

## Exams list - Master Degree

### Human Computer Interaction | vote: 30 cum laude

- **Program:** The course was organized around the following technical and theoretical topics:
  - Needfinding: activity and cognitive task analysis, establishing design goals.
  - Prototyping: storyboarding, paper and digital mock-ups, high-fidelity digital prototypes.
  - Programming models for HCI: events and managing asynchronicity, the model-view-controller model.
  - Usability assessment: testing, metrics, heuristic evaluation, user studies.
  - Platforms: mobile, desktop, large surface, wearable.
  - Technical topics: python programming for user interfaces, the Kivy framework, managing asynchronicity, rapid prototyping tools.
  - Advanced theoretical, applied, and emerging topics: natural interaction, tangible interaction, Kinect, the Internet of Things (IoT), functional reactive programming, gamification, etc.
- **Project:** <https://github.com/SestoAle/Wesnoth-Companion-App>

### Visual and Multimedia Recognition | vote: 30 cum laude

- **Program:** Computer Vision and Machine Learning for automatic recognition. This course was an up-to-date, deep immersion into details of the most important solutions for visual recognition, with updates in the very recent achievements of deep learning architectures. The course has offered a detailed understanding of cutting-edge research in computer vision.

### Computer Graphics & 3D | vote: 30 cum laude

- **Program:**
  - Computer graphics: the computer graphics pipeline was presented and analyzed, by focusing on the aspects of modeling, animation and rendering of a 3D scene. Practical examples were given using OpenGL and Matlab code;
  - 3D acquisition and processing: we focused on the acquisition and processing of 3D real data. Algorithms and methods were addressed for concrete applications, like 3D retrieval, 3D recognition, 3D biometrics, etc.
- **Project:** <https://github.com/SestoAle/GeyserCG-3D>

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## Software Architectures and Methodologies | vote: 30 cum laude

- **Program:** This class was about (1) SW architectures and (2) software engineering methods. (1) The concept of software architecture was addressed with reference to the the Java Enterprise Architecture in a 3-tier web application based on JPA/Hibernate, Java objects, EJB3 and CDI. (2) The concept of software engineering methods was mainly addressed with reference to patterns of Object Oriented analysis and testing methods development and performance engineering.
- **Project:** <https://github.com/SestoAle/PhdAngular>

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## Advanced Topics in Programming Languages | vote: 30 cum laude

- **Program:** This course was an in-depth investigation of the theory of programming languages, covering the fundamental techniques for analysis, design and implementation of programming languages. Main topics: operational semantics and associated formal proofs ; higher-order functions, lambda calculus and partial evaluation; type systems and type-safety for functional and object- oriented paradigms; polymorphism; dynamic and static type-checking.

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## Optimization Methods | vote: 30 cum laude

- **Program:**
  - Optimality Conditions
  - Local unconstrained optimization
  - Local Constrained Optimization
  - Optimization methods for Machine Learning
  - Large Scale optimizationTo understand optimality condition and to be able to use them. Knowledge of main algorithmic approaches for local optimization and their theoretical and computational aspects.

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## Image and Video Analysis | vote: 30

- **Program:** The course aimed at providing the knowledge and ability to design and implement modules for the analysis and processing of image and video data.
  - Design and prototype of processing modules for analyzing image regions based on color and texture;
  - design and prototype of processing modules for image segmentation;
  - design and prototype of processing modules for detection and tracking of moving objects in video.
- **Project:** <https://github.com/SestoAle/Facial-Expression-Prediction>

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## Advanced Numerical Analysis | vote: 30

- **Program:** Numerical Methods for eigenvectors and eigenvalues. Singular value decomposition. Numerical methods for initial value problems. Knowledge and understanding: acquisition of the theoretical and algorithmic bases of numerical analysis with particular attention to numerical linear algebra and to its basic problems. Starting to understand the nature of numerical methods and the modalities of research in this field. Practical application of acquired knowledge: ability to write numerical algorithms for solving mathematical problems and implement them in Matlab language.

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## Computational Vision | vote: 30

- **Program:**
  - Vision in Man and Machine: Computational aspects.
  - Image formation.
  - Monocular vision: views of planar surfaces.
  - Image registration.
  - Cameras: models and calibration.
  - 3D Structure from dense 2D motion: video sequences.
  - Stereo vision.
  - 3D reconstruction from single images and image collections.
  - Applications: Cultural heritage, Augmented reality, Human-machine interaction, Advanced robotics, multimedia, Information forensics, etc.

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## Data & Document Mining | vote: 30

- **Program:** The course first aimed at introducing the main Data Mining techniques that allow to model large amounts of data and extract useful information. Secondly, we considered the problems arising when extracting information and indexing both textual and non-textual documents. To this purpose we introduced the main models and algorithms in Information Retrieval and described the techniques for information extraction from digital born and digitized documents that are represented in the form of images.
  - Data Mining
  - Document Engineering
  - Document Image Analysis
  - Information Retrieval

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## Parallel Computing | vote: 29

- **Program:** The goal of this course was to introduce students to techniques of parallel programming and HPC. At the end of the course the student knows the basics of parallel programming or multicore systems, clusters and GPGPU. He knows the basics paradigms of parallel programming in Java, C++11, Pthreads, OpenMP, MPI and CUDA.
- **Project:**
  - <https://github.com/SestoAle/Parallel-Histogram-Equalization>
  - <https://github.com/SestoAle/Parallel-K-Means>

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## Image Processing & Security | vote: 28

- **Program:** The program included the following topics:
  - Image acquisition and representation
  - Spatial Domain Processing
  - Numerical transforms
  - JPEG and MPEG Compression Standards
  - Data hiding techniques
  - Image forensic techniques
  - Cryptography and image encryption

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## Information Theory | vote: 26

- **Program:** The course dealt with the problem of an efficient and reliable message transmission. It introduced the information as something defined and measurable and answered to two fundamental questions for any information system: what is the highest compression level and the maximum data transmission rate. The course also provided source and channel encoding elements, used to approach the previously defined theoretical limits.

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## Exams list - Bachelor Degree

- Mathematical analysis I, II - 28
- Mathematical Methods and Probability - 28
- Discrete Mathematics - 30
- Physic I, II - 29
- Geometry and Linear Algebra - 26
- Multimedia Design & Production - 30 cum laude
- Software Engineering - 30 cum laude
- Databases - 30 cum laude
- Distributed Systems - 30 cum laude
- Artificial Intelligence - 29
- Programming Fundamentals - 28
- Object Oriented Fundamentals - Id
- Algorithms and Data Structures - 25
- Oprating System - 24
- Computers - 24
- Fundamentals of Telecommunications Networks - 30
- Signal Theory - 30
- Foundations of Automatic - 28
- Fundamentals of Telematics - 26
- Circuit Theory - 21
- Electronics - 20
- Foundations of Operations Research - 18