MASTER PUBLIC HEALTH DATA SCIENCE
DIGITAL PUBLIC HEALTH GRADUATE PROGRAM

Teaching Unit 1: Basics
6 ECTS

Learning objectives of the TU:
- Give to students the basics knowledge and working capabilities of the tools essential for health data analytics.
- Provide core principles in biostatistics: experimental design, probabilistic modeling and maximum likelihood estimation.
- Provide core principles in medical informatics: database design, notion of object-oriented programming as well as Unix shell, networks & Docker.
- Provide core principles in epidemiology: causality principles, reproducible science, data Legislation as well as communicable & reproducible data science.

Content:
- Core principle of Biostatistics
- Database design
- Unix shell, networks & docker
- Notion of object-oriented programming
- Regression modelling
- Introduction to machine learning
- Data legislation
- Experiment design and modelling
- Parallel programming & reproducible science
- Core principle in epidemiology
- Basic of digital health communication

Teaching Unit 2: Digital Cohorts
3 ECTS

Learning objectives: Students will be able to
- Characterize the design of digital cohorts
- Describe issues in digital cohorts
- Define, identify, and discuss bias in a digital cohort
- Describe the most common methods of sampling within a cohort
- Describe the most common statistical methods for digital cohorts
- Interpret and discuss the results of a digital cohort
- Conduct critical appraisals of published epidemiological studies based on digital cohorts.

Content:
- Principles of digital cohort studies
- Communication strategies in eHealth and mHealth
- Survival analysis
- Causality

Teaching Unit 3: Electronic Health Data
6 ECTS

Learning objective of the TU:
- To give to students the abilities needed to conceptualize, manage, analyze and communicate through health research performed from Electronic Health Records (EHR) and medico-administrative databases (MA-DBs)

Content:
- EHR: data secondary use
- Electronic health data: presentation of existing datasources
- EHR: terminology
- Electronic health data: from research question to research protocol
- EHR: data integration
- EHR: NLP
- EHR: ETL / data warehouse systems
- Visualization of MADBs, and EHRs data
- Electronic health data: how to deal with missing information: advanced statistical methods
- Project

Teaching Unit 4: Omics data
6 ECTS

Learning objectives of the TU:
- To give to students the abilities needed to conceptualize, manage, analyze and communicate clinical studies that integrate high dimensional data.

Content:
- Principle of chemical trials
- Data-management and dataware house systems
- Genomics data: generation, management and analysis
- Gene and gene set annotations
- Predictive analysis
- Mixed models
- Tests multiplicity
- Analysis tools for high dimensional data
- Principle of genome-wide association studies
- Project

Teaching Unit 5: Web-based data
6 ECTS

Learning objectives of the TU:
- To give to students the abilities to perform Public Health studies, which integrate data from social networks and web forums, linked open data and mobile data.
- To practice through a dedicated use case on processing of a large mobile data set (call details records).

Content:
- Limitation and opportunities of web-based data for public health
- NLP and text mining for web-based data

- Principles of semantic indexing and retrieval
- Geolocalized & environmental data processing & analysis
- Querying linked open data
- Web data visualization
- Project

Teaching Unit 6: Value creation
3 ECTS
Learning objectives of the TU:
- To prepare students to be immediate contributors in the workplace upon graduation and to train them for success over their careers in either academia or industry (chief project managers).
- To develop students' critical competencies in creating economic as well as societal value from digital public health data.
- To sensitise students on necessary strong and demonstrable project management skills: planning, coordinating and achieving milestones (technical/operational skills), and communicating, influencing, relationship building, resolving issues and managing risks (leadership skills).
- To make students aware of their entrepreneurial capacity and comprehension regarding societal and economic value created from digital public health data research.

Content:
- Principles of value creation in academia and industry
- Creating value in industry
- Creating value in academia
- Communication value effectively in English

Internship
30 ECTS