

# PO ATTAINMENT

The following discussion is the result of PO attainment of the Graduates in 2017 (Intake Year 2013) and Graduates in 2018 (Intake Year 2014).

## OBE Database System

Owing to the fact that tracking of the student attainments of CO and PO is a major part in the OBE education, the School has made the effort to develop CO and PO attainment system namely the “OBE Database System”. This system enables both lecturers and management to keep track the CO and PO attainments for both cohort and individual basis. According to the analysis provided by the OBE Database System, both 2017 and 2018 Chemical Engineering Graduates performed well in relation to the POs. The final average marks upon graduation for the overall cumulative result is above 60% for each PO (see Table 1 and Table 2). The results revealed that the 2017 graduates scored highly in PO9 (teamwork skills) and while 2018 graduates scored highest in PO8 (ethics). The results also revealed that the 2017 and 2018 graduates performed well in the soft skills compared to technical skills. The average trend in by year of study also shows that the students have performed roughly similar performance throughout the 4 year programme.

**Table 1:** Average Marks for PO Attainment for 2017 Graduates

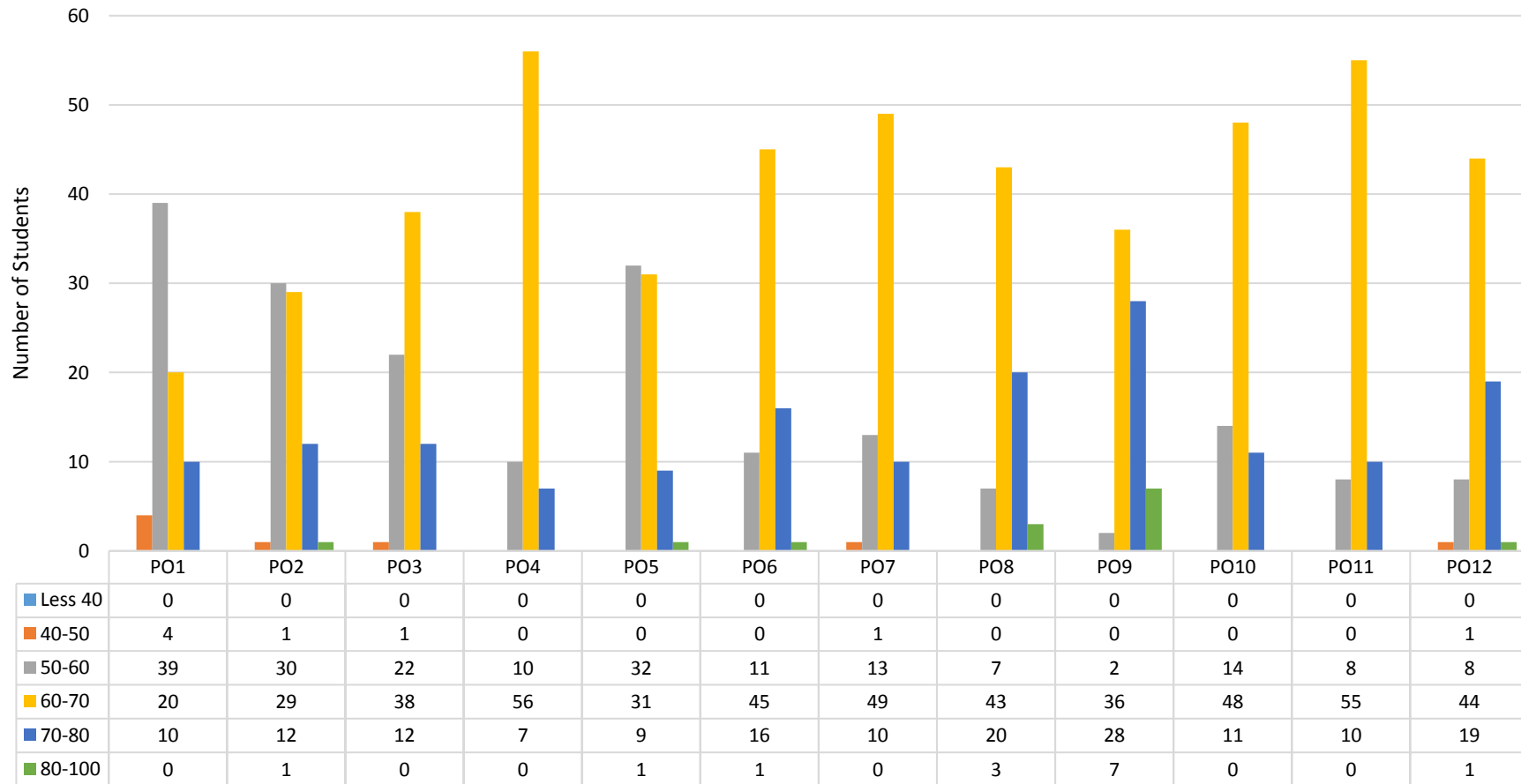
| PO   | Year 1 (2014)<br>Result (%) | Year 2 (2015)<br>Result (%) | Year 3 (2016)<br>Result (%) | Year 4 (2017)<br>Result (%) |
|------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| PO1  | 57.18                       | 59.94                       | 60.41                       | 60.59                       |
| PO2  | 61.54                       | 63.36                       | 62.25                       | 62.53                       |
| PO3  | 77.35                       | 70.15                       | 63.79                       | 63.74                       |
| PO4  | -                           | 70.74                       | 64.31                       | 63.94                       |
| PO5  | 61.91                       | 68.15                       | 63.56                       | 62.56                       |
| PO6  | -                           | -                           | 64.54                       | 66.04                       |
| PO7  | -                           | -                           | 62.91                       | 63.73                       |
| PO8  | -                           | 76.44                       | 66.97                       | 67.52                       |
| PO9  | -                           | 70.27                       | 71.85                       | 70.51                       |
| PO10 | 53.99                       | 62.33                       | 63.99                       | 64.63                       |
| PO11 | -                           | -                           | 55.91                       | 65.90                       |
| PO12 | -                           | 89.52                       | 81.44                       | 66.65                       |

**Table 2:** Average Marks for PO Attainment for 2018 Graduates

| <b>PO</b> | <b>Year 1 (2015)<br/>Result (%)</b> | <b>Year 2 (2016)<br/>Result (%)</b> | <b>Year 3 (2017)<br/>Result (%)</b> | <b>Year 4 (2018)<br/>Result (%)</b> |
|-----------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| PO1       | 63.01                               | 63.48                               | 59.43                               | 60.12                               |
| PO2       | 64.44                               | 61.79                               | 58.99                               | 61.26                               |
| PO3       | 60.78                               | 63.49                               | 57.38                               | 60.33                               |
| PO4       | -                                   | 65.36                               | 58.28                               | 61.38                               |
| PO5       | 65.16                               | 65.09                               | 61.96                               | 61.88                               |
| PO6       | -                                   | -                                   | 62.95                               | 65.98                               |
| PO7       | -                                   | -                                   | 50.28                               | 60.94                               |
| PO8       | -                                   | 76.54                               | 67.29                               | 68.26                               |
| PO9       | 75.93                               | 59.74                               | 58.31                               | 61.71                               |
| PO10      | 74.74                               | 65.05                               | 57.82                               | 64.37                               |
| PO11      | 60.09                               | 60.16                               | 50.67                               | 62.87                               |
| PO12      | 76.21                               | 76.21                               | 57.81                               | 69.30                               |

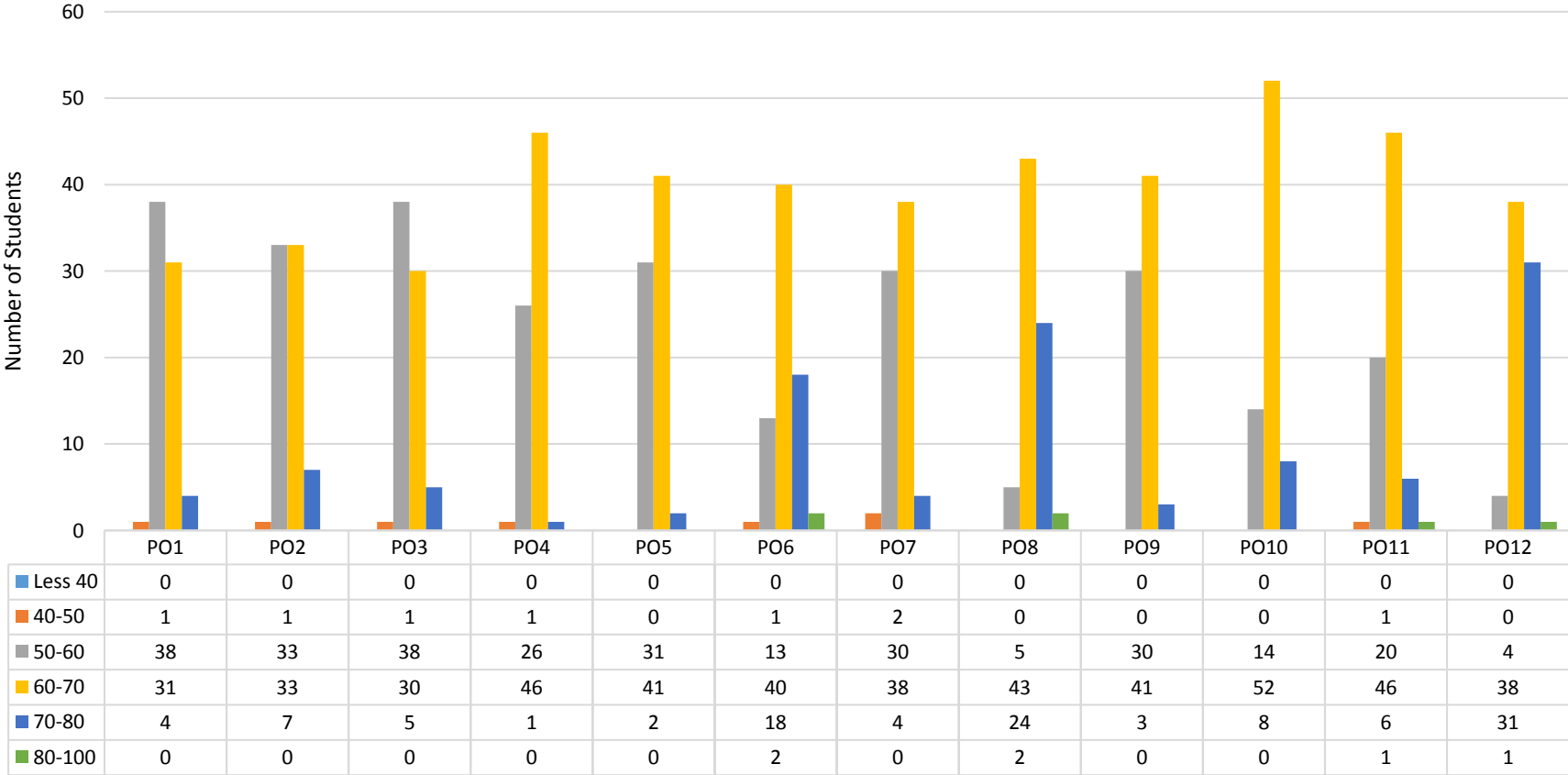
All of the 2017 and 2018 graduates exceeded the 40 % bench mark performance target set by the School in all of the POs. Results from the distribution of the performance (see Figure 1 and Figure 2) also shows that none of the students scored less than 40 % and not more than 4 students scored less than 50%. Nevertheless, at most 7 students in 2018 graduates and 4 students in 2017 graduates scored more than 80% in few POs namely in PO8 (ethics), PO9 (teamwork) and PO12 (lifelong learning skills). The majority of the students fall in the category of 60% to 80%.

## Overall Cumulative Average Marks of PO Attainment of the 2017 Graduates



**Figure 1:** Distribution of Overall Cumulative Average Marks of PO Attainment of the Students

## Overall Cumulative Average Marks of PO Attainment of the 2018 Graduates



**Figure 2:** Distribution of Overall Cumulative Average Marks of PO Attainment of the Students

## Key Exiting Year Courses Result

The 2017 Graduates performed well in both their Design Project and Final Year Project courses (Table 3). These courses are very demanding as they are project-based courses and the students are being assessed in many aspects of the PO. Overall, the average mark of design and FYP courses show PO achievement in the range of 53.4% to 74.0%. The highest mark comes from PO9 (teamwork) with 74.0%.

**Table 3:** Analysis of Design and FYP Courses for 2017 Graduates

| PO   | EKC451<br>Process Design<br>& Analysis | EKC453<br>Plant Design &<br>Economics | Final Year<br>Project | TOTAL<br>AVERAGE |
|------|--|---------------------------------------|-----------------------|------------------|
| PO1  | 68.1                                   | 79.2                                  | 72.0                  | 73.1             |
| PO2  | 70.7                                   | 79.2                                  | 64.8                  | 71.6             |
| PO3  | 60.5                                   | 57.8                                  | 64.8                  | 61.0             |
| PO4  | -                                      | -                                     | 72.0                  | 72.0             |
| PO5  | 53.7                                   | 53.1                                  | -                     | 53.4             |
| PO6  | 53.7                                   | 75.4                                  | -                     | 64.6             |
| PO7  | 60.5                                   | 71.2                                  | 64.8                  | 65.5             |
| PO8  | 53.7                                   | 77.8                                  | -                     | 65.8             |
| PO9  | 74.3                                   | 73.6                                  | -                     | 74.0             |
| PO10 | 74.3                                   | 75.4                                  | 64.9                  | 71.5             |
| PO11 | 68.7                                   | 73.6                                  | 65.0                  | 69.1             |
| PO12 | -                                      | -                                     | 64.9                  | 64.9             |

Similar performance result could be seen for 2018 Graduates in both their Design Project and FYP courses (Table 4). Overall, the average mark of design and FYP courses show PO achievement in the range of 56.8% to 78.9%. It is interesting to note that for both Graduates the lowest marks could be seen in PO5 (Modern Tools Usage).

**Table 4:** Analysis of Design and FYP Courses for 2018 Graduates

| PO   | EKC451<br>Process Design<br>& Analysis | EKC453<br>Plant Design &<br>Economics | Final Year<br>Project | TOTAL<br>AVERAGE |
|------|--|---------------------------------------|-----------------------|------------------|
| PO1  | 46.4                                   | 89.8                                  | 75.4                  | 70.5             |
| PO2  | 67.5                                   | 89.8                                  | 79.5                  | 78.9             |
| PO3  | 43.2                                   | 67.5                                  | 79.5                  | 63.4             |
| PO4  | -                                      | -                                     | 75.4                  | 75.4             |
| PO5  | 52.7                                   | 60.9                                  | -                     | 56.8             |
| PO6  | 52.7                                   | 79.7                                  | -                     | 66.2             |
| PO7  | 43.2                                   | 76.1                                  | 79.5                  | 66.3             |
| PO8  | 52.7                                   | 79.7                                  | -                     | 66.2             |
| PO9  | 64.2                                   | 82.6                                  | -                     | 73.4             |
| PO10 | 64.2                                   | 82.6                                  | 76.0                  | 74.3             |
| PO11 | 53.8                                   | 80.6                                  | 74.9                  | 69.8             |
| PO12 | -                                      | -                                     | 76.0                  | 76.0             |

**Exit Survey Result (Score out of 5.00)**

The result from exit survey (Table 5) is a very useful method to assess the students' perception of their performance in terms of attainment of PO. Both 2017 and 2018 Graduates perceived their attainment highest in PO7 (Environment & Sustainability), PO8 (Ethics) and PO9 (Teamwork).

**Table 5:** Result of Exit Surveys

| PO   | 2014<br>Graduates | 2015<br>Graduates | 2016<br>Graduates | 2017<br>Graduates | 2018<br>Graduates |
|------|-------------------|-------------------|-------------------|-------------------|-------------------|
| PO1  | 3.67              | 4.02              | 4.03              | 3.83              | 3.75              |
| PO2  | 3.60              | 3.91              | 4.06              | 3.70              | 3.80              |
| PO3  | 3.58              | 4.02              | 4.09              | 3.75              | 3.72              |
| PO4  | 3.63              | 4.02              | 4.08              | 3.75              | 3.96              |
| PO5  | 3.42              | 3.72              | 3.83              | 3.51              | 3.75              |
| PO6  | 3.66              | 3.92              | 4.11              | 3.87              | 3.82              |
| PO7  | 3.76              | 4.12              | 4.12              | 3.96              | 4.06              |
| PO8  | 3.83              | 4.20              | 4.12              | 3.93              | 4.02              |
| PO9  | 3.81              | 4.03              | 4.19              | 3.93              | 4.11              |
| PO10 | 3.85              | 4.18              | 4.12              | 3.85              | 3.84              |
| PO11 | 3.59              | 3.85              | 4.11              | 3.74              | 3.99              |
| PO12 | 3.65              | 4.08              | 4.11              | 3.85              | 4.00              |

## **PO Attainment Analysis**

### Overall Analysis

The overall analysis shows that the results obtained from the three different methods (OBEDB, Design and FYP) are almost consistent. Generally, the results from Design Project and FYP courses are in line with the perception of the students. The PO achievement measured by the Overall OBE Database however has lower performance result than the rest. Since the results of the Design and FYP courses were measured during the student's final year of the programme, high correlation of these results to the exit survey was expected. The Overall OBE Database measured the average performance of the whole 4 - year programme and thus, provides the overall performance of the students.

The Performance Indicators set by the School for the PO Attainment for all POs have been successfully satisfied. All students who graduated on time (GOT) attained at least 40% average marks provided by the OBE Database System in all POs. All average PO attainment marks from the key exiting year courses was higher than performance target set by the School at 40.0%. The students also gave a favourable score in the Exit Survey exceeding the performance target set by the School at 3.50. The bar chart showing the Percentage Average Marks from different methods of assessments and status of attainment of each Performance Indicators for each POs are given in the PO Tray below. Please see Appendix D9 for proof of dissemination of PO Attainment in the School and Appendix D10 for PO Trays of each PO.

Tray for PO1: Engineering Knowledge

The Attainment of the Programme Outcome 1 of 2017 Graduates

| No. | Programme Outcome 1 Performance Indicators   | Performance                 | Status        |
|-----|--|-----------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved PT of Cumulative Average PO1 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% with average of 60.59% | > PT Achieved |
| 2.  | PT of 60 % in Average PO1 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 73.1%                       | > PT Achieved |
| 3.  | A PT Score of 3.50/5.00 of Graduates Response on PO1 Attainment in Exit Survey   | 3.83                        | > PT Achieved |

The Attainment of the Programme Outcome 1 of 2018 Graduates

| No. | Programme Outcome 1 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO1 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 60.12% | > PT Achieved |
| 2.  | 60 % in Average PO1 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 70.5%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO1 Attainment in Exit Survey  | 3.75                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 1 has been achieved.



