Q1 (Done/Bülent)

The number of active students in the IE program has not shown a dramatic change since the last report. As of the Fall semester of 2024 (after the gradual decline observed in our last report) we have 539 students, compared to 535 in the Fall semester of 2023. On the other hand, the percentage of female students has increased from 40% to nearly 46%. Compared to the last report, we see that: (i) the number of students from CS doing double major with IE has increased significantly from 19 to 33 students; (ii) the number of IE students doing double major with ECON and MAN has slightly increased. The number of students registered to a minor program continues declining compared to previous years. Finance and Analytics are still the most popular minor areas among the IE students; however, the numbers dropped from 42 students to 26 and from 36 students to 23, respectively, compared to the previous year.

Our concern about the high ratio of the number of students per IE faculty member persisted again for the 2023-24 academic year. Gündüz Ulusoy and Gizem Özbaygın left the program at the end of 2023-24 and Murat Fadıloğlu joined as a lecturer. His addition has helped maintain our capacity to offer courses; however, we still relied on part-time lecturers for the summer as well as for some core elective courses offered during fall and spring semesters, IE 303, IE 403 and IE 413 as such. We have to hire high-caliber academics for permanent positions and as lecturers to diversify our course offerings, in particular for IE 303, which has now become a required course.

Q2:

The number of students with first intentions in IE is increasing for the last three years, while that of CS is declining. Compared to the previous academic year, though, the number of placed students decreased by 4 to 166. The ratio of the number placed in IE to the number who intended to study IE in the 2023-2024 has decreased to 100% (still well above the 80% expected by the Quality Assurance and Strategy Council). The IE program has lost 64 students from those originally intending to study IE but, in return, got 64 students whose first intention was another program.

Q3

The number of international students in the program decreased by 3 to 17. As for the exchange programs, the number of our students who use this opportunity decreased by 1 to 29. The number of incoming exchange students declined again to 4. It is important to have an idea on what proportion would be good for our students using the exchange program.

Q4 (Burak/Done)

In 2024-2025, the proportion of students scoring above 2 for their TGPA's increased to 65% in the Spring semester (from 60% of the Spring of 2023-2024) and 58% in the Fall semester (from 56% of the Fall of 2023-2024).

In terms of the CGPA's the proportion of IE students having a CGPA less than 2 is 24%, which is less than 27% for all the students in the faculty. For the IE program, this statistic is 1-percentage

point lower compared to that of the previous academic year. Senior students appear to be performing better in terms of attaining higher TGPA and CGPAs.

Q5

For the last three academic years (starting in the Fall of 2021/2022/2023), we offered seven core courses in both semesters. Additionally, IE 430 was regularly offered in the Fall, IE 402, IE 409, IE 416 once a year (in Fall or Spring) unless a sabbatical leave prevented it. Finally, IE 404 was opened once a year during the two of the three last years. The enrollment figures (except for IE 405) seem to follow a similar pattern. IE 401, IE 405, IE 403 and IE 413 (and sometimes IE 304) are attracting more than 100 students almost in all semesters. This makes them too crowded for elective courses. We need to offer more core courses and while doing that we should avoid making our courses appear "too niche", which would otherwise reduce the student interest. We are facing the TA challenge. That is, we are unable to find enough TA to help us out for our courses. This problem would exacerbate if we offered more courses. We try to close recitations for senior level courses and instead provide students with videos that show how to solve sample questions. We have to extend this practice.

Q6

For the internship (IE 395), the number increased to 219 in 2023-2024 from 188 in 2022-2023. A great majority of our students are doing their internships in Turkey while a small number (6 in 2023-2024) can find internships in different countries. Starting from 2023-2024, with the help of the dean's office, we try to distribute the number of students uniformly among the faculty member because a faculty member had to supervise around 20 students for the summer and this is a seriously big number.

In the 2023-2024 academic year, 227 students took ENS 491-2 in the IE program, more than 182 in the previous academic year. Around 23% of the students did their graduation projects under the supervision of faculty members of some other programs. This leaves 16 students on average per IE faculty member (some co-supervised by non-IE faculty members). A total of 21 students were part of the SOP and only 8 of them were supervised by a single IE faculty member while the others by non-IE faculty members. The already big number of students we have to supervise may be making involvement in SOP less appealing.

19 SU students in the Fall, 4 SU students in the Spring and 17 students (3 SU and 14 non-SU) participated in Pure projects with the IE faculty.

Q7

The number of graduating students in 2023-2024 decreased to 166 from 204 in the previous year. The mean number of years to complete the program is 4.41 years in 2023-2024. There seems to be a slight increase in this statistic for the last three years. 61% (as against 72% in the previous year) of the graduating students completed their studies in 8 or fewer semesters and for only 7, it took more than 13 semesters. In the 2023-2024 academic year, 21% of the students participated in exchange programs (the same ratio as in the previous academic year).

