

International Master in Computer Science

Master (M2) DISS Data and Intelligence for
Smart Systems - UCBL CS Dept.

<http://master-info.univ-lyon1.fr/DISS/>



Late enrollment

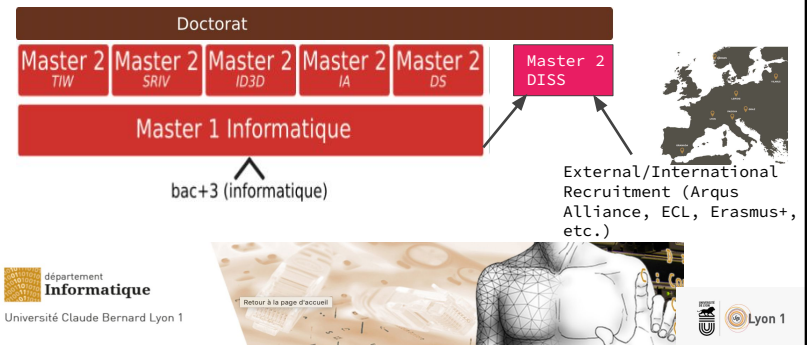
It is still possible to
enroll before November 15,
2022

- Please send your application to the Director of the Master program DISS Angela Bonifati (angela.bonifati@univ-lyon1.fr)
- Please include in one ZIP file the following documents:
 - your recent CV
 - your M1 diploma or enrolment certificate with list of exams and corresponding grades in M1
 - a letter of motivation in which you explain why you are interested in this Master

Welcome to the newly enrolled students!

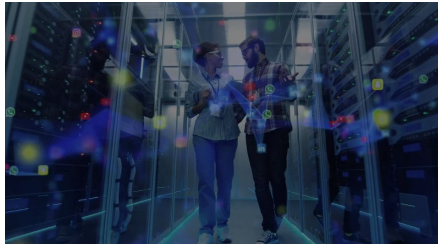


DISS - our new International Master



Master DISS Highlights

- Cross-disciplinary* research-oriented Master:
 - First of its kind at UCBL, it prepares students to PhD studies or/and research work in industry
- Courses are dispensed in English
- Expecting max 15-20 students
- Diploma in Computer Science at Lyon 1
- Possibility to have double diploma (in the years to come)
- Recruitment based on top M1 grades and motivation
- Top-notch researchers are teaching in this Master

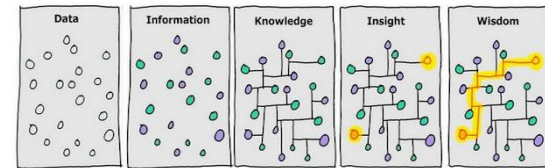


* Across different fields in Computer Science, such as Data Management, Graphics and Visual Computing, Intelligent Systems and Service-oriented Computing



Master DISS - Focus

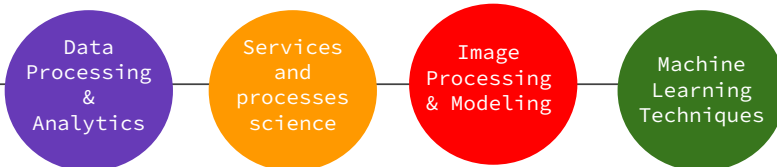
The cursus encompasses several important areas of today's computer science technology, enabling the data transformation into insights and wisdom.



[Cartoon by David Somerville, based on a two pane version by Hugh McLeod]



Key topics & Skills (in a nutshell)



Data is inherently heterogeneous, including structured/unstructured data, processes and images.

This data needs to be prepared, processed and modeled in order to feed analytical and inference methods for smart systems. The latter represent the pillars of *Industry 4.0* and *Digital Transformation* with many concrete applications in various domains such as healthcare, education, energy and climate change.



Master DISS - Syllabus



ECTS - Organisation

Block 1 :

- 24 ECTS (Four Mandatory courses)
- 6 ECTS (Two elective courses - among several choices)

Block 2:

- 9 ECTS Internship Training and Soft Skills
- 21 ECTS Internship



List of Mandatory Courses (Tot 33 ECTS)

Data Processing and Analytics Techniques for Smart Systems (6 ECTS)

Smart Service Science Definition, Theories and Modeling (6 ECTS)

Machine Learning Techniques and Applications (6 ECTS)

Fundamentals of **Image Processing** and Interpretation (6 ECTS) **B1**

Internship Training and Soft Skills (9 ECTS) **B2**

List of Elective Courses (2 options out of 5 / Tot 6 ECTS)

B1 : 2 Options

Big Graph Processing Systems: from languages to efficient execution (3 ECTS)

Blockchain as a Service (3 ECTS)

Distributed Artificial Intelligence and Multi-Agents Systems (3 ECTS)

Fundamentals of **3D shape modeling** (3 ECTS)

Robotic Modeling and Control (3 ECTS)

Internship (21 ECTS)

List of involved people

- Angela Bonifati (UCBL, LIRIS)
- Remy Cazabet (UCBL, LIRIS)
- Raphaelle Chainé (UCBL, LIRIS)
- Parisa Ghodous (UCBL, LIRIS)
- Salima Hassas (UCBL, LIRIS)
- Mathieu Lefort (UCBL, LIRIS)
- Letitia Matignon (UCBL, LIRIS)
- Andrea Mauri (UCBL, LIRIS)
- Frédérique Bennier (INSA Lyon, LIRIS)
- Shaifali Parashar (CNRS, LIRIS)
- Riccardo Tommasini (INSA Lyon, LIRIS)
- Liming Chen (ECL, LIRIS)
- (and many significant others)