Tray for PO2: Problem Analysis

The Attainment of the Programme Outcome 2 of 2017 Graduates

| No. | Programme Outcome 2 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO2 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 62.53% | > PT Achieved |
| 2.  | 60 % in Average PO2 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 71.6%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO2 Attainment in Exit Survey  | 3.70                             | > PT Achieved |

The Attainment of the Programme Outcome 2 of 2018 Graduates

| No. | Programme Outcome 2 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO2 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 61.26% | > PT Achieved |
| 2.  | 60 % in Average PO2 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 78.9%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO2 Attainment in Exit Survey  | 3.80                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 2 has been achieved.

Tray for PO3: Design/Development of Solutions

The Attainment of the Programme Outcome 3 of 2017 Graduates

| No. | Programme Outcome 3 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO3 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 63.74% | > PT Achieved |
| 2.  | 60 % in Average PO3 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 61.0%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO3 Attainment in Exit Survey  | 3.75                             | > PT Achieved |

The Attainment of the Programme Outcome 3 of 2018 Graduates

| No. | Programme Outcome 3 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO3 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 60.33% | > PT Achieved |
| 2.  | 60 % in Average PO3 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 63.4%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO3 Attainment in Exit Survey  | 3.72                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 3 has been achieved.

Tray for PO4: Investigation

The Attainment of the Programme Outcome 4 of 2017 Graduates

| No. | Programme Outcome 4 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO4 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 63.94% | > PT Achieved |
| 2.  | 60 % in Average PO4 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 72.0%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO4 Attainment in Exit Survey  | 3.75                             | > PT Achieved |

The Attainment of the Programme Outcome 4 of 2018 Graduates

| No. | Programme Outcome 4 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO4 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 61.38% | > PT Achieved |
| 2.  | 60 % in Average PO4 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 75.4                             | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO4 Attainment in Exit Survey  | 3.96                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 4 has been achieved.

Tray for PO5: Modern Tools Usage

The Attainment of the Programme Outcome 5 of 2017 Graduates

| No. | Programme Outcome 5 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO5 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 62.56% | > PT Achieved |
| 2.  | 60 % in Average PO5 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 53.4%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO5 Attainment in Exit Survey  | 3.51                             | > PT Achieved |

The Attainment of the Programme Outcome 5 of 2018 Graduates

| No. | Programme Outcome 5 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO5 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 61.88% | > PT Achieved |
| 2.  | 60 % in Average PO5 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 56.8%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO5 Attainment in Exit Survey  | 3.75                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 5 has been achieved.

Tray for PO6: The Engineer and Society

The Attainment of the Programme Outcome 6 of 2017 Graduates

| No. | Programme Outcome 6 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO6 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 66.04% | > PT Achieved |
| 2.  | 60 % in Average PO6 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 64.6%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO6 Attainment in Exit Survey  | 3.87                             | > PT Achieved |

The Attainment of the Programme Outcome 6 of 2018 Graduates

| No. | Programme Outcome 6 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO6 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 65.98% | > PT Achieved |
| 2.  | 60 % in Average PO6 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 66.2%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO6 Attainment in Exit Survey  | 3.82                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 6 has been achieved.

Tray for PO7: Environment and Sustainability

The Attainment of the Programme Outcome 7 of 2017 Graduates

| No. | Programme Outcome 7 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO7 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 63.73% | > PT Achieved |
| 2.  | 60 % in Average PO7 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 65.5%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO7 Attainment in Exit Survey  | 3.96                             | > PT Achieved |

The Attainment of the Programme Outcome 7 of 2018 Graduates

| No. | Programme Outcome 7 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO7 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 60.94% | > PT Achieved |
| 2.  | 60 % in Average PO7 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 66.3%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO7 Attainment in Exit Survey  | 4.06                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 7 has been achieved.

Tray for PO8: Ethics

The Attainment of the Programme Outcome 8 of 2017 Graduates

| No. | Programme Outcome 8 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO8 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 67.52% | > PT Achieved |
| 2.  | 60 % in Average PO8 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 65.8%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO8 Attainment in Exit Survey  | 3.93                             | > PT Achieved |

The Attainment of the Programme Outcome 8 of 2017 Graduates

| No. | Programme Outcome 8 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO8 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 68.26% | > PT Achieved |
| 2.  | 60 % in Average PO8 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 66.2%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO8 Attainment in Exit Survey  | 4.02                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 8 has been achieved.

Tray for PO9: Individual and Teamwork

The Attainment of the Programme Outcome 9 of 2017 Graduates

| No. | Programme Outcome 9 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO9 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 70.51% | > PT Achieved |
| 2.  | 60 % in Average PO9 Attainment Marks from EKC499 Final Year Project  | 74.0%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO9 Attainment in Exit Survey  | 3.93                             | > PT Achieved |

The Attainment of the Programme Outcome 9 of 2018 Graduates

| No. | Programme Outcome 9 Performance Indicators   | Performance                      | Status        |
|-----|--|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO9 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 61.71% | > PT Achieved |
| 2.  | 60 % in Average PO9 Attainment Marks from EKC499 Final Year Project  | 73.4%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO9 Attainment in Exit Survey  | 4.11                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 9 has been achieved.



Tray for PO10: Communication

The Attainment of the Programme Outcome 10 of 2017 Graduates

| No. | Programme Outcome 10 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO10 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 64.63% | > PT Achieved |
| 2.  | 60 % in Average PO10 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 71.5%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO10 Attainment in Exit Survey  | 3.85                             | > PT Achieved |

The Attainment of the Programme Outcome 10 of 2018 Graduates

| No. | Programme Outcome 10 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO10 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 64.37% | > PT Achieved |
| 2.  | 60 % in Average PO10 Attainment Marks from Design Courses (EKC 451 and EKC453)  | 74.3%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO10 Attainment in Exit Survey  | 3.84                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 10 has been achieved.

