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*L-33 Classe delle lauree in SCIENZE ECONOMICHE*

Tesi di laurea

**Analisi dei dati relativi agli immatricolati a Scienze Statistiche nell'anno  
accademico 2015/2016 con attenzione ai percorsi formativi e di orientamento**

*Data analysis of students enrolled in the 2015/2016 academic year in statistics  
with attention to their training and academic orientation*

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**Anno Accademico 2015-2016**



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## INTRODUCTION

Our data was collected by the means of a survey, conducted for the students enrolled for their first degree in The Department of Statistics at The University of Padua. The survey consisted of answering a set of 38 questions with subquestions permitting us to examine about 93 variables. Some questions contained simple “Yes” or “No” questions while others contained more structured answers to be given by the respondents. As a matter of fact about 120 students responded to the aforementioned survey permitting us to have 120 observations. It should however be noted that the class was not made of 120 students, instead it was composed of about 180 students meaning we obtained a sample of roughly 66.66% of the class population.

In the first chapter we perform univariate exploratory analysis in order to have a wider look and a better image of the students, focusing ourselves on aspects like the various high school backgrounds and high school types, their performances at the final exam and their grades as compared to the British grading system. We shall also try to have an overview of where they geographically come from and how they performed at the entrance test.

In the second chapter we tackle some key questions as to know how the students came to know about The Department of Statistics and the level of importance they assigned to each major means of communication through which they came to know about The Department of Statistics. We shall also have a look at whether there is some sort of association between various independent variables, the expected second year specialization class profile and find out if they chose The Department of Statistics as their first options or they chose to study statistics only because it was a second best choice for them. If they this was the case investigate in order to know the departments from where they dropped-out and any other type of informations which will enable us to understand how they got orientated and the underlying reasons for their respective university career in The Department of Statistics.

The programming language used for analysing the data was R first of all because R is the most free and it has become the standard data analysis software and programming language nowadays without forgetting that it has an increasingly growing contribution community.

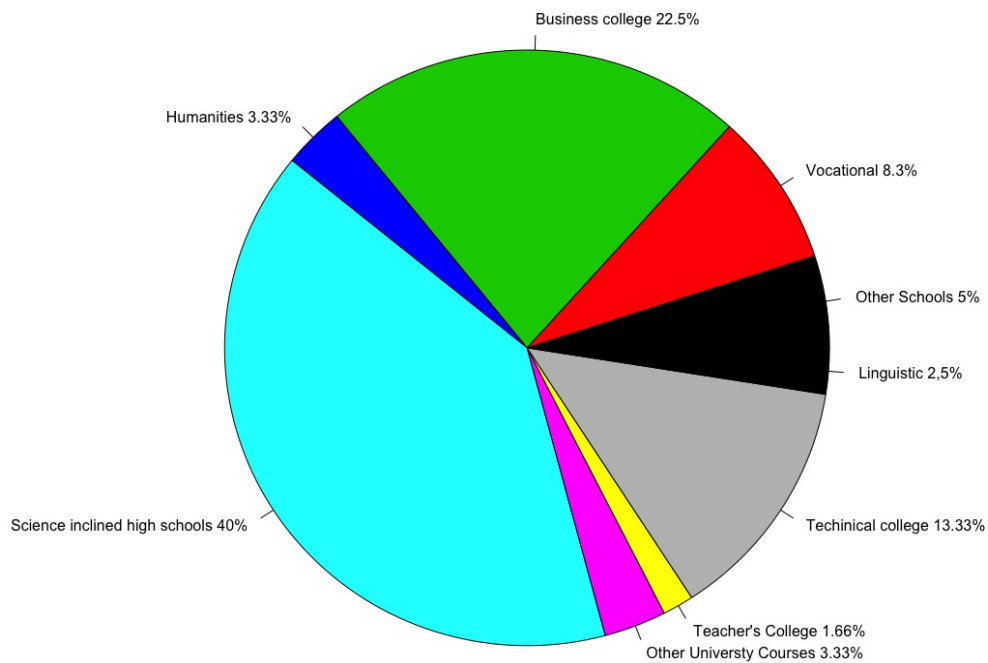


## CHAPTER 1

### EXPLORATORY AND UNIVARIATE ANALYSIS

#### 1.1 VARIOUS TRAINING BACKGROUNDS

Before tackling this section we have to mention that The Department of Statistics is opened to all students in indiscriminately of the former high school background the future students may have. This to permit equal opportunity to anybody seeking for statistical knowledge. A clear insight of their training backgrounds is illustrated using the percentages pie chart based on their high schools of origin.



**Figure 1.1: Percentage pie chart of type of high schools where students originate**

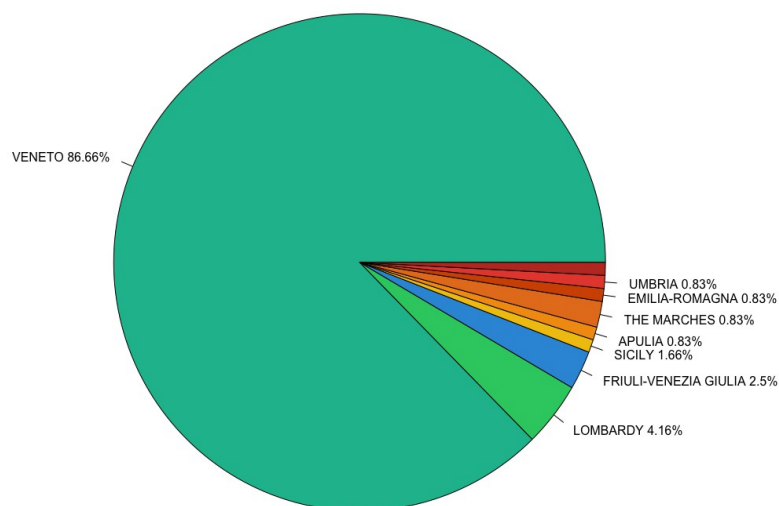
It came out that of all the students enrolled at their first year for the Bachelor degree in Statistics in the academic year 2015/2016 had a very vast range of high school origins, of which:

- 48 students came from Science inclined high schools,
- 27 from business colleges,
- 16 students came from technical high schools,

- 10 students came form vocational schools,
- 6 from other recognized high schools,
- 4 students come from Humanities high schools,
- 4 students came from another Undergraduate course,
- 3 students came from Linguistic high schools,
- And 2 students came from Teacher's training colleges.

## 1.2 GEOGRAPHICAL AREAS OF ORIGIN

The University of Padua is mostly known for its high teaching profiles and its high academic excellence enabling its students to acquire professional and academic instruments to better compete in the labour market. So it is only but normal if it is made of about 61,315 students in a city of about 211,215 inhabitants. While all the courses offered in the various departments in general and in The Department of Statistics in particular are full of students coming from all over Italy, Europe and the rest of the world, the students of the 2015/2016 first year mainly came from northern Italy (104 students from Veneto, 5 from Lombardy, 3 from Friuli-Venezia Giulia and 1 from Emilia Romagna regions respectively), a very discrete number came from central and south Italy and only one student came from the People Republic of China.



**Figure 1.2: Percentage pie chart of regional distribution of the class.**

As we can notice, the total percentage of students classified according to their regions of origin is distributed in percentages as follows after rounding them up :

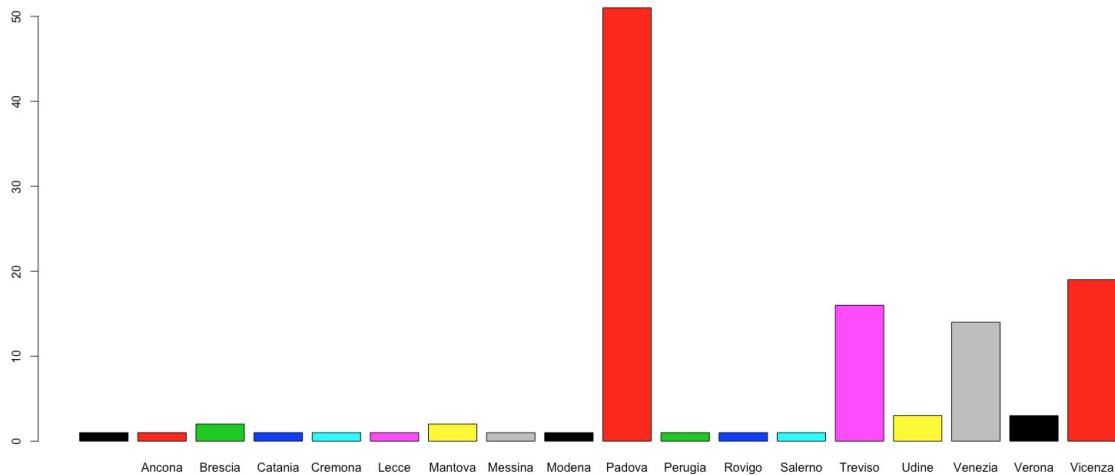


- 86.66% of the students come Veneto region,
- 4.16% come from Lombardy,
- 2,5 % from the Autonomous region of Friuli-Venezia Giulia,
- 1.66% from Sicily,
- And 0.83% for The Marches, Apulia, Emilia-Romagna and Umbria regions respectively.

We also signal the fact we did not include the 1 student from the PRC because we were dealing with internal regions of Italy and the row was eliminated earlier when cleaning our data.

Putting an eye a little bit further we look at how the graph below shows us the provincial origins of the aforementioned students. The most represented city of origin is Padua, Vicenza, Treviso, and Venice with 51, 19, 16 and 14 students respectively. This may be because of the convenience of being relatively not far from The University campuses.

It would be contradictory if the number of students in Padua were less than for example the number of students coming from Udine even though their schools of origin are in another region and more than hundreds of kilometres away from Padua. We have in the graph below a bar plot of the number of students coming from the various towns represented in the class.

