		ROB Robotics VC Computer Vision, 6 (if not done in Finland) CNU Numerical Computation COM Complexity, 6 (if not done in Finland) **Total**	6 6 6 6 **30**
Total	**30**		
Second spring at TKK		**Second spring at UPC-FIB**	
Master's Thesis (30 ECTS) supervised by both universities			

[1)] **TKK requirement:** Compulsory foreign language courses, minimum of 3 ECTS credits including both oral and written requirements.

CLUSTER Dual Degree Curriculum 2

TKK	**UPC-LSI**
TKK/ Department of Information and Computer Science **Master's Programme in Machine Learning and Data Mining** http://www.cis.hut.fi/macadamia/ Responsible academic persons: Professor Samuel Kaski (samuel.kaski@tkk.fi) Professor (pro tem) Harri Lähdesmäki (harri.lahdesmaki@tkk.fi) Coordinator Tapani Raiko (tapani.raiko@tkk.fi)	Technical University of Catalonia UPC/ Software Department LSI **Master's Degree in Artificial Intelligence (MIA)** http://www.fib.upc.edu/en/masters/mia Responsible academic persons: Dr René Alquézar (alquezar@lsi.upc.edu) Coordinator: Professor Ulises Cortés (ia@lsi.upc.edu)

Description of the Master's Programme in Artificial Intelligence (MIA)
http://www.fib.upc.edu/en/masters/mia

The Artificial Intelligence Master Program aims at providing a solid background and advanced knowledge in Artificial Intelligence for qualified professionals that must able

take high responsibility positions in industry or start research activities in theoretical or practical aspects of Artificial Intelligence. Students completing the master will be competent for:

- Professional jobs making strategic decisions, and requiring a high capacity of analysis and the resolution of complex problems.

- Creating and transferring research-based knowledge in the professional world.
- Starting an academic career in research, by entering a Ph.D. program.

Modules in the Cluster Dual Master Programme:
T270-2 Intermediate Module in Computer and Information Science
T271-3 Advanced Module in Computer and Information Science
T279-C Special Module in Computer and Information Science
Txxx-3 UPC/LSI Advanced Module in Artificial Intelligence

FIRST-YEAR COURSES IN HOME UNIVERSITY

TKK as home university		**UPC-LSI as home university**	
First autumn courses at TKK		**First autumn courses at UPC-LSI**	
Code, Course	**Cr**	**Code, Course**	**Cr**
T-61.3050 Machine Learning: Basic Principles	5	Artificial Intelligence	7.2
		Logic in Computer Science	6.0
T-61.5130 Machine Learning and Neural Networks	5	Computer Vision	6.0
		Compilers	7.2
T-61.5060 Algorithmic Methods of Data Mining	5		
		At least one course from the following:	
Kie-98.xxxx Foreign language courses[1)]	3		
		Programming Project	4.8
and 12 cr from the following:		Software Engineering I	6.0
T-106.1003 IT-Services at TKK	2	Computer Networks Project	4.8
T-61.5080 Signal Processing in Neuroinformatics	5	Visualization and Graphics Interaction	6.0
T-61.5150 Speech Recognition	5		
T-79.4201 Search Problems and Algorithms	4		
T-79.4301 Parallel and Distributed Systems	4		
T-79.4501 Cryptography and Data Security	4		
T-79.5103 Computational Complexity Theory	5		
T-61.60xx Special Course(s) in Computer and Information Science	3-7		

Kie-98.7011 Finnish 1A Kie-98.7012 Finnish 1B **Total**	2 2 **30**	 **Total**	 **31.2**
First spring courses at TKK		**First spring courses at UPC-LSI**	
Code, Course	**Cr**	**Code, Course**	**Cr**
T-61.5140 Machine Learning: Advanced Probabilistic Methods	5	Machine Learning Data Mining	6.0 6.0
T-61.5010 Information Visualization **and 20 cr from the following:**	5	Artificial Intelligence Applications Natural Language Processing	6.0 6.0
T-61.5020 Statistical Natural Language Processing	5	**At least 1 course from the following:**	
T-61.5050 High-Throughput Bioinformatics	5	Software Engineering II	7.2
T-61.5070 Computer Vision	5	Robotics	6.0
T-61.5090 Image Analysis in Neuroinformatics	5	Information Recovery	6.0
T-61.60xx Special Course(s) in Computer and Information Science	3-7		
T-79.5204 Combinatorial Models and Stochastic Algorithms	6		
Total	**30**	**Total**	**30**

[1] **TKK requirement:** Compulsory foreign language courses, minimum of 3 ECTS credits including both oral and written requirements.

SECOND-YEAR COURSES AT THE HOST UNIVERSITY

TKK as host university		**UPC-LSI as host university**	
Second autumn courses at TKK		**Second autumn courses at UPC**	
Code, Course	**Cr**	**Code, Course**	**Cr**

T-61.3050 Machine Learning: Basic Principles	5	**At least 30 cr from the following:**	
Kie-98.xxxx Foreign language courses[1)]	3	Machine Learning in Multi-Agent Systems	6
and 22 cr from the following:		Intelligent Decision Support Systems	6
T-106.1003 IT-Services at TKK	2	Multi-Agent Systems	6
T-61.5910 Research Project in Computer and Information Science	5-10	Advanced Techniques in Machine Learning	6
T-61.60xx Special Course(s) in Computer and Information Science	3-7	Natural Language Processing for Man-Machine Communication	6
T-61.5130 Machine Learning and Neural Networks	5	Natural Language Processing for Massive Textual Data Mining	6
T-61.5060 Algorithmic Methods of Data Mining	5	Computational Logic for Artificial Intelligence	6
T-61.5150 Speech Recognition	5	Constraint Programming and Problem Solving	6
T-61.5080 Signal Processing in Neuroinformatics	5	Neural and Evolutionary Computation	6
		Data Mining II	6
Total	**30**	**Total**	**30**
Second spring at TKK		**Second spring at UPC-LSI**	
Master's Thesis (30 ECTS) supervised by both universities			

[1)] **TKK requirement:** Compulsory foreign language courses, minimum of 3 ECTS credits including both oral and written requirements.

CLUSTER Dual Degree Curriculum 3

TKK	UC3M
TKK/ Department of Information and Computer Science	Universidad Carlos III de Madrid, Spain
Master's Programme in Machine Learning and Data Mining http://www.cis.hut.fi/macadamia/	**Ingenieria en Informatica (Computer Engineering)** http://portal.uc3m.es/portal/page/portal/first_and_second_cycle_courses/comp_eng/
Responsible academic persons:	Responsible academic persons: