



MALTA UNIVERSITY CONSULTING

CALL FOR QUOTATIONS
DATA ANALYSIS AND DATA PROCESSING:
ENGINEERING EDUCATION IN MALTA PAVING THE
WAY FOR FUTURE INDUSTRY

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Commissioned by the **Malta University Consulting Limited**
on behalf of the **Chamber of Engineers**

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FINAL REPORT

Engineering Education in Malta: Paving the way for future Industry

Data Analysis

1 Introduction

1.1 Background

The past years have seen an imbalance between the ever-decreasing number of students taking up engineering as a career path and the demand of engineers in industry.

The aim of this report is to analyse data presented by the Chamber of Engineers to establish the percentage number of students, who took up subjects that lead to graduate with an engineering degree from the University of Malta (UoM) at various critical points of their lives from 2007 until 2017. These critical points refer to Form 2, Form 5 and Higher Secondary level, as illustrated in Figure 1 below. Although the original Call for Quotations requested analysis starting from 2004, the Chamber of Engineers informed MUC that due to practicality in terms of data acquisition, the analysis is to start from 2007 onwards.

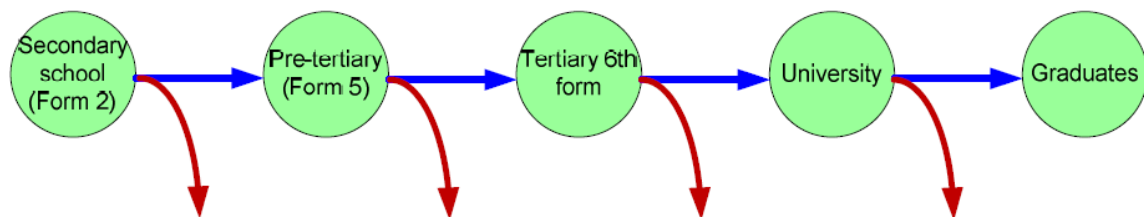


Figure 1 – Scope of Data Analysis (Chamber of Engineers)

An applicant interested in following an engineering degree at the UoM should:

1. satisfy the general entry requirements of the UoM meaning that an applicant should obtain the Matriculation Certificate and a pass at grade 5 or better in the secondary education certificate examinations in English language, Maltese and Mathematics, in conjunction with A levels in Pure Mathematics and Physics at grade C or better,
2. be in possession of passes in the secondary education certificate examination at Grade 5 or better in Maltese and English language, and of either the MCAST-BTEC Higher National Diploma in an area deemed by the Board to be relevant to the course, or the MCAST Diploma in Industrial Electronics.

Due to unavailability of MCAST data at the time of writing this report, focus in this report will be directed towards point 1.

Reasons for selecting the three critical points in Figure 1 follow.

Until secondary school level, Mathematics is compulsory for all students and is studied throughout all the years in secondary school. Physics is not compulsory in all secondary schools. At schools where Physics is chosen on an optional basis, Physics is chosen at the end of Form 2 to be studied between Forms 3 – 5 with the aim of sitting for the secondary education certificate examination at the end of Form 5. The selection of subjects at the end of Form 2 is thus the first crucial step for several students.

As seen in the entry requirements stated above, applicants wishing to be accepted for a degree in engineering need to have achieved a secondary education certificate which includes attaining a pass at grade 5 or better in Physics and Mathematics, making Form 5 the second important step in a student's path towards a degree in engineering.

Similarly, the third critical step towards a path for a Bachelor's Degree in engineering from the UoM occurs at post-Secondary level, since as per entry requirements above, students need to achieve the Matriculation certificate including an A level in Pure Maths and an A level in Physics at grade C or better.

Having identified the critical points, we now move on to analyse the data available at the different stages for the period 2007 – 2017, covering academic years 2007/2008 – 2016/2017 obtained for April/May examination session. Percentages of UoM B Eng graduates for the years 2016/2017 – 2017/2018 are also presented. Since information on the number of students choosing Physics in Form 2 was not available, percentages for this critical stage cannot be presented.

2 Data Analysis

2.1 Secondary School - Form 2

Given that the aim of the study is that of keeping track of how the percentages of students change at the different time points, it was decided that **all the percentages at the critical points shown in Figure 1 will be worked out with respect to a common population. This population is taken to be the total number of students enrolled in Form 2 in all state, church and independent schools on the Maltese Islands.** If a student follows a typical academic path from Form 2 to UoM, a student enrolled in Form 2 in academic year 2007/2008, would have been enrolled in Form 5 in 2010/2011, in the second year of studies at post-secondary level in 2012/2013, entering UoM in 2013/2014 and graduating from UoM in academic year 2016/2017. Tables and figures presented in this report are all based on these time frames. The fact that a student may encounter academic difficulties along these years, possibly needing to repeat a year or to sit for examinations over multiple years could not have been considered in this report. Furthermore, due to the data available, it was also not possible to cater for the possibility that non-Maltese nationals or immigrants started to attend Maltese schools at a time point that is more recent than Form 2.

The number of students enrolled in Form 2 from academic year 2007/2008 up till 2016/2017 are shown in Figure 2.

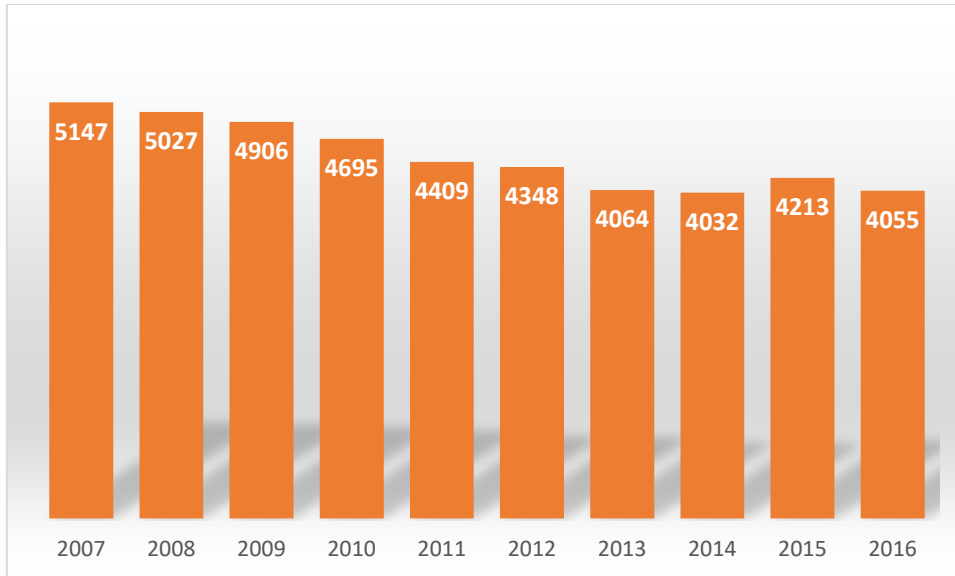


Figure 2 – Total number of Students enrolled in Form 2 by Academic Year

Figure 2 shows that the number of students attending Form 2 has been declining over the years; for instance, the number of students that could potentially follow an engineering degree has decreased from 5147 in 2007 to 4055 in 2016; a difference of 1092 students. The major decrease in the number of Form 2 students is from academic year 2012/2013 (4348 students) to academic year 2013/2014 (4064 students).

With a slight exception of an increase in enrolment in academic year 2015/2016 (4213 students), the number of Form 2 students enrolled in the last few years is close to 4000.

The decline seen in Figure 2 can be attributed to a decrease in the birth rate. Students enrolled in Form 2 between 2007/2008 and 2016/2017 were born between 1995 – 2004. The number of births registered for the period 1995-2004 on the Maltese Islands are shown in Figure 3.

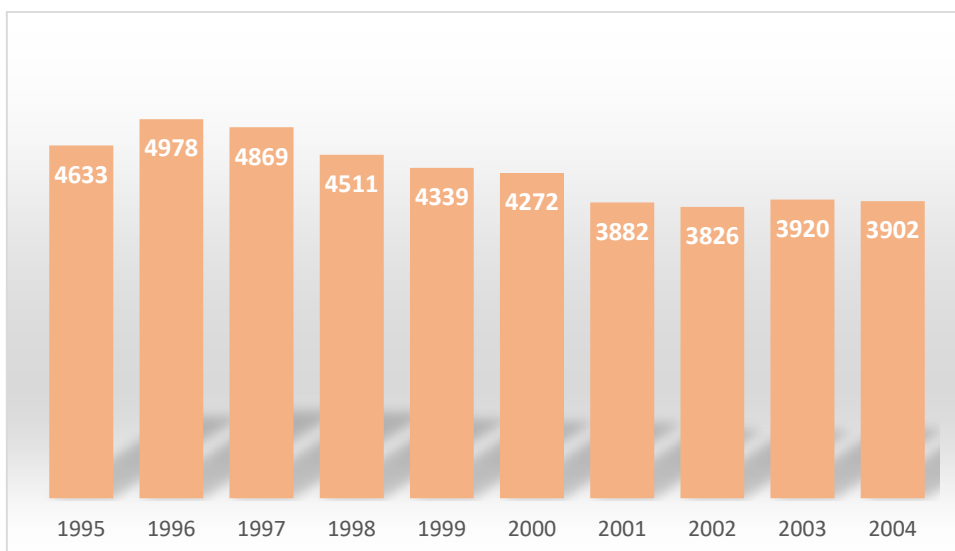


Figure 3 – Total number of Births Registered on the Maltese Islands for the Period 1995 - 2004

2.2 Secondary School - Form 5

The main interest in this section lies with working out the percentages of students who obtained six SEC examination passes at grade 5/C or better including English Language, Maltese, Mathematics and Physics, from 2011-2017, allowing these students to further their studies at post-secondary level, bringing them a step closer to follow an engineering degree at UOM. Percentages of interest are presented in Figure 4. Seeing that Physics and Mathematics play a very important role in pursuing an engineering degree, percentages of students who passed from Physics SEC examination and Maths SEC examination are presented in Figures 5 and 6 respectively. Bear in mind that **these percentages are worked out in reference to the number of students who started Form 2 four years earlier**. Refer to Figure A.1, in the Appendix, for a plot of the total number of students who obtained six SEC examination passes at grade 5/C or better including English Language, Maltese, Mathematics and Physics, from 2011-2017.

From Figure 4, it may be noticed that over the period 2011-2017, the percentage of students who obtained the SEC certificate has always been higher than 40%, with the largest increase, of around 5%, taking place between 2013 and 2014. In year 2017, this percentage stood at 47.44%.

Figures 5 and 6 show that over the period 2011-2017, consistently, a larger percentage of students achieved a pass from Mathematics SEC exam versus a pass from Physics SEC exam. The percentage for Mathematics stands at around 60-65% with exceptional pass rates achieved in 2014 and 2016. The corresponding percentages were in fact 85.5% and 83.3% respectively.

The percentage for Physics is around 55% with exceptional pass rates also achieved in 2014 and 2016, with corresponding percentages of 64.73% and 66.42% respectively.

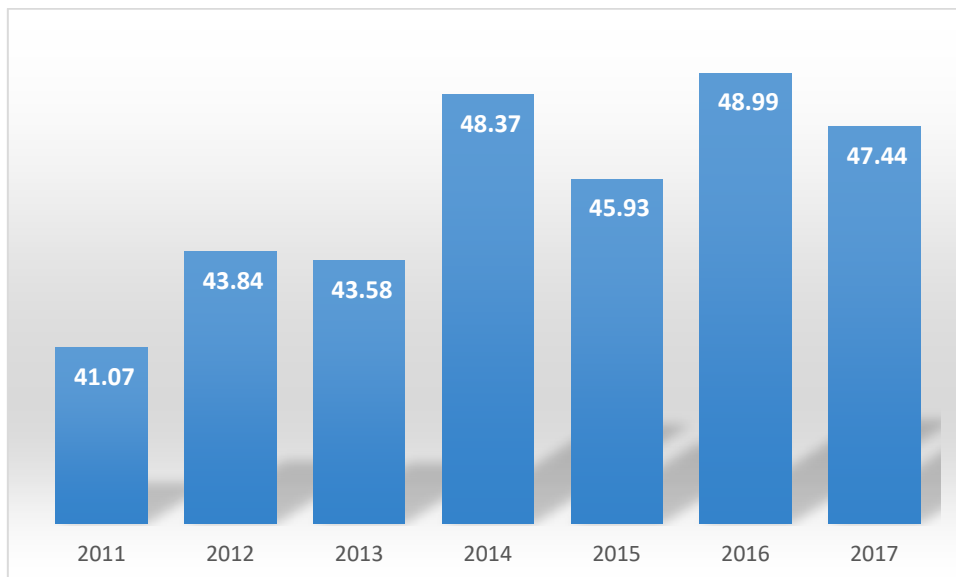


Figure 4- Percentage of Students who obtained six SEC examination at Grade 5/C or better including English Language, Maltese, Mathematics and Physics

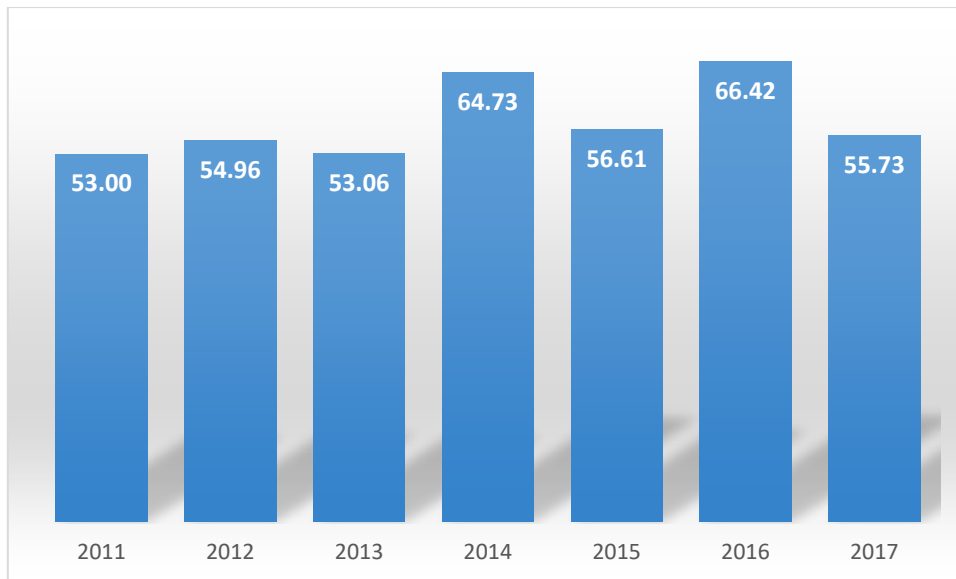


Figure 5 - Percentage of Students who passed from Physics SEC Examination

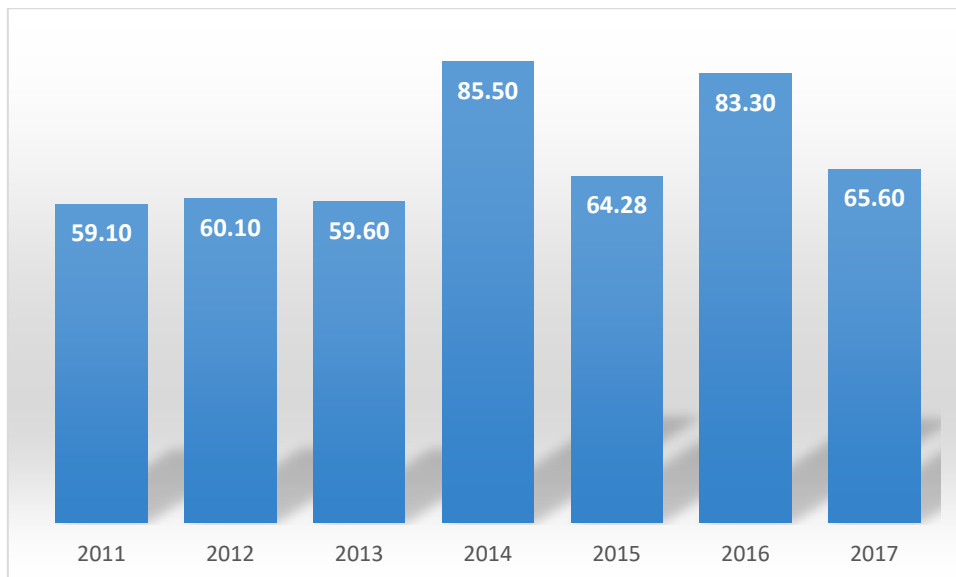


Figure 6 - Percentage of Students who passed from Mathematics SEC Examination

2.3 Post-Secondary Level

Focus in this section is directed to working the percentages of students who over the period 2013 – 2017, have been awarded the MATSEC certificate and obtained a grade C or better in both Maths and Physics MATSEC examination, allowing these students to opt for an engineering degree at UOM. Percentages of interest are presented in Figure 7. **These percentages are worked out in reference to the number of students enrolled in Form 2 six years earlier.** Refer to Figure A.2, in Appendix A, for a plot of the total number of students who were awarded the Matriculation Certificate and a grade C or better in both Mathematics and Physics MATSEC Examination.

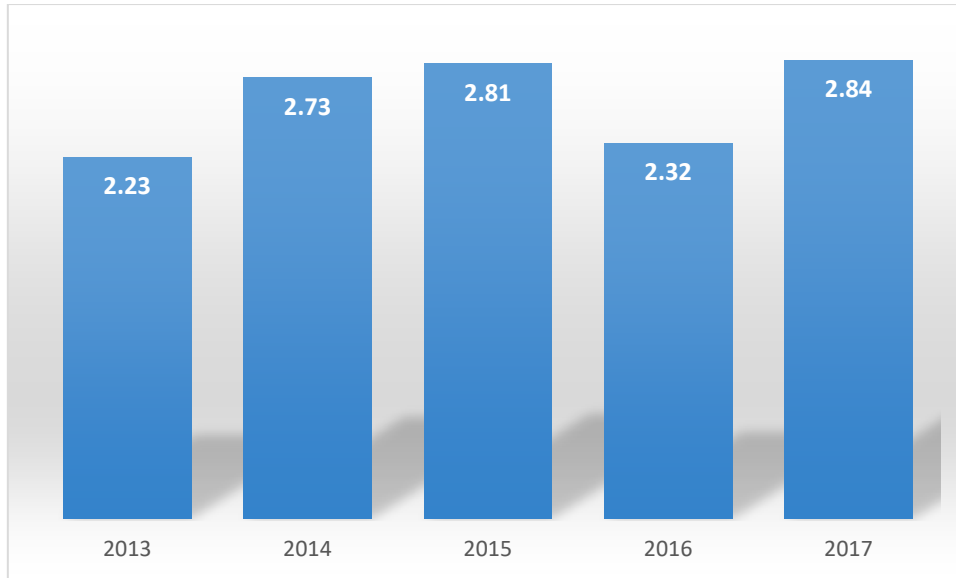


Figure 7 - Percentage of Students who were awarded the Matriculation Certificate with a Grade C or better in both Mathematics and Physics

Figure 7 shows that, over the period 2013-2017, the percentage of students who obtained the necessary qualifications to follow an Engineering degree at the UoM stood around 2-3%. There was a very slight decrease of 0.5% between 2015 and 2016, which was however made up for between 2016 and 2017.

