

## THE USE OF OFFICIAL STATISTICS IN TEACHING UNIVERSITY GEOGRAPHY STUDENTS IN ITALY

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*This paper intends to be a report on the statistical methods and tools used in geography courses in Italy. We will mostly focus on the upper level of Italian educational system as well as on the geographical disciplines taught both in Italian universities and in some strictly selected postgraduate courses. We will also take into account the didactical role that statistical and mathematical disciplines have been playing in geography courses for the last ten years, as well as university programmes that are presently adopted. Data will be taken from the programmes of geography degree courses, and from the programmes of twelve selected master courses, carried out in partnership with some of the most prestigious Italian universities. This study aims at explaining the utility of quantitative language in didactics and geographical research.*

### STATISTICS IN UNIVERSITY GEOGRAPHY COURSES

Italian university programmes took the recent achievements of didactics into account with great delay. This was yet a natural process, since geographers are now interested in far more professional fields than before, as they were bound to be teachers. As a consequence, for the past years geography degree courses have gone through a major evolution to allow geographers' skills to match more with the employers' needs on the work market.

In the past years geography degree courses have followed a three-step evolution. During these separate phases the old system, based on wide and general knowledge of geographical phenomena, has been replaced by a new system focused on more and more specific skills in the different fields of geography. This process has brought about, among other effects, increased opportunities of degree specialisation. There was no specific Geography university department until 1993 and students could only obtain a geography degree after a two-year specialised course. As far as job opportunities were concerned, students were virtually bound to become teachers. A four-year geography degree course came to life in 1993. It offers now two different degrees: one is specialised in theoretical matters and was created for future teachers, and the other one allows students to work in technical fields. Five different curricula were made available in 2001, both in Rome and in Genoa. They include specific disciplines, thus allowing students to turn to five different professional fields.

We will now briefly see how geography degrees have been evolving in recent times and how the teaching of statistical and mathematical disciplines has played an increasingly important role.

#### *First step (until 1993)*

A degree in geography, i.e. a specialisation of the degree in Arts, could be obtained after attending any university course for two years. Priority was given to students coming from faculties whose curricula were considered closer to geographical matters: Economics, Philosophy, Mathematics, Physics, Natural Science, and Political Sciences. Students could specialise in geography during their last two years of study.

They should thus attend a course in the department of Arts and were mostly taught matters that would turn them into geography teachers for high school students. After attending a mere two-year specialised course, geography graduates possessed far less specific skills than people who had graduated in other disciplines. Their technical knowledge was still insufficient. As an obvious consequence, they could eventually become geography teachers, yet they were very unlikely to find jobs that were ordinary opportunities for geographers of other countries, such as territory planning and management. In this first phase quantitative, graphical and technical skills were obtained through the studying of specific and obligatory matters such as: general geography, physical geography, geology, economical geography.

*Second step (from 1993 until today)*

A separate four-year geography degree course was created in 1993. It was meant to include specific and traditional matters, such as physical geography, economical geography, geology, cartography, etc., as well as two important disciplines, i.e. statistical mathematics and political economy. The course was also meant to include other optional disciplines that would make it easier to study the territory from a social point of view. The study of geography at university has thus gone through a major change, and geographers have been given the chance of obtaining far more specific knowledge.

The degree curriculum included 21 examinations plus 2 foreign language tests, and was organised as follows: the first two years included 10 examinations for every student; the last two years included 11 examinations as well as specialised courses split into a theoretical/didactical curriculum and a technical curriculum.

The creation of two different curricula finally allowed students to choose between a humanistic curriculum to obtain teaching skills and work eventually in the school system, and a technical curriculum; this could be used to find a job in the following sectors: analysis of spatial phenomena, territory planning and management, geographical research.

It is interesting to note that, as far as the quantitative tools of new geography degree courses are concerned, statistical, mathematical, economical and political disciplines were directly introduced in the first two-year course attended by all students. This means that in a short time there will be geography teachers or professors scientifically skilled, capable of using the quantitative and graphical language as well as statistical tools. Thus, according to the programme laid down in 1993, during the first two years students had to pass ten examinations. Two of them belonged to the statistical and mathematical field and the other two belonged to the political economic field:

*Statistical mathematical field:* Fundamental elements of mathematics. Preliminary to other examinations (this was absolutely new for a degree course in the faculty of Arts)

One examination to choose among (after a one-year lecture):

- Statistics.
- Judiciary statistics.
- Mathematical statistics.
- Sanitary statistics.
- Social statistics.

*Political economical field.*

One examination to choose between (after a one-year lecture):

- Political economy
- Economical politics

One examination to choose among (after a one-year lecture):

- Urban and regional geography
- Development economy
- Population economy

Both two-year specialised final courses included three optional examinations, among which there was a Demography module to pass after a one-year lecture.

*Third step (i.e. present situation, which will be analysed more thoroughly)*

The departmental order number 509 of the 3<sup>rd</sup> November 1999 and the departmental order number 170 of the 4<sup>th</sup> August 2000 have defined a new category of degrees in Geographical Sciences (classified as number 30) in Italy. This measure is part of the reform of the Italian University promoted by Minister Berlinguer: the course now lasts only three years and Italian geography degrees finally match with European standards. After a three-year standard course students can obtain a first level degree; they then have the possibility to attend a further specialised two-year course and obtain a second-level degree.

The new degree course can be attended in the universities in which the study of geography has been a long tradition: the department of Arts and Philosophy of Rome, which belongs to the faculty of Humanistic Sciences of the University “la Sapienza”, and the department of Arts and Philosophy of the “Università degli studi di Genova” in Genoa.

Category number 30 refers to general standards for degrees in Geographical Sciences, yet the two universities quoted above have interpreted them slightly differently, so that there are nowadays five distinct geographical curricula in Italy, three in Rome and two in Genoa. Statistical and mathematical disciplines also play a different role according to the curriculum they are introduced in.

The university of Rome offers the following curricula:

- 1) Specialisation in history and landscape.
- 2) Specialisation in environmental issues.
- 3) Specialisation in territorial urbanisation.

In the first two curricula mathematics and statistics examinations total 14 “CFU” (“Crediti Formativi Universitari”, i.e. university credit points) out of 180. They are distributed as follows:

-Fundamental elements of mathematics	6 CFU
-Fundamental elements of computer science	4 CFU
-Statistics	4 CFU

In the third curriculum they total 18 CFU out of 180 and are named as follows:

-Fundamental elements of mathematics	6 CFU
-Fundamental elements of computer science	4 CFU
-Statistics	4 CFU
-Demography	4 CFU

Genoa offers two curricula, i.e.:

- 1) Analysis and environment and landscape development
- 2) Geographical information and tourist culture

The first curriculum includes only one examination on statistical and mathematical disciplines, which totals 5 CFU out of 180. The examination deals with both mathematical and statistical notions:

-Elements of mathematics and statistics	5 CFU
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In the second curriculum mathematical and statistical disciplines total 10 CFU. It includes the following examinations:

-Elements of mathematics and statistics	5 CFU
-Demography	5 CFU

The five curricula of the three-year degree course aim at introducing graduates to the work market as soon as they have obtained their first-level degree. The three curricula of the university of Rome seemingly draw more attention on statistical tools. Geographers know that such tools are profitable only if they can be used to manipulate quantitative and graphical data and information: they prove to be helpful both for studying countries from a social and economical point of view, and for using advanced geographical information systems, namely for cartographic production. Without any mathematical and statistical skills, geography students could not study thoroughly specific issues in the field of geographical sciences.

The technical matters included in the five curricula aim at making students acquainted with their future jobs in the field of geography (see Table 1). They can be profitable only if students already possess good basic knowledge in statistical and mathematical disciplines.

The eighteen courses discussed allow students to obtain the necessary skills to work as geographers soon after graduating. It is important to note that knowing the quantitative and graphical language (students already have skills in mathematical and statistical disciplines when they begin to study specific subjects) is dramatically helpful for the understanding of specific issues. It allows students to focus not only on theoretical subjects, but also on their practical applications.

Thanks to these specific examinations, future geographers are given a whole range of skills that no other student graduating in any other discipline can totally possess. Among many other things, they actually can create geographical databases and constantly up-datable information systems to analyse phenomena on the territory; draw thematic charts in order to obtain a simpler spatial reading of complex phenomena; set a mechanic-optical scanner on the wave length of the electromagnetic frequencies emitted by the object to detect using a satellite image of the earth surface; interpret and measure the forms of landscapes and man-made objects

while reading aerial photographs; make a data survey on the environmental conditions in urban and other areas; carry out a study on the environmental impact in new industrial areas; carry out territory marketing studies and territory planning; elaborate development opportunities through the promotion of sustainable tourism; and study and compare different countries, social and economical systems and life standards.

Table 1  
*Technical Matters Included In the Five Curricula*

<i>Matters</i>	<i>Curriculum</i>
Geographical Information Systems (GIS) for the study of the territory	(Genoa, 1, 2)
Thematic cartography plus workshop in environmental cartography	(Genoa, 1, 2)
Thematic cartography	(Rome, 1, 2, 3)
Remote survey and geological picture reading	(Genoa, 1; Rome 1, 2, 3)
Urbanology – Analysis of urban and territorial systems	(Rome, 1, 2, 3)
Environment analysis and assessment	(Rome, 2, 3)
Basic elements of environmental impact assessment	(Genoa, 1; Rome 2)
Territory planning and management	(Rome, 3)
Territory planning for tourism and urban areas	(Genoa, 1, 2)
Territory and tourism marketing	(Genoa, 2)
Economical geography	(Rome, 1, 2, 3)
Political and economical geography	(Rome, optional; Genoa, 1)
Regional geography	(Rome, optional; Genoa, 1, 2)
Medical geography	(Rome, 2, 3)
Environment economy	(Rome, 2, 3)
Environment geology	(Rome, 1, 2, 3)
Environment policies	(Genoa, 2)
Ecology	(Rome, 1, 2, 3)

Geographers can so possess such skills as to be professionally unique in the field of applied sciences. They can work independently and in partnership with engineers, anthropologists, biologists and geologists. Geographers are actually considered as professionals who are able to co-ordinate complexly structured teams in charge of studying and transforming the territory.

