THE ITALIAN CERTIFICATION
OF COMPUTER SCIENCE UNIVERSITY CURRICULA

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ABSTRACT

The paper describes the certification mark promoted by the Italian Association of Computer Science University Professors (GRIN) for undergraduate and graduate degree programs in Computer Science. The certification process yields a system of comparable and transparent curricula that facilitates student mobility across different Universities.

Keywords
Quality assurance, Transparency of curricula.

1. INTRODUCTION

Computer Science University degree programs are required both to provide students a solid scientific and technological background, and to cover as much as possible the wide spectrum of disciplines exploiting the computer science methodology.

The autonomy that has been granted to Italian Universities in the specification of their curricula forces the faculties to qualify their products with respect to the plethora of courses that are offered in the educational market. Students and families get often confused by radio and TV commercials. Also when focussing just on curricula offered by the University system, it is very difficult to evaluate the values of curricula that look very similar. The same holds for enterprises and recruitment agencies, having hard time to classify the different Universities with respect to the quality of each degree program, as the contents and the structure of the whole University system has deeply changed in the last decade.

In this context, each University delivering a degree program in Computer Science should be fair enough to guarantee that their curricula cover the basic spectrum of scientific knowledge in Computer Science, and that courses are given by qualified professors.

Unfortunately in Italy both conditions above can be disregarded, e.g. there are Universities degree programs in CS where not even one faculty member has a PhD neither in Computer Science nor in Computer Engineering.

GRIN, the Italian Association of Computer Science University Professors (http://www.di.unipi.it/grin) promoted a common effort involving almost all of the Italian Universities towards the elicitation of the "product qualities" of undergraduate degree programs in Computer Science, and characterized the constraints to be fulfilled in order to obtain the GRIN quality certification. Rules and results of this certification process are made public, in order to provide families and enterprises to do the right choice. There is no other similar initiative in the Italian academic context. In order to manage this certification process, a web site is maintained by Università di Roma "Tor Vergata". This project is supported by the Italian Council of University Deans (CRUI). The result of the 2004, '05 and '06 certification process are available at the URL http://grin.informatica.uniroma2.it/ by connecting as generic user. In 2006, more than 40 undergraduate degree programs in Computer Science have been granted the GRIN certification mark.

2. CERTIFICATION REQUIREMENTS

The GRIN Association decided to adopt the following criteria, in order to avoid the need of heavy organizational duties: the quantity of data to be treated should be quite limited; data should be easy to get and to check; data should be already available at each site, as part of the usual public information provided to potential students.

The GRIN quality certification is based on the verification of the fulfilment of a set of constraints on the programs.

The general guidelines to define the certification rules are as follows:

• The percentage of courses in Computer Science in the degree program has to be relevant.

• The main areas of Computer Science should be properly covered

• The degree program should not too much focussed on a single area.

Two certification levels were designed, the first one aimed at undergraduate degree programs (certificazione base), the second one for graduate degree programs or for very focussed undergraduate programs (certificazione avanzata).

Observe that also graduate programs having an interdisciplinary character might be granted a first level certification.

According to the ACM-IEEE classification, a list of 11 main Computer Science areas was identified, as depicted in Fig.1, and a detailed list of subtopics were associated to each of them.

A. Foundations
B. Algorithms
C. Programming
D. Computer Languages
E. Computer Architectures
F. Operating Systems
G. Data Base Management Systems
H. Network Computing
I. Software Engineering
L. Human Computer Interaction – Graphics - Multimedia
M. Knowledge Representation

Fig.1: Main Computer Science Areas

The certification rules are defined in terms of credits (cfu, where one cfu corresponds to 25 hours of learning activities, including lectures, training, and individual study for the average student).

In order to be eligible for the GRIN quality certification mark, each University degree program in CS must satisfy the following constraints:

1. At least 78 cfu must be assigned to learning activities in Computer Science or in Computer Engineering.

2. At least 60 cfu (out of the 78 above) must be assigned to learning activities in the 11 areas listed in Fig.1

3. At least 7 areas (out of the 11 listed in Fig.1) must be covered by at least 6 cfu.

It is easy to verify that these rules strictly correspond to the three criteria presented above. The first rule guarantees that more than 1/3 of the program is specifically dedicated to CS topics; the rest of the credits should cover mathematical and physical foundations, more specialized topics, or complementary aspects (e.g., legal, economical, and ethical issues). The second rule guarantees a good coverage of the main areas of Computer Science; observe that credits assigned to the same area can be spread among different courses. Finally, the third rule prevents from degree programs whose scope is too narrow: at least half of the 11 areas must be properly covered, say by at least 48 hours of lectures.

3. THE SUPPORTING WEB APPLICATION

Each year, the chair of each Computer Science degree program may apply for the GRIN quality certification by inserting in the certification web site the data concerning the activated curricula, and the syllabus of each course taught. For each course, the following information has to be provided: total number of credits, number of credits labelled as "computer science", and corresponding area (see Fig.1). A synthetic description of the contents of each credit in the 11 areas has to be inserted as well. Observe that this data result in a system of comparable and transparent curricula that facilitate student mobility.

4. THE CERTIFICATION AUTHORITY

The quality certification is issued by AICA, a certification authority that grants other CS certification marks like ECDL and EUCIP. It is important to notice that all the data about the certified courses are made public in the web: they offer the reader a complete and synoptic picture of the main academic degree programs in Computer Science (also of the Universities that do not fulfil the certification requirements).

5. CONCLUSIONS

The GRIN quality certification mark of University degree programs in Computer Science has a value both for the whole Italian Computer Science community, but also for the european University system, as it yields a system of comparable and transparent curricula that facilitates student mobility in a national or international context.

6. REFERENCES

[1] ACM-IEEE Computing Curricula 2001 Joint Task Force on Computing Curricula. http://www.computer.org/education/cc2001/

[2] Cortesi A., and Nardelli E., The Quality Certification Mark for Italian University Degree Programs in Computer Science. *Proc. 8th IFIP World Conference on Computers in Education, Cape Town, South Africa*, july 2005, ISBN 1-920-01711-9