UNIVERSITÀ DI PISA
Department of Computer Science

Master's degree in
Business Informatics
(2 years, 120 ECTS)

(Class LM-18: Informatics)

Study plan rules ("Regolamento")
Starting from Academic Year 2014/15

Contact for information
businessinformatics@di.unipi.it

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Preamble

The master's degree program Business Informatics is designed to prepare graduates both to master the information technologies and to understand the needs of organizations with a specific training in Business Intelligence for decision support.

Only a *subset* of the courses of the Business Informatics degree are taught in English, namely those marked with an asterisk in this document. **The other courses are taught in *Italian*.**

Students *with* a bachelor degree in Computer Science or Computer Engineering must attend mandatory *bachelor program basic courses* for at least 18 ETCS in the economics area offered by the Department of Economics in *Italian*, as it happens at the University of Pisa for all the bachelor program courses.

Students *without* a Bachelor Degree in Computer Science or in Computer Engineering, if admitted, will have a study plan which include mandatory *bachelor program basic courses* offered in *Italian* both in the economics area, for at least 18 ETCS, and in the basic computer science area, for at least 36 ETCS (e.g. computer programming, algorithms, logic, and databases).

Therefore, applicants must demonstrate knowledge of basic Italian, or, if their application is accepted, they must take an Italian language entry test or to attend a course on Italian during the first semester.

The master's degree program requires a solid background, high motivation, and hard working attitude. Concept abstraction, problem solving, formal modeling, mathematical reasoning, and basic concepts on computer programming and databases are essential characteristics that you should possess. Students shall not underestimate this advice: statistics on students' careers show that 1/3 of students gives no exam during the first year, and 1/4 withdraw within the first year.

The *assessment* of a course consists usually of a written and an oral exam. In the written exam, the student must demonstrate the use of knowledge of the course contents to solve problems. During the oral exam the student must be able to demonstrate knowledge of the course contents and be able to discuss the topics thoughtfully and with propriety of expression.

Attendance at courses is not mandatory. Part-time students, however, experience lower success rates in exams and longer time to graduate. We greatly recommend students to regularly attend lectures and to successfully complete the courses each semester.

Our graduates are highly sought after in the job market. This is the reward for their commitment and motivation.

1 Brief Presentation

The two year graduate program in Business Informatics has been designed to meet the growing demand for professionals with an interdisciplinary skill both in informatics and in business to satisfy the increasing demand by companies to compete using analytics methods. The graduate program is focused on Business Intelligence techniques to support decision making. The interdisciplinary competence covered by the Business Informatics degree is intended to overcome the cultural divide between IT and management. In fact, as reported by several studies and publications, there is a shortage of trained professionals who can integrate the various skills and approaches necessary to overcome the traditional distrust of management in involving computer professionals in decision-making. This is because computer professionals tend to be regarded as bearers of important but highly specialized knowledge, which may either seem difficult to apply or which has little relevance to the needs of organizations.

Those who successfully complete their degree in Business Informatics will be able to engage in activities that require the use of advanced methods in terms of design, development and management. This will also include estimations, testing and the management of innovative operational information systems or decision support systems. They will become experts of:

- Information and communication technology supporting business and operational goals (operational information systems), management to make good business decisions (decision support information systems), and business services on the Web.

- The fundamentals of economics and management science.

- Enterprise organizational models, typical functions, primary and support activities.

- The role of management planning and controlling systems.

- The Business Intelligence methods and tools to design, plan, implement and manage applications to provide managers with information synthesis for deciding more effective tactics and strategies to increase their competitive edge.

- Decision support systems based on operations research models in production and distribution logistics.

- Methods and tools for analyzing business processes and the redesign of such processes eventually using the technology of Web services.

Finally, Business Informatics graduates will have the skills necessary to access more advanced levels of university education, such as the PhD in Computer Science at the Università di Pisa.

2 Programme Overview

This Master Programme is offered by the Department of Computer Science, in cooperation with the Department of Economics and Management of the Università di Pisa, and it has the following structure:

- Compulsory subjects with 48 ECTS credits from the *Informatics* area.

- Compulsory subject with 6 ECTS credits from the *Operations Research* area.

- Elective subjects with 18 ECTS credits from the *Business Economics* area.

