Facultad de Informática
Universidad Politécnica de Madrid

Credit and Grading Systems

Description of the Qualification Mechanism,
the Credit and Grading Systems,
and their adaptation to ECTS.

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Qualification marks in Spain, as in many European Higher Education Institutions, are subjective absolute grades, rather than relative rankings, like qualification schemas in US. This means that the qualification marks are given according to an absolute evaluation of the student's performance in a general scope, not compared with rest of the students in the same subject. This leads to a grading system without a related comparison among the students in the same year, but with a comparative scale of the students of several courses.

This document provides a general overview of Facultad de Informática and the Graduate Degree it grants, as well as the grading system in Spain, specially focused at the one implemented in our institution. As subjective absolute scale, there is no mechanism to balance the qualification marks themselves. To complement this evaluation schema, in this document we provide few additional information, based on historical records, to manage the ranks from a given student.

General overview of Facultad de Informática

Facultad de Informática is one of the 19 engineering schools of Universidad Politécnica de Madrid, and was founded in 1976 from the former Instituto de Informática. It is divided into four main departments, a departmental section, and an intercampus department:

- Computer Architecture and Technology (**DATSI**)
- Artificial Intelligence (**DIA**)
- Languages, Computer Systems and Software Engineering (**DLSIIS**)
- Applied Mathematics (**DMA**)
- Photonic Technology (**DTF**). Departmental Section.
- Linguistics Applied to Science and Technology (**DLACT**). Intercampus Department.

Description of Facultad de Informática

What is a *Facultad* (Faculty or School) in Spain? The notion of School and Department is slightly different at Universidad Politécnica de Madrid, and in Spain in general, than in other universities and may be confusing at first.

At a School in Universidad Politécnica de Madrid (UPM) the number of students is very high – close to 2500 in the case of Facultad de Informática- and so is the number of academic staff – around 180 professors and lecturers. Therefore, instead of having a single very large Computer Science Department, as would be the case in many other Universities, UPM has one School –Facultad– with several Departments. Each Department is in charge of the teaching and practical training concerning a given area of disciplines. All these disciplines are usually related to one and the same degree.

When there is a need for disciplines that cross the boundaries of a degree (and thus Schools), "Sections" of the corresponding Department are created. However, there are also Departments organized across different Schools (and, therefore, degrees), much the same as in other universities. These are called "Intercampus".

Graduate Degrees Offered at the Facultad de Informática

Ingeniero en Informática. The study program of this degree consists of two cycles: first cycle and second cycle. First cycle includes the first two yearly courses, and second cycle the next three yearly courses. At the end of the second cycle the student is committed to develop a Final Term Project (*Proyecto Fin de Carrera*), writing and defending a Final Term Dissertation.

Detailed Structure of the Degree of "Ingeniero en Informática"

The program is based on a five-year program and a Final Term Project and, because of its extension and content, it is usually compared with foreign degrees as a **combined Bachelor + Master of Sciences degree**.

The first two years are **common** to almost all students, and they are intended to provide a broad base of computer science engineering by covering the major subjects of computing engineering in depth. The last three years are focused on more specialized subjects and students are given the chance to match their abilities to their interests by providing a range of **optional** subjects, from which they have to choose **a given number of credits** each year.

The last step to get their degree is the **Final Term Project**, which normally involves not only application development but also some research work. Students undertake this research project at a company or at a departmental laboratory and submit a dissertation in about 6 to 9 months.

ECTS Credit System and its application in FI-UPM

The European Credit Transfer System (ECTS) is partially implemented at Facultad de Informática. It is used for Course Commitment Load estimations, and for Record Transcript interchanges with other Universities within the Erasmus Programme. Also, recent master courses have been developed and structured in ECTS from the beginning.

Some words have to be said on how Facultad de Informática estimates the equivalence between ECTS and UPM credits, since ECTS credits obtained as "equivalent" to UPM credits are slightly different from ECTS credits used "from scratch".

A UPM credit is evaluated having into consideration lecturing time. If the number of hours a course is devoted to lecturing and works at the classroom is **n** the equivalent number of UPM credits is **n/10**, as a credit is equivalent to **10 lecturing hours**. On the other hand it is admitted that the maximum number of ECTS credits per academic year should not surpass 60. In fact, Spanish laws fixed 60 ECTS as the workload measure of one year. However, Spanish laws also fixed the workload of an ECTS credit in between **25 and 30 working hours**.

Thus, when evaluating the equivalent ECTS credits, we fix the credits of an academic year to 60, then recalculate ECTS credits of each subject as the corresponding percentage of 60 to the number of UPM credits of that academic year. For example, first year of Ingeniero en Informática amounts to 72 UPM credits. Therefore, each subject of X UPM credits in the first year amounts to 60X/72 ECTS credits.[1]

On the other hand, when the ECTS credit is used natively to evaluate workload of a study program, the number of 25 working hours is used as the equivalent. Rough estimates of the current degree of Ingeniero en Informática from this point of view yield around 110-120 ECTS credits per academic year, which would correspond to 1.5 ECTS credits per UPM credit.

Course Structure Diagram

The degree is structured into five Academic Years. Each student is expected to follow a total number of credits per year given in the table below:

Course	Compulsory Credits (UPM/ECTS)	Optional Credits (UPM/ECTS)	Free Choice Credits (UPM/ECTS)	Total
1st	63 / 52.5	0 / 0	9 / 7.5	**72/60**
2nd	75 / 60	0 / 0	0 / 0	**75/60**
3rd	54 / 41.5	15 / 11.5	9 / 6	**78/60**
4th	48 / 37	19.5 / 15	10.5 / 8	**78/60**
5th	33 / 27.5	28.5 / 24	10.5 / 8.5	**72/60**

A total number of 15 Free Choice UPM Credits (12 ECTS) may be taken within a programme of practical work in an institution outside UPM, such in Industry or a Research Institution. A Final Term Project for

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[1] The average ratio of the five yearly courses is 0.8.

the total amount of 6 UPM Credits (30 ECTS, given that it takes no less than a semester to complete) credits is compulsory to obtain the final degree.

Course Development and Examinations

Most courses are **quarterly** except some few ones, which are **annual**. The year is divided into **two terms or semesters**, the first one starting the last week of September to the last week of January with a break of two weeks for Xmas. The second one starts the last week of February to the last week of May with a break of one week for Passover. At the end of each term, during the three first weeks of February and in June, there are examinations given for each course concerning the material covered during that quarter. For annual courses there are three examination sessions: one ordinary in June, and two extraordinary in September and February, although students can only do examinations in two sessions out of the three possible ones. For quarterly courses there are two examination sessions: one ordinary at the end of the quarter (either February or June) and one extraordinary in September.

Grading System

Grading system in Spain is ranked from 0 to 10 points, being 5 the minimum qualification to pass a given subject. Marks bellow these 5 points are considered unsuccessful terms and the subject should be examined again for the next semester. Together with the marks ranked from 0 to 10, there is also a qualitative label, which is also included in the grading system.

In order to be granted with the degree of Ingeniero en Informática students must pass (get 5 or more points) in all the Compulsory Courses and also in a number of Optional and Free Choice Courses to cover the minimum credits mentioned above. This qualification schema is also followed by the evaluation of the Final Term Project, which is also mandatory.

Marks		Label
From	To	
10	10	Matrícula de Honor / With Honours
9'0	10	Sobresaliente / Very Good
7'0	8'9	Notable / Good
5'0	6'9	Aprobado / Passed
0	4'9	Suspenso / Failed

The qualification of "Matricula de Honor" is a very special honour granted only to the students with the best marks (10 out of 10 points). This special label can only awarded to the top 5% of the students in a given course. Although there are only 5% of the students who can get this grant, in practice there are few less than this theoretical 5% limit (from 1% to 2% indeed) for these nominations. Any student with this special performance honour can be considered as highly outstanding in the matter of the course.

