
A2_7 Progression of Physics and Astronomy Students

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Mar 22, 2011.

Abstract

The percentage of physics and astronomy students obtaining different degree classifications is compared to the students' average matriculation UCAS point scores at a number of institutions. These are compared to see what trends exist. It is found that there are correlations between average points scores and percentage degree classification.

Introduction

With university fees to rise to at least £6000 with a cap of £9000 [1], it seems prudent to investigate the level of progression provided by UK universities to their physics students. With degrees costing more, a great deal more focus will be placed on the robustness of the university degree classification system, particularly between the same subjects at different universities. Most undergraduate students study at college or sixth form to obtain A-Levels before entering university, it is therefore possible to use the results of students' academic achievement at this stage in their academic career and compare this to their final degree classification at the end of their physics degree. It seems intuitive that better scoring students at A-level will on average obtain better degree classifications than their poorer scoring colleagues. The data required to pursue such a study is provided online by unistats.com [2] a branch of direct.gov.uk, the governmental information website for the United Kingdom.

Description of Data

Physics and Astronomy departments in 35 of England, Wales and Northern Ireland's universities were investigated. Data for Scotland was not fully available. The fee rise will primarily effect English universities, however the comparison between universities elsewhere in the UK is still valid. Two sets of data were used. The first set lists the median number of UCAS points attained by matriculating students in 2008, the second the percentages of degree classifications awarded to graduating students in that same year. UCAS points are a numerical system of estimating student performance at A-Level and in other similar qualifications. They are primarily used as part of the UCAS university application process. Table 1 below outlines the point breakdown for A/AS Level students. The A* grade is the highest possible (and only at A2 level), while E is the lowest score that will gain points. Typically a student will first complete AS levels and then the A2. The completion of the A2 consumes the AS qualification.

University degrees are typically broken down in to

Table 1: Point breakdown for UCAS points for GCE A/AS Level Qualifications [3]

Grade	Points at A Level	Points at AS Level
A*	140	-
A	120	60
B	100	50
C	80	40
D	60	30
E	40	20

four classifications. A first class degree is considered the best result, while a pass would represent the lowest. The degree classification is important to employers. A large proportion of all students obtain a second class first division classification and this is seen a 'good' degree. In the current economic climate a first class degree is quickly becoming a necessity to be a noticed candidate for a position.

Data Analysis

Having obtained this data, it can then be plotted as the percentage obtaining a degree result against the average UCAS points score obtained by institution. In this way it is possible to assess the progression of students from their A Level results through their degree. This will hopefully give some idea of what degree to expect for a given UCAS point score and also allow any anomalous institutions giving abnormally high or low classifications given the performance of its students. It does not necessarily follow that one's A Level performance is directly related to one's degree classification, there are a number of other factors to be considered, however this is a good first approximation to how students should be performing given their prior academic performance. Four plots are shown in figure 1 below.

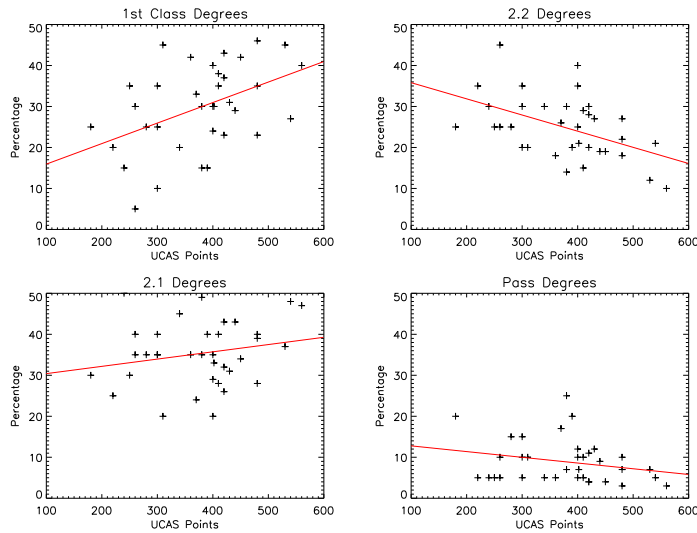


Fig. 1: Percentage of students obtaining a physics degree classification vs the average UCAS points obtained on matriculation to the university in question. Correlation r values: $r_{first} = 0.447966$, $r_{2.1} = 0.212286$, $r_{2.2} = -0.479211$, $r_{pass} = -0.242414$

As can be seen, the plots show the four degree classifications and the average number of UCAS points scored by entrants by institution.

Discussion

The plots show that there is a positive correlation between first class degree percentages and UCAS points. A reduced correlation for the 2.1 degree classifications is found. A negative correlation for the 2.2 degree classification is discovered. A negative correlation is also discovered for the pass degree classification. These results are largely as expected and show that more successful students at the A Level stage continue being successful, while students with lesser achievements continue this trend. While this seems to be the case, it would also seem to be the case that university seems to level out the achievement of students somewhat to make these results less polarising. The number managing to achieve a first at the lowest average UCAS points scores is not negligible despite there being a correlation between the two. We can understand this better by using the linear regression fit to produce an estimate of expected percentage of firsts, given the average UCAS point score.

$$P_{1st} = 10.93 + 0.05U_{av}, \quad (1)$$

where P_{1st} is the percentage of firsts obtained at an institution while U_{av} is the average matriculation UCAS points attained. Thus we see that for a low score of 200 points, in theory 20.9% of the students will still obtain firsts. While students attaining on average 500 points can expect 35.9% of them to collect firsts. The difference between these two values is quite small compared to the difference in the points scores. Similarly

for other degree classifications:

$$\begin{aligned} P_{2.1} &= 28.63 + 0.018U_{av}, \\ P_{2.2} &= 39.75 - 0.04U_{av}, \\ P_{pass} &= 14.18 - 0.014U_{av}. \end{aligned} \quad (2)$$

It is important to remember that this data is by average performance at an institution not by individual student accomplishment. It is still a good guide to discovering anomalies in institution awarding of degree classes as well as being an aid to students in providing them with a target to aim for given their prior performance. It is important to note once again however that achievement at university is not necessarily directly related to prior achievement at A Level. Nonetheless, from the data it would appear that some degree of correlation exists.

Conclusion

By presenting data from a number of institutions it is discovered that the percentage of degree classifications obtained is somewhat related to the average number of UCAS points obtained by students. This methodology is a good technique for ensuring the cross-institutional standardisation of degree classification as well as being useful for students.

REFERENCES

- [1] <http://www.bbc.co.uk/news/education-12475227>. (11/03/2011).
- [2] <http://unistats.direct.gov.uk/downloadSpreadsheet.do>. (24/02/2011).
- [3] http://www.ucas.com/students/ucas_tariff/tariffables/. (24/02/2011).