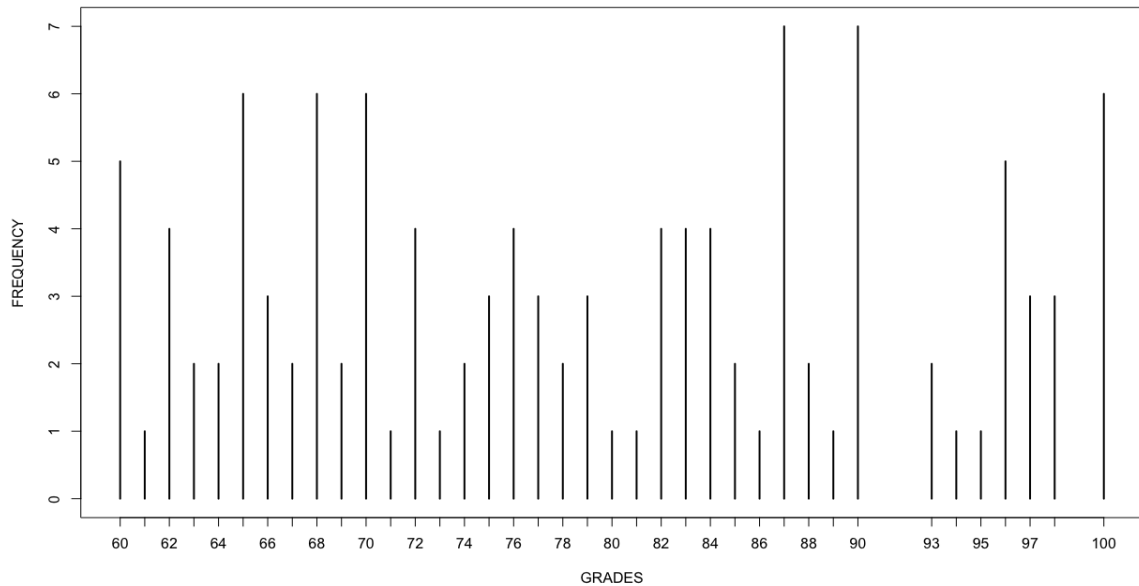


**Figure 1.3. Bar plot of various provinces of origin of the 2015/2016 year 1 class.**

### 1.3 HIGH SCHOOL FINAL GRADES

The Italian high school final exam scores are calculated in cents. This meaning that at the end of the high school cycle, a student will have his or her final exam graded on X / 100 scale. The minimum grade to pass the final high school exam in Italy is 60/100 and the maximum is

100 magna cum laude (100 e Lode or 100L in Italian).



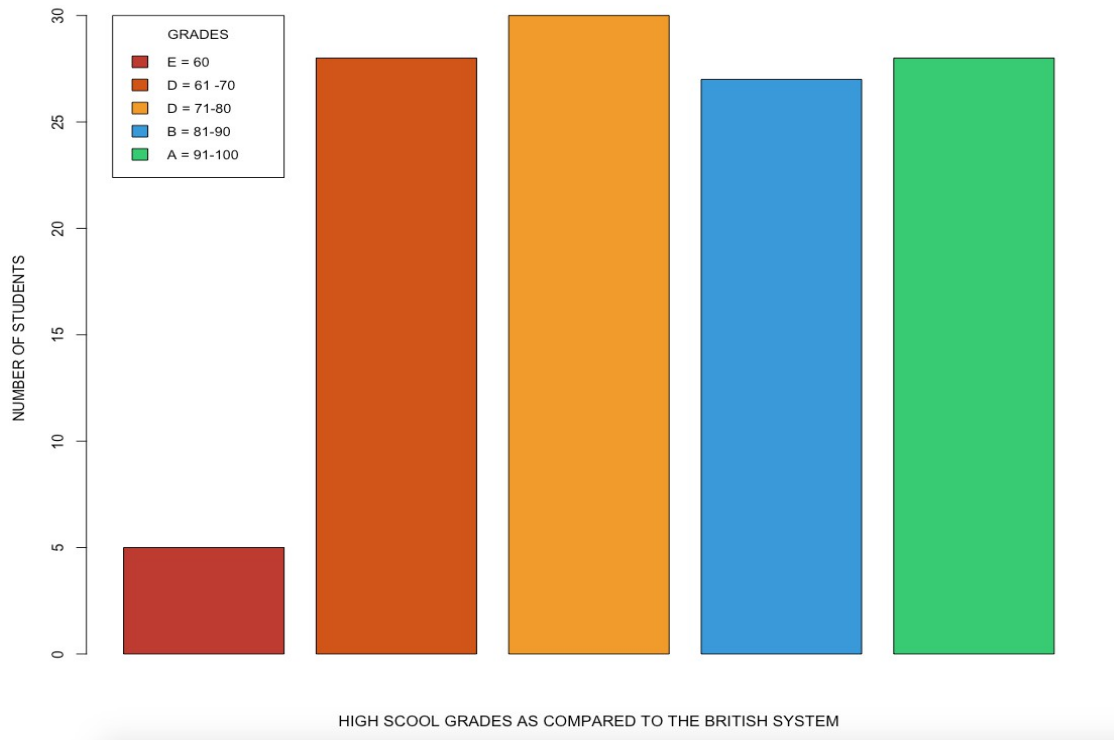
**Figure 1.4. plot of high school final grades versus frequency of recurrence**

Figure 1.4 is a detailed plot of final high school examination grades showing us a more general overview of academic qualifications obtained by the respondents before getting admission in the department.

Now considering Figure 1.4 and Figure 1.5, we'll notice that even though admission into the statistical department is not restricted to certain high school geniuses, the class 2015/2016 Statistics year 1 was made up of the following grades as compared to the G.C.E Advanced Levels of the British educational system.

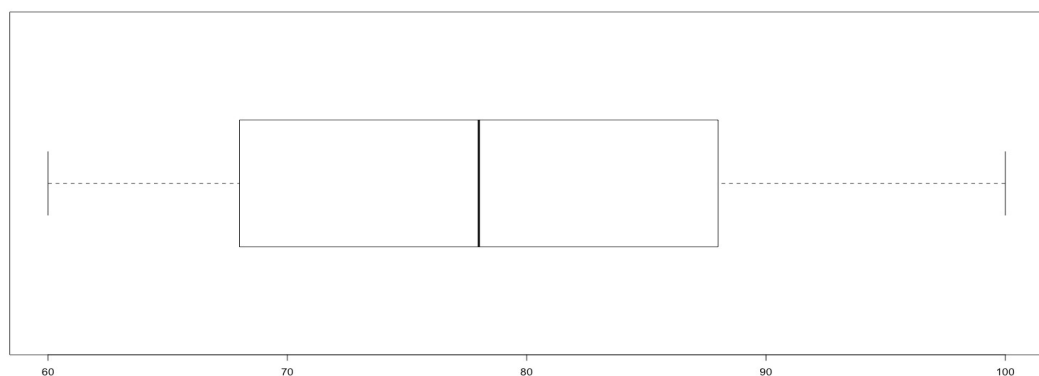
- 5 students with a final grade of 60 which is more or less an equivalent of an E Grade (Red colour),
- 28 students with a final grade ranging between 61 and 70 which is roughly equal to a D Grade (Orange),
- 30 students with a final grade ranging between 71 and 80 which is a rough equivalent of a C Grade (Yellow),
- 27 students with a final grade ranging from 81 to 90 obtaining an equivalent of B Grade (Blue),
- And finally 28 students obtained a final grade ranging from 91 to 100L letting them have an equivalent of an A Grade (Green).

The legend in Figure 1.5 can better elucidate how the afore mentioned concept was plotted.



**Figure 1.5: Bar chart of high school final grades as compared to the British grading system**

To help us have a better understanding of these high school performances we can observe the box plot in Figure 1.6.



**Figure 1.6: Box plot of student's high school final grades**

From the graph it can be noted that there is a good distribution of grades between the students. The minimum grade is 60, the first quartile is equal to 68 meaning that  $\frac{1}{4}$  of the sample scored up to 68 at the final high school exam. The median is 78 letting us understand that the

half of the class scored up to a bounding grade of 78. The third quantile is equal to 88 and the fourth or maximum score was 100 leading us to say that even though they were accepted in statistics without an competitive exam at the entrance, they were fit to be part of the class.

#### **1.4 MATHEMATICS PRE-COURSE**

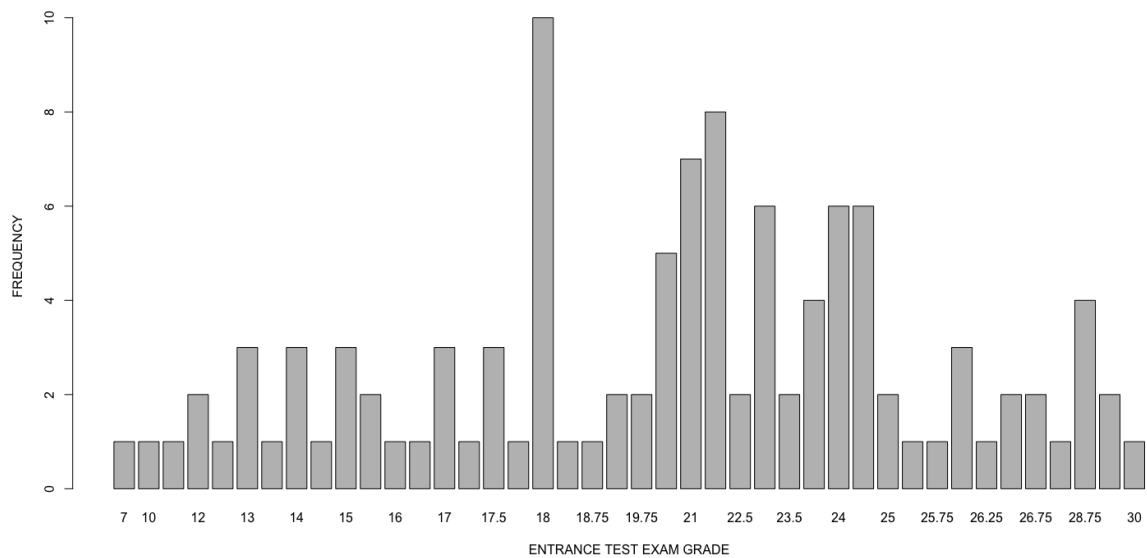
Every year The Department of Statistics organizes a two weeks mathematics pre-course usually in September for prospective students. This is done in order to recall the chapters treated in high school and also to let students from non scientific backgrounds to have a good foundation in order to face core lessons like “Introduction to Mathematical Analysis” taught at the beginning of the first year. In short, its main goal is to let all the students have a common background and base in order to follow up the lessons better. It is always very advisable to attend this particular pre-course even if you have the basic knowledge for understanding the subjects which will be taught then in class once the academic year begins.