2.4 University of Malta

The percentage of students who were accepted to read for a B.Eng Honours degree at UoM in academic year 2013/2014 until academic year 2018/2019 are shown in Figure 8. During these years, students could opt to read for a course in Mechanical or Electrical Engineering. **These percentages shown in Figure 8 are worked out in reference to the number of students enrolled in Form 2 six years earlier.** Refer to Figure A.3, in the Appendix, for a plot of the total number of students who were accepted for a B.Eng Honours Degree at UoM.

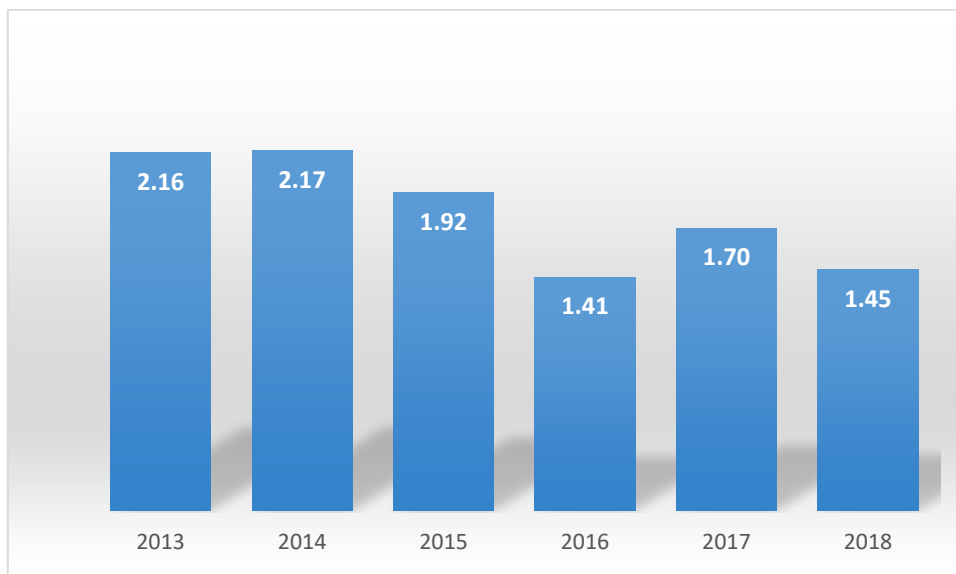


Figure 8 - Percentage of Students who were accepted for a B.Eng Honours Degree

Figure 8 shows that, during the first three academic years considered, the percentage of students who started an Engineering degree at the UoM stood around 2%. This percentage has however decreased to 1.41% during academic year starting 2016, with a slight increase of 0.29% during the subsequent year, followed by another decrease of 0.25% over the last academic year.

It was also of interest to obtain the percentage of students who graduated with a B.Eng degree from UOM. Due to data limitations, it was only possible to calculate this percentage for the cohorts of students who started Form 2 in 2007 and 2008. Assuming that the students followed a typical path, without taking any gap years and without having to repeat any scholastic years, these students started the B.Eng degree at UOM in academic years 2013 and 2014 and graduated in 2017 and 2018 respectively. The corresponding percentages are shown in Figure 9. The percentage of graduates for academic year 2017/2018 seems to be slightly higher than that of 2016/2017.

Refer to Figure A.4, in Appendix A, for a plot of the total number of students who graduated with a B.Eng Honours Degree from UOM.

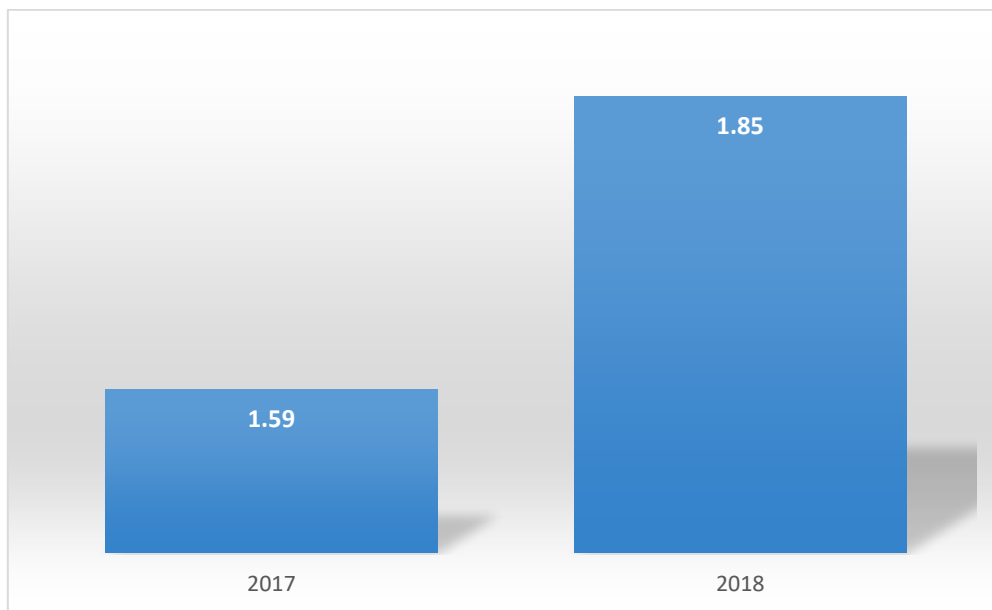


Figure 9 - Percentage of Students who graduated with a B.Eng Degree

3.0 Concluding Remarks

Form 2, Form 5 and post-Secondary level were identified as three critical time points at which students may decide to choose subjects that may lead them to choose an engineering degree at the UoM. Figure 1 displays the path that students need to follow to get to choose this degree.