Tray for PO11: Project Management and Finance

The Attainment of the Programme Outcome 11 of 2017 Graduates

| No. | Programme Outcome 11 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO11 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 65.90% | > PT Achieved |
| 2.  | 60 % in Average PO11 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 69.1%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO11 Attainment in Exit Survey  | 3.74                             | > PT Achieved |

The Attainment of the Programme Outcome 11 of 2018 Graduates

| No. | Programme Outcome 11 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO11 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 62.87% | > PT Achieved |
| 2.  | 60 % in Average PO11 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 69.8%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO11 Attainment in Exit Survey  | 3.99                             | > PT Achieved |

Result Conclusion:

All performance target for each performance indicators for Programme Outcome 11 has been achieved.

Tray for PO12: Lifelong Learning

The Attainment of the Programme Outcome 12 of 2017 Graduates

| No. | Programme Outcome 11 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO12 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 66.65% | > PT Achieved |
| 2.  | 60 % in Average PO12 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 64.9%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO12 Attainment in Exit Survey  | 3.85                             | > PT Achieved |

The Attainment of the Programme Outcome 12 of 2018 Graduates

| No. | Programme Outcome 11 Performance Indicators   | Performance                      | Status        |
|-----|---|----------------------------------|---------------|
| 1.  | 100 % of GOT Students Achieved Cumulative Average PO12 Attainment Marks of 40% and Above from Courses that Contributed to PO1 as in OBE Database System | 100% > PT with average of 69.30% | > PT Achieved |
| 2.  | 60 % in Average PO12 Attainment Marks from Key Exiting Year Courses (EKC 451, EKC453 and EKC499)  | 76.0%                            | > PT Achieved |
| 3.  | A Score of 3.50/5.00 of Graduates Response on PO12 Attainment in Exit Survey  | 4.00                             | > PT Achieved |

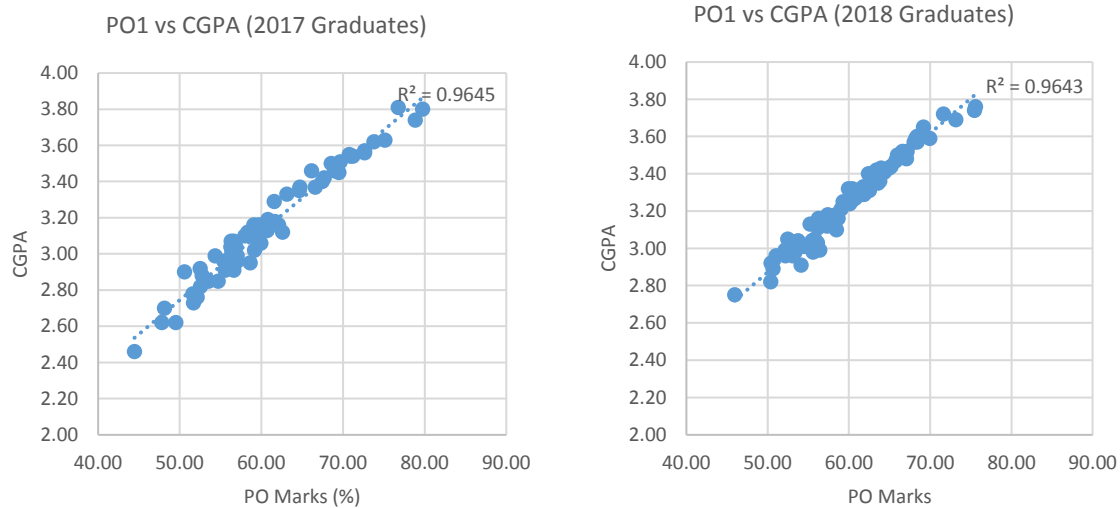
Result Conclusion:

All performance target for each performance indicators for Programme Outcome 12 has been achieved.

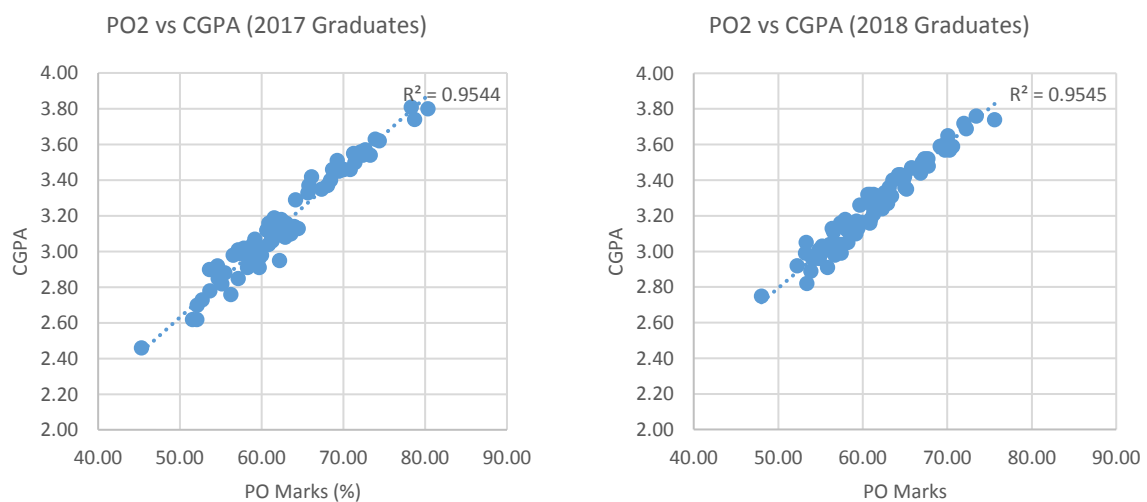
## Relationship between CGPA-PO Attainment Systems (Data Validation)

The CGPA of the students have been used to validate the result of PO attainment calculation of the students by Method 1 OBE Database System. Since CGPA is traditionally used to measure the technical skills of the students, therefore it is naturally true that the CGPA of the students should be well correlated with PO Attainment related to technical skills but it may or may not be well correlated with PO attainment related to soft skills. Working on this hypothesis, correlation graphs between CGPA of the 2017 and 2018 Graduates with the result of OBE Database System for each PO was constructed for data validation (Figure 3).