The respondents were asked if they attended the pre-course and according to the data collected almost half of the class attended the pre-course(58 out of 120 students). Of these 58 students, 7 affirmed not to give a positive evaluation of the pre-course even though they passed the end of pre-course test. While some students didn't attend the pre-course for many different reasons it should be noted that all of those who attended passed the end of pre-course test.

#### **1.5 ENTRANCE TEST EXAMINATION**

At the beginning of every academic year, The Department of Statistics organises an “Entrance Test”. It is not really an entrance test in the straight sense of the term ( many entrance tests are done mainly to sifter the students at their entrance in most departments and if you don't pass the test you are not admitted to enrol in the course) but rather a mock test. A mock test because it is not obligatory to take the test and even if you do not pass the test you are admitted the same as anyone who passes it. This is mainly because The Department of Statistics has the intention to know how prepared the students enrolling are to face the future challenges they will face while studying no matter their future specialisation will be.

So for the 2015/2016 academic year it was the same and the test results was as illustrated in the graph.



The surveyors also wanted to know if the test was up to the students expectations and if they found it difficult or not. More than half of the students who participated in answering the survey found the test up to their expectations and were happy they attended the mathematics pre-course.



## CHAPTER 2

### BIVARIATE ANALYSIS

Every year the each department of The University organizes orientation meetings with prospective students in their various high school campuses in order to counsel and orientate students willing to enrol in a scientific subject at The University. It is called “Scientific Degree Project”.

The questions in this section of the survey were to know how the responding students came to know about The Department of Statistics(their main sources of informations) and the weight of importance each source of information had on their final choices. If enrolling in statistics was their first or second best choices and which other departments are competing with statistics.

#### 2.1 VARIOUS INFORMATION SOURCES

Table 2.1 shows us the various sources from which the students could obtain informations regarding The Department of Statistics. We have chosen to represent the questions in an abbreviated form FI which stands for “Fonte d’Informazione” in Italian.

There were fourteen listed information sources among which we had the following;

- FI1 which represents the information source given by a high school teacher
- FI2 if the student was advised by a friend or acquaintance who had enrolled in statistics,
- FI3 a friend or acquaintance who didn't enrol in statistics,
- FI4 a university teacher of statistical science they met at an orientation event,
- FI5 a university teacher of statistical sciences they personally might have come in contact with,
- FI6 a university teacher from another department,
- FI7 any other university staff,
- FI8 television,
- FI9 any material in printed format or a prospectus from The Department of Statistics,
- FI10 a printed material from The University or The School of Sciences ,
- FI11 the website of The Department of Statistics,

- FI12 the Facebook page of The Department of Statistics,
- FI13 other websites
- FI14 stands for informations obtained from an event.

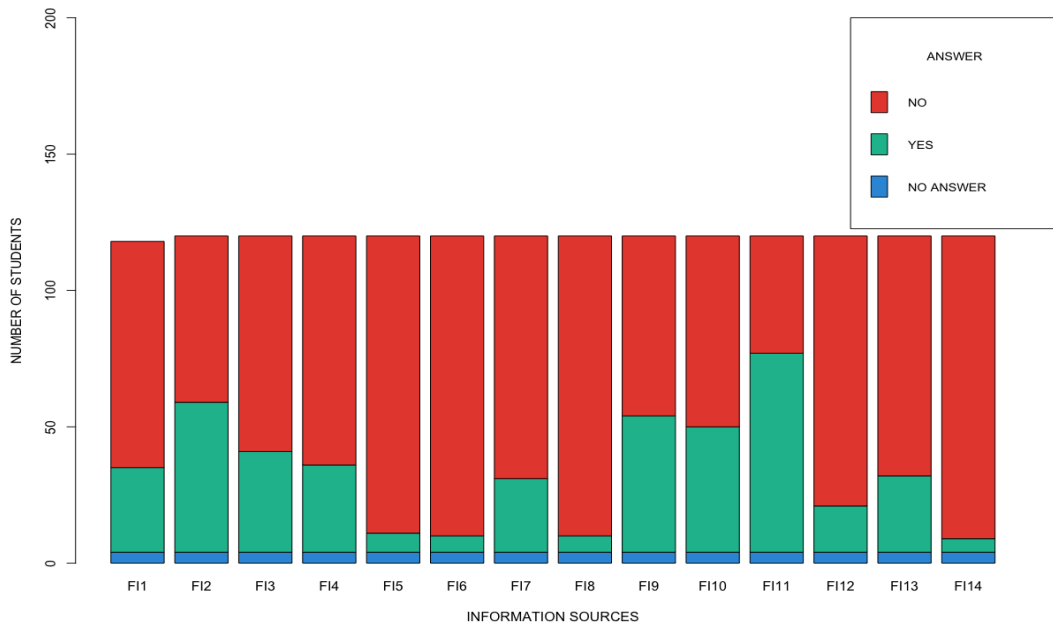
The answers obtained from the survey can be represented as in Table 2.1.

	FI1	FI2	FI3	FI4	FI5	FI6	FI7	FI8	FI9	FI10	FI11	FI12	FI13	FI14
NO ANSWER	4	4	4	4	4	4	4	4	4	4	4	4	4	4
YES	31	55	37	32	7	6	27	6	50	46	73	17	28	5
NO	83	61	79	84	109	110	89	110	66	70	43	99	88	111

**Table 2.1: Information sources students have come in contact with**

The information contained in Table 2.1 gives us a brief summary of what the bar chart will look like. The red part of each bar represents the number of students who gave a negative answer to the question, while the green portion corresponds to the number of students who gave a positive answer. The blue portion simply shows the amount of students who did not give any answer to the questions regarding this section of the survey.

While going through and looking at the graph we understand that the best means from which the students got informations pertaining The Department of Statistics was via the department's website(73 students in FI11) and the worst was from events (only 5 students in FI14).



**Figure 2.1: Bar Chart plot showing different sources of information versus number of students**



We can give an explanation to these two extreme cases. Events are first of all costly and the presence of people also depends on the location of the event while websites are accessible nowadays mostly from mobile devices which makes it easier for everybody to get the informations needed directly from the palm of their hands rather than travelling kilometres away from home to attend specific orientation events only because one is a prospective student.

It also brings us in mind that there might be a degree of association between information sources and the fact that students said had easy access to them or not. This doesn't mean they were stopped from getting access to the information source but simply that they did not come across such information. In order to verify if there is a degree of association between the variables we need to conduct a Pearson's Chi-Squared test and compare with the null hypothesis but first of all we need to verify if Table 2.2 satisfies all the needed requirements.

Requirements for performing a chi test are:

- Have a random sample,
- Observations must be independent of each other (so, for example, no matched pairs),
- Cell count must be 5 or above for each cell in a 2 x 2 contingency table.

We have decided to drop out the “No Answer” population in our sample because they are irrelevant and may they might be misleading. In Table 2.2 we can affirm that the students who answered “yes” meant that they had access to the information sources in the corresponding columns while the “No” part was simply to let know they did not come in contact with the information source. The resultant is represented as follows:

	FI1	FI2	FI3	FI4	FI5	FI6	FI7	FI8	FI9	FI10	FI11	FI12	FI13	FI14
YES	31	55	37	32	7	6	27	6	50	46	73	17	28	5
NO	83	61	79	84	109	110	89	110	66	70	43	99	88	111

**Table 2.2: Sources of information with respect to accessibility by the students**

We shall first start by recalling the *Null Hypothesis* regarding our data which states as follows:

H0: Accessibility and Information sources are independent,

H1: Accessibility and Information sources are not independent,

The level of significance or p-value is 0.05 which means if we get a p-value less than 5% we reject the null hypothesis while the p-value is greater than 5% we accept the null hypothesis. Conducting the Pearson's Chi-squared test we got the following results

$$\chi^2 = 254.88, df = 13, p\text{-value} < 2.2e-16$$

We have a p-value =  $2.2e-16$  which is far more less than 0,05, hence the null hypothesis is rejected and we can say that there is a degree of association between information sources and the students respective accessibility of these informations.

## **2.2 GRADE OF IMPORTANCE OF INFORMATION RESOURCES**

This section focuses on the question regarding the importance of the afore mentioned information sources grouped in major sources. Importance in the sense that the Department provided two answering options to indicate the grade of importance of each of the major information sources when the student had to evaluate an eventual enrolment in a University course in general and in statistics in particular. The student had to rate the major information sources as:

- “Important”,
- And “Not Important”.

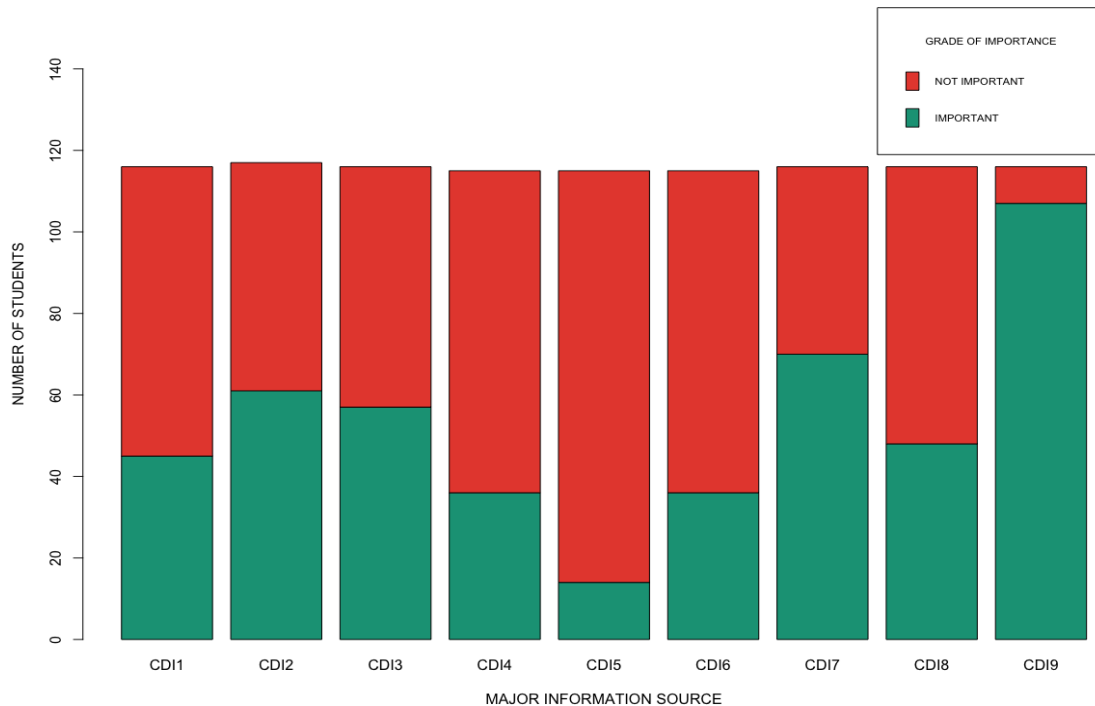
So we summarised the results of the survey regarding this section with help of both a table and a bar chart graph using R programming language.