Various percentages for the different time points have been presented throughout this report:

- the percentages of students who obtained six SEC examination passes at grade 5/C or better including English Language, Maltese, Mathematics and Physics, from 2011-2017,
- the percentages of students who over the period 2013-2017, have been awarded the MATSEC certificate and obtained a grade C or better in both Maths and Physics MATSEC examination,
- the percentage of students who were accepted to read for a B.Eng Honours degree at UoM in academic year 2013/2014 until academic year 2018/2019,
- the percentage of students who graduated with a B.Eng degree from UoM in academic years 2016/2017 and 2017/2018.

A student who started Form 2 in 2008 and who decided to read for a four-year B.Eng course at UoM is expected to graduate in 2017. Thus, full percentage details for the path shown in Figure 1 can only be presented for students who were enrolled in Form 2 in 2007 and 2008. These paths are shown in Figure 10. From these paths, it may be noted that around 60% of the students who could potentially further their studies at UoM are lost due to not getting their SEC certificate. After post-secondary, only between 2-3% of the original population remain eligible to become potential engineering graduates, from which around 70% proceed to graduate with a B.Eng degree.

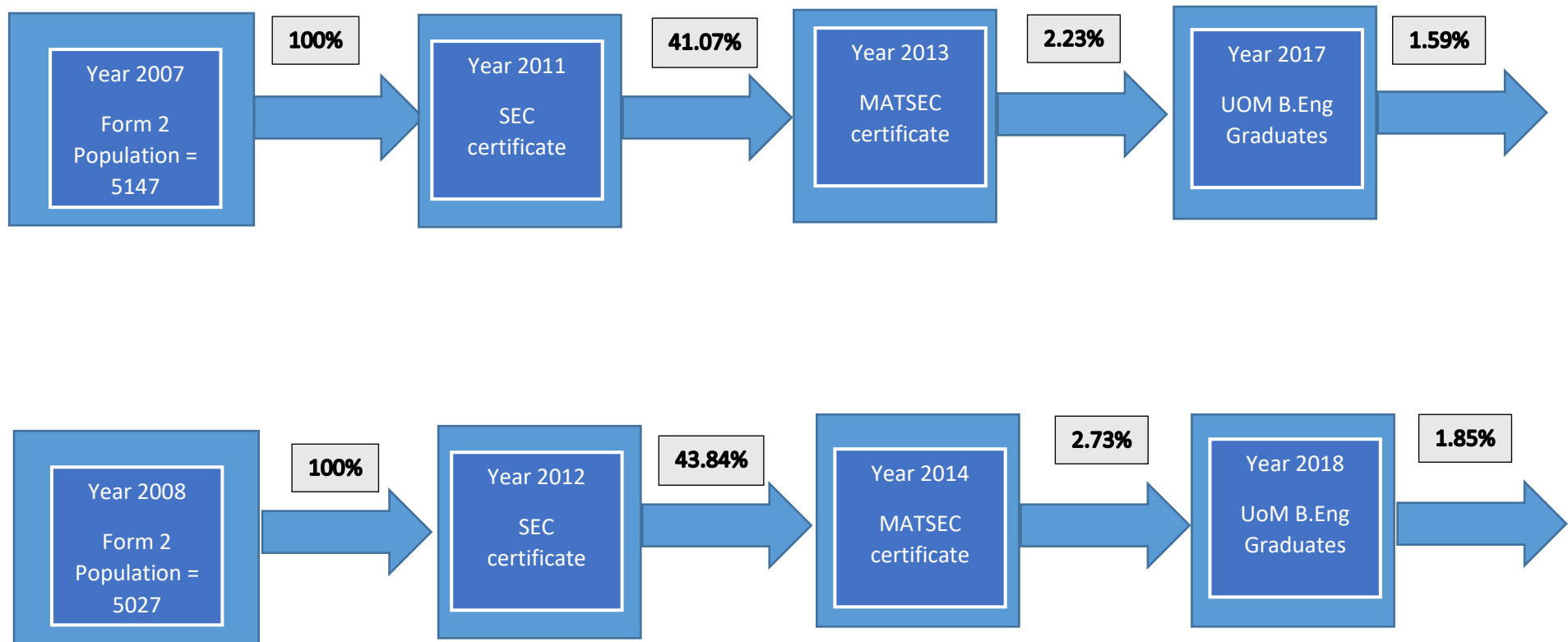


Figure 10. Data Analysis Results

Appendix A

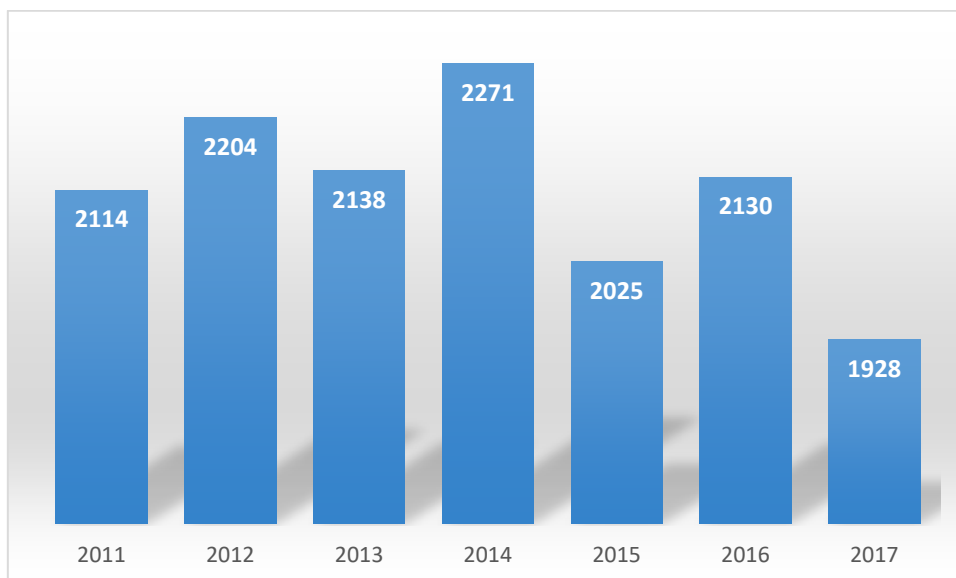


Figure A.1 - Total Number of Students in possession of six passes in the SEC Examination at Grade 5/C or better including English Language, Maltese, Mathematics and Physics