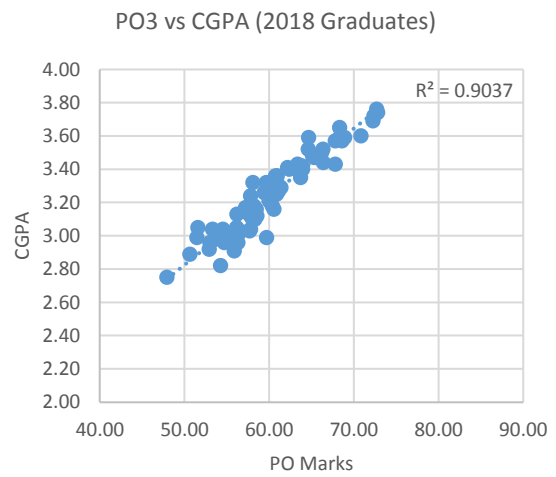
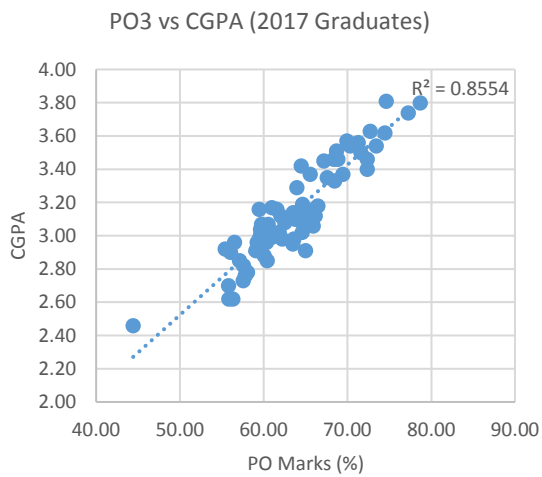
### a) PO1: Engineering Knowledge



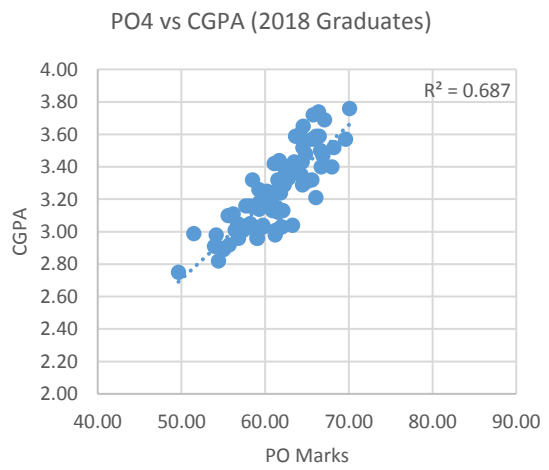
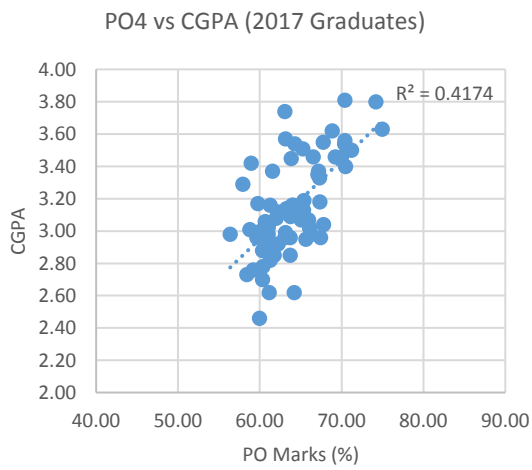
### b) PO2: Problem Analysis



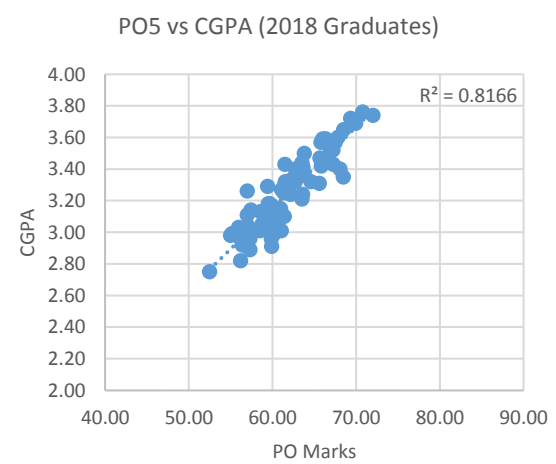
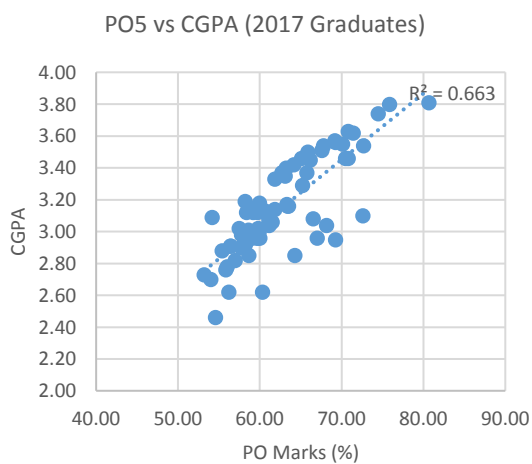
c) PO3: Design



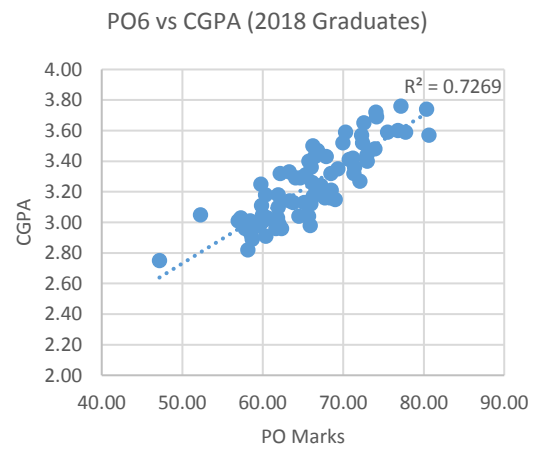
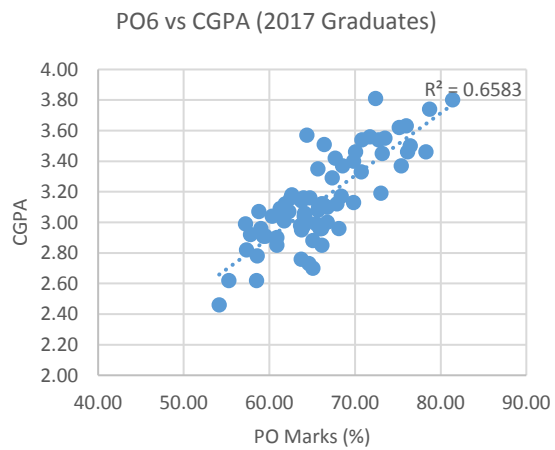
d) PO4: Research



