

# Competences Offered to Statisticians by the Italian Universities and Required by the Job Market

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**Summary.** The development of the European higher education system, within the frame of the Bologna process, requires that higher education be more and more integrated with the wider economic strategies (Lisbon objectives) and that employability be taken into account by the study programmes. Higher education institutions are invited not only to answer to the needs of the national labour markets but also to incorporate into their perspectives the European one. The Italian university reform provides for a first triennial cycle with educational and training purposes that give graduates an immediate access to the labour market. The labour market requires, on the other hand, graduates to have not only a theoretical education, but also professional competences. This paper aims to build cognitive maps of the study programmes in Statistics and rank the competences required by the job market to graduates in Statistics. We apply for that various methods of multivariate and textual analysis.

**Keywords:** Competences; Statistics; Programme statements; K-means cluster analysis; Multiple correspondence analysis; Rasch analysis; Textual analysis.

## 1. Competences and the Italian University reform

The reform of the Italian university system (decree of 3 November 1999, no. 509) has radically transformed the formative objectives of the study programmes (Aureli & Iezzi, 2004, 2005; Iezzi, 2005). Since 2001, the Italian university programmes are organised on 3 cycles: Three-year cycle (CDL1 = Bachelor); Two-year cycle (CDL2 = Master); Third cycle of variable length (CDL3 = Ph.D.).

The CDL1 aims at guaranteeing undergraduate students with an adequate command of general scientific concepts and methods, as well as professional skills. General admission requirement is the Italian high school certificate awarded to those who pass a national exam, after completing 13 years of schooling; foreign comparable certifications may be accepted as well. Admission to individual degree programmes may be subject to specific requirements. First level degrees are awarded to students who have earned 180 credits.

The CDL2 includes highly qualified activity in specific areas. Access to the second level is through the Italian CDL1 or a foreign comparable degree. This degree is awarded to students who have earned a global amount of 300 credits, including a maximum of 180 of the first level that have been recognised for access to the CDL2. The drawing up of an original dissertation is compulsory.

A limited number of programmes regulated by EU directives (in dentistry, human medicine, veterinary medicine, pharmacy) share the following different features: access is free to those who have an Italian high school graduation diploma or a foreign comparable certification. Admission is always subject to an admission exam; normal length is 5 years (human medicine takes 6 years).

The postgraduate studies consist of the following typologies of degree programmes:

- A) Ph.D. programmes;    B) 2nd level specialisation programmes;
- C) 2nd level university master degree programmes.

*Competence*, or *competency* (Spencer & Spencer, 1993) is “an underlying characteristic of an individual that is causally related to criterion-referenced effective and/or superior performance”. In our case, a competence may be defined “an enduring characteristics of an individual that causes and foresees his/her work-hunting and professional behaviour”.

Competences are a mix of knowledge, skills and attitudes that make it possible graduates to be successful in their interactions with others at work, school, home, and in the community at large. To match the university educational offers and the job market requisites we assume the so-called ‘iceberg model’ of competences (Spencer & Spencer, 1993, see Table 1).

The concept of competence became influential initially in business organisations, more specifically in the field of recruiting and selecting new employees. The McClelland’s (1973) goal of “testing for competence rather than for intelligence” is the starting point of the competence movement (Barrett & De-

**Table 1.** Iceberg model of competences

<i>Measurement</i>	Performance	Skills Knowledge	Behaviour
<i>Hidden</i>	Competence	Self-concept Stable personal attributes	Competence Convictions/ beliefs Identity
<i>Guess</i>	Ability	Motives & intentions	Spirituality