ABET SELF-STUDY QUESTIONNAIRE:

TEMPLATE FOR A SELF-STUDY REPORT

2015-2016 Review Cycle

ABET

ENGINEERING ACCREDITATION COMMISSION

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ABET Self-Study Report for the program:

Automation Engineering Program

(Licenciatura en Ingeniería en Automatización)

at

Universidad Autónoma de Querétaro

Cerro de las Campanas s/n. Colonia Las Campanas
C.P. 76010
Santiago de Querétaro, Qro. México.

June 2015

CONFIDENTIAL

BACKGROUND INFORMATION

A. Contact Information

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B. Program History

The Engineering department opened the degree in Instrumentation and Process Control in 1984, after the creation of a number of graduate and undergraduate educational programs. By the end of the year 2002, the syllabus was restructured and the program started up in January 2003 with a new name: Automation Engineering Program.

Since then, the program has been submitted for local certifications as well as CIEES (2007) in level I, and CACEi (2013) also in level I, which is the higher level of quality accreditation program in each one of those. Having had had this excellent results, the program found an opportunity for seeking an international accreditation and therefore the faculty members and their leadership began a competence-based program in 2012 approved in 2014.

In each new course syllabi (curricula) approved by the Institution council, a prefix

code is instituted in relation of the year of approval (INA10- INA14). Now day, the program is running both course syllabi but the same assessment methodology. Since 2012, Faculty members have made some modifications to their courses in order to start a competence-based program in both INA10 and INA14 lectures. This is the first ABET assessment for the degree program.

C. Options

The Automation Engineering Program (AEP) offers professionals in the analysis and design of Automatic Control Systems and Microsystems, with the purpose of measuring and/or controlling industrial processes to achieve a desired competitiveness and quality, complemented with an integral formation in social-humanistic areas. This process is supported in the following elective areas of concentration (terminals profiles) that students chooses up to seventh semester of the program:

1. Optional Module in Instrumentation and Process Control: Specific training in: chemical and thermal processes; industrial instrumentation; analytical and environmental instrumentation; process plant projects; distributed control networks; pneumatic and hydraulic processes and computational algorithms.

2. Optional Module in Industrial Electronics: Specific training in: power electronics; advanced digital systems; remote controls with optical fiber and electromagnetic signals; analogue and digital electronic design; electronic computer-aided design; analogue signal conditioning; maintenance of electronic equipment and systems.

3. Optional Module in Mechatronic Systems: Specific training in: classification, characteristics and modelling of robots; numerical control machines; robotic assembly lines; computer vision; manufacturing and computer-aided design; management, assembly and control of robots (program now submitted to ABET´s accreditation).

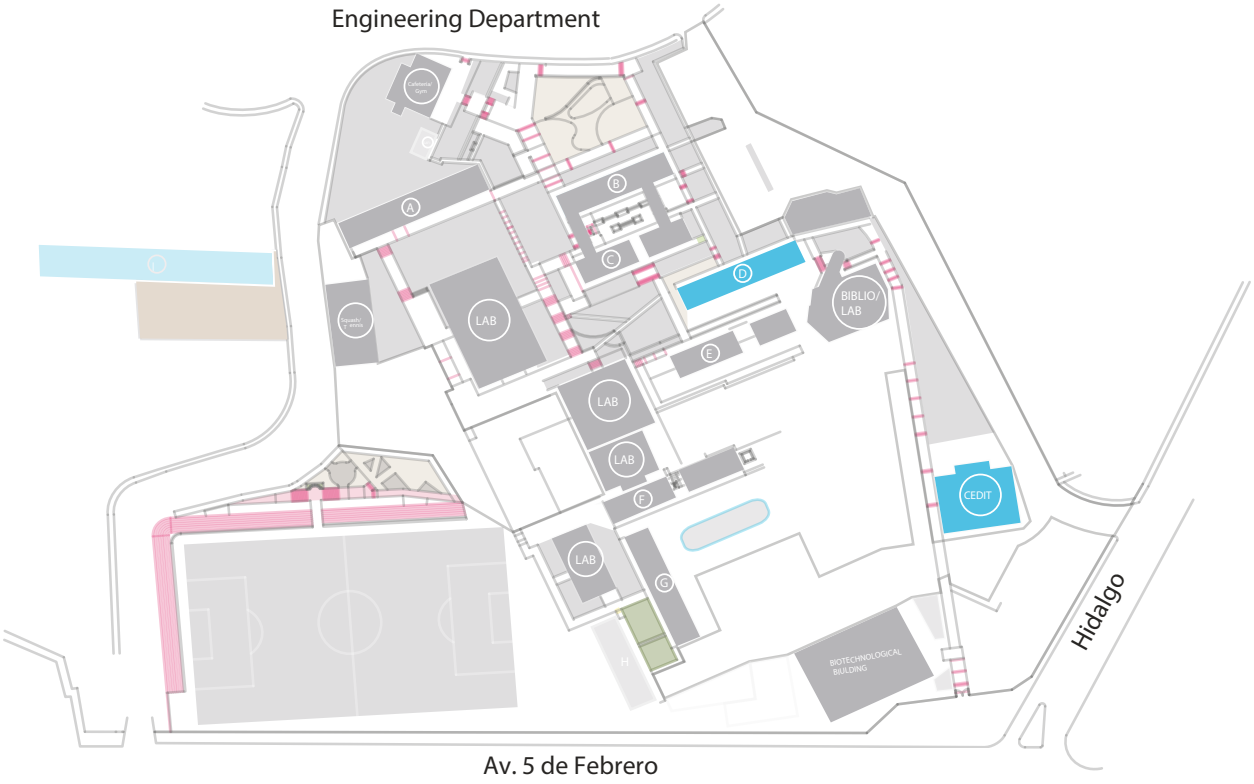
4. Optional Module in Industrial Systems: Specific training in: management and operation of the production and services industry; business management; application of total quality control; strategies for innovation and implementation of leading edge technology; industrial processes by computer simulation; planning and control of production.

D. Program Delivery Modes

This is a full time semester program. Each Fall & Spring all courses are offered during the following hours: 7:00 – 14:00hrs and 15:00 – 22:00hrs, from Monday through Friday, and in some cases, Saturday morning hours are used for courses too. Laboratory services remains open all weekdays and Saturdays. The classes are primarily taught as traditional l ectures with laboratory hours from January to June for the Spring Semester and from August to December for the Fall Semester. In especial cases, if a group of more than 15 students request a summer course, the academic area of the engineer department makes the request to the Automation chair for a special summer course taught from June-August from 8:00-14:00hrs.

E. Program Locations

The AEP courses are offered only in the Engineering department, at the Autonomous University of Querétaro, in Querétaro, México. Traditional courses are taught at buildings B and C, while the digital courses take place at building D, where the computer laboratories with the appropriate software are located. Practical courses are offered at several specialized laboratories inside the Engineering Department as well (Automation Laboratory, Physics & Chemistry Laboratory and Mechatronics Laboratory).



IMG 1.- Location of the Engineer Department inside the Autonomus University of Queretaro, Qro., Mexico.

The AEP also offers an international partnership with the West Virginia University and CONCYTEQ where the students are able to choose to take transfer courses (Appendix E).

F. Public Disclosure

The Institution has a public official website where the most emblematic data of each program is uploaded. Also, the AEP has a specific public site for specific information of the program.

Program education objectives (PEOs):
http://ingenieria.uaq.mx/educacion/licenciaturas/ingenieria-automatizacion/

Students Outcomes (SOs):

http://ingenieria.uaq.mx/students-outcomes/

Annual student enrolment and graduation:
http://www.uaq.mx/estadistica/estad/04_1115/12_13/11ing/al_ie.html

Curricula: each course redirects a link for the complete syllabus, laboratory book, and Faculties portfolio's. In some cases, the Faculty member has uploaded his/her specific outcomes analysis.

http://ingenieria.uaq.mx/plan-de-estudios/

G. Deficiencies, Weaknesses or Concerns from Previous Evaluation(s) and the Actions Taken to Address Them

This is the first accreditation cycle (there are no previous evaluations).

GENERAL CRITERIA

CRITERION 1. STUDENTS

A. Student Admissions

To be eligible for Engineering Admission, applicants must possess an adequate formation in the mathematical, chemical and physical sciences and an inclination for technological development. In addition, the following skills are required:

- To be effective in decision-making

- Effectively abstract problems elements.

- Successfully communicate ideas and concepts in written and verbally modes.

- Analysis and synthesis.

- Creatively found solutions.

- To be teamwork.

The necessary considerations concerning the academic background are handled in institutional form. It is mentioned that the student aspiring to enter the AEP must have a background in the branch of mathematical physics or its equivalent, and must have a total average grade of at least 7 at high school level.

The admission process within the AEP is made up of a preparatory course; in this part of the process the applicant must take four courses: mathematics, physics, chemistry, and thinking skills. When a student passes the courses, he gets the equivalent to 30% of the total percentage required for entry. The preparatory exam is taken into account among the necessary parameters to access the AEP within the income profile.

The test of skills and basic knowledge (EXHCOBA) has a weighting of 70% of the total percentage required for admission (minimum grade for entry to the PE is 7.0). The appliance of this assessment is institutional in nature.

On the following graphics, it is shown the admission process for all candidates:

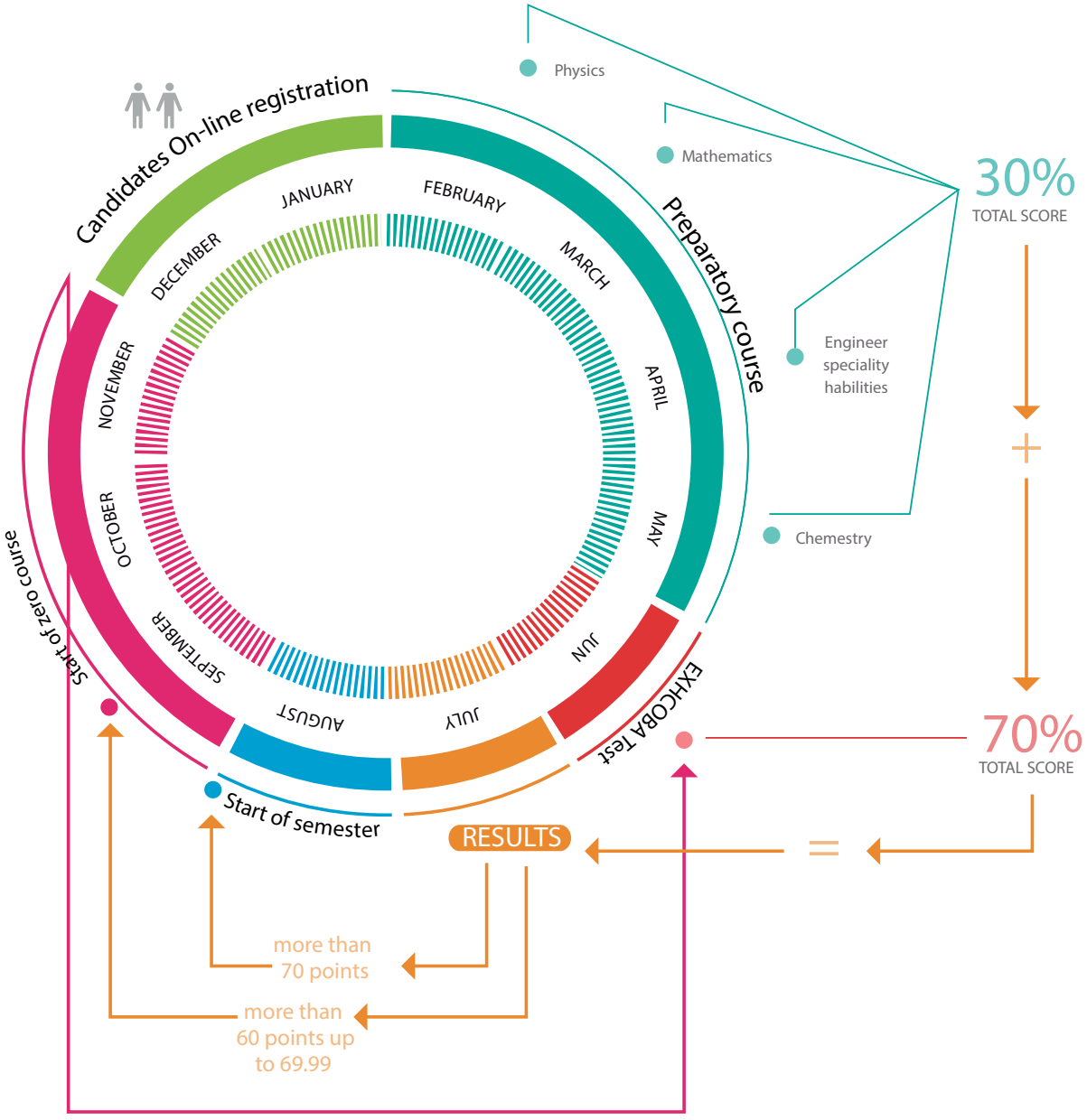


Image 1.1.- Graphic process for students admissions.

We have a 10% of candidates' (200 aspirants) accrediting the admission process in every fall semester, and 12% in every spring semester. Some of this students required a special support in mathematics, physics or others that are attended by the tutoring department.

	2012		2013		2014		2015	
Number and % of accepted students	35	12.68	70	26.42	93	30.19	18	6.3
Number and % of accepted students who received extra courses support for attendance their academic weaknesses	23	66	23	33				

Table 1.1.- Acceptance and students support.

Activities and responsibilities during the acceptance process is shown in the following table:

Stage Sequence	Activity	Responsible
1. *Verify applicant's personal documents*	*1.1 Receive verification of high school studies, small photographs, and paid receipt*	*UAQ School Services*
2. *Present the preparatory course*	*2.1 During the preparatory course the student has the responsibility to assist to class as well as present any work or exams required.*	*Applicant*
3. *Group, schedule, and teacher assignments for the preparatory course*	*3.2 Establish the starting and ending dates for the preparatory course as well as exam dates, schedules, groups, and professors*	*Engineering Department admission process coordinator*
4. *Reception and publication of results*	*4.1 Publish the results in local newspapers and the UAQ site*	*UAQ School Services*
5. *Group, schedule, and teacher assignments for semester zero*	*5.1 Establish the starting and ending dates for semester zero as well as exam dates, schedules, groups, and professors*	*Engineering Department admission process coordinator*
6.- *Classes taught in Semester Zero*	*6.1 Of the classes a student takes in semester zero, 4 are leveling classes (Mathematics, Physics, Reading and Editing, and Programming), and 3 are classes for*	*Engineering Department admission process coordinator*

B. Evaluating Student Performance

Students' progress in the program is monitored in several ways to ensure student learning and program quality. The Academic Engineering Department and the Chief of the program are the ones responsible of taking measures to follow the student performance by accessing an institutional platform named

SIIA within all transfers for students are uploaded and modified in real time. All courses are evaluated from 0 to 10 in partial terms, being 6 the lower grade without failing. For the final review, grades are given from 6 to 10 for those approved, and NA (no approval) for those who earned from 0 to 5. For those students failing more than three courses, the Academic Engineering department or the Automation Engineering area Chair makes an appointment and refers them to the tutoring program (section D).

Ensuring program prerequisites

Web site re-inscription:

Each semester the students can choose a maximum of nine courses in the online registration managed by the Engineering department. This web site prohibits students submitting courses if they have not taken the program prerequisites. Also, if a students has not accredited a course from two previous semesters, the web site deny the possibility of choosing further courses until that one is successfully accredited.

National or International stays // transfer applicants:

Students who coursed a national or international stay and those who apply for a transfer to the program, have to submit their official grades to the academic committee for revision and approval to ensure the prerequisite have been taken.

One step exam:

In some cases, student's circumstances deny the possibility of taking in-person lectures, in such cases, they can submit their documents to the Academic Committee and ask for a one step exam. The academic committee designates an evaluation committee made out of three faculty members that are experts in the area, who design and apply a one-time exam involving all prerequisites to the student and designates a grade. For each academic period, the student is allowed to present up to three courses in this way with his Tutor or the Engineering area chair approval.

Extraordinary exam:

When the student has the opportunity of attending classes, but fails two of the three evaluations in the semester, he or she is able to take an extraordinary exam at the end of the course and receive tuition from a senior student in a peer tutor program.

Student's progress

In-class techniques:

Faculty members of the program have freedom of instruction and evaluation for their partial techniques, although they have to apply a unique final evaluation designed by the Academic Unit department, which involves all of the syllabus contents in order to ensure the quality of the program and measure the same amount of knowledge in all groups. It is worth mentioning that this criterion is not homogeneous and that some of the courses do not apply tests of this type. Departmental exams are applied only in the area of mathematics from the basic sciences group. Currently, we are working in implement this type of assessments in all courses that have more than one group.

It is established that the student must complete: a) 100% of laboratory practices; b) 80% of homework and/or other work; and c) 80% of attendance to be eligible for a grade. The Engineering Department has established that at least 3 partial evaluations must be carried out in the semester. Similarly, homework, research, projects and extracurricular work are taken into account.

This partial evaluation techniques evaluate the student's performance and their learning progress during their stay on the program, usually this includes several types of tests, rubrics, surveys, homework's, problem solving, exercises, oral and written expositions, laboratory practices, portfolios, papers and reports, contests, manual reports, and program executions (some of this material will be able to be reviewed during the visit of the Evaluation Committee).

Pair tutor:

When a Faculty Member of the program detects a learning problem in one or more of his

students, he or she has to notify the Tutorial department and ask for a peer tutor program. In this case, a senior student is in charge of giving personal classes until all disclaimers are dismissed. This is the first warning for a student if he/she wants to remain in the program.

Web site re-inscription:

Each semester in the web site re-inscription process, a data-base of the students that had failed one or more courses is generated and given to the Tutoring department; this department evaluates each case and designates a Faculty member to be the student tutor. This tutor make at least three sessions through the semester with the student for orientation about the courses of the program and how to manage his next courses helping him in theoretical aspects of his courses. This is the second warning for student and if he accumulates ten failed courses then he's automatically out of the program.

C. Transfer Students and Transfer Courses

For transfer students and courses

Students seeking admission from other institutions or international programs have to submit the corresponding equivalent syllabus to the Automation Engineering area chair for a complete evaluation of the selected courses prerequisites. Once the Chief of the Program agrees with the equivalences of the courses and their pre requisites, he will emit an approval or denial letter to the Transfer department. In case the student is accepted, the Transfer department is in charge of the legal responses and making contact with the other institution.

There is no specific time for document deadlines, although exchange students must contact the Automation Engineering area chair before the semester starts. Once they are accepted, they must accredit and complete the syllabus requirements of the courses of their choice. They can choose autumn, summer or spring period for their stay on the program.

For those students seeking an international exchange program, the Institution demands

some requisites:

1. Be a regular student of the program.
2. Have at least 50% of credits of the program syllabus accredited.
3. Have at least 70% in similarity of content between syllabuses.
4. Have a favourable response from the other institution in order to have all requisites accomplished.