153 IE graduates participated to exit surveys. 63% (less than 67% of the previous year) of the graduating students consider professional life, which is slightly higher than the faculty average of 59%. 22% of IE graduates (more than 16% of the previous academic year), as against 29% of the faculty average, consider postgraduate study after graduation. Out of those who consider post-graduate studies, 67% (less than 96% of the previous academic year), consider schools abroad. Everybody has gotten at least one job offer. The graduating students seem to be happy about their university with 90% of them indicating that they would recommend it, which is slightly higher than the faculty average of 85%. 86% of the IE graduates indicated that they would recommend their program, which is slightly higher than the 79% of the faculty mean. 67% (less than 75% of 2022-2023, making it a second consecutive drop in this statistic since 2021-2022) of them agreed that the IE program offers core/area courses on a sufficiently wide spectrum, which has now fallen below the faculty mean of 75%. This may be indicating our need to hire new faculty members. 77% (dropping from 84% in the previous year) of them agreed (with 79% as the faculty mean) that the IE program fulfilled their expectations. The 63% of the IE students found the program difficult, which is the same as the faculty mean. And 78% (dropping from 87%) of them, almost the same as the faculty average of 77%, found the program positively challenging and stimulating. 48% of the IE students had a part-time job outside the university, higher than the faculty mean of 42%.

In terms of the questions about Sabancı University, the IE students have mostly a very positive opinion. The lowest scores are for the questions whether the university is sensitive to the needs of the students (57% dropping from 62% agreed) and if the university has a substantial international impact (64% dropping from 72% agreed). For the capabilities the university provides to students, the IE students are positive or highly positive. The lowest figure is for creativity (66% dropping from 75%– as highly and excellently -- agreed that the university provided this) and innovation (68% agreed as highly and excellently). There seems to be a decline in the positive perception of the graduates for the university, which needs further investigation.

Q8

Among the program outcomes (POs), PO1-PO5 are "Common Outcomes of Undergraduate Programs at SU"; PO6-PO13 are "Common Outcomes of Undergraduate Programs at FENS"; and PO14-PO16 are "Industrial Engineering (IE) Undergraduate Program Specific Outcomes". The POs of the IE undergraduate program are as follows:

PO14. Formulate and analyze problems in complex manufacturing and service systems by comprehending and applying the basic tools of industrial engineering such as modeling and optimization, stochastics, statistics.

PO15. Design and develop appropriate analytical solution strategies for problems in integrated production and service systems involving human capital, materials, information, equipment, and energy.

PO16. Implement solution strategies on a computer platform for decision-support purposes by employing effective computational and experimental tools.

In the first five outcomes, common to all university programs, the mean score increased noticeably compared to the previous academic year and each resulted in a mean score of approximately 80%.

Among the faculty-based outcomes, we see decreases in PO6 (by 3%) and PO8 (by 1%). In POs 9,10 and 11, there is significant increase in the mean score (more than 6%) and in the remaining POs (POs 7, 12 and 13) the mean increase is more than 1.5%.

Regarding the IE specific POs, we also see slight increases in mean scores in outcomes PO14 and PO15, however, the traditionally problematic outcome PO16 decreased by 3%. The courses contributing PO16 are ENS 208 (LO2), IE 311 (LO4), IE 312 (LO5), IE 313 (LO4), IE 305 (LO3), IE 405 (LO8).

We make the following suggestions noting that normally we would like to remove recitations in senior courses and much of the effort can entail more TA support as well:

1. Real-World Case Studies: Introducing more real-world industrial engineering problems to improve students' ability to link theory with practice.

2. Dedicating More Effort During Recitation Hours: Allocating additional time in recitation sessions to help students practice identifying and formulating IE problems with guidance.

3. Guest Lectures & Industry Collaboration: Inviting industry professionals to discuss practical applications of industrial engineering.

4. Enhanced Project-Based Learning: Encouraging students to work on small-scale projects to improve their analytical and problem-solving skills.

Below we provide a detailed evaluation of the students' performance by instructors. The reports for two courses in the Fall 2023 semester and two in the Spring 2024 semester were either not created or could not be accessed. The absence of these reports may have impacted the overall analysis.

We first list the courses that impact PO16.

ENS 208 (Fall, D. Taş Küten, İ. Sadati): The assessment was conducted by mapping exam questions (two midterm exams and one final exam) and participation activities to the course LOs. The LO2 achievement and the overall course LO achievement were above 56% and 65%, respectively.

ENS 208 (Spring, İ. Sadati): The assessment was conducted by mapping exam questions (two midterms and one final exam) and participation activities to the course LOs. The LO2 achievement and the overall course LO achievement were above 57% and 49%, respectively. The latter indicates an acceptable performance. However, LO4 (30.0%) and LO5 (40.3%) were below and close to the 40% threshold.

LO4: "Establish the link between industrial engineering and required professional skills." The achievement was 30.0%, which suggests that students struggled to connect theoretical industrial engineering concepts with professional skills. This might be due to the abstract nature of the topic and limited exposure to real-world applications.

LO5: "Identify IE problems that you can attack, formulate and solve." The achievement was 40.3%, indicating difficulty in problem identification and formulation. This might be due to a lack of structured problem-solving exercises or insufficient emphasis on practical case studies.