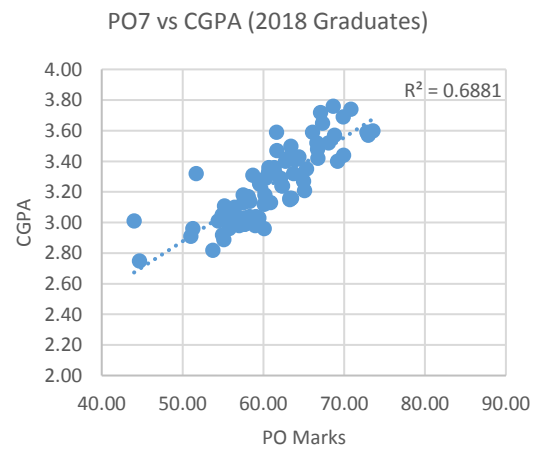
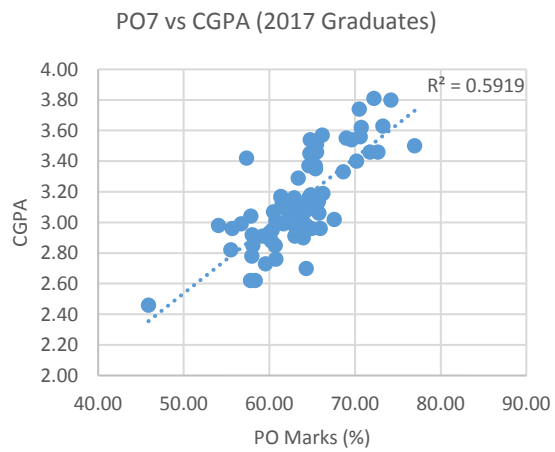
e) PO5: Modern Tools Usage Research



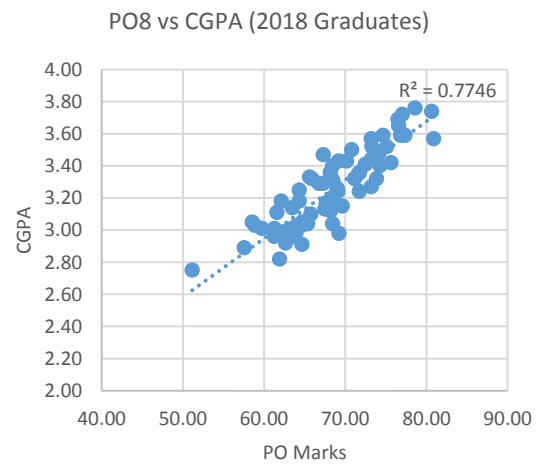
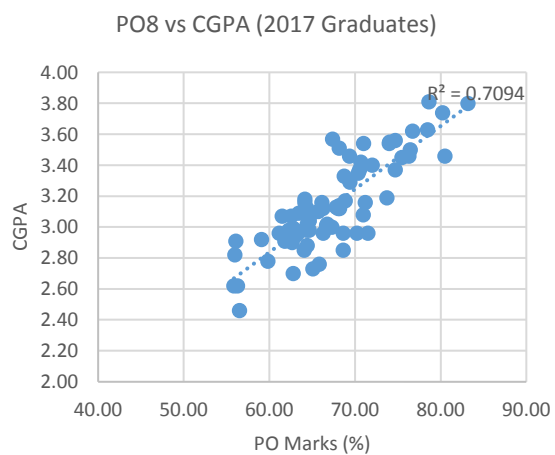
f) PO6: Engineer and Society



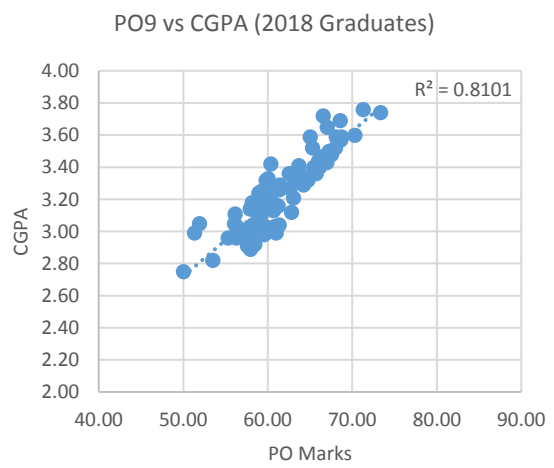
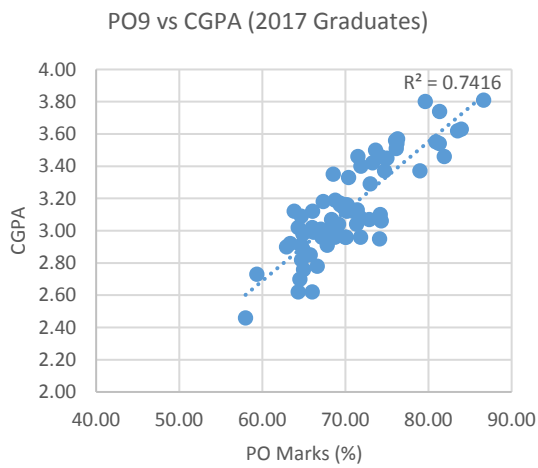
g) PO7: Environment and Sustainability



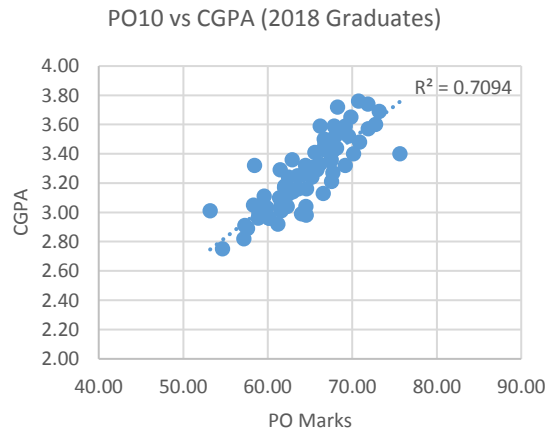
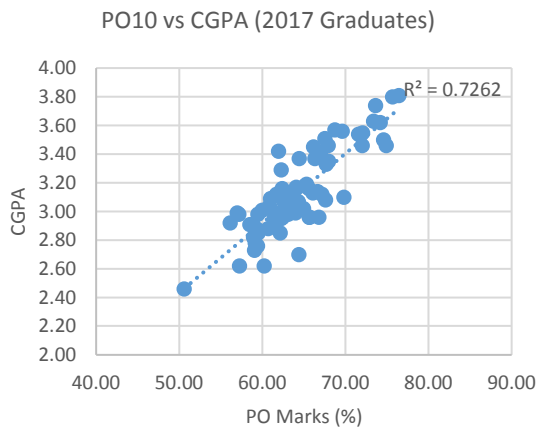
h) PO8: Ethics