The Engineering Academic Committee is in charge of reviewing the student academic record, and once he or she achieves all requisites accomplished, the Engineering Academic Committee designates the file to the Transfer department and the Academic department of the University for concluding the internal process.
Almost all of the mobility cases in the program are with international institutions such as West Virginia University, Arkansas University, Sao Pablo University and the Central School of Paris.

International Applicants	2012	2013	2014	2015	Total
Transfer students enrolled	3	5	5	2	15
Enrolled Applicants	5	3	5	7	20
Enrolled Applicants with curricula course taking	5	3	5	5	18
Total Applicants	13	11	15	14	

Table 1.2 .- International applicants enrolled in the program.

Undergraduates of the program, participates in the contest called “Verano de la Ciencia” which allows them making mobility to other institutions or industries such as MABE, MAKINO, TREMEC, BROSE, VRK, CONDUMEX, and so forth for making research and projects of automation subjects. Only a prestigious cluster of Universities participates in this contest and every year we have outgoing and incoming applicants. As a result, next table shows the interchange of Automation students’ in Mexico.

National Applicants	2012	2013	2014	2015	Total
UAQ to other institution	2	2	3	1	8
Other institution to UAQ	3	4	5	0	12
Total Applicants	5	6	8	1	

Table 1.3 .- National applicants enrolled in the program.

Student credit transfer

A student may apply for a revalidation or credit transfer in two cases:

Validation:

A student enrolled in the previous plan of studies can be changed, if he is interested, to the new plan, being necessary that he requests it to the Engineering Academic Committee, adhering to the current criteria. In case that a minimum of courses are not validated and presently demanded, an exemption will be requested to the corresponding instance.

Revalidation:

An enrolled student or aspirant to the plan of studies can request the revalidation of studies that he had carried out in another Higher Education Institution, taking into account the provisions in the applied criteria by the Engineering Academic Committee following the next conditions:

a) A grade of 8 or higher, or an equivalent, in the course up for revalidation.

b) The content of the course that was taken must be identical to an 80% of the content of the course to be revalidated.

Admission by revalidation will be approved only if the number of courses revalidated is greater or equal to 5, from which at least 3 must be from the area that is going to be revalidated, without exceeding what is established in Article 24 of the Incorporation and Revalidation Regulatory Studies.

D. Advising and Career Guidance

The AEP is one of the most demanded engineering academic programs in the state with approximately 200 aspirants per year, yet, each year the program offers several events for high school students and the community in general to give account of the general curricula, the program outcomes and school community programs. Once the prospective student achieves all the requirements of the Engineering Department to be in the program, the Automation Engineering area chair and the Engineering Department, through the Academic and Tutoring Department, takes several measures to ensure students achievements in the PEO and his outcomes, as well for completing all engineering curricula in good time and in an appropriate manner. For all this, the program takes the following measures:

Pre advising events

Automation undergraduate students are recruited by means of several annual events such as robotic contests (namely Robo UAQ). Also the program faculty members help spreading the information by giving interviews in the main newspapers of the State, radio conferences and high school visiting's. Information is shown in the official website, therefore, aspirants may have an idea of the infrastructure, faculties portfolio's, and so forth. Senior students visit certain strategic regions such as rural places and science meetings to show their projects, and as a result, aspirants may understand what an automation engineer can do. Finally, high school students visit the University, so they might take a chance in the program.

Automation Engineering area chair

One of the most important actions to ensure the program quality and a good advising and guidance to students is the full time faculty promoted by the chief of the program. In fact, the AEP has the largest enrolment of full time faculty members inside the Engineering department and almost the largest inside the whole Institution. Each full time faculty member is able to have up to 8 students for guidance or advising, which are does the Tutoring department assigned for each one of them. Another way students can get an advising inside the program is by working and

enrolling in projects and scholarship inside and outside the institution. The Automation Engineering area chair enrolls at least 80% of the program students in professional research with industry or Faculty members for solving real engineering problems related to the society inside and outside the institution. This gives the student a wide idea of his outside performance opportunities; it helps him choose an area of specialization, and above all, ensures his stay in the program despite possible economic issues. These scholarships are given from several economic sources; from the Tutoring Department, Engineering Department, University scholarship department, industrial or governmental. Also, the Automation Engineering area chair is in charge of seeking and spreading relevance information about elective courses, contests, scholarships, national and international stays, and so forth that helps students in their personal and academic formation inside the program, as well as getting industrial visits, socio cultural workshops, students meetings, fairs, conferences, etc.

Job Fair

Every year, the Graduate Students Department offered a Job Fair in which most of the biggest companies of the region presents their positions in order to show the requirements to be hired. Besides, there are certain agreements between the Faculty and Industry partners. These consist, for instance, by switching the school and working on that company. This is done in 7th semester. Therefore, this permits that students perform the necessary skills in a specific field when they get graduate.

Tutoring Department

The tutoring program is still in the consolidation process within the PE. It involves a wide registration of teachers who are responsible to guide and support students throughout their academic career. In order to give appropriate follow-up to this program, the Continuous Education Secretary has been responsible for monitoring the progress and achievements of students. This department is in charge of three fundamental aspects of a good student: academic life, health and personal wellbeing. This department has several programs that attend each one of these aspects:

Pair tutor:

The objective of this program is to assist students by students themselves in a bound of trust. A senior student guides a new student through their curricula decisions and through their difficulties at learning, without giving him psychological help. This is a good alternative for those students that feel confused and overwhelmed at the beginning of the program.

Workshops:

Several workshops are offered with no cost through the academic year. Most of the students attending any of the tutoring programs are encouraged to attend at least one or two of these workshops that feels it will complement their formation and instruction. Some of the most offered workshops are: Brain gymnastics // Communication with neuro-linguistic programming//Motivation//Love and sexuality//Reading Circle//Potentiate your intelligence // Manage your time // Violence prevention // Sculpture // Painting // Clarification of values.

Scholarships

Each semester, this department launches a call for those who are in the need of financial support. These ensure the stay on the program of students despite their economic problems. There are several ways of support.

- Food scholarship: Breakfast and meal is given by the Engineering Department in the Engineering Cafeteria.
- Occupational / research scholarships: Students are paid for their collaboration in research projects. Most of these kind of scholarship founds are managed by Faculty members researches and Industries researches.
- Maternal / paternal scholarships: For those who have had sons, the Institution and the Engineering Department gives a financial support school for materials and supporting their kids so they can successfully finish the program. Also, offers a day care for those children's of students while they attended classes.