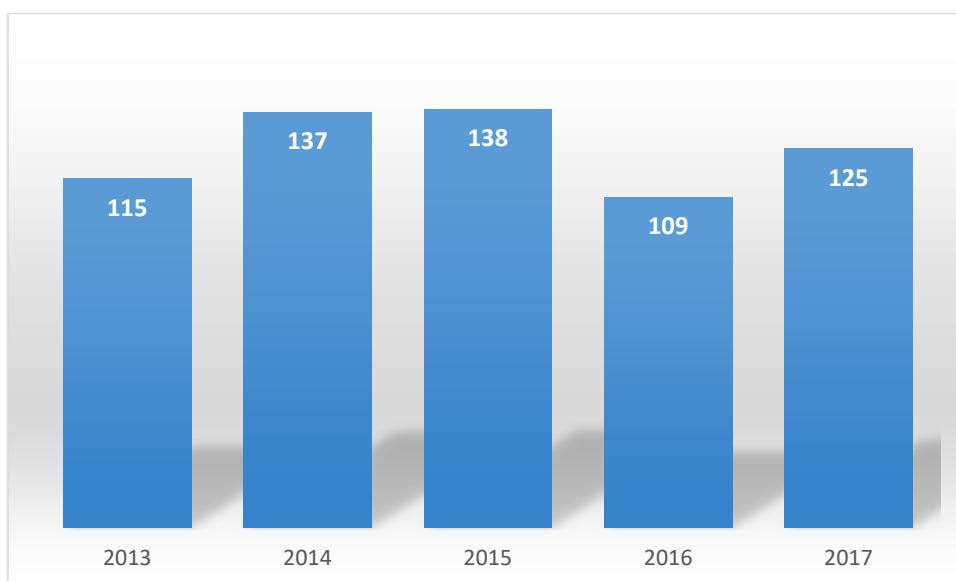


Figure A.2 - Total Number of Students who were awarded the Matriculation Certificate and a grade C or better in both Mathematics and Physics MATSEC Examination

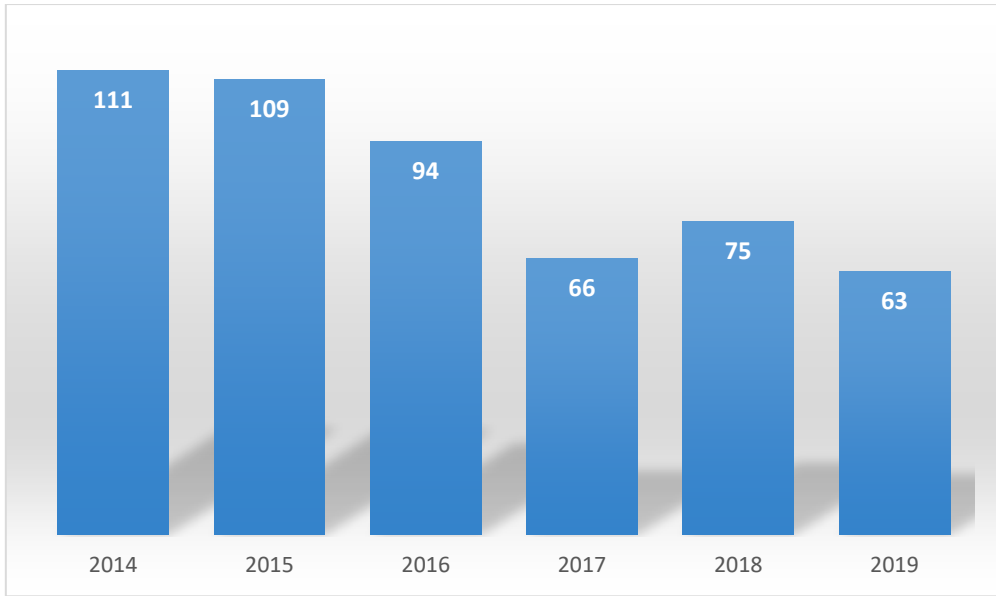


Figure A3 - Total Number of Students who were accepted for a B.Eng Hons Degree at UoM

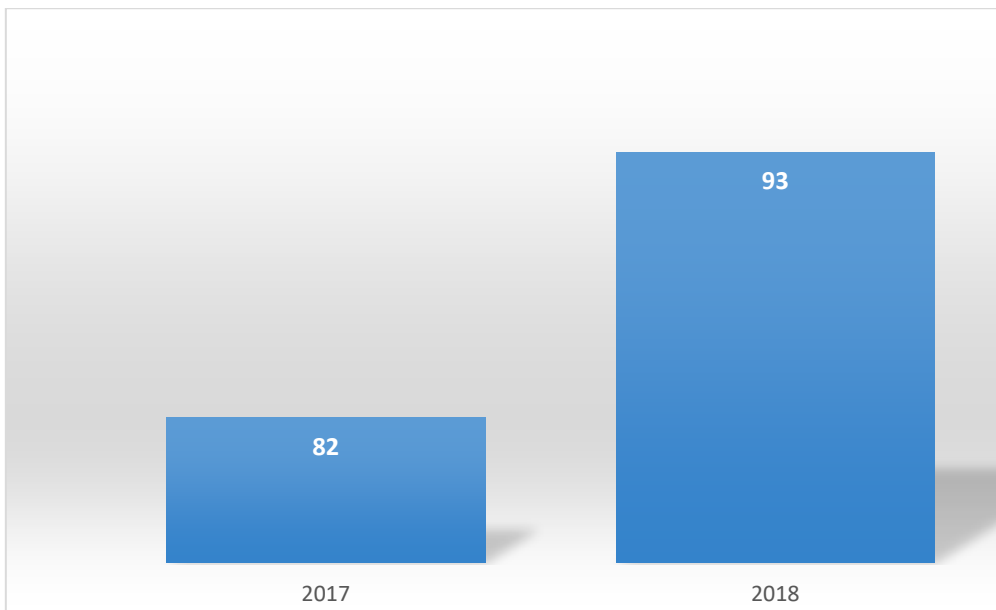


Figure A4 - Total Number of Students who graduated with a B.Eng Degree from UoM

Appendix B: Additional Information that was not requested in quote but might be of interest to the Chamber of Engineers