Qualification Grades of UPM compared with other Universities in Spain

The Universidad Politécnica de Madrid is one of the best institutions in Spain in Engineering Studies. In particular, Facultad de Informática has been referred as the best School in Spain in Computer Science/Computer Engineering (see http://www.fi.upm.es for further details). In Europe, our University is also considered one of the best Higher Education Institutions, being member of several education networks of excellence, like ATHENS, SEFI, ETF, TEMPUS, and others.

The marks obtained by the students from our university should be considered with respect to the standards of quality of our university. Although other universities could use the same grading system (in Spain), the amount of effort and the performance demanded to the students in our institution is quite exigent, as the statistics below show. Moreover, the fact that a rough estimate of workload of the degree amounts to almost twice the standard figure of 60 ECTS per academic year supports also this assertion. If the qualifications would be considered compared with other universities, please take into account this exigency level.

Statistics of the Grading System

The statistics below show the percentage of students attending all the courses (Compulsory and others) that have obtained each of the labelled qualifications in the Spanish Grading System. The statistics have been computed from the ordinary examination session of all the courses in the year 2003/2004. This data form a population of 12636 evaluations.

Label	Percentage	Aggregated[2]
Matrícula de Honor	0,66%	0,66%
Sobresaliente	4,26%	4,92%
Notable	13,19%	18,11%
Aprobado	21,69%	39,81%
Suspenso[3]	60,19%	100%

ECTS Grading System and its application in FI-UPM

Marks can be converted from the Spanish Grading System to the ECTS Grading System simply by computing the corresponding percentages of students which have been assigned each of the (Spanish system) grades, and obtaining the (Spanish system) grades which are at the frontier for each percentage rank in the ECTS. The result of this calculation for the course 2003/04 appears below:

ECTS		Spanish Marks	
Grade	Description		
A	Excellent	9'0	10
B	Very good	7'5	8'9
C	Good	6'5	7'4
D	Satisfactory	5'5	6'4
E	Sufficient	5'0	5'4
F	Failed	0	4'9

In order to maintain a translation table for grades as updated as possible, but still keep a correlation that allows exchanging grades disregarding the academic year they have been obtained, the above table has been adjusted from the calculations of statistics from courses 2004/05 and 2005/06. The resulting table above is being used to translate qualifications into ECTS for all past courses in which ECTS Grading was not used.

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[2] This value actually means the percentage of students with this grade or better.
[3] This item also includes students that do no try the final examination, thus they do not pass the course.

Annex

List of Courses and General Syllabus

FIRST COURSE

Code	Subject	Category	Type	Credits	
				UPM	ECTS
130	Infinitesimal Calculus	Compulsory	Annual	15.0	12.4
131	Programming Methodology	Compulsory	Annual	15.0	12.4
132	Discrete Mathematics	Compulsory	Quarterly (1Q)	7.5	6.3
133	Physical Foundations of Informatics	Compulsory	Quarterly (1Q)	7.5	6.3
134	Linear Algebra	Compulsory	Quarterly (2Q)	7.5	6.3
135	Foundations of Computer Hardware	Compulsory	Quarterly (2Q)	7.5	6.3
136	Formal Logic	Compulsory	Quarterly (2Q)	3.0	2.5

SECOND COURSE

Code	Subject	Category	Type	Credits	
				UPM	ECTS
200	Theoretical Informatics	Compulsory	Annual	9.0	7.2
201	Probability and Statistics	Compulsory	Quarterly (1Q)	6.0	4.8
202	Computer Technology	Compulsory	Quarterly (1Q)	4.5	3.6
203	Computer Structure	Compulsory	Quarterly (1Q)	9.0	7.2
204	Data Structures I	Compulsory	Quarterly (1Q)	6.0	4.8
205	Mathematical Analysis	Compulsory	Quarterly (1Q)	7.5	6.0
206	Data Structures II	Compulsory	Quarterly (2Q)	7.5	6.0
207	Systematic Program Development	Compulsory	Quarterly (2Q)	4.5	3.6
208	Operating Systems	Compulsory	Quarterly (2Q)	6.0	4.8
209	Computer Structure Laboratory	Compulsory	Quarterly (2Q)	6.0	4.8
210	Statistical Inference	Compulsory	Quarterly (2Q)	4.5	3.6
211	Computational Logics	Compulsory	Quarterly (2Q)	4.5	3.6