IE 311 (Fall, E. Karabulut Türkseven): The assessment was done by matching the exam questions, quizzes and labs with the learning outcomes. CLOs 1 (modelling), 3 (duality), and 4 (implementation) had an outcome around 55%, while CLO2 (simplex methodology) is around 50%. Dr. Karabulut observes the following: "Generally I would expect CLO4 to have the lowest outcome, considering the students' struggles with Python; however, their higher performance in labs appears to compensate for the lower performance during the exams."

IE 311 (Spring, B. Kocuk): The course results were assessed by matching exam and quiz questions with the course CLOs. The achievement rates for the four CLOs were below 40%. Yet, the average achievement rate across all CLOs was close to 40%. Dr. Kocuk observes the following: "This course teaches mathematical foundations of operations research together with its applications and implementation. Unfortunately, our student body does not come ready for this course as their mathematical background as well as computing background are not satisfactory."

IE 312 (Fall, G. Özbaygın): No course report.

IE 312 (Spring, G. Özbaygın): No course report.

IE 313 (Fall, B. Balcıoğlu): The assessment was done by matching exam questions with the CLOs. The mean of outcome achievement was 49% however in two CLO's (2 and 4), outcome achievement was less than 30%. CLO4 is "perform computation analysis of the stochastic processes of interest using a programming language". Students have great difficulty with Python and this can make them give up on all this. CLO2 is "Have a basic knowledge of continuous time Markov chains (CTMCs), formulate suitable applications as CTMCs and analyze their transient and steady-state behaviors." Dr. Balcıoğlu states "I also needed to test CLO2 also in the computer based part, which lowered the outcome since 30% of the grade was related to the computer based exam."

IE 313 (Spring, B. Balcıoğlu): The assessment was done by matching exam questions with the CLOs. The mean of outcome achievement was 50% however in two CLOs (2 and 4), outcome

achievement was less than 30%. The same explanations made for Fall semester persisted here as well "Students must come with a stronger background in Python coding."

IE 305 (Fall, S. Yıldırım): The achievement rates for three CLOs are: CLO1 – 66%, CLO2 – 59%, and CLO3 – 45%. Dr. Yıldırım makes the following observation: "Students have experienced some technical issues with Arena throughout the semester. According to a survey I conducted, it was understood that at least 90 students had Macbooks. With this survey, it was observed that the percentage of students using Macbooks has increased significantly compared to previous years. These students had difficulty installing and running Arena. This may have affected the average CLO3 performance of the class. In order to eliminate this problem and increase student participation, it is recommended that students prioritize Arena installation at the beginning of the semester. Various quizzes can be organized to make Arena mandatory for students. In addition, the IT unit should help students more with the use of Arena, the Academic License of which is purchased by FENS, which will significantly reduce the problems."

IE 305 (Spring, S. Yıldırım): The achievement rates for three CLOs are: CLO1 – 51%, CLO2 – 48%, and CLO3 – 43%.

IE 405 (Fall, H. Frenk): No course report.

IE 405 (Spring, K. Kılıç): No course report.

The following courses impact PO14 and PO15.

IE 304 (Fall, B. Çatay): The assessment was done by matching the exam questions with the learning outcomes. The outcome achievement for all CLO's was above 40%.

IE 304 (Spring, B. Çatay): The assessment was done by matching the exam questions with the learning outcomes. The outcome achievement for CLO1, 3, and 4 are below 40%. CLO1 is "Studying different production systems and assembly line balancing via modeling and heuristics", CLO3 is "Modeling and solving machine scheduling problems" and CLO4 is "Modeling and solving facility layout and location problems". Dr. Çatay observes: "CLOs 2 and 4 require background in mathematical programming. Thus, IE 311 (the prerequisite course) is not sufficient to equip most students with that background. Changing the prerequisite requirement with IE 312 can be considered."

IE 401 (Fall, T. Tunc): The assessment was done by matching the exams and projects and participation with the learning outcomes (sometimes one exam by all learning outcomes). Thus, the outcome achievement was above 65% for all CLO's. This had to be done by matching questions to CLO's.

IE 401 (Spring, M. Kaya): The assessment was done by matching the exam questions with the learning outcomes. The mean of outcome achievement was 49% however in two CLO's (2 and 3), outcome achievement was less than 40%. CLO2 is "Develop demand forecasting models using time series methods" and CLO3 is "Apply the fundamental inventory management models (including the EOQ, newsvendor, (Q,R) and (s,S) models) to relevant problems"

Q9

89% of the IE graduates (higher than the university and faculty averages) work in professional life. Most of them work in the traditional IE areas of production and industry, IT, consulting, banking, and other service areas such as retail industry as specialists, analysts, and engineers. It is not always easy to read graphs, so the areas listed on the x-axis of graphs can be listed separately. This may be due to participants independently naming their sector and position.

Q10

We are searching for new faculty to hire. With the help of the faculty, DSA 201 -- based on Python -- has become the new required course while CS 201 can now be taken as a core course. We hope that this will strengthen the coding skills of our students. IE 303, which was a core course taken by almost all the IE students, has become a required course, which will assure their sufficiency for basic engineering economy concepts.