- Elective subjects with 12 ECTS credits from the *Business Economics, Business Law, Informatics, Mathematics, Operations Research, and Statistics* areas.

- Elective subject with 9 ECTS credits, from a list defined every year by the Master Program Council.

- A thesis with 27 ECTS credits.

The Programme offers a wide range of courses taught in English, including at least 36 ECTS credits for mandatory courses.

The final thesis may be associated with an internship in public or private companies.

3 Study Program

The study program depends on the applicant BSc area, but in all cases it will have at least 48 ECTS credits of Informatics, with 36 in the field of the fundamentals of Business Intelligence, and it will be designed to give an interdisciplinary expertise in informatics and business to understand the needs of organization's activities in order to exploit new opportunities offered by information technology.

Only courses marked with an asterisk are offered in English.

Compulsory Courses from the *Informatics* area (48 ECTS)

- **Decision Support Databases***

  (INF/01 ECTS 6 DSD 600AA)

- **Data Mining***

  (INF/01 ECTS 12 DM 420AA)

    - (Module 1) Foundations (6 ECTS)
    - (Module 2) Advanced Topics and Applications (6 ECTS)

- **Business Performance Analysis***

  (INF/01 ECTS 12 APA 417AA)

    - (Module 1) Business Process Modeling (6 ECTS)
    - (Module 2) Business Intelligence Laboratory (6 ECTS)

- **Elective courses from Table 1 (18 ECTS)**

Area	Course	Description			
		SSD	ECTS	Abbr	Code
Informatics	Big Data Analytics*	INF/01	6	BDA	599AA
	Business Intelligence and Performance Management*	INF/01	6	BIPM	566AA
	Database Structures and Algorithms*	INF/01	6	BSA	411AA
	Machine Learning: Fundamentals*	INF/01	6	AA1	320AA
	ICT Risk Analysis*	INF/01	6	ARI	416AA
	Information Retrieval*	INF/01	6	IR	289AA
	Laboratorio di applicazioni internet	INF/01	6	LAI	253AA
	Laboratorio di basi di dati	INF/01	6	LBD	254AA
	Laboratory on Algorithms for Big Data*	INF/01	6	LAB	588AA
	Peer-to-Peer Systems*	INF/01	6	P2P	261AA
	Social Network Analysis*	INF/01	6	SNA	589AA
	Software Services*	INF/01	6	SS	389AA
	Technologies for Web Marketing*	INF/01	6	TWM	537AA
	Visual Analytics*	INF/01	6	VA	602AA

Table 1: GR1: Elective Courses from the *Informatics* area (18 ECTS)

Compulsory Subject from the *Operations Research* area (6 ECTS)

- **Logistics**[∗]

  (MAT/09 ECTS 6 LOG 255AA)

GR2: Elective courses from the *Business Economics* area (18 ECTS) (Table 2)

Area	Course	Description			
		SSD	ECTS	Abbr	Code
Business	Analisi e gestione dei costi	SECS-P/07	9	AGC	265PP
Economics	Analisi e ricerche di marketing	SECS-P/08	9	ARM	202PP
	Economia aziendale II	SECS-P/07	9	EA2	018PP
	Economia e gestione delle imprese	SECS-P/08	9	EGI	049PP
	Economia politica	SECS-P/01	9	EP	149PP
	Organizzazione aziendale	SECS-P/10	6	OA	096PP
	Pianificazione e controllo gestionale	SECS-P/07	9	PCG	278PP

Table 2: GR2: Elective courses from the *Business Economics* area (18 ECTS)

GR3: Elective courses from the *Business Economics, Business Law, Informatics, Mathematics, Operations Research, and Statistics* areas (12 ECTS) (Table 3)

Area	Course	Description			
		SSD	ECTS	Abbr	Code
Business Economics	Analisi e gestione dei costi	SECS-P/07	9	AGC	265PP
	Analisi e ricerche di marketing	SECS-P/08	9	ARM	202PP
	Economia aziendale II	SECS-P/07	9	EA2	018PP
	Economia e gestione delle imprese	SECS-P/08	9	EGI	049PP
	Economia politica	SECS-P/01	9	EP	149PP
	Organizzazione aziendale	SECS-P/10	6	OA	096PP
	Pianificazione e controllo gestionale	SECS-P/07	9	PCG	278PP
Business Law	Diritto dell'informatica	IUS/05	6	DIR	058NN
Informatics	Algoritmica e laboratorio	INF/01	12	AIL	008AA
	Analisi dei dati	INF/01	6	AD	414AA
	Basi di dati	INF/01	6	BD	244AA
	Ingegneria del software	INF/01	6	IS	271AA
	Introduzione all'Intelligenza Artificiale	INF/01	6	IIA	597AA
	Logica per la programmazione	INF/01	6	LpP	009AA
	Programmazione I e laboratorio	INF/01	12	PRL	007AA
	Reti di calcolatori e laboratorio	INF/01	12	RCL	274AA
	Sistemi informativi territoriali	INF/01	6	SIT	260AA
Mathematics	Matematica discreta	MAT/02	6	MD	597AA
	Model-Driven Decision-Making Methods*	MAT/09	6	MDM	601AA
	Network Optimization Methods*	MAT/09	6	MOR	533AA
	Ricerca operativa	MAT/09	6	RO	029AA
	Simulazione	MAT/09	6	SIM	259AA
Statistics	Statistica per l'informatica	SECS-S/01	6	STA	412PP

Table 3: GR3: Elective courses from the *Business Economics, Business Law, Informatics, Mathematics, Operations Research, and Statistics* areas (12 ECTS)

4 Study Plan

A recommended pattern of study follows, based on the program requirements above. Areas of interest for the selection of subjects are shown in italics.

The allocation of courses by each year is only an indication. The 120 ECTS credits required for graduation can be earned in less than two years.

The student at the time of enrollment is required to submit his study plan to be approved by the Course Board of Studies, and it may be updated annually.

Year	First Semester	ECTS	Second Semester	ECTS
First	*GR2: Subjects from the area Business Economics*	9	*GR2: Subjects from the area Business Economics*	9
	GR3: Subjects from the area Business Economics, Law, Informatics, Mathematics, Statistics	6	*GR3: Subjects from the area Business Economics, Law, Informatics, Mathematics, Statistics*	6
	Logistics*	6	*GR1: Subjects from the area Informatics (Characteristic)*	6
	Decision Support Databases* (*Characteristic*)	6		
	Data mining*: (Module I) Foundations (*Characteristic*)	6	Data mining*: (Module II) Advanced Topics and Applications (*Characteristic*)	6
Total		**33**		**27**
Second	Business Performance Analysis*: (Module I) Business Process Modeling (*Characteristic*)	6	Thesis	27
	Business Performance Analysis*: (Module II) Business Intelligence Laboratory (*Characteristic*)	6		
	GR1: Subjects from the area Informatics (Characteristic)	12		
	Elective subjects	9		
Total		**33**		**27**

5 Requirements for Admission

Applicants must hold a first cycle degree in Computer Science or Computer Engineering, or a degree with at least 40 ECTS credits in the following areas: Management, Economics, Informatics, Physics, Mathematics, Statistics.

In the case of other degrees, or academic qualifications obtained abroad, exceptions may be made only with a resolution of the Degree Programme Admissions Committee, on the basis of the specific background of the candidate.

Information on how to apply for the Master Programme can be found at:

http://www.di.unipi.it/en/education/mbi

There are quotas on the number of extra-UE students that can enroll. Pre-applications will undergo a selection process. For more information, follow the link above.

In order to gain admission to the Programme, the candidate must exhibit personal qualifications, as well as an adequate command of the English language.

6 Information for Students Enrolled in Previous Years

Students enrolled up to the A.Y. 2013/14 may opt for moving to the new study plan rules. This section provides some information useful to evaluate if this possible or convenient. For any clarification, contact the Director of the Master Degree.

6.1 When to opt?

The new study plan rules enter in force starting from A.Y. 2014/15, **one year at a time**: the first year study plan starts in November 2014, and the second year study plan starts in November 2015. Students with the new study plan will **not** be able to graduate before December 2015. Summarizing:

1. *If you plan to graduate before December 2015, you should **not** consider moving to the new study plan.*

2. *If you intend to move to the new study plan, your formal application shall be done in November 2015.*

Applications shall be submitted at the Director of the Master Programme. However, you can already attend courses taking into consideration the mapping described in the next subsection.