THIRD COURSE

Code	Subject	Category	Type	Credits	
				UPM	ECTS
300	Numerical Calculus	Compulsory	Annual	10.5	8.0
301	Operations Research	Compulsory	Annual	10.5	8.0
302	Computer Networks	Compulsory	Quarterly (1Q)	9.0	7.0
303	Computer Architecture	Compulsory	Quarterly (1Q)	9.0	7.0
304	Concurrent Programming	Compulsory	Quarterly (1Q)	4.5	3.5
305	English for Informatics I	Compulsory	Quarterly (2Q)	6.0	4.6
306	Program Development Model	Compulsory	Quarterly (2Q)	4.5	3.5
307	Digital System Design	Optional	Quarterly (1Q)	6.0	4.6
308	Geometric Techniques	Optional	Quarterly (1Q)	6.0	4.6
309	Enterprise Organisation and Management	Optional	Quarterly (1Q)	4.5	3.5
310	Complex Analysis	Optional	Quarterly (1Q)	6.0	4.6
311	Microcontroler Design	Optional	Quarterly (2Q)	6.0	4.6
312	Semiconductor Materials and Electronic Devices	Optional	Quarterly (1Q)	9.0	7.0
313	Logic Design Structuring	Optional	Quarterly (2Q)	6.0	4.6
314	Introduction to Economics	Optional	Quarterly (2Q)	4.5	3.5
315	Graph Theory	Optional	Quarterly (2Q)	4.5	3.5
316	Theory of Curves and Surfaces	Optional	Quarterly (2Q)	4.5	3.5
317	Logic Programming	Optional	Quarterly (2Q)	6.0	4.6
318	Information Theory	Optional	Quarterly (2Q)	6.0	4.6

FOURTH COURSE

Code	Subject	Category	Type	Credits UPM	ECTS
400	Software Engineering I	Compulsory	Annual	9.0	6.9
401	Artificial Intelligence	Compulsory	Annual	9.0	6.9
402	Compilers	Compulsory	Annual	9.0	6.9
403	Network Architectures	Compulsory	Quarterly (1Q)	4.5	3.5
404	Operating System Design	Compulsory	Quarterly (1Q)	9.0	6.9
405	Data Bases	Compulsory	Quarterly (2Q)	7.5	5.8
406	VLSI Design	Optional	Annual	9.0	6.9
408	Process Control	Optional	Quarterly (1Q)	9.0	6.9
409	Computer Design and Evaluation	Optional	Quarterly (1Q)	6.0	4.6
410	Fractal Geometry	Optional	Quarterly (1Q)	6.0	4.6
411	Digital Signal Processing	Optional	Quarterly (1Q)	6.0	4.6
412	Numerical Method Optimisation	Optional	Quarterly (1Q)	6.0	4.6
413	Declarative Programming	Optional	Quarterly (1Q)	4.5	3.5
414	Pattern Recognition	Optional	Quarterly (1Q)	6.0	4.6
415	English for Informatics II: Reading and Comprehension of Computer Science Texts	Optional	Quarterly (1Q)	6.0	4.6
416	Computational Geometry	Optional	Quarterly (1Q)	6.0	4.6
417	Real Time Systems	Optional	Quarterly (2Q)	6.0	4.6
418	Architectures with Inner Parallelism	Optional	Quarterly (2Q)	7.5	5.8
419	Distributed Operating Systems	Optional	Quarterly (2Q)	9.0	6.9
420	Instrumentation and Data Acquisition	Optional	Quarterly (2Q)	6.0	4.6
421	Cryptography: Systems and Protocols	Optional	Quarterly (2Q)	6.0	4.6
422	Wideband Data Networks	Optional	Quarterly (2Q)	6.0	4.6
423	Graphical Techniques	Optional	Quarterly (2Q)	6.0	4.6
424	Programming Environment	Optional	Quarterly (2Q)	4.5	3.5
425	Simulation Methods	Optional	Quarterly (2Q)	6.0	4.6
426	Extensions of Logic Programming	Optional	Quarterly (2Q)	6.0	4.6
427	Connexionist Artificial Intelligence: Neural Networks	Optional	Quarterly (2Q)	6.0	4.6
428	Writing Techniques for Computer Science Technical Texts in English	Optional	Quarterly (2Q)	6.0	4.6
429	Introduction to Dynamic Systems	Optional	Quarterly (2Q)	4.5	3.5