As a result, currently we have more than the half of the students with any kind of scholarship help or are involved in a tutoring process.

Scholarhips	2012		2013		2014	
	Number	%	Number	%	Number	%
Number & % of scholarships given by the Institution	24	9	30	11	103	33
Number & % of scholarships given by PRONABES	40	14	48	18	20	6
Number & % of scholarships given by CONACYT	62	22	70	26	0	
Number & % of scholarships given by other resources	12	4	20	8	64	21
Total scholarships given	138	50	168	63	187	61
Number & % of students in a tutoring program	219	79	250	94	165	54

Table 1.4.- Relation of students scholarships.

Interfaming:

This is for the creation of a space for the family inside the academic life of students. Through some lectures and workshops it allows exploring new forms of coexistence with the mission of being university student and a professional in the future.

Tutoring Day

Strengthen the tutor-tutee connection in relation to the institution and society allowing us to bring forms of care and integral development offered by the different faculties in UAQ to the student community.

E. Work in Lieu of Courses

The Institutional Academic department regulates that all program and course syllabus are based in a national system for credit assignment named SATCA. Specifically in the program, since students successfully earned 70% of the program credit, they are able to present their professional internship (21 credits) in any industry or research program they select. Although the college does not have a process for awarding credit for work in lieu of courses, wherever a student feels that they have already mastered a topic, can elect to take a one step exam that is developed by the faculty. This exam reflects the knowledge a student is expected to have mastered by the end of the particular course. If the student approved this one step exam, the Automation Engineering area chair is notified and he/she will be awarded credit as if he has presented a face-to-face course.

F. Graduation Requirements

In the institutional students regulation, students are required to success 300 credits for submitting their papers to review by the Academics Councils. Eleven different ways of graduate options are named and can be selected by students in the better of each one of the cases:

1. By a high grade point average
2. For a public examination in knowledge areas*
3. By accreditation of postgraduate studies.
4. For preparation and approval of refresher courses (continuing education).
5. For research work.
6. For memories of community service.
7. For collective thesis.
8. For interdisciplinary thesis.
9. By the preparation of individual thesis.
10. By memory work.
11. By the preparation of text, practices book or teacher's guide

* In our case the EGEL examination, implemented by CENEVAL institution is used.

Since degree options are varied, students have a wide range of opportunities to choose from. It has been detected that offering refresher courses often helps students to graduate more quickly, which is why courses like PLCs, Electrical Installations, Quality Management, Six Sigma, among others are offered every year. Once a candidate has selected his/her graduation method, a review process of the transfer and their documents ensuring all the requirements has to be submitted to the Engineering Academic Committee and the Institution Academic Committee. For all the thesis and memories options, candidates must approached the Automation Engineering area chair to assign a thesis committee members at least one semester before ending all the students credits.

G. Transcripts of Recent Graduates

The program will provide transcripts from some of the most recent graduates to the visiting team along with any needed explanation of how the transcripts are to be interpreted. These transcripts will be requested separately by the team chair. State how the program and any program options are designated on the transcript. (See 2015-2016 APPM, Section II.G.4.a.).

CRITERION 2. PROGRAM EDUCATIONAL OBJECTIVES

A. Mission Statement

Institutional Mission statement

The Autonomous University of Queretaro is an institution of higher education with social relevance, financially viable, and which focuses its attention on the formation of its students to ensure their permanence and integral development, with educational programs recognized for their high standards and quality. The institution: a) generates and applies knowledge; b) trains human resources in research with consolidated academic bodies integrated in national and international collaborative networks; c) contributes to the preservation and dissemination of culture, closely linked with the different sectors of society, promoting plurality and freedom of thought and is committed to the development of the entity, with effective and efficient management processes.

Engineering Department Mission statement

The Mission of the Engineering Department is to form fully competitive human capital at international level in the field of engineering sciences and technology for ethical professional practice, with leadership, entrepreneurial, competitive, and innovative abilities, along with social commitment, in addition to generating, applying, disseminating and spreading knowledge in the different established lines that strengthen the possible routes of sustainable and independent development.

Automation Engineering Program statement

The Automation Engineering Program establishes its mission to train professionals of high level, that is, ethical, analytical, critical, entrepreneurial, competitive, creative and innovative, with high social sense and solid knowledge in the area of automation engineering in the fields of Instrumentation and Process Control, Industrial Electronics, Mechatronics, and Industrial Engineering with the capacity and skills to generate engineering solutions to meet the needs of the industrial, academic, and social sectors. Contribute to sustainable, scientific, technological, and economic development of the region and the country, through the generation, application, dissemination, and transference of knowledge. To achieve this, we formed a team that works with integrity, responsibility, ethics, and enthusiasm in the pursuit of quality and continuous improvement, as well as carrying out activities of dissemination, research, and technological development; all this with the commitment of achieve excellence in all areas, for the benefit of Mexican society.

B. Program Educational Objectives

The Automation Engineering Program Educational Objectives are described below. They appear on the UAQ website (http://ingenieria.uaq.mx/perfil-de-egreso/) and are posted on various bulletin boards in the Engineering Faculty building.

-Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.

- To effectively manage, apply and develop his knowledge of engineering, TICs and sciences in social projects, research projects and in industry collaborating successfully in disciplinary and multidisciplinary teamwork.

- Effectively lead in engineering investigation and industry fields.

- Effectively communicate with other professionals and cooperates in multi-disciplinary groups.

- Consciously value and respect present day problems, recognizing individual and cultural differences on the basis of professional ethics principles, adhering to quality criteria and standards in order to promote sustainable development.

C. Consistency of the Program Educational Objectives with the Mission of the Institution

The Institution mission address to the importance of training students with a high social relevance and high quality standards in their areas, up to solved the most complex problems in local, national and international context. Because of this, the program educational objectives aligned perfectly on this mission and guarantees specialized people with a human sense and prepared to respond any national or international engineering problem.

D. Program Constituencies

Alumni

At the time of graduation, our students will conduct professionally in solving engineer problems inside industry and research, recognizing the impact of their solutions in a local, national and international context and with a high sense for social impact of the results.