- CDI1 stands for informations they obtained from a teacher in high school,
- CDI2 stands for informations obtained from friends,relatives or acquaintances,
- CDI3 is for former statistics graduate students,
- CDI4 if the information was from a teacher of The Department of Statistics,
- CDI5 if the teacher was not from the statistics department,
- CDI6 is for Other university staff,
- CDI7 stands for printed material or prospectus,
- CDI8 is for News paper article or similar,
- CDI9 is for Web.

	CDI1	CDI2	CDI3	CDI4	CDI5	CDI6	CDI7	CDI8	CDI9
IMPORTANT	45	61	57	36	14	36	70	48	107
NOT IMPORTANT	71	56	59	79	101	79	46	68	9

**Table 2.3: Degree of importance of major information sources**

From Table 2.3 we can see that the major information source with the poorest performance was that obtained by university teachers from other departments(CDI5) where only 14 students said the informations they got from a teacher from another department was important what they gathered to put on the scale university courses. Internet here still confirms itself as the best major information source with only 9 students considering it as not important at all when they were taking their decision. This means we have two very different information sources with very different levels of importances when the students of the 2015/2016 batch had to confront themselves with the choice of a University course. We can have a clearer picture of the situation with the help of a bar chart plot as in Figure 2.2.



**Figure 2.2: Bar Chart of degree of importance of major information sources**

The red colour means that the information source was not important while the green colour stands for very important.

### 2.3 UNDERLYING REASONS OF ENROLMENT IN STATISTICS

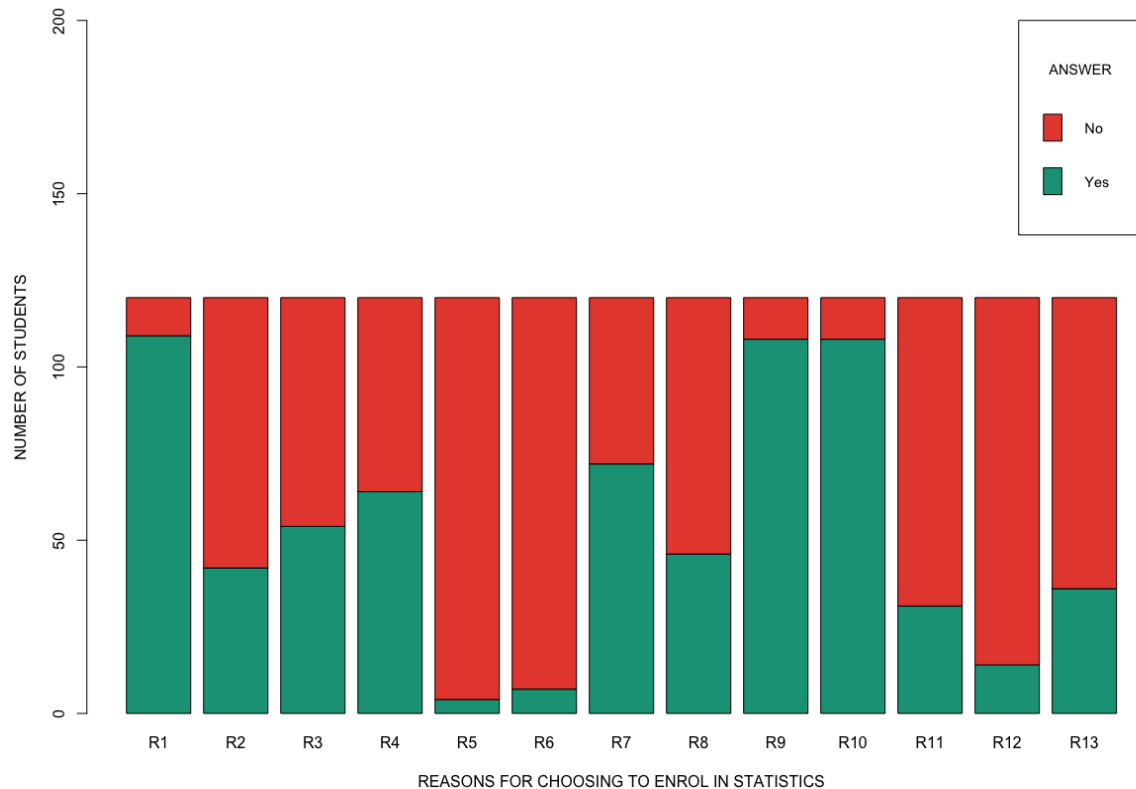
This section of the survey was intended to understand the underlying reasons why the students chose to enrol in statistics. Surprisingly in this section all the respondents answered the questions giving a greater and vaster picture of the situation. First of all we'll look at Table 2.3 to have an overall picture of the section's questions. The R in the title of each column stands for "REASON". So we have thirteen reasons listed in this question standing for :

- R1 love for the subjects,
- R2 Advices from parents and family members,
- R3 Advices from friends and Acquaintances,
- R4 Corresponds to the backgrounds I have,
- R5 Possibility to study with friends,
- R6 Statistics is relatively simple,
- R7 The department is well organized in general,
- R8 The class is not crowded ( few students enrolled ),
- R9 Offers better job opportunities,
- R10 Offers better career growth opportunities,
- R11 Permits to conciliate studies and work,
- R12 I have been rejected from other courses,
- R13 The test is not selective.

	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13
Yes	109	42	54	64	4	7	72	46	108	108	31	14	36
No	11	78	66	56	116	113	48	74	12	12	89	106	84

**Table 2.4: Table of underlying reasons of enrolment in statistics**

We can clearly notice that the top rated underlying reasons are R1 (because the students love the subjects taught),R9 (because graduated statisticians have better job opportunities) and R10 they have better career growth perspectives in the future. The worst performance is R5 which is the possibility to study with friends and it is only logical for this reason to be very low. The obtained results were plotted and represented in Figure 2.3.



**Figure 2.3: Bar Chart of underlying reasons for enrolment in statistics**

We can try to investigate if there is a degree of association between the first underlying reason of enrolment and the gender. That is, is the love for the subjects linked with respect to the gender of the population. In other words do boys love the subjects more than girls or vice versa or the two variables are independent from one another. This will help us accept or reject the null hypothesis.

	No	Si
Femmina	1 46	16
Maschio	3 39	15

**Table 2.5: Table of contingency between R1 and gender**

After computing our variables we came with the following answer:

$$X\text{-squared} = 0.12384, df = 1, p\text{-value} = 0.7249$$

This takes us to accept the null hypothesis and confirm there is no association between the two variables. This means that the love of the subjects is not linked with the fact that the respondent was a Female or Male.

## 2.4 PREVIOUS ORIENTATION INITIATIVE ATTENDANCE

In this section the students were asked if they had ever attended any orientation initiatives where they were informed about The Department of Statistics when they were still in high school. In fact, every year The University of Padua organises a series of orientation encounters with prospective students in various high schools on the regional territory, among which we have:

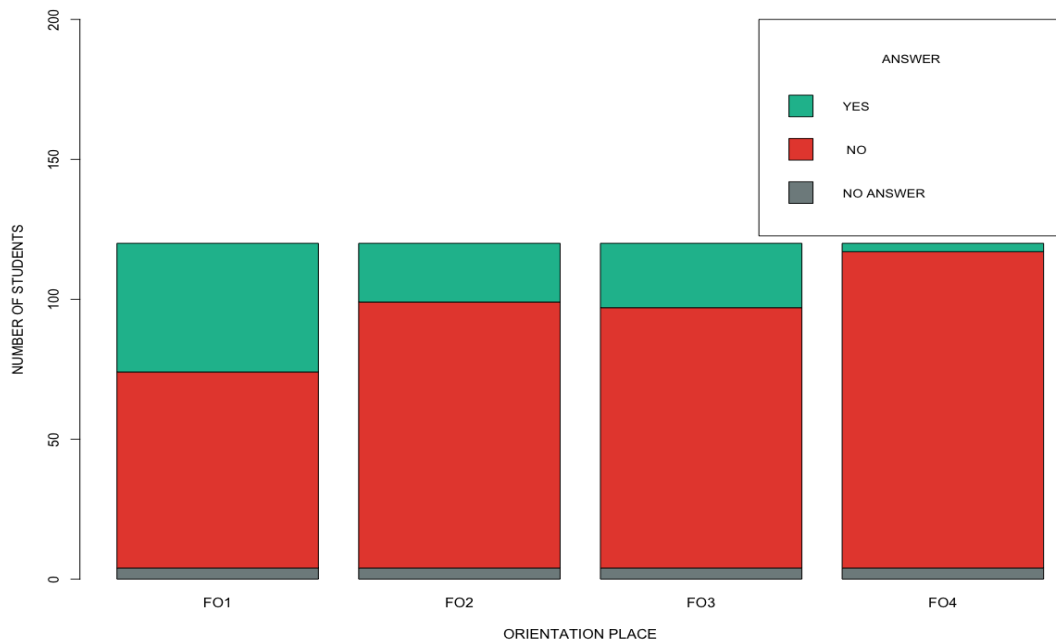
- The initiative in the “Agripolis” campus at the School of Agriculture and Veterinary Medicine (FO1)
- Open Days of The Department of Statistics (FO2)
- Orientation seminars held in high schools in order to let high school students discover their hidden talents for scientific subjects and attract in more final year students go in for science fields at The University(FO3).
- FO4 stands for other means of orientation ( only three students who got oriented via this media which was an event organised in Verona and is called “Job Orienta”).

	F01	F02	F03	F04
NO ANSWER	4	4	4	4
NO	70	95	93	113
YES	46	21	23	3

**Table 2.5: Orientation initiatives attended by the students**

We clearly see that Orientation events held in distant areas have almost a null effect on students attending The University of Padua.