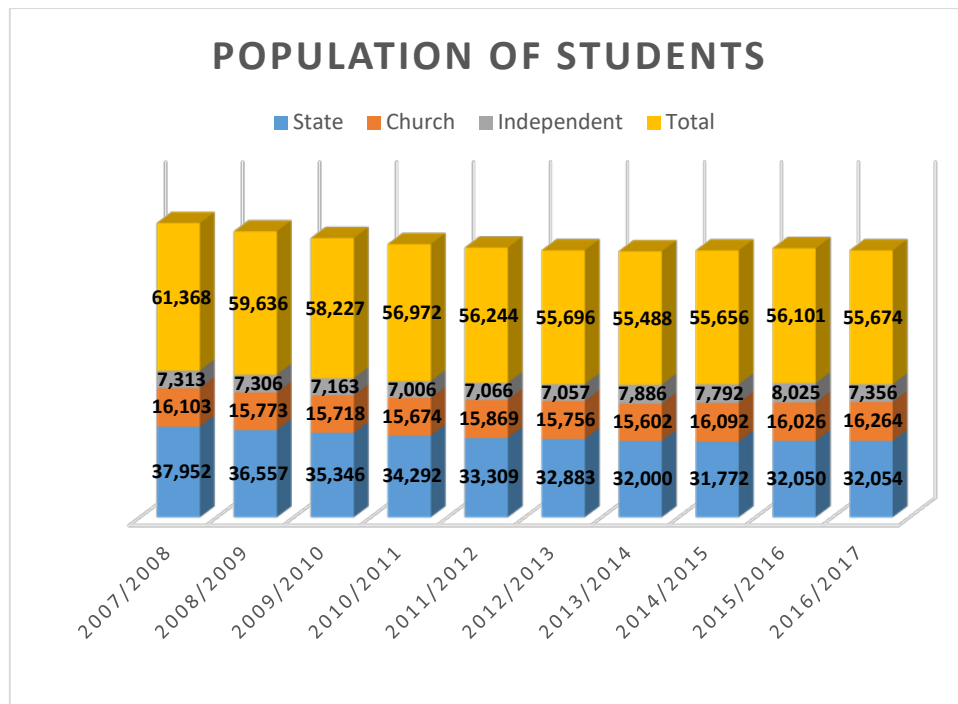


Figure B1 – Total Number of Students enrolled in a Secondary School by Academic year and School Type

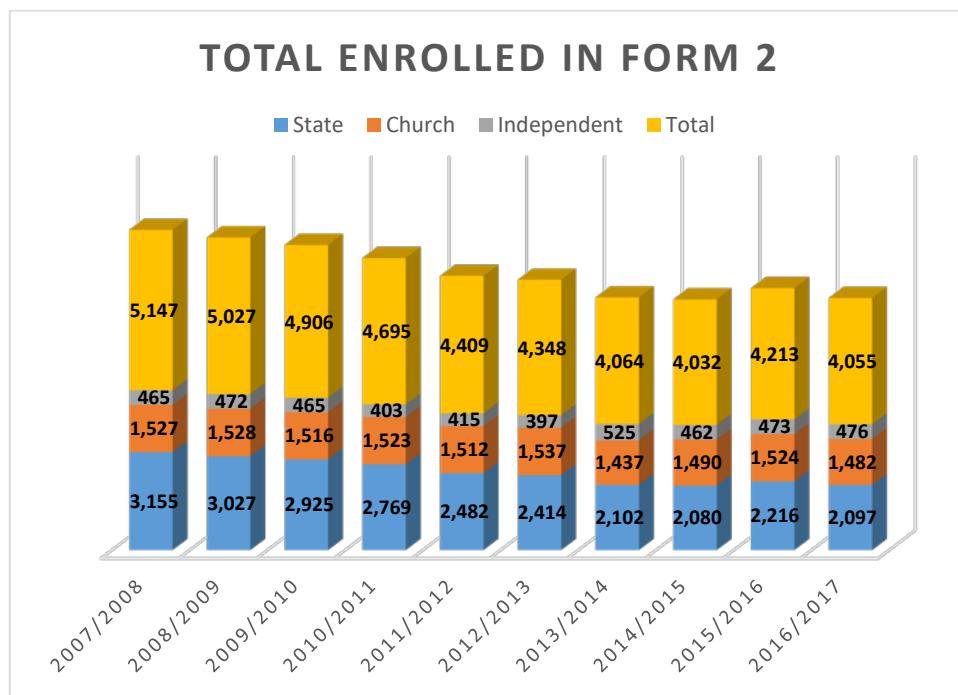


Figure B2 – Total Number of Students enrolled in Form 2 by Academic Year and School Type