Stakeholders

The program was established given the needs of Queretaro's industry and research. The result was that today some companies recruit engineers exclusively from the program and most of our graduates get a job before ending the last credits of the program. The graduate's profile is pertinent since there are industries in the region that require automated processes. There are big employers such as Bombardier, MABE, Licore, Open Pal and Makino with which the program have settle several collaboration and hiring agreements for

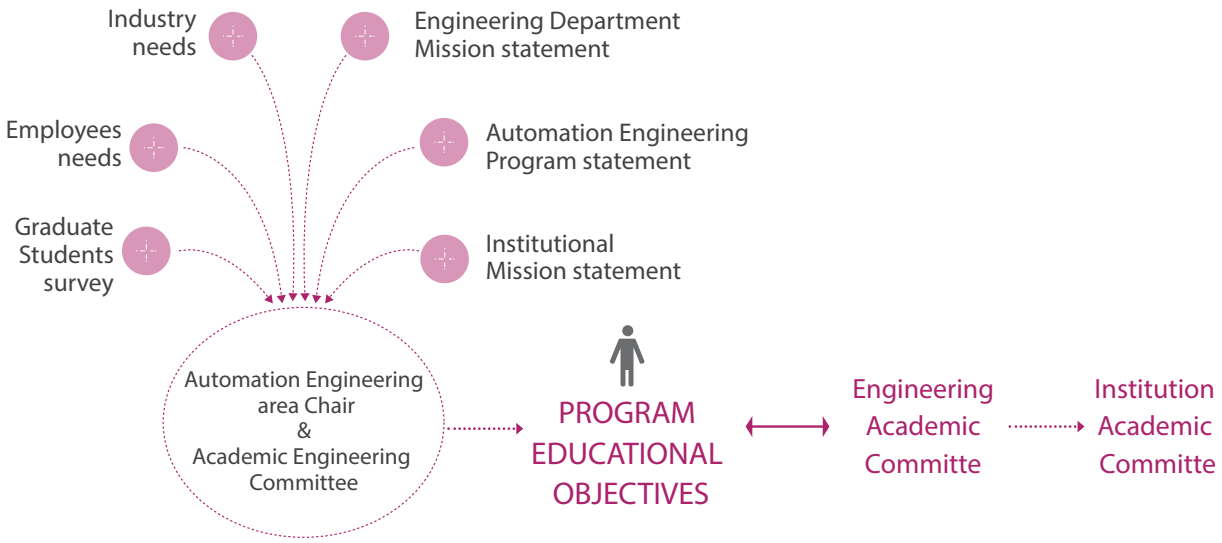
the undergrads students searching for professional practices. Each year, the employee-engineering department applies a survey to the companies for ensuring their actual needs from the graduates, nowadays a large number of students have this occupational demand. Industries survey and some memos of meetings are used as input for reviewing the program educational objectives each period, for the consistence of the industry and society needs.

Faculty members and Academic committee

Every four years, the program is submitted for an evaluation review of the PEO and the curricula content. Faculty members, graduate students, undergraduate students, stakeholders survey and the academic committee from the area are considering for this evaluation. Faculty members are hired by their professional experience and promoted by their continuously upgrading knowledge in their area pedagogy and their expertise areas.

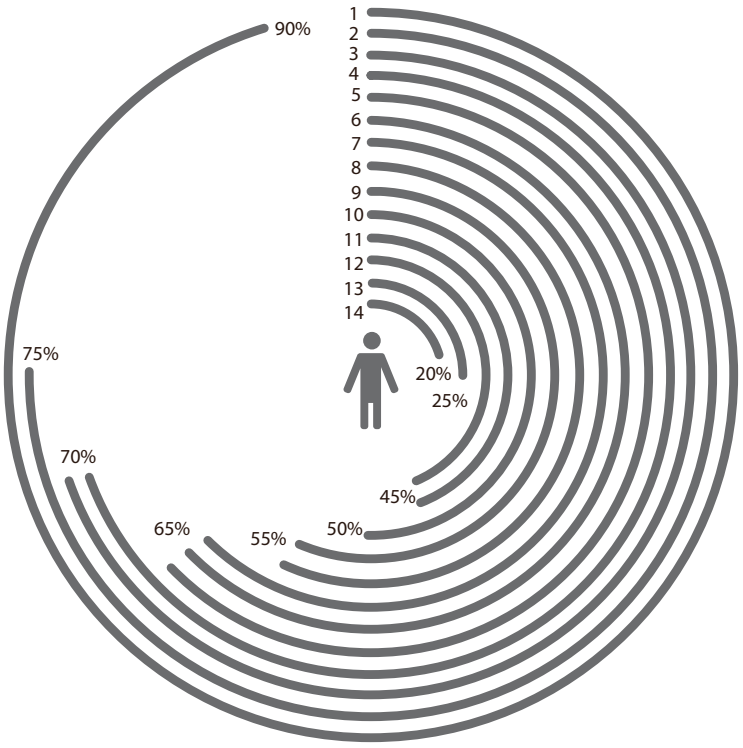
E. Process for Review of the Program Educational Objectives

Describe the process that periodically reviews the program educational objectives including how the program's various constituencies are involved in this process. Describe how this process is systematically utilized to ensure that the program's educational objectives remain consistent with the institutional mission, the program constituents' needs and these criteria. The reviewing of the Program Educational Objectives are made every four years, first by the Faculty members and Stakeholders lead by the Automation Engineering area chair, review by the Engineering Academic Committee and then approved by the Institution Academic Committee. Ones they approve the pertinence of the program educational objectives, the document is submitted to all faculty members for a general syllabus content review. The last review was made in 2013 and approved in the program INA2014. A description of the process can be seen in the following graphic Stakeholders.



Graphic 2.1.- PEO review process.

Every period, the Graduate Students Department conducts a survey for all industries and long-term graduate students seeking the actual needs of the outcomes to succeed by engineering in our national context. This survey is one of the main inputs for reviewing the PEO of the program. This help us understand the actual needs outside institution. The following graphic demonstrates the desirable meet of outcomes searched by industries in Queretaro, and how this is important for the PEO analysis.



Graphic 2.- Survey results of the desirable PEO listed as follows.

1.- Team working.
2.- To generate a correct problem diagnosis and resolving them.
3.- Pressure working.
4.- Planning developing and organization in work.
5.- Multidisciplinary team working.
6.- Communicate verbally in a desirable level.
7.- Communicate orally in a desirable level.
8.- Working without supervision.
9.- Negotiating.
10.- Be able of analyzing and synthesis.
11.- To design and project management.
12.- An ability for applying scientific and technological knowledge in their discipline.
13.- Research development.
14.- International development work.

(Further information inside Criterion 4).