In fact the best performance was obtained by the “ Agripolis” event still probably because of logistical reasons in the sense that most students came from Padua and the school of veterinary medicine is at about 15 to 30 minutes from the city of Padua itself.



**Figure 2.4: Bar Chart of orientation activities attended by the students**

## 2.5 SECOND YEAR EXPECTED SPECIALIZATION CHOICES IN NUMBERS AND GENDER

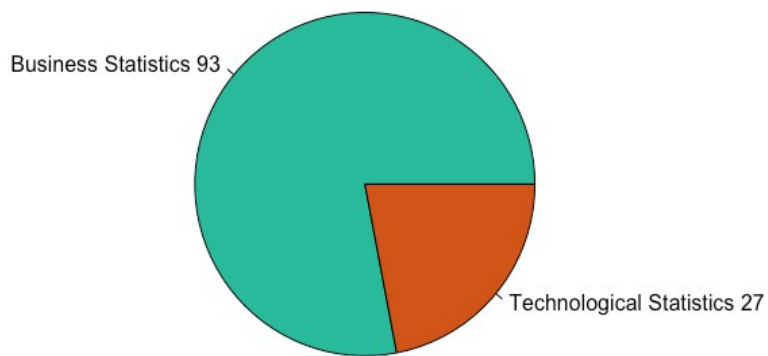
It may be worth noting that there are two main specialization tracks (courses) in The Department of Statistics, Statistics for Business and Economics (we will often call Business Statistics) and Statistics for Sciences and Technologies (Technological Statistics). As from the second year of the Bachelor degree each student is called to choose his or her academic specialization training track which will mark the beginning of their university path towards their expected future jobs. Inside both specialization curricula we also have the Methodological Statistics sub curriculum.

Methodological statistics is a special track built for those students who intend to proceed directly to their Masters after their Bachelor degree before choosing a definite specialization. It is the ideal track for those who are not interested in getting specific professional training till get to their Masters degree and the track is conceived in a softer manner with respect to other sub specializations.

Under Statistics for Business and Economics we have Statistics for Marketing, Statistics for Business and Management, Statistics for Finance and Socio-Economic Statistics sub curricula.

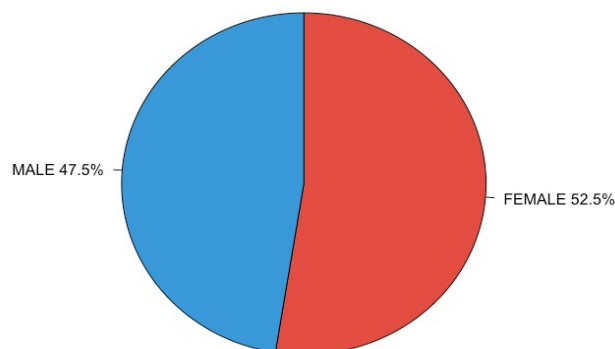
While in Statistics for Sciences and Technology, apart from Methodological Statistics, we have more specific fields such as Statistics for Big Data, Biostatistics and Statistics for Technologies.

Ninety three (93) students chose to follow the Statistics for Business and Economics curriculum(77,5%) as from year 2 while only 27 chose Statistics for Sciences and Technologies (22,5%).



**Figure 2.5: Pie chart of expected second year specialization.**

Beside this we are also going to look at the gender percentage distribution in the class. Doing this we will know the overall composition of the class basing ourselves on the gender.



**Figure 2.6: Percentage pie chart of gender distribution of the class.**



Observing Figure 2.5 and Figure 2.6, we realise that contrarily to the general thoughts, in this class there was a greater percentage of girls (52.5%) and this completely contradicts the common belief that science subjects are mostly for boys rather than girls.

## 2.6 SPECIALIZATIONS BASED ON HIGH SCHOOL BACKGROUNDS

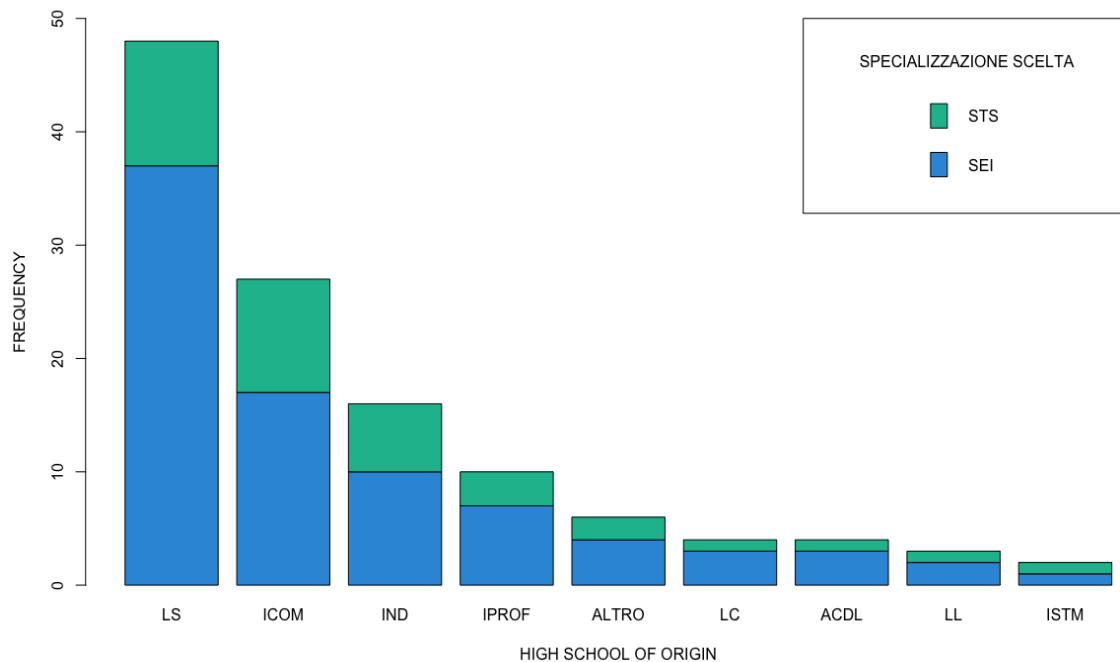
We would like to know the number of students who chose to either take the Statistics for Business and Economics or Statistics for Sciences and Technology tracks and their respective high school background types. Abbreviations in table 2.6 correspond to the list below.

- ALTRO stands for other type of high school,
- IPROF is for vocational school,
- ICOM stands for business college,
- LC means humanities high school,
- LS is for science inclined high school,
- ACDL stands for other university course,
- ISTM is for teachers training college,
- IND stands for technical college,
- LL is for linguistic college
- SEI stands for Statistics for Business and Economics
- STS Stands for Statistics for Sciences and Technology.

	LS	ICOM	IND	IPROF	ALTRO	LC	ACDL	LL	ISTM
SEI	37	17	10	7	4	3	3	2	1
STS	11	10	6	3	2	1	1	1	1

**Table 2.6: Specializations based on high school backgrounds**

We realize from Table 2.6 that there is a great portion of students coming from science inclined schools in the class. May be the reason why they are a majority is, because they studied a few or more subjects or chapters treated here while they were still in high school. The situation can be seen clearer with the use of a graph like the one in Figure 2.6.



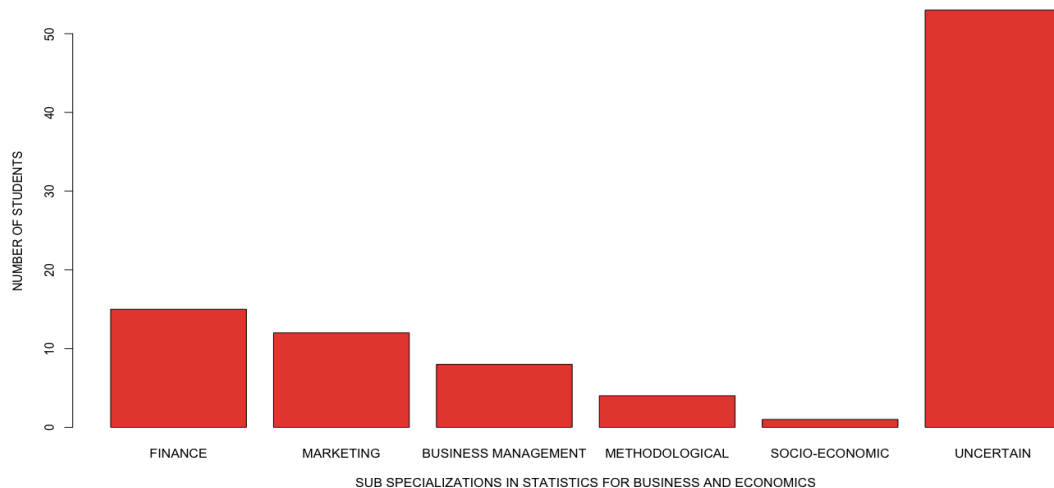
**Figure 2.6: Bar plot of expected specializations based on high school backgrounds**

In this case it is clear that the leading high schools are Science inclined high schools followed by business colleges and technical colleges. The high schools less represented are Humanities high schools, Linguistics high schools and Teacher's training Colleges

## **2.7 STATISTICS FOR BUSINESS AND ECONOMICS SUB-SPECIALIZATION CHOICES**

We will try to figure out how many students have chosen the various sub curricula in both major specializations. We notice for example with the aid of the graph in Figure 2.7 that in Statistics for Business and Economics, we have the following specialization configuration:

- 15 students have chose to go in for Financial Statistics,
- 12 students have chosen Marketing Statistics,
- 8 have chosen to take Business Management Statistics,
- 4 chose to go in for Methodological Statistics,
- 1 student has chosen Socio-Economic Statistics,
- And we have 53 students who are still uncertain of their specialization.