FIFTH COURSE

Code	Subject	Category	Type	Credits UPM	ECTS
500	Informatic Systems	Compulsory	Annual	15.0	12.5
501	Knowledge Engineering	Compulsory	Quarterly (1Q)	6.0	5.0
502	Software Engineering II	Compulsory	Quarterly (1Q)	12.0	10.0
503	Computability Theory	Optional	Annual	9.0	7.5
504	Reasoning Models	Optional	Annual	9.0	7.5
505	Multiprocessor Architectures	Optional	Quarterly (1Q)	6.0	5.0
506	Integration-Oriented Architectures	Optional	Quarterly (2Q)	9.0	7.5
507	Information Protection	Optional	Quarterly (1Q)	6.0	5.0
508	Deductive Data Bases	Optional	Quarterly (1Q)	6.0	5.0
509	Distributed Data Bases	Optional	Quarterly (1Q)	6.0	5.0
510	Engineering of Communication Protocols	Optional	Quarterly (2Q)	6.0	5.0
511	Distributed Systems: Communication Architectures	Optional	Quarterly (2Q)	6.0	5.0
512	Numeric Modelling for Engineering	Optional	Quarterly (1Q)	6.0	5.0
513	Decision Support Systems	Optional	Quarterly (1Q)	6.0	5.0
514	Optoelectronic Technology and Systems for Informatics	Optional	Quarterly (1Q)	4.5	3.7
515	Natural Language	Optional	Quarterly (1Q)	6.0	5.0
516	The Computer Science Function in the Enterprise	Optional	Quarterly (1Q)	4.5	3.7

517	Information Systems Evaluation	Optional	Quarterly (1Q)	6.0	5.0
518	Techniques for Spoken Presentation of Computer Science Topics and Conversation in the Professional Environments	Optional	Quarterly (2Q)	6.0	5.0
519	Design of Discrete Control Systems	Optional	Quarterly (1Q)	4.5	3.7
520	Scientific Computation Techniques	Optional	Quarterly (1Q)	4.5	3.7
521	Fault-Tolerant Computing	Optional	Quarterly (2Q)	6.0	9
523	Architectures for Signal and Image Processing	Optional	Quarterly (2Q)	9.0	7.5
524	Deepening in Software Engineering	Optional	Quarterly (2Q)	6.0	5.0
525	Object-Oriented Data Bases	Optional	Quarterly (2Q)	6.0	5.0
526	Design, Planning and Management of Data Communication Systems	Optional	Quarterly (2Q)	6.0	5.0
527	Techniques for Solid Modelling, Realism and Animation	Optional	Quarterly (2Q)	6.0	5.0
528	Vectorial and Parallel Processing	Optional	Quarterly (2Q)	7.5	6.2
529	Cognitive Science	Optional	Quarterly (2Q)	6.0	5.0
530	Robotics and Computational Perception	Optional	Quarterly (2Q)	6.0	5.0
531	Validation of Knowledge-Based Systems	Optional	Quarterly (2Q)	6.0	5.0
532	Automatic Learning	Optional	Quarterly (2Q)	6.0	5.0
533	Informatics Auditing	Optional	Quarterly (2Q)	4.5	3.7
534	Practical Project: Building a Software System	Optional	Quarterly (2Q)	6.0	5.0

FREE CHOICE

Free choice subjects have not been included in the above tables. They may vary from one year to the next, since the offer is done each year independently. To transform their UPM credits into ECTS credits the *average ratio* of the five yearly courses has been used, which is *0.8* times the UPM credits.