Faculty members and Academic committee

Once the Automation Engineering area chair collects all data from stakeholders, the chair calls for several open meetings for faculty members and the specialties committees for revision. These meetings are for discuss and complement the PEO according to the actual needs and to review their constituency with the Engineering department and Institution, objectives and mission. Once the PEO are reviewed and approved by all committees, each faculty member is in charged of reviewing their syllabus content to be constituency with the PEO. Since 2013, the Automation Engineering area chair offers training workshops for faculty members for guidance in their extended syllabus course preparation aligned to de PEO and the SO of the program.

CRITERION 3. STUDENT OUTCOMES

A. Student Outcomes

There are 7 student outcomes of the program that maintain a direct correspondence with all ABET learning outcomes. These outcomes have by their own general performance indicators from which the outcome is measure in the assessment. These outcomes and performance indicators are review and presented by the Engineering specialties committees led by the Automation Engineering area chair every four years, and they can be found in public disclosure at:

http://ingenieria.uaq.mx/students-outcomes/

Engineering Fundamentals & experimental skills

SO 1 Apply and use the knowledge of mathematics, basic science

and engineering to design and carry out research, application, technological and social innovation projects using specialized methods and techniques. Maintain correspondence with ABET learning outcomes (a and b).

Performance Indicators Outcome 1:

1.1 Use numeric representation algebraic and analytical techniques

1.2 Solve problems of social, technological and/or research

1.3 Interpret relations and functions

1.4 Analyze data, evaluate and interpret results

1.5 Model phenomena

1.6 Use electronic and digital tools

1.7 Visualize abstractly mathematical ideas

Teamwork skills

SO 2 Collaborate on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context. Maintain correspondence with ABET learning outcomes (d).

Performance Indicators Outcome 2:

2.1 Provide knowledge that build the solution

2.2 Use quality standards

2.3 Integrate the vision of other disciplines

2.4 Use economic, social and environmental aspects to promote

2.5 Play appropriate roles for the success of the working team.

Design skills

SO 3 Design components, systems and automated processes in order to meet specific needs and propose suitable solutions. Maintain correspondence with ABET learning outcomes (c).

Performance Indicators Outcome 3:

3.1 Abstract and synthesize the particular elements of the problem.

3.2 Evaluate solutions

3.3 Document integrated solutions of the problem whereas the engineering language (blueprints, drawings, diagrams, reports, calculation statements).

Impact analytical solutions using engineering tools

SO 4 Formulate solutions to problems of automation, components, systems and processes considering the impact and contributing to the improvement of the global, economic, environmental and social context using current tools and techniques. Maintain correspondence with ABET learning outcomes (e, h and k).

Performance Indicators Outcome 4:

4.1 Evaluate the impact of the solution in the context.

4.2 Analyze the particular elements of the problem.

4.3 Apply the engineering tools.

4.4 Know the global context.

Ethics & contemporary issues

SO 5 Assess and take care of the problems facing today's society recognizing individual and cultural differences to live responsibly in the social and labor fields based on professional ethics and sticking to the criteria and quality standards to promote sustainable development.

Maintain correspondence with ABET learning outcomes (f and j).

Performance Indicators Outcome 5:

5.1 Know regulations, criteria, and quality standards

5.2 Be aware of the living and working environment

5.3 Know the ethical principles of their profession

Communications skills

SO 6 Communicates ideas, concepts and knowledge of engineering in a multicultural context.

Maintain correspondence with ABET learning outcomes (g).

Performance Indicators Outcome 6:

6.1 Use all engineering languages (verbal, graphic, written, and technical)

6.2 Ability to communicate in more than one language

6.3 Express ideas relevant in the communication environment

6.4 Express ideas coherently and clearly

6.5 Use “TICs”

Life-long learning

SO 7 Upgrade continuously the knowledge to improve their development, adapting to the changing needs of the environment.

Maintain correspondence with ABET learning outcomes (i).

Performance Indicators Outcome 7:

7.1 Search for different information sources

7.2 Participate in national and/or international academic activities

7.3 Recognize the importance of learning

Each Engineering specialty committee is in charge of generating the syllabus material of the courses they belong in, and by intern policy of the program, each course must choose up to three mainly outcomes to work with strongly, although all outcomes are promoted in different levels in all courses. Once the mainly outcomes of the courses are assigned by the committees, the course coordinator generates up to three specific outcomes of each course with their specific performance indicators related to those general performance indicators, and must be equal to all Faculty members assigned to that course. In the following chart all courses are shown meeting its general student outcomes and ABET´s outcomes.

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS
INA14	203	Linear Algebra	1, 4, 6	a, b, e, h, k, g
INA14	811	Differential Calculus	1, 2, 6	a, b, d, g
INA14	204	Chemistry	1, 4	a, b, e, h, k
INA14	214	Probability and Statistics	1	a , b
INA14	205	Computer Assisted Design	2, 3	d, c
INA14	1015	Foreign Language I	6	g
INA14	1207	Physical Culture I	2, 5, 6	d, f, j, g
INA14	206	University and Society	2, 5, 7	d, f, j, i

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS
INA14	202	Statics	1, 6	a, b, g
INA14	821	Integral Calculus	1, 6	a, b, g
INA14	822	Physics	1, 6	a, b, g
INA14	229	Metrology	4,5,6	e, h, k, f, j, g
INA14	215	Programming	1, 3	a, b, c
INA14	1024	Foreign Language II	6	g
INA14	1208	Physical Culture II	2, 5, 6	d, f, j, g
INA14	1418	Artistic Optional Course	2,5,6	d, f, j, g
INA14/10	212	Dynamics	1, 2, 3, 6	a, b, d, c, g
INA14/10	221	Differential Equations	1, 6, 7	a, b, g, i
INA14/10	211	Multivariable Calculus	1, 6, 7	a, b, g, i
INA14/10	213	Electromagnetism	1, 2, 6	a, b, d, g
INA14/10	230	Advanced Programming	1,4	a, b, e, h, k
INA14/10	228	Electric Circuits I	2, 4	d, e, h, k
INA14	1277	Development Workshop of Automation Technology I	2, 5, 7	d, f y j, i
INA14/10	1305	Foreign Language III	6	g
INA14/10	1209	Physical Culture III	2, 5, 6	d, f, j, g