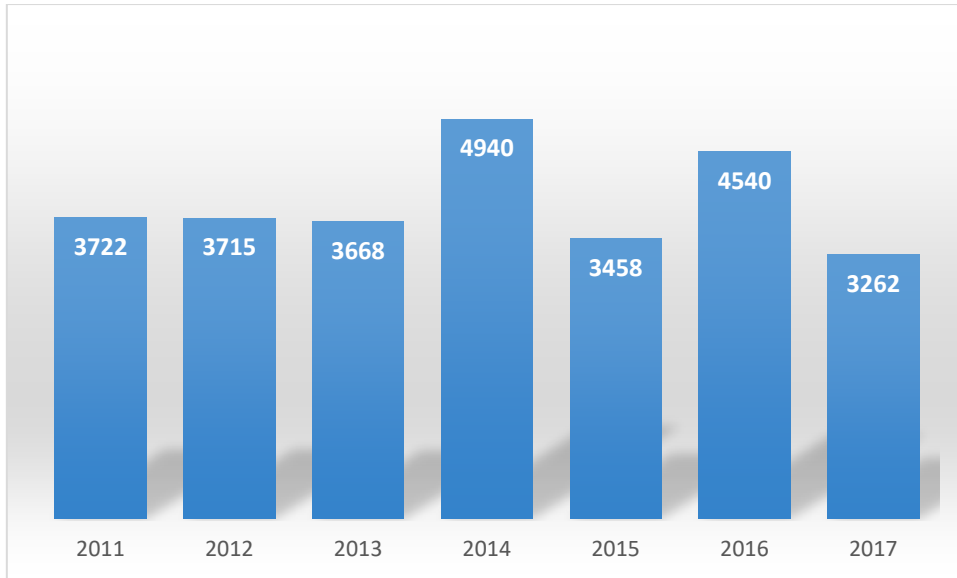


Figure B3 - Total Number of Students who sat for the Mathematics SEC Examination

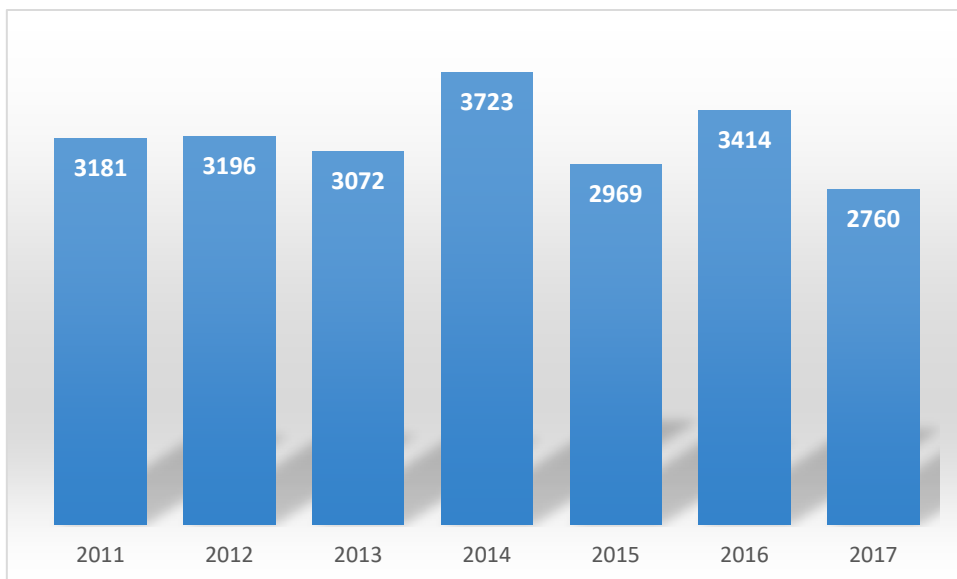


Figure B4 - Total Number of Students who sat for the Physics SEC Examination

Figures B3 and B4 show that more students sit for Mathematics SEC examination than for Physics SEC examination.

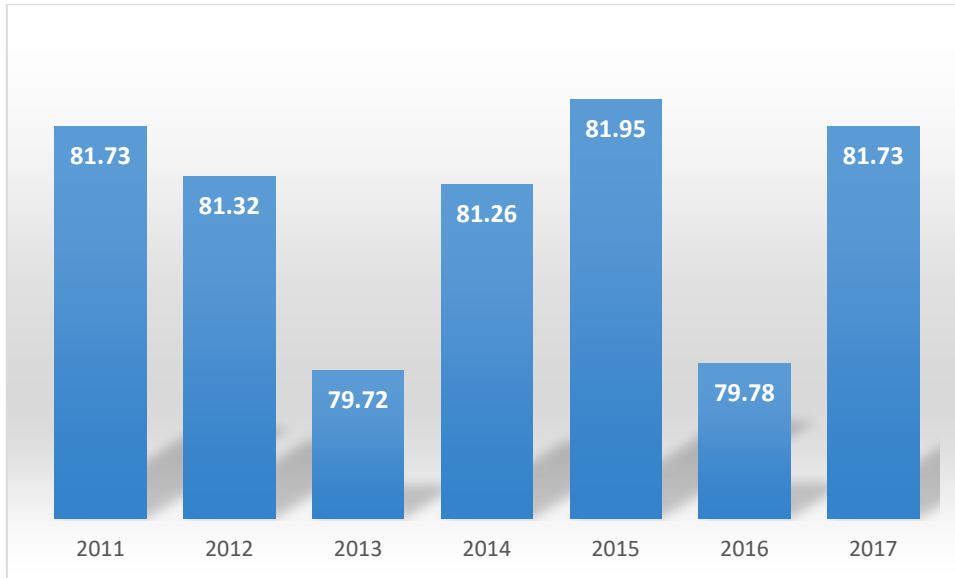


Figure B5 - Percentage of Students who passed the Mathematics SEC Examination, worked out with the total number of students who sat for Maths SEC Examination (shown in Figure B3) in the denominator

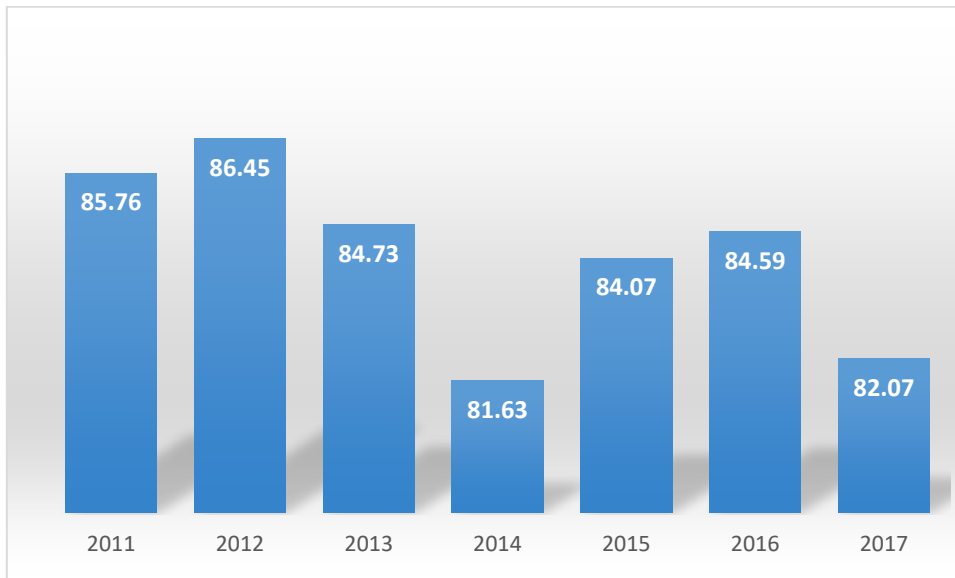


Figure B6 - Percentage of Students who passed the Physics SEC Examination, worked out with the total number of students who sat for Physics SEC Examination (shown in Figure B4) in the denominator