



VRIJE
UNIVERSITEIT
BRUSSEL

Data Management and Analytics

InfoGroep Seminar 2021

Prof. Dr. Beat Signer

Prof. Dr. Bas Ketsman

Prof. Dr. Ann Nowé



<https://www.vub.be/en/computer-science-specialisations#data-management-&-analytics>

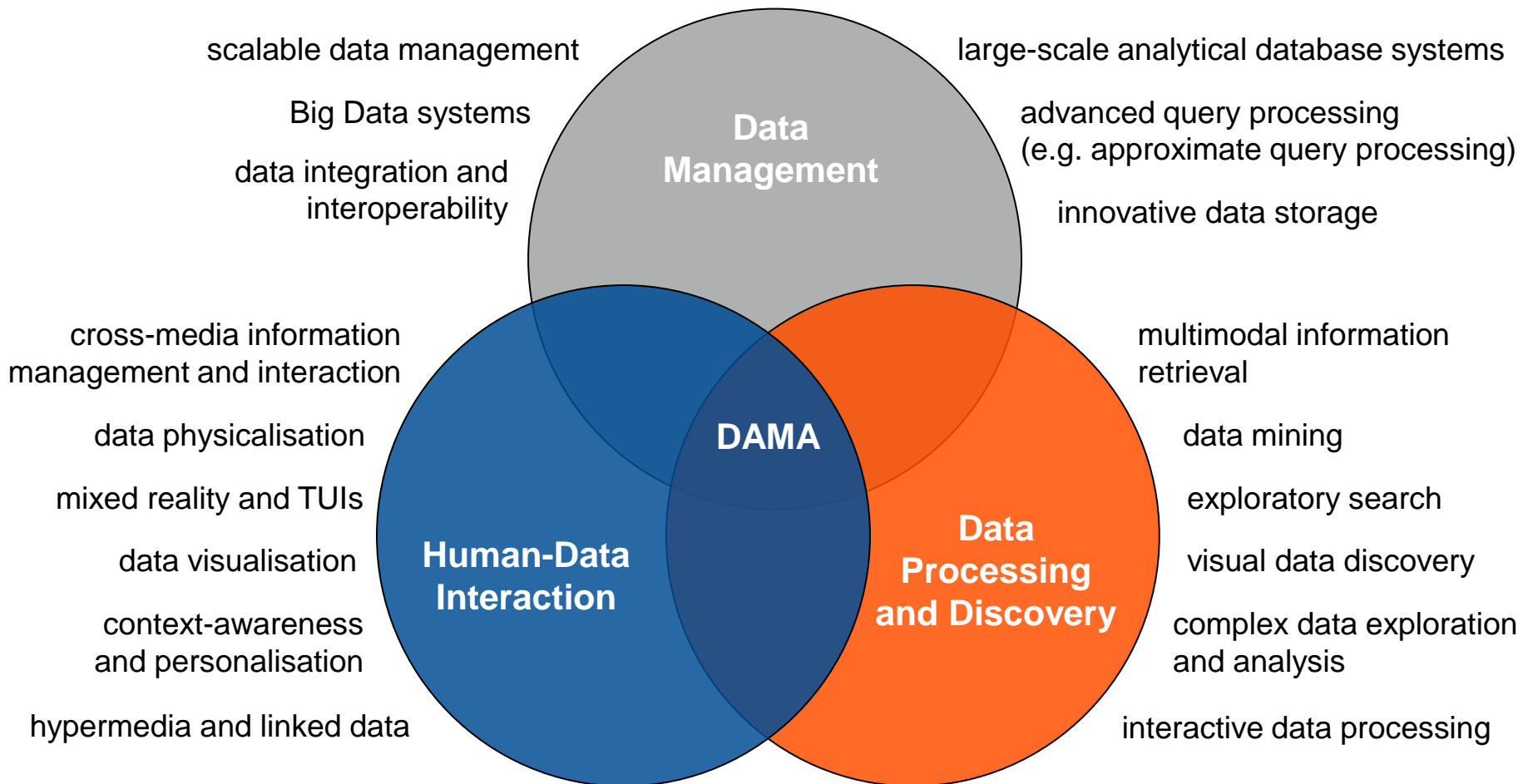


Data Management and Analytics (DAMA)

"Our goal is to prepare students for the future challenges in managing and analysing the rapidly growing amounts of data that is produced manually by humans as well as automatically generated by, for example, sensors in emerging Internet of Things solutions, data capturing on the Web or as an outcome of scientific experiments. Thereby, we focus on the scientific aspects and concepts for scalable data management solutions, information retrieval and data mining as well as different information visualisation and interaction techniques rather than on existing mainstream technologies, and provide students the necessary education for a future career as data scientists and data engineers."



Data Management and Analytics (DAMA) ...