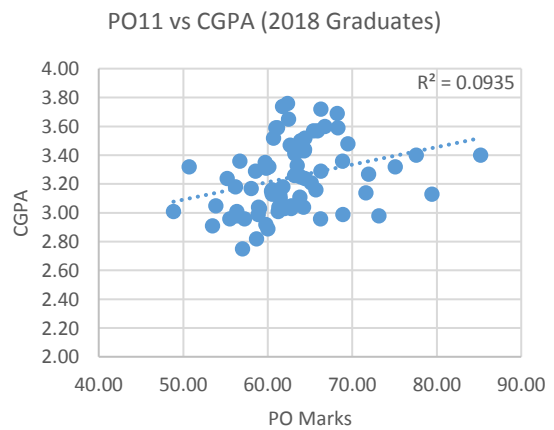
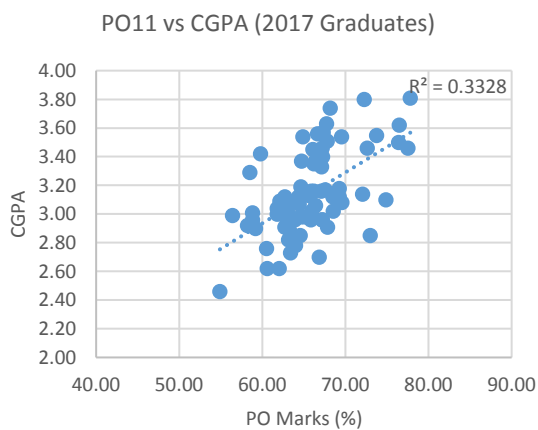
i) PO9: Teamwork



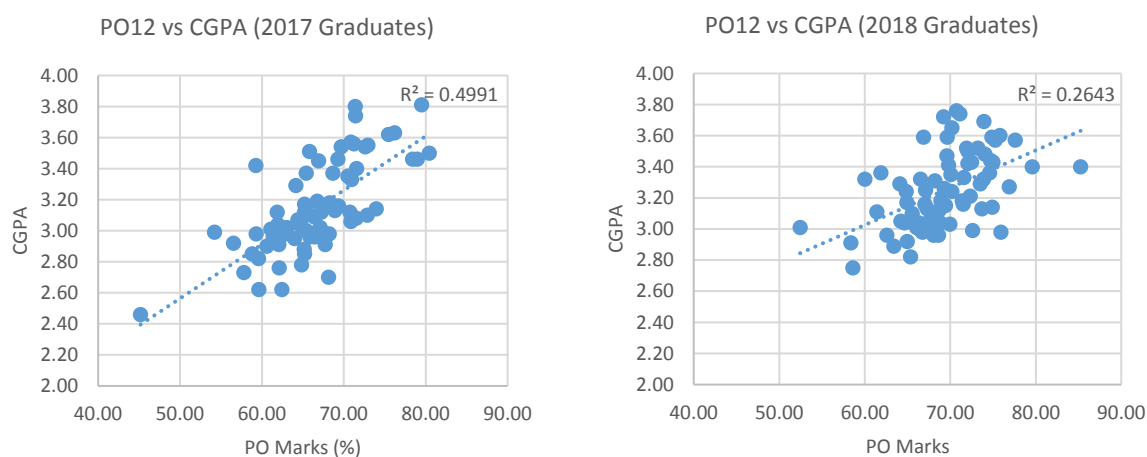
j) PO10: Communication



k) PO11: Project Management



I) PO12: Lifelong Learning



**Figure 3:** Correlation between PO-CGPA

**Table 6:** Correlation PO-CGPA

| PO   | Nature of PO     | 2017 Graduates            | 2018 Graduates            |
|------|------------------|---------------------------|---------------------------|
|      |                  | Correlation Factor, $R^2$ | Correlation Factor, $R^2$ |
| PO1  | Technical Skills | 0.9645                    | 0.9643                    |
| PO2  | Technical Skills | 0.9544                    | 0.9545                    |
| PO3  | Technical Skills | 0.8554                    | 0.9037                    |
| PO4  | Technical Skills | 0.4174                    | 0.6870                    |
| PO5  | Technical Skills | 0.6630                    | 0.8166                    |
| PO6  | Soft Skills      | 0.6583                    | 0.7629                    |
| PO7  | Soft Skills      | 0.5919                    | 0.6881                    |
| PO8  | Soft Skills      | 0.7094                    | 0.7746                    |
| PO9  | Soft Skills      | 0.7416                    | 0.8101                    |
| PO10 | Soft Skills      | 0.7262                    | 0.7094                    |
| PO11 | Soft Skills      | 0.3328                    | 0.0935                    |
| PO12 | Soft Skills      | 0.4991                    | 0.2643                    |

The correlation factor  $R^2$  is a measure of fitness of the best straight proportional line between CGPA and OBE Database PO Attainment Results. It is found that when the  $R^2$  values sorted on a decreasing pattern (Table 6); it shows that the POs on technical skills which are PO1 to PO6 are more inclined to be at the top of the table to indicate that the exist high level of correlation between CGPA and POs Attainment on technical skills. Meanwhile, POs more skewed towards soft skills are nicely grouped at the bottom to indicate less correlation with CGPA of the students with the PO Attainment. Since these results support the above hypothesis thus, conclusion has been drawn that the method of calculation used in Method 1



OBE Database System is dependable and reliable. Furthermore, the result of PO Attainment Method 1 is corroborated and triangulated by PO Attainment Method 2 (Detailed Analysis on Key Exiting Year Courses) and PO Attainment Method 3 (Exit Survey) by looking at the consistency of all results from 3 different types of assessment.