#### GEOGRAPHY MASTER COURSES AND POSTGRADUATE TRAINING

The web sites of Italian major universities and newspapers focusing on professional training include many advertisements of master and specialised courses for people who graduated in geographical and territorial disciplines. This study aims at understanding which statistical and mathematical skills are needed to be entitled to apply for such courses and which ones are taught to admitted students. We have selected twelve master courses that offer a variety of professional opportunities and are held by major institutes. They have been classified in six topic groups, each one including two courses.

##### *Cultural patrimony*

1. Cultural patrimony management
2. Geo-archaeological techniques for territory management and the protection of cultural patrimony

##### *GIS*

3. Space system on earth observation
4. Territory information systems, remote survey and thematic cartography for geo-environmental planning

*Economy and Tourism*

5. Tourism marketing
6. Tourism economy

*Environment*

7. Environment economy and management
8. Environment and energy management

*Local development*

9. Sustainable development and management of agricultural and environmental systems
10. Training of experts in territorial and environmental urban policy assessment

*Management of tourist facilities*

11. Specialisation in tourism
12. Hotel management

The selected master courses are held by the following institutes: Università Bocconi (number 6 and 7); Università di Bologna (9); Università La Sapienza (8); Università di Lecce (3); Università di Roma Tre (2 and 4); Università di Venezia (10); Istituto Internazionale di Scienze Turistiche (1 and 5); Scuola Internazionale di Scienze Turistiche (11 and 12).

A restricted intake is valid for all selected master courses. People who wish to apply must have a university degree: in some cases (see number 2, 4 and 5) it is explicitly mentioned that applicants must have a degree in environmental disciplines such as geography; some courses require a degree in economical, legal or technical disciplines, such as statistics (3 and 9). All selected courses include various matters and deal with a great variety of issues. Most of them focus on technical disciplines.

The master courses of the first group mostly focus on such matters as archaeology, history and art history. They are indeed the most humanistic courses we have been able to find, although they still pay great attention to technical matters such as: public relations, use of software, computer management, cultural patrimony survey and classification systems, and e-publishing.

The courses of the second group focus on new technologies in the field of remote survey and GIS. They mostly include classes about data management (collection, observation and interpretation) based on specific software for the organisation of geographical databases. The third group is intended for future managers in the tourist sector and include matters such as marketing, corporate strategies, human resources management, investing, feasibility assessment, tourism statistics, tourism economy, environment economy, information systems and communication technologies.

The fourth and the fifth group, though slightly different, are both aimed at people who wish to become professionally skilled in territorial development planning, policy evaluation, natural environment protection in rural and urban areas. These courses include many different matters such as: ecology, environment economy, environment sustainability, analysis of costs and benefits, accountancy, environment attestation, monitoring systems and international standards. The master courses of the fifth group are mostly intended for future entrepreneurs in the hotel and catering sector. They thus include the following matters: business economics, business management, human resources management, accountancy, investing and feasibility analysis.

Our survey about available master courses reveals some very interesting features. They focus on professional sectors to which graduates in geography spontaneously turn when looking for a job. As we have seen, most of them deal with technical subjects that can only be understood by students possessing a thorough basic knowledge in statistical and mathematical disciplines. Master students must have already familiarised with the quantitative language, for most courses include at least one class about applied statistics.

**CONCLUSIONS**

Geography aims at expressing complex phenomena in a spatial dimension. To do so, it needs a great quantity of information about the phenomena that it studies and it must measure as

precisely and thoroughly as possible the space in which they take place. Quantitative and graphical tools and languages are a basic background for whoever wishes to study profitably specific issues in the field of geographical sciences. The study carried out on the didactical methodology adopted both in universities and in postgraduate training institutes shows that statistical and mathematical matters have become increasingly important for the past ten years.

This process is generally involving the whole Italian educational system (including compulsory education) and is bringing about a new generation of geographers, endowed with technical skills and able to work in different fields of research and professional activities. Thanks to the growing sophistication of statistical survey techniques, it is now possible to obtain a huge amount of increasingly accurate and detailed data. Statistical resources have thus become essential in geography: they can be extremely helpful as long as geographers who use them possess the right skills and are able to read data, find information and use it according to their scientific purposes.

New technologies are also a very useful resource for geographers, who can now study phenomena that would have remained obscure years ago. Remote survey, the use of satellite images, the possibility of creating geographical databases and of easily determining the absolute position of a point on the globe thanks to the GIS allow geographers to work in various research and professional fields. Yet they cannot use all these tools unless they have obtained basic knowledge on quantitative disciplines in their studies.

There is thus no more doubt that quantitative disciplines must be increasingly studied in the geographical field. We actually hope that didactical instruments will meet the needs of geography students more and more. This must be done in every educational field and especially in public universities, which must not focus only on theoretical and didactical matters. It is necessary to create professionally oriented courses and seminars, as well as laboratories in which students could improve their technical skills at a high level.