DAMA Semester 1 (Example)

Methods for Scientific Research (3 ECTS) – Prof. Bart De Boer
understanding of the scientific method and the process of doing research
Scientific Integrity (3 ECTS) – Prof. Gustaaf Cornelis
understanding of science ethics
Software Architectures (6 ECTS) – Prof. Coen De Roover
architecture definition, architectural patterns, micro-service architectures, ...
Open Information Systems (6 ECTS) – Prof. Bas Ketsman
data integration, semantic web, ontologies, description logic, linked data, RDF stores
Information Theory (3 ECTS) – Prof. Leo Van Biesen
signal theory and the study of communication channels
Scalable Data Management Systems (6 ECTS) – Prof. Bas Ketsman
distributed databases, MapReduce, data partitioning, distributed query planning, scalable transaction management
Next Generation User Interfaces (6 ECTS) – Prof. Beat Signer
interaction design, multimodal interaction, tangible user interfaces, augmented reality, gesture-based interaction

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



DAMA Semester 2 (Example)

Declarative Programming (6 ECTS) – Prof. Geraint Wiggins

syntax, semantics and proof theory of clausal logic, advanced reasoning techniques, ...

Theory of Computation (3 ECTS) – Prof. Bart Bogaerts

Church-Turing thesis, decidability, halting problem, NP-completeness, ...

Information Retrieval and Data Mining (6 ECTS) – Prof. Geraint Wiggins

IR models, web search, relevance feedback, semantic search, information seeking paradigms

Information Visualisation (6 ECTS) – Prof. Beat Signer

data representation, data presentation, visualisation techniques, dashboards, perception and colour theory

Advanced Topics in Big Data (6 ECTS) – Prof. Beat Signer and Prof. Bas Ketsman

seminar about recent developments in big data (data management, retrieval and human-data interaction)

Computational Creativity (6 ECTS) – Prof. Geraint Wiggins

computational creativity theory, engineering computational creativity

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



DAMA Semester 3 (Example)

Research Training & Master's Thesis (30 ECTS over semester 3&4)
thesis promoted by the research labs
Cloud Computing and Big Data Processing (6 ECTS) – Prof. Jens Nicolay and Joeri De Koster
properties of big data, MapReduce and other Hadoop-related technologies, cluster-computing with Spark, ...
Natural Language Processing (6 ECTS) – Prof. Katrien Beuls and Dr. Paul Van Eecke
advanced course on different modelling techniques and design methods
Physical Communication (6 ECTS) – Prof. Gerd Vandersteen
wired and wireless channels, single-carrier modulation, multi-carrier modulation

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



DAMA Semester 4 (Example)

Research Training & Master's Thesis (30 ECTS over semester 3&4)

thesis promoted by the research labs

Statistical Foundations of Machine Learning (6 ECTS) – Prof. Bernard Manderick

linear model, error and noise, neural networks, overfitting, support vector machines, kernel methods, ...

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



Other Courses

Database Systems Architecture (5 ECTS) – Prof. Stijn Vansummeren
query optimisation, physical design, secondary memory indexes, cost-based plan estimation, ...
Advanced Databases (5 ECTS) – Prof. Esteban Zimanyi
deductive databases, multimedia databases, temporal databases, data warehouses, ...
Computational Game Theory (6 ECTS) – Prof. Ann Nowé and Prof. Tom Lenaerts
multi-agent learning, evolutionary game theory, learning by imitation, evolutionary dynamics
Software Quality Analysis (6 ECTS) – Prof. Coen De Roover
data flow analysis, control flow analysis, pointer analysis, abstract interpretation of higher-order programs
Computer Vision (4 ECTS) – Prof. Hichem Sali
fundamental mathematical and computational computer vision techniques
Virtual Reality (5 ECTS) – Prof. Gauthier Lafruit
3D meshes, 3D point clouds, OpenGL, realistic shading, 3D input devices, physics engines, 3D modelling
...

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



Repair Courses (from Bachelor)

Gebruikersinterfaces (User Interfaces) (3 ECTS) – Prof. Beat Signer
UI design principles, usability, user-centred design, mobile user interfaces
Web Technologies (6 ECTS) – Prof. Beat Signer
HTTP, Web 2.0, RIAs, Web Services, REST, HTML5, JavaScript, CSS, Web 3.0, XML, RDF, web search, security, ...
Databanken (Databases) (6 ECTS) – Prof. Bas Ketsman
ER model, relational model & algebra, SQL, transactions, concurrency control, storage & access structures, ...

Up to a maximum of 12 ECTS can be taken from these Bachelor courses in case of lacking knowledge
(*conditional to the agreement of the exam commission*)

DAMA: <https://www.vub.be/en/study/applied-sciences-and-engineering-computer-science#data-management-&-analytics>

Detailed course catalogue: <https://we.vub.ac.be/caliweb/ma/cs/dama>

- mandatory core (30 ECTS)
- elective DAMA (min 6 ECTS)
- mandatory DAMA + thesis (24 + 30 ECTS)
- elective (rest) + free elective (max 6 ECTS)



Exchange Semester Abroad



Chalmers University of Technology,
Sweden



École Polytechnique Fédérale de
Lausanne, Switzerland



CY Cergy Paris University,
France



Technische Universität München,
Germany



Universitat Politècnica de Catalunya,
Spain

- Possibility to study a semester abroad (3rd semester)
 - top European universities via Erasmus+ programme
 - EPFL Lausanne, Chalmers University of Technology, Warwick University, UPC, TU Munich, University of Konstanz, Bauhaus University Weimar, Potsdam University, CY Cergy Paris University
 - non-EEA destinations
 - Brazil, China, Canada, Japan, Mexico, Russia, South Korea, Chile, Morocco and South Africa

Details: <https://student.vub.be/en/exchange>