**Figure 2.7: Bar plot of chosen sub-specializations of students in Business and Economics**

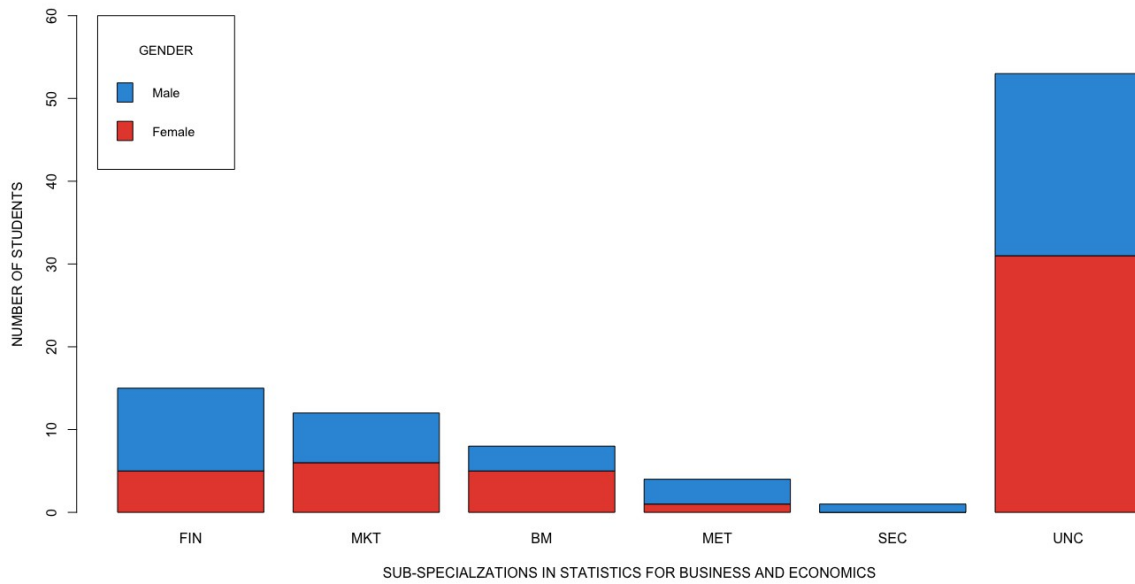
Investigating a little bit deeper to find out the various genders in each and every sub-specialization we get an overview as shown in Table 2.7 and Figure 2.9 pertaining to Statistics for Business and Economics where the abbreviations are as follows:

- FIN stands for Finance,
- MKT for Marketing,
- BM is for Business Management,
- MET stands for Methodological,
- SEC is for Socio-Economic Statistics,
- UNC stands for Uncertain.

	FIN	MKT	BM	MET	SEC	UNC
Female	5	6	5	1	0	31
Male	10	6	3	3	1	22

**Table 2.7: Sub-specialization in Statistics for Business and Economics according to gender**

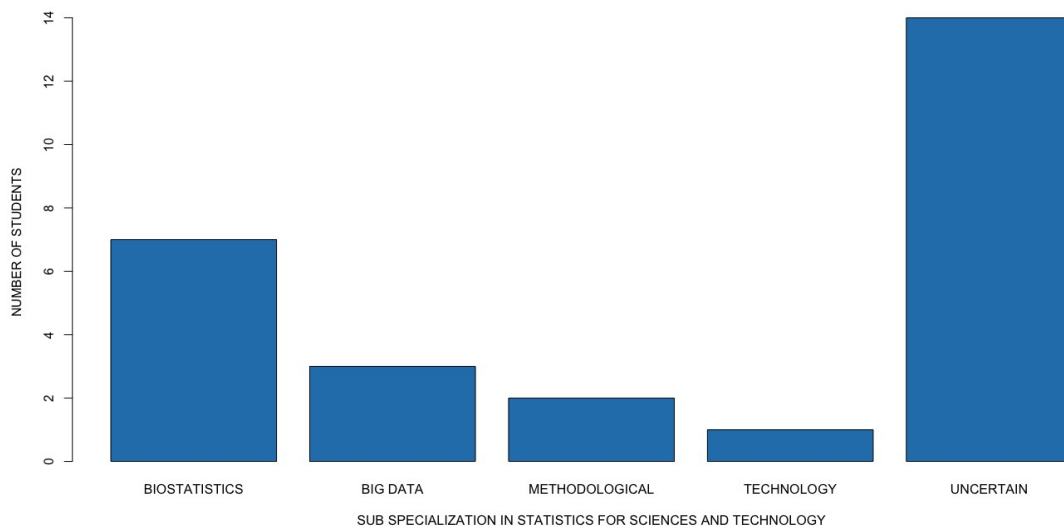
From Table 2.7 we can see that the males are leading in Financial Statistics while girls are more in business management and girls are also relatively more uncertain than boys in this sub-specialization. Figure 2.9 illustrates the observed situation better.



**Figure 2.9: Student gender distribution bar chart in Statistics for Business and Economics**

## 2.8 STATISTICS FOR SCIENCES AND TECHNOLOGY SUB-SPECIALIZATION

The situation almost doesn't change within the Science and Technology major course as we can notice in the bar chart in Figure 2.8.



**Figure 2.8: Bar plot of chosen sub-specializations of students in Sciences and Technologies**

The sub-specialization tracks in Statistics for Sciences and Technology is often made up of

very small amounts of students which is often the reason why students are asked if they already have their minds set on a particular major specialization so as to let know the Department staff in advance which will then either activate various corresponding lessons pertaining to each specialization or cancel them for either the semester or the the academic year.

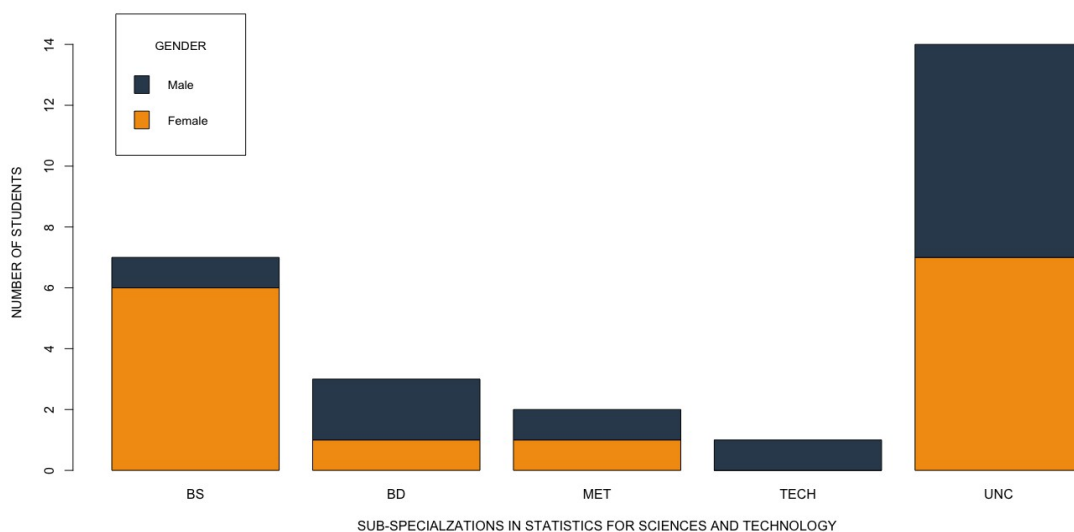
The abbreviations in Table 2.8 correspond to each sub-specialization track as follows:

- BS stands for Biostatistics,
- BD is for Big Data,
- MET stands for Methodological Statistics,
- TECH is for Statistics for Technologies,
- And UNC stands for Uncertain.

	BS	BD	MET	TECH	UNC
Female	6	1	1	0	7
Male	1	2	1	1	7

**Table 2.8: Sub-specialization in Statistics for Sciences and Technology according to gender**

Figure 2.10 can help us understand better the gender distribution with respect to each specific sub-specialization. Girls rule in Statistics for Science and Technology especially in Statistics for Big Data while there are more males interested in studying Biostatistics and Statistics for technology.



**Figure 2.10: Student gender distribution bar chart in Statistics for Sciences and Technology**

## 2.9 ENROLMENTS IN STATISTICS

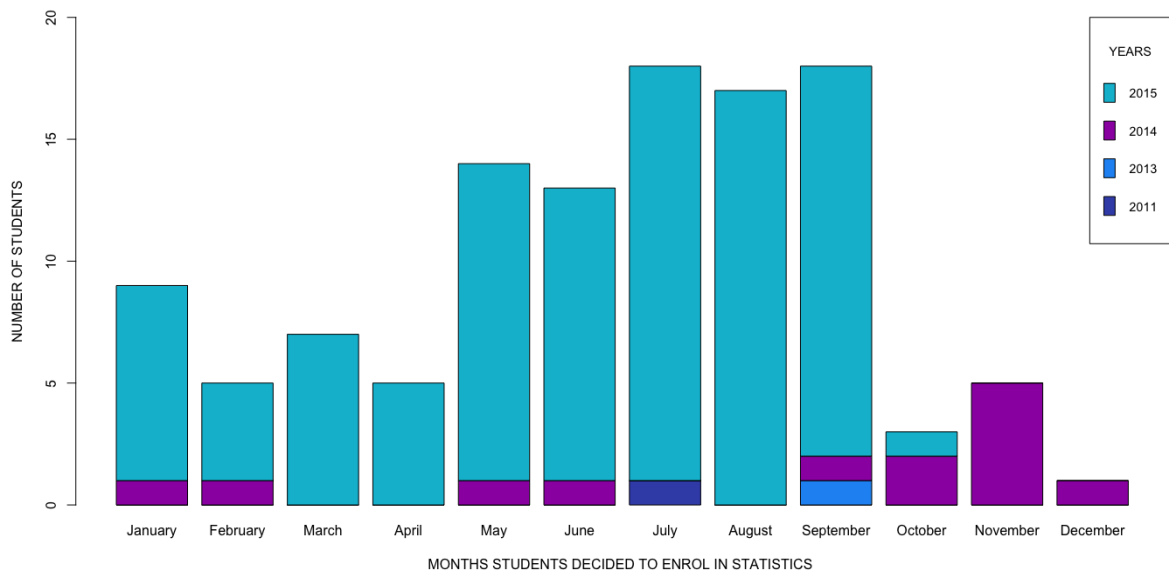
The decision to enrol oneself at The University is generally a matter of prospectives (future possibilities) and expectations for those graduating from high schools. Some times choosing an area of study becomes very problematic because of the vast study fields out there no matter the diploma in possession. Some come out of high school with clear ideas of what they want to do at The University while others don't but still they have the will to study at a higher level. While some choose a faculty or school or department basing themselves on their affinities with the subjects taught in the track and are very rational on their choices, others choose by instinct or because of friends or acquaintances and followed their advices. The mission of this section is to know if the respondents chose statistics right from the beginning as their “first best” or they were rejected from other departments and statistics was their “second best” because there were no other choices available.

