ΠΑΝΕΠΙΣΤΗΜΙΟ ΠΕΙΡΑΙΩΣ
ΤΜΗΜΑ ΠΛΗΡΟΦΟΡΙΚΗΣ

ΠΜΣ ΚΥΒΕΡΝΟΑΣΦΑΛΕΙΑ
ΚΑΙ ΕΠΙΣΤΗΜΗ ΔΕΔΟΜΕΝΩΝ

MSc CYBERSECURITY
AND DATA SCIENCE

DEPT OF INFORMATICS
UNIVERSITY OF PIRAEUS

Track:
Business & Data Analytics

1st semester

https://cybersecdatasci.cs.unipi.gr

Courses

- CDS107: **Data Analytics and Machine Learning**
- CDS108: **Information Systems Management and Innovation**
- CDS109: **Optimization Techniques**
- CDS110: **Big Data Management**
- CDS111: **Computational Tools for Business Analytics**
- CDS112: **Algorithms and Complexity**

CDS107: **Data Analytics and Machine Learning**

- **Syllabus**:
  - Introduction to data analytics: principles, pipelines and pre-processing methods
  - Common Machine Learning methods for classification and regression (Bayesian, Least Squares, SVM, etc.)
  - Neural networks and Deep Learning fundamentals
  - Clustering techniques (from standard to advanced)
  - Applications on text/audio/video analytics
- **Lab hours**:
  - Python, R, Matlab
- **Instructors**:
  - Prof. Aggelos Pikrakis, Prof. Yannis Theodoridis, Dr. Harris Georgiou

CDS108: **Information Systems Management and Innovation**

- **Syllabus**:
  - Security mgmt of information systems, innovative e-services and supply chain services; Security governance of enterprises and smart ecosystems
  - Digital Transformation Mgmt
  - Enterprise Resource Planning (ERP); Customer Relationship Mgmt (CRM)
  - Software development methodologies and Enterprise Architectures
  - Business Process Mgmt / Process Mining
  - IT Project Mgmt (project scheduling, resource planning, cost planning); Economics of Project Mgmt
- **Lab hours**:
  - MS Project, Camunda BPM platform, PM4PY process mining library
- **Instructors**:
  - Prof. Nineta Polemi, Dr. Gregory Koronakos, Dr. Alexandros Bousdekis

CAMUNDA

PM4PY

CDS109: **Optimization Techniques**

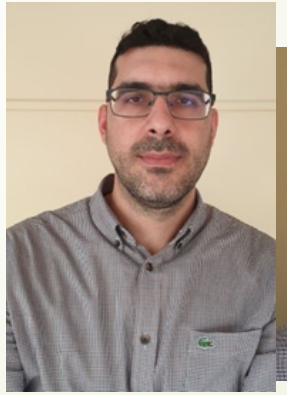
- **Syllabus**:
  - Introduction to mathematical modeling and optimization
  - Convex and non-convex data hulls
  - Frontier analysis and data envelopment analysis: models and applications
  - Data envelopment analysis with streaming data
- **Lab hours**:
  - Exercises on the topics of the course
- **Instructor**:
  - Prof. Dimitris Despotis

CDS110: **Big Data Management**

- **Syllabus**:
  - Introduction – review of relational and object-relational databases; Modern trends in database design
  - Non-traditional data types (text, multimedia, spatial information)
  - Non-traditional database architecture (sensor networks, data streams, distributed, in the cloud)
  - The "big data" era (MapReduce architecture, etc.)
- **Lab hours**:
  - PostgreSQL, MongoDB, Spark (batch vs. stream processing), SparkMLib
- **Instructors**:
  - Prof. Yannis Theodoridis, Dr. George Papastefanatos

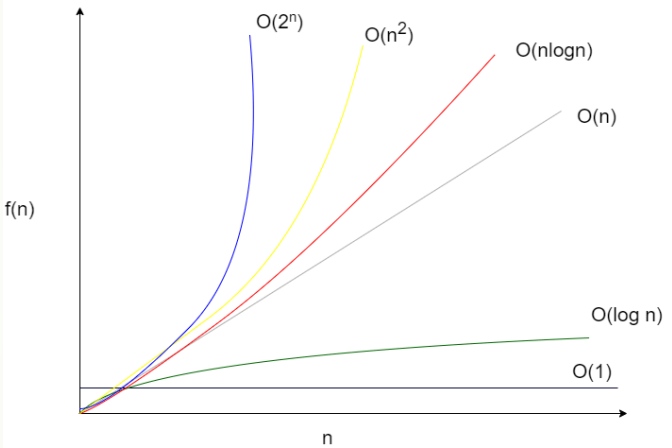
CDS111: **Computational Tools for Business Analytics**

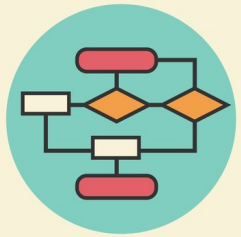
- **Syllabus**:
  - Business analytics with Python
  - Methods, algorithms and case studies of business analytics for portfolio optimization
    - bi-objective problem. The portfolio return should be maximized, while portfolio risk should be minimized
    - solution using multi-objective evolutionary algorithms (MOEAs)
  - Methods, algorithms and case studies for business analytics in Industry 4.0
- **Lab hours**:
  - Python libraries (numPy, Matplotlib, Pyomo, SymPy, etc.), jmetal metaheuristic library
- **Instructors**:
  - Dr. Gregory Koronakos, Dr. Alexandros Bousdekis, Dr. Kostas Liagouras



CDS112: **Algorithms and Complexity**

- **Syllabus**:
  - Basic techniques for algorithm design and analysis
  - Decidability and Complexity classes
  - Algorithms for computationally intractable problems
  - Algorithmic Game Theory
- **Lab hours**:
  - Exercises on the topics of the course
- **Instructor**:
  - Prof. Charalampos Konstantopoulos





Weekly Planner

week 1: Oct. 11-15, 2021

Monday	Tuesday	Wednesday	Thursday	Friday
Week –1				
Preparatory sessions on background knowledge *				
Weeks 1 to 2				
CDS111: **Computational Tools for Business Analytics** **				
Weeks 3 to 12				
CDS110: **Big Data Management**	CDS108: **Information Systems Management and Innovation**	CDS107: **Data Analytics and Machine Learning**	CDS109: **Optimization Techniques**	CDS112: **Algorithms and Complexity** ***

* Content: Python (incl. Linux environment) X 2 lectures, PostgreSQL X 1 lecture

** day by day (5 lectures, in total)

*** weeks 3 to 7 (5 lectures, in total)