6.2 How courses are mapped to the new study plan?

A natural question is the following: *are the courses of the old study plan recognized/valid in the new study plan?* To answer this question, students should try and fill the new study plan (see Section 4) by mapping courses of their study plan according to the following subsections. After the mapping, it may be the case that:

- some elective courses of the old study plan are not anymore necessary;

- and/or additional courses must be considered to complete the new study plan.

6.2.1 Old study plan compulsory courses

The following compulsory courses remain the same:

- **Data Mining**[*]

- **Business Performance Analysis**[*], please notice that *Module 2: Business Intelligence Laboratory* will move to the first semester starting from A.Y. 2015/16.

- **Logistics***

The compulsory course **Decision Support Information Systems*** (ECTS 12) is mapped to:

- the compulsory course **Decision Support Databases*** (ECTS 6)

- plus the GR 3 course **Model-Driven Decision-Making Methods*** (ECTS 6) for students enrolled in A.Y. 2013/14, or plus the GR 1 course **Business Intelligence and Performance Management*** ECTS 6) for students enrolled up to the A.Y. 2012/13.

6.2.2 Old study plan GR 1 courses

Almost all courses that were in the GR 1 group of the old study plan are still there in the new study plan. The following are exceptions:

- *Web Mining and Social Network Analysis* will be recognized as *Social Network Analysis* (the course name has changed);

- If you have *Sistemi informativi territoriali* in your GR 1 group, this will be mapped to the same course in the GR 3 group of the new study plan.

6.2.3 Old study plan GR 2 courses

Courses in the old GR 2 group that are still in the new GR 2 group are naturally mapped to themselves.

Courses in the old GR 2 group that are not anymore in the new GR 2 group may be recognized as *Elective subjects*.

6.2.4 Old study plan GR 3 courses

Courses in the old GR 3 group that are still in the new GR 3 group are naturally mapped to themselves.

The course *Intelligenza Artificiale: tecniche di base* will be mapped to *Introduzione all'Intelligenza Artificiale*.

Courses in the old GR 3 group that are not anymore in the new GR 3 group may be recognized as *Elective subjects*.

6.3 Can the newly introduced courses be attended?

The following newly introduced courses did not exist in the old study plan:

- Courses in the GR 1 group: *Big Data Analytics**, *Information Retrieval**, *Laboratory on Algorithms for Big Data**, *Machine Learning: Fundamentals**, *Visual Analytics**.

- Courses in the GR 3 group: *Statistica per l'informatica*.

All of them will be activated starting from A.Y. 2014/15, except *Big Data Analytics** that will be activated starting from A.Y. 2015/16.

They can be attended by students of the old study plan as *Elective subjects* (if there is room in their study plan) or as *Additional courses* ("Esami in più") which will be recognized at the time of moving to the new study plan as courses of the GR 1 and GR 3 groups respectively.

7 Teaching organization

Semesters

The Academic Year is articulated over two semesters, each one comprising at least 12 weeks of lessons. The academic calendar is published on the web site of the Master degree:

<div align="center">

http://www.di.unipi.it/en/education/mbi

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Exams

Courses typically have an exam consisting of a written part and an oral part. The dates of the exam sessions are reported in the academic calendar. Marks at exams are in the range $[0 : 30]$, with 18 being the minimum mark to pass the exam. The mark "30 cum laude" can be also assigned.

Compulsory attendance

Attendance at courses is not mandatory. Part-time students, however, experience lower success rates in exams and longer time to graduate. Regular attendance is greatly recommend.

Graduation and awarding of the graduation grade

The graduation grade is in the range $[66 - 110]$. It is determined by the *Degree Assessment Board* (*Commissione di Laurea*) as follows.

- The grade point average is calculated by the weighted mathematical average on the credit point values of all marks expressed out of 30 (a mark of 30 *cum laude* is considered as 32) and converted into a mark out of 110.

- Up to 7 points may be added to the grade point average based on evaluation of the thesis contents and the student's graduation thesis presentation and defence.

  The additional classification of *cum laude* (with *distinction*) may be awarded when the following two conditions are met:

  1. The sum of the grade point average and the graduation thesis evaluation is at least 112.
  2. The grade for the thesis evaluation is at least 5.