In order have clear answers to these questions we had to know the year and moth when they decided to enrol in statistics. Their respective answers were collected and can be viewed in Table 2.9.

	January	February	March	April	May	June	July	August	September	October	November	December
2011	0	0	0	0	0	0	1	0	0	0	0	0
2013	0	0	0	0	0	0	0	0	1	0	0	0
2014	1	1	0	0	1	1	0	0	1	2	5	1
2015	8	4	7	5	13	12	17	17	16	1	0	0

**Table 2.9: Years and months in which students decided to enrol in statistics**

The months of May, June, July, August and September resulted as the period with the highest level of enrolment decisions and 100 students chose to enrol in Statistics in this period simply because if they don't they'll have to wait till the next University academic year. The picture is better represented in Figure 2.11 as it also shows all the years involved in the decision process of going in for Statistics.



**Figure 2.11: Bar plot of when students decided to enrol in statistics**

While some make up their minds and choose immediately after graduating from high school, others decide months before enrolment periods. This may be the reason behind the fact that we have many students who started thinking about enrolling in statistics as early as in January 2015 when looking at the plot and the corresponding colours which represent the years. It may also mean that there is a rush for registrations in the middle section of the graph because there are many students who have attempted to enter in other Departments and didn't succeed, so in order not to lose a year of non studies they prefer going in for Statistics.

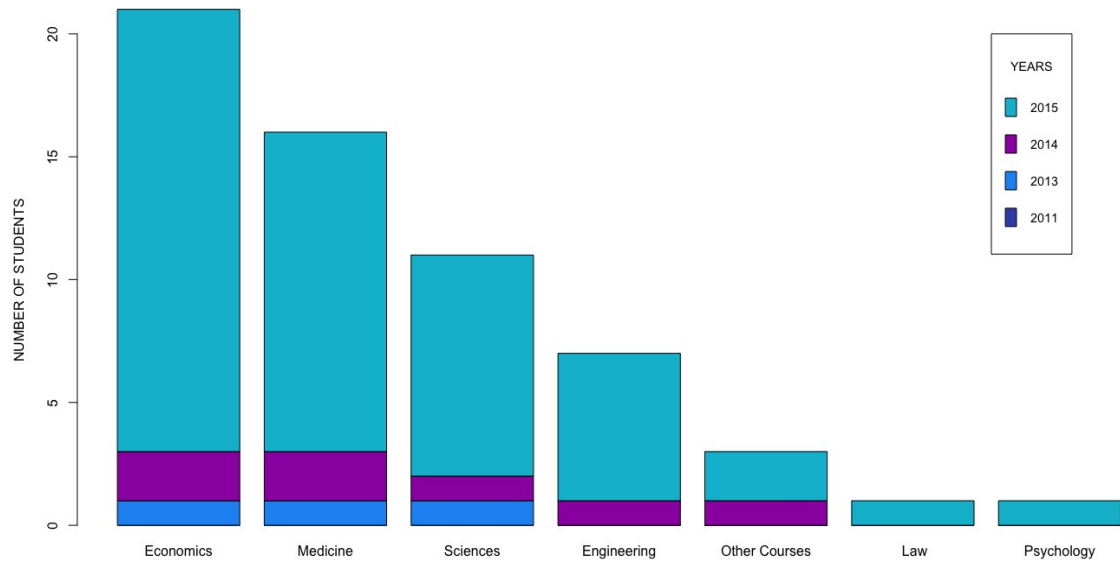
### 2.10 MAJOR COMPETITORS OF THE DEPARTMENT OF STATISTICS

In the process of looking where the 50% of the second best students come from we found out that we had 60 students who came from other departments as distributed in Table 2.10 below.

	Economics	Medicine	Sciences	Engineering	Other	Courses	Law	Psychology
2011	0	0	0	0	0	0	0	0
2013	1	1	1	0	0	0	0	0
2014	2	2	1	1	1	0	0	0
2015	18	13	9	6	2	1	1	1

**Table 2.10: Second best students distributed among their first best choices**

Among the 60 students who tried to get an entrance in other departments we have included 11 students who came to statistics because they had already been rejected in two different departments. We have been able to plot a simple bar chart that may help to understand better the situation.



**Figure 2.12: Bar chart showing departments of preference different from Statistics**

From Figure 2.12 we can notice that contrarily to what some may think, the majority of “second best” students graduated from high school the same year they got access to Statistics. So they were concentrating preparing for other selective entrance tests which at the end they did not pass.



## CONCLUSION

Considering the theme of our dissertation which was “ Data analysis of students enrolled in the 2015/2016 academic year in statistics with attention to their training and academic orientation” and going through the main features of the questionnaire on which our survey was based we have arrived at the end of our analysis with a luggage full of aspects we did not know at the beginning.

We had a global overview of the geographical, racial and gender composition of our sample and have found that even though there is an amount of diversity among the students, this diversity is not much pronounced for example geographically speaking with the fact that more than 93 % of the population originates from the Northern regions topped by Veneto(86.66%) and only one student from the People's Republic of China. We also realized that the gender distribution of the class was made up of a majority of females with respect to men, that girls ruled too in the various expected second year specialization choices and that the most quoted major specialization track chosen by the population of our sample was Statistics for Business and Economics with 93 students compared to 27 for Statistics for Sciences and Technology.

Even though The Department of Statistics is not selective in its choice of the ideal student, we found that more than half of its population did not choose statistical sciences as their first best choice but rather enrolled in statistics after they were not admitted or got expelled from other departments like Economics topping the list followed by the department Medicines. Roughly 50% of the class are dropouts from other Departments and the reason may be because The department of statistics in general and statistics in particular as a field is not as famous as it ought to be.

Almost all those enrolling in statistics are motivated because of their affinities with the various subjects they will be taught, by the real fact that they will have a very high probability of getting a job after their studies and also because they could have a higher possibility of progress in their various careers.

Even though the information sources which impacted most had high levels of reach, The Department of Statistics is not known sufficiently in general and not to talk about the outstanding outcomes their graduate students get in hand after their training. There is still a long way to go even though the long way is starting to be shortened due to the new global technological needs of statisticians in every single job field we can think about today, be it in health, computer sciences, agriculture, business, finance and academics. One of the leading information sources, the department's website has to continue giving the maximum key

informations to prospective students while the Scientific Degree Project has a very long way to go and needs to be boosted in order to reach the maximum number of high school students.

# Questionario matricole 2015

Vi preghiamo di rispondere con attenzione e sincerità perché le vostre risposte saranno importanti per aiutarci a programmare l'attività di orientamento per il prossimo anno accademico.

Ci sono 38 domande all'interno di questa indagine.

## Anagrafica

### Corso di laurea

Scegli **solo una** delle seguenti:

- Statistica per l'Economia e l'Impresa
- Statistica per le Tecnologie e le Scienze

### Sai già quale percorso intendi seguire a partire dal secondo anno?

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Statistica per l'Economia e l'Impresa' Alla domanda '1 [ACDL]' (Corso di laurea)

Scegli **solo una** delle seguenti:

- Metodologico
- Marketing
- Gestione Impresa
- Finanza
- Socio-Economico
- Sono ancora indeciso

### Sai già quale percorso intendi seguire a partire dal secondo anno?

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Statistica per le Tecnologie e le Scienze' Alla domanda '1 [ACDL]' (Corso di laurea)

Scegli **solo una** delle seguenti:

- Metodologico
- Big Data
- Tecnologia
- Biostatistica
- Sono ancora indeciso

**Genere**

Scegli **solo una** delle seguenti:

- Femmina  
 Maschio

**Anno di nascita**

Ogni risposta deve essere compresa tra 1900 e 2000  
Solo un valore intero può essere ammesso in questo campo.

Scrivere la propria risposta qui:

**Scuola di provenienza:**

Scegli **solo una** delle seguenti:

- Liceo classico  
 Liceo Scientifico  
 Istituto tecnico industriale  
 Liceo o istituto informatico  
 Istituti professionali  
 Istituto magistrale  
 Istituto tecnico commerciale  
 Istituto per geometri  
 Liceo linguistico  
 Altro corso di studio universitario  
 Altro

**Specificare quale altro tipo di scuola di provenienza**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Altro' Alla domanda '6 [DScuolaProv]' (Scuola di provenienza:)

Scrivere la propria risposta qui:

**Nome della scuola superiore (per esteso. Ad esempio: Istituto Professionale "Valle")**

Scrivere la propria risposta qui:

### **Comune della scuola di provenienza**

Scrivere la propria risposta qui:

### **Residenza durante l'ultimo anno di superiori, specificare lo Stato:**

Scegli **solo una** delle seguenti:

- Italia
- Altro Stato

**Residenza durante l'ultimo anno delle superiori, specificare la provincia:**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Italia' Alla domanda '10 [F1ResStato]' (Residenza durante l'ultimo anno di superiori, specificare lo Stato:)

Scegli **solo una** delle seguenti:

- Padova
- Belluno
- Rovigo
- Treviso
- Venezia
- Verona
- Vicenza
- Agrigento
- Alessandria
- Ancona
- Aosta
- Arezzo
- Ascoli Piceno
- Asti
- Avellino
- Bari
- Barletta-Andria-Trani
- Benevento
- Bergamo
- Biella
- Bologna
- Bolzano
- Brescia
- Brindisi
- Cagliari
- Caltanissetta
- Campobasso
- Carbonia-Iglesias
- Caserta
- Catania
- Catanzaro
- Chieti
- Como
- Cosenza
- Cremona
- Crotone

- Cuneo
- Enna
- Fermo
- Ferrara
- Firenze
- Foggia
- Forlì-Cesena
- Frosinone
- Genova
- Gorizia
- Grosseto
- Imperia
- Isernia
- La Spezia
- L'Aquila
- Latina
- Lecce
- Lecco
- Livorno
- Lodi
- Lucca
- Macerata
- Mantova
- Massa-Carrara
- Matera
- Messina
- Milano
- Modena
- Monza e della Brianza
- Napoli
- Novara
- Nuoro
- Olbia-Tempio
- Oristano
- Palermo
- Parma
- Pavia
- Perugia
- Pesaro e Urbino
- Pescara
- Piacenza

- Pisa
- Pistoia
- Pordenone
- Potenza
- Prato
- Ragusa
- Ravenna
- Reggio Calabria
- Reggio Emilia
- Rieti
- Rimini
- Roma
- Salerno
- Medio Campidano
- Sassari
- Savona
- Siena
- Siracusa
- Sondrio
- Taranto
- Teramo
- Terni
- Torino
- Ogliastra
- Trapani
- Trento
- Trieste
- Udine
- Varese
- Verbano-Cusio-Ossola
- Vercelli
- Vibo Valentia
- Viterbo

### **Quale Stato estero?**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Altro Stato' Alla domanda '10 [F1ResStato]' (Residenza durante l'ultimo anno di superiori, specificare lo Stato:)

Scrivere la propria risposta qui:



**In quale anno hai svolto la maturità (se hai frequentato la scuola in Italia) o hai svolto l'ultimo anno delle superiori (se hai frequentato una scuola estera)?**

Solo valori numerici sono consentiti per questo campo  
Ogni risposta deve essere compresa tra 1970 e 2015

Scrivere la propria risposta qui:

## Voto di maturità (solo per chi ha concluso le scuole superiori in Italia)

Rispondere solo se le seguenti condizioni sono rispettate:

La risposta era maggiore o uguale a '1999' Alla domanda '13 [GAnnoMaturita]' (In quale anno hai svolto la maturità (se hai frequentato la scuola in Italia) o hai svolto l'ultimo anno delle superiori (se hai frequentato una scuola estera)?)

