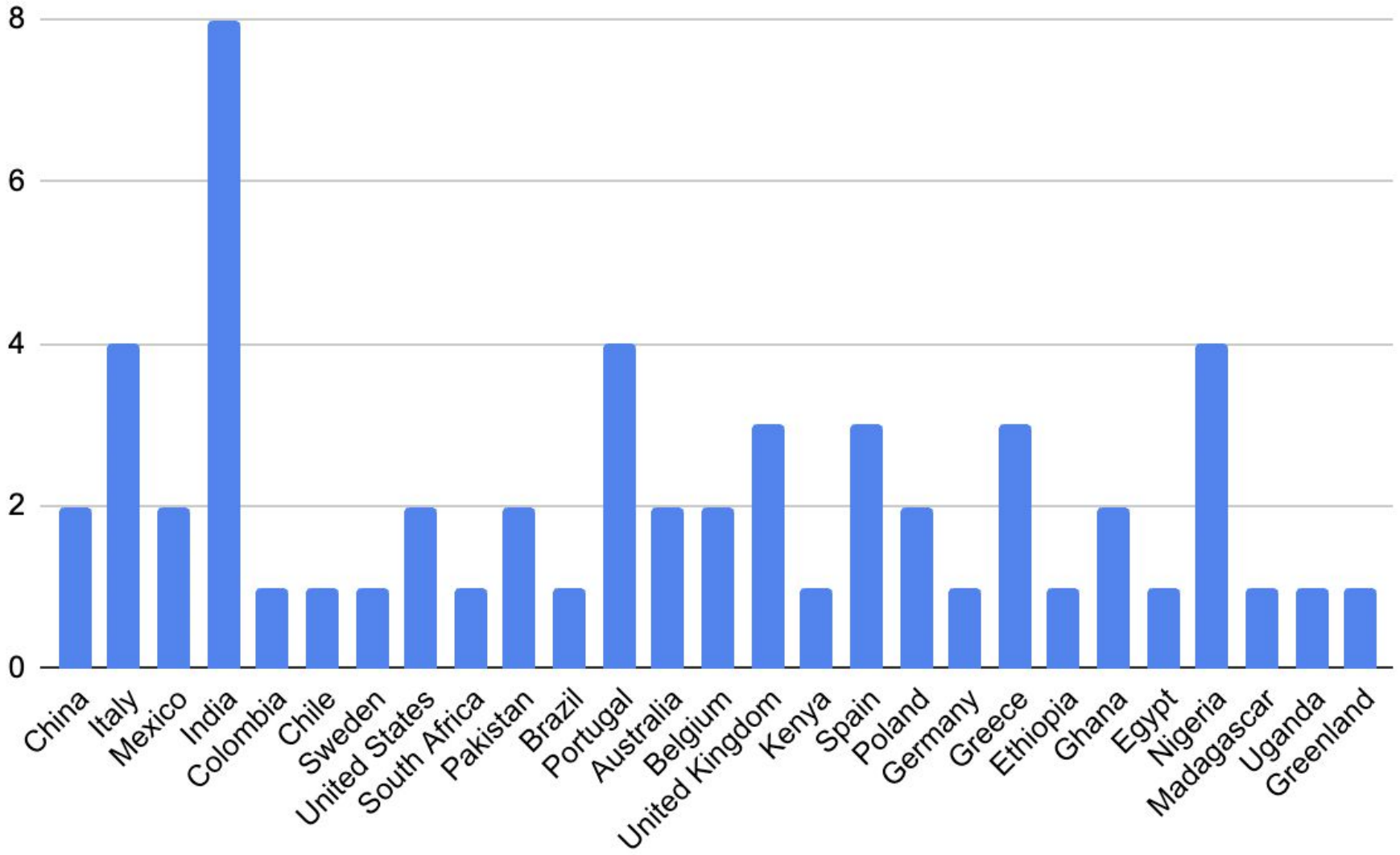
You :-)

On-site (34 from 11 countries):



You :-)

Online (57 from 27 countries):



While Fernando gets ready

I'll pass around 2 sheets:

1) One where you have to confirm that you are present
2) One where you can sign up if you want to join the boat trip