Syllabus

DISS International Master - UCBL

Mandatory Courses

Block 1 + Block 2 (Soft Skills)



Data Processing and Analytics (6ects) Teachers: A.Bonifati, A. Mauri, R. Tommasini



- Foundations of Big Data processing with a focus the 4 Vs (Variety, Velocity, Volume and Veracity) of Big Data processing along several axes:
 - Volume processing (Spark)
 - Query-driven processing (Spark SQL)
 - Graph processing (Graphx)
 - Stream processing (Spark streaming)
 - Quality-driven processing
- 36h lectures, 24h practical labs
- Evaluation:
 - Project (70%) up to 3 students
 - Paper presentation (10%)
 - MCQ (20%)
- Research-oriented work: problems are presented but classes are also round tables in which you can come up with a problem on the topic of the lecture and chime in !
- The goal is to get inspiration for doing research



Machine learning techniques and applications (MLT-DISS 6ects)

Teachers: Rémy Cazabet, Mathieu Lefort, (Giuseppina Andresini)

- **Objective: overview of a wide variety of problems and approaches**
 - Data Exploration, Feature engineering
 - Supervised/Unsupervised methods
 - Deep Learning Basics
 - ...
- **Focus on some hot topics**
 - Graph Machine Learning
 - Deep Learning advanced (Adversarial Learning)
 - Explainable AI
 - ...
- **Evaluation: Project + Final exam**



Smart Service Science (SSS-DISS, 6ects)

Cloud Services (Parisa Ghodous & Jean-Patrick Gelas)

- SaaS, PaaS, IaaS Concepts and Implementation

Evolution of services (Chirine Ghedira)

- Foundations and classification of services, then going to the need for semantics and then the contribution of AI and illustrating by types, sectors of use and complex processes, the issues and scientific challenges

Economic and security models of Services (Frédérique Biennier)

Skyline Queries for Services (Karim Benouaret)

- Skylines queries aim to filter the results of a database to keep only the objects which are not worse than the others. In this course, we formalize the notion of skyline, and study the most popular algorithms in theory and in practice.

Service uncertainties (Djamel Benslimane)

Usage of Services, AIRBUS implementation (Nicolas Figay)

Course, Practical Work, Project



Fundamentals of Image Processing and Interpretation (6ects)

- **Objective:** This course will cover main computer vision topics related to images. This includes
 - Basic image processing
 - Keypoint detection
 - 2D motion detection (Optical flow)
 - Multiple view geometry
 - Camera calibration from images
 - 3D reconstruction from images
 - 3D reconstruction
 - Introduction to deep learning for computer vision researchers
- **Evaluation:** Assignments + Paper presentation + Final exam

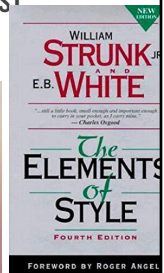


Internship Training and Soft Skills (INT1-DISS 6ects)

Teachers: A. Bonifati, A. Mauri, ...

- Getting familiar with research methodology, experiment design and how to communicate (and publish) your research
 - Define the problem statement and research question(s)
 - Investigate the state of the art
 - Design experiments correctly
 - Communicate your results (article and presentations)
- Evaluation
 - Mock research (group)
 - Pitch presentation (individual)
 - Paper reading (individual)

Same outline for
INT2-DISS 3ects
(online - during
the internship)



Elective courses

Block 1 - Choice of 2 optional courses



Big Graph Processing Systems (BGP-DISS, 3ects)

- Overview of graph processing systems
 - Data model (Property Graph)
 - Graph Query languages
 - Indexes for graph queries
 - Architectures for Big Graph Processing Systems
 - Schemas and schema discovery for property graphs
- Practical work (Neo4j, Oracle PGX, Gradoop)
- Final Exam



Blockchain as a Service (BAS-DISS, 3ects)

Introduction to blockchain concepts (Parisa Ghodous and Jean-Patrick Gelas)

Smart Contract (Jean-Patrick Gelas)

Regulation, legal aspects and Governance of Blockchain systems (Frédérique Biennier)

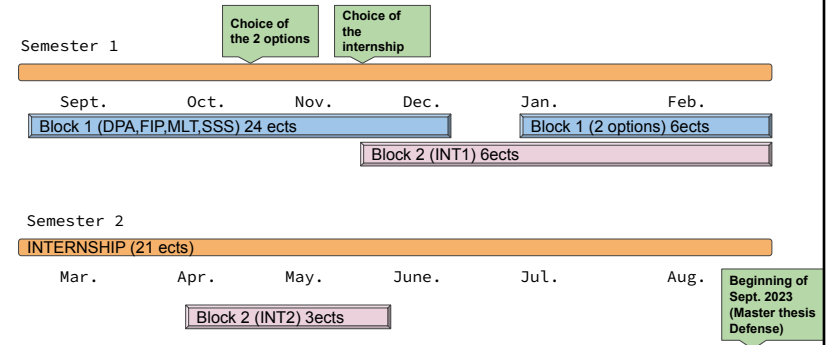
Applications and Usage of Blockchain (Christophe Ozcan)

Course, Practical Work and Project

MOOC of CHAISE (<https://chaise-blockchainskills.eu>)



Courses and Internship Timeline



Any questions? Please contact me

Prof. Angela Bonifati

Mailto:
angela.bonifati@univ-lyon1.fr

Home page:
liris.cnrs.fr/angela.bonifati/



For accommodation and life in Lyon



Useful resources:

- Studapart Platform (offers of accommodation for students without prepayment)
<https://univ-lyon1.studapart.com/en/>
- Practical guide for foreign students
<https://www.univ-lyon1.fr/en/foreign-student>

**Thanks for your attention.
Be inspired and engaged !**