Scegli **solo una** delle seguenti:

- 60
- 61
- 62
- 63
- 64
- 65
- 66
- 67
- 68
- 69
- 70
- 71
- 72
- 73
- 74
- 75
- 76
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- 91
- 92
- 93
- 94

- 95
- 96
- 97
- 98
- 99
- 100
- 100L

### **Voto di maturità (solo per chi ha concluso le scuole superiori in Italia)**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era minore o uguale a '1998' Alla domanda '13 [GAnnoMaturita]' (In quale anno hai svolto la maturità (se hai frequentato la scuola in Italia) o hai svolto l'ultimo anno delle superiori (se hai frequentato una scuola estera)?)

Scegli **solo una** delle seguenti:

- 36
- 37
- 38
- 39
- 40
- 41
- 42
- 43
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- 45
- 46
- 47
- 48
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- 50
- 51
- 52
- 53
- 54
- 55
- 56
- 57
- 58
- 59
- 60
- 60L



## Fonti informative e orientamento

### Negli ultimi anni delle scuole superiori, sei venuto a contatto con le seguenti fonti informative su Scienze Statistiche?

Scegliere la risposta appropriata per ciascun elemento:

	Sì	Non so	No
Un professore delle superiori	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Un amico, un parente o un conoscente, laureato o studente di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Un amico, un parente o un conoscente, non laureato né studente di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Un professore di Scienze Statistiche durante incontri per l'orientamento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Un professore di Scienze Statistiche durante un incontro personale	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Un professore universitario non di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Altro personale dell'università, per esempio del Servizio Orientamento o Immatricolazioni	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Trasmissioni televisive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materiale cartaceo specifico dei corsi di laurea in Scienze Statistiche (depliant, bollettino, etc)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Materiale cartaceo generico di Ateneo o della Scuola di Scienze	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Il sito web di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La pagina Facebook di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Altri siti web	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Eventi "Notte Europea della Ricerca" o "Festival della Statistica"	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Una risposta per ogni fonte informativa

### Negli ultimi anni delle scuole superiori, hai partecipato a qualche iniziativa di orientamento in cui sono stati presentati i Corsi di Laurea di Scienze Statistiche?

Scegliere la risposta appropriata per ciascun elemento:

	Sì	Non so	No
Incontri ad Agripolis organizzati dall'Ateneo e dal Dipartimento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incontri presso il Dipartimento di Scienze Statistiche (Open Day, Statistica sarà il caso?..)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Incontri organizzati presso la tua scuola superiore	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Altri iniziative di orientamento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

### Quali altre iniziative di orientamento?

Rispondere solo se le seguenti condizioni sono rispettate:

La risposta era 'Sì' Alla domanda '17 [K]' (Negli ultimi anni delle scuole superiori, hai partecipato a qualche iniziativa di orientamento in cui sono stati presentati i Corsi di Laurea di Scienze Statistiche? (Altri iniziative di orientamento))

Scrivere la propria risposta qui:

**Hai partecipato a un laboratorio PLS (Piano Lauree Scientifiche) per Matematica e Statistica nella scuola superiore?**

Scegli **solo una** delle seguenti:

- Sì  
 No

**Quanto sono state per te importanti le seguenti fonti informative per decidere di iscriverti a Scienze Statistiche?**

Scegliere la risposta appropriata per ciascun elemento:

	Molto	Abbastanza	Per nulla
Professore delle superiori	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amico, parente o conoscente, laureato o studente di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Amico, parente o conoscente, non laureato né studente di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professore di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Professore universitario non di Scienze Statistiche	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Altro personale dell'Università, per esempio del Servizio Orientamento	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Depliant, volantini	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Qualche pubblicazione (inserti dei giornali, guide per l'orientamento...) o tv	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Internet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

# Test d'Ingresso

Rispondi ora a qualche domanda sul test d'ingresso

## Fare il test di ingresso per te è stato semplice?

Scegli **solo una** delle seguenti:

- Sì  
 No

## Il test è stato conforme alle tue aspettative?

Scegli **solo una** delle seguenti:

- Sì  
 No

## La votazione conseguita nel test è stata:

Solo valori numerici sono consentiti per questo campo  
Ogni risposta deve essere compresa tra 0 e 30

Scrivere la propria risposta qui:

# Precorso di matematica

Rispondi ora a qualche domanda sul percorso di matematica

## Hai partecipato al percorso di matematica?

Scegli **solo una** delle seguenti:

- Sì  
 No

## Ne dai una valutazione positiva?

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Sì' Alla domanda '24 [M1]' (Hai partecipato al percorso di matematica?)

Scegli **solo una** delle seguenti:

- Sì  
 No

## Hai svolto la prova finale?

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Sì' Alla domanda '24 [M1]' (Hai partecipato al percorso di matematica?)

Scegli **solo una** delle seguenti:

- Sì  
 No

## Che voto hai conseguito alla prova finale?

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Sì' Alla domanda '26 [M3]' (Hai svolto la prova finale?)

Solo valori numerici sono consentiti per questo campo

Ogni risposta deve essere compresa tra 0 e 30

Scrivere la propria risposta qui:



## **Perché hai scelto di non partecipare al percorso di matematica?**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'No' Alla domanda '24 [M1]' (Hai partecipato al percorso di matematica?)

Scegli **solo una** delle seguenti:

- Conoscevo già gli argomenti di matematica oggetto del percorso
- Ho deciso all'ultimo momento di iscrivermi a Scienze Statistiche
- A settembre non avevo tempo di seguire il percorso
- Non ne ero a conoscenza
- Altri motivi

## **Specificare quali altri motivi:**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Altri motivi' Alla domanda '28 [M4]' (Perché hai scelto di non partecipare al percorso di matematica?)

Scrivere la propria risposta qui:

## Percorso di scelta

### Prova a identificare il momento in cui hai deciso di iscriverti a Scienze Statistiche a Padova; anno:

Ogni risposta deve essere compresa tra 2000 e 2015  
Solo un valore intero può essere ammesso in questo campo.

Scrivere la propria risposta qui:

### ...e mese:

Scegli **solo una** delle seguenti:

- gennaio
- febbraio
- marzo
- aprile
- maggio
- giugno
- luglio
- agosto
- settembre
- ottobre
- novembre
- dicembre

### Che cosa ha determinato la tua scelta di iscriverti a Scienze Statistiche?

Scegliere la risposta appropriata per ciascun elemento:

	Sì	Non so	No
Mi piacevano le materie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I suggerimenti della mia famiglia	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I consigli ricevuti da amici e conoscenti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La corrispondenza con gli studi precedenti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
La possibilità di studiare con i miei amici	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E' relativamente semplice	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
E' ben organizzata	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ha pochi iscritti	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Offre molte opportunità di lavoro	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Offre buone prospettive di carriera	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Consente di conciliare studio e lavoro	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sono stato respinto da altri corsi	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Il test d'ingresso non era selettivo	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**Prima di iscriverti a Scienze Statistiche, avevi seriamente considerato la possibilità di iscriverti, o ti eri preiscritto, a corsi di laurea organizzati da altre Scuole dell'Ateneo?**

Scegli **solo una** delle seguenti:

- Sì  
 No

**Quali?**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era 'Sì' Alla domanda '33 [Q]' (Prima di iscriverti a Scienze Statistiche, avevi seriamente considerato la possibilità di iscriverti, o ti eri preiscritto, a corsi di laurea organizzati da altre Scuole dell'Ateneo?)

Scegliere **tutte** le corrispondenti:

- Agraria e Medicina Veterinaria  
 Economia e Scienze Politiche  
 Giurisprudenza  
 Ingegneria  
 Medicina e Chirurgia  
 Psicologia  
 Scienze  
 Scienze Umane, Sociali e del Patrimonio Culturale  
 Altro

**Specificare quale altro:**

**Rispondere solo se le seguenti condizioni sono rispettate:**

La risposta era Alla domanda '34 [R]' (Quali?)

Scrivere la propria risposta qui:

## Perché li hai esclusi?

### Rispondere solo se le seguenti condizioni sono rispettate:

La risposta era 'Sì' Alla domanda '33 [Q]' (Prima di iscriverti a Scienze Statistiche, avevi seriamente considerato la possibilità di iscriverti, o ti eri preiscritto, a corsi di laurea organizzati da altre Scuole dell'Ateneo?)

Scegliere **tutte** le corrispondenti:

- Non ho passato i test di ammissione
- Ho avuto esiti peggiori ai test di ingresso/valutazione
- Scienze Statistiche è più vicina ai miei interessi
- Gli altri corsi di laurea offrono meno opportunità di lavoro
- Sono peggio organizzati
- Mi sono stati sconsigliati per vari motivi
- Sono scomodi dal punto di vista logisitico
- Altro

## Specificare altri motivi

### Rispondere solo se le seguenti condizioni sono rispettate:

La risposta era Alla domanda '36 [S]' (Perché li hai esclusi?)

Scrivere la propria risposta qui:





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