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS
INA14/10	841	Thermodynamics	1, 2	a, b, d
INA14/10	231	Signal Analysis	1, 6	a, b, g
INA14/10	742	Numerical Methods	1, 4	a, b, e, h, k
INA14/10	239	Electronics	1,4	a, b, e, h, k
INA14/10	237	Electrical Machines I	1,2, 3, 4	a, b, d, c, e, h, k
INA14/10	238	Electric Circuits II	3, 4	c, e, h, k
INA14	1278	Development Workshop of Automation Technology II	2, 5, 7	d, f, j, i
INA14/10	1046	Additional Language IV	6	g
INA14/10	1210	Physical Culture IV	2, 5, 6	d, f, j,
INA14/10	851	Control I	1, 3	a, b, c
INA14/10	249	Automation I	1, 4	a, b, e, h, k
INA14/10	343/	INA10 Digital Systems II (INA14Microsystems)	2, 3	d, c
INA14/10	250	Advanced Electronics	4,6	e, h, k, g
INA14/10	248	Electrical Machines II	1	a, b, e
INA14/10	853	Electric Systems Design	1, 4, 7	a, b, e, h, k, i
INA14	1280	Development Workshop of Automation Technology III	2, 5, 7	d, f, j, i
INA14/10	1057	Foreign Language V	6	g
INA14/10	226	Social and Human Sciences Optional Course	2, 4, 5, 6, 7	d, e, h, k, f, j, g, i

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS
INA14/10	861	Control II	1, 3	a, b, c
INA14/10	269	Automation II	1, 4	a, b, e, h, k
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic I)	2, 3, 4	d, c, e, h, k
INA14/10	862	Informatics Engineering	1, 3	a, b, c
INA14/10	268	Materials Technology	3, 4	c, e, h, k
INA14/10	271	Instrumentation I	1, 2, 7	a, b, d, i
INA14	1282	Development Workshop of Automation Technology IV	2, 5, 7	d, f, j, i
INA14/10	1064	Foreign Language VI	6	g
INA14/10	74	Professional Optional Course I	1, 3	a, b, c
SIM10/14	888	Robotics	1, 4	a, b, e, h, k
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	2, 3, 4, 5	d, c, e, h, k, f, j
SIM14	12XX	Design of Machines	2, 6, 7	d, g, i
SIM14	1212	Ergonomics and Security	2, 5, 6	d, f, j, g
SIM10/14	361	Manufacturing Engineering	1, 2, 3	a, b, d, c
SIM14	12XX	Kinematics and Dynamics of Machines	2, 3, 7	d, c, i
SIM14	1284	Development Workshop of Automation Technology V	2, 5, 7	d, f, j, i
SIM10/14	1073	Foreign Language VII	6	g
SIM10/14	883	Social Service	2, 5, 6, 7	d, f, j, g, i
SIM10	291	Instrumentation II	1, 2, 7	a, b, d, i
SIM10	354	Digital systems III	2, 5, 7	d, f, j, i
SIM10	316	Proyect integration seminar	2, 5, 6, 7	d, f, j, g, i

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS
SIM10/14	877	Mechatronics	1, 2 , 3, 4	a, b, d, c, e, h, k
SIM10/14	298	Servomechanisms	1, 3, 4	a, b, c, e, h, k
SIM10/14	882	Degree Seminar	2, 4, 6	d, e, h , k, g
SIM10/14	887	Mechatronics Project	1, 2, 3	a, b, d, c
SIM10/14	364	Computer Vision	1, 3	a, b, c
SIM10/14	85	Specialty Optional Course	1,2, 3, 4	a, b, d, c, e, h, k
SIM10/14	1082	Foreign Language VIII	6	g
SIM14	1214	Productivity and Quality	4, 5, 7	e, h, k, f, j, i
SIM14	1215	Mobile Devices Programming	2, 3, 7	d, c, i
SIM10/14	891	Professional Internship	2,4,5,6,7	d, e, h, k, f, j , g, i

Table 3.1.- Mainly SO relationshiop with the curricula courses and direct ABET`s relationship.

Most of the SO assessment is collected from faculty's courses, although indirect methods, as surveys, are made periodically. (More detail processes is mention in Criterion 4). All outcomes are review every four years as well as the educational objectives. Faculty members and stakeholders are involved in the process.

B. Relationship of Student Outcomes to Program Educational Objectives

Mainly, the program is concern in developing prepared engineers with a high social sense of responsibilities of the impact their solution can make to their environment and with a grown capability of applying engineering tools in their

engineer solutions inside industry and research. The following chart describes the direct relationship between the Student outcomes to the educational objectives.

ABET OUTCOME	PROGRAM OUTCOME		PEO1: Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.	PEO2: To effectively manage, apply and develop his knowledge of engineering, TICs and sci-ences in social projects, research projects and in industry collaborating successfully in disciplinary and multidisciplinary teamwork.	PEO3: Effectively lead in engineering investigation and industry fields.	PEO4: Effectively communicate with other professionals and cooperates in multi-disciplinary groups.	PEO5: Consciously value and respect present day problems, recognizing individual and cultural differences on the basis of professional ethics principles, adhering to quality criteria and standards in order to promote sustainable development.
a&b	1	Apply and use the knowledge of mathematics, basic science and engineering to design and carry out research, application, technological and social innovation projects using specialized methods and techniques	x	x			
d	2	Collaborate on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context.		x	x	x	x
c	3	Design components, systems and automated processes in order to meet specific needs and propose suitable solutions.	x	x			
e,h & k	4	Formulate solutions to problems of automation, components, systems and processes considering the impact and contributing to the improvement of the global, economic, environmental and social context using current tools and techniques.	x	x			x
f & j	5	Assess and take care of the problems facing today's society recognizing individual and cultural differences to live responsibly in the social and labor fields based on professional ethics and sticking to the criteria and quality standards to promote sustainable development.					x
g	6	Communicate ideas, concepts and knowledge of engineering in a multicultural context.				x	
i	7	Upgrade continuously the knowledge to improve their development, adapting to the changing needs of the environment			x		x

Table 3.2.- PEO direct relation to SO.

Each one of these outcomes involves general performance indicators the faculty members uses as input of their own specific performance indicator of each course. The following charts, demonstrates the relationship between the general outcomes of the program, its general indicators and their constituency with the PEO of the program.

ABET OUTCOME	PROGRAM OUTCOME		PEO1: Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.	PEO2: To effectively manage, apply and develop his knowledge of engineering, TICs and sci-ences in social projects, research projects and in industry collaborating successfully in disciplinary and multidisciplinary teamwork.	PEO3: Effectively lead in engineering investigation and industry fields.	PEO4: Effectively communicate with other professionals and cooperates in multi-disciplinary groups.	PEO5: Consciously value and respect present day problems, recognizing individual and cultural differences on the basis of professional ethics principles, adhering to quality criteria and standards in order to promote sustainable development.
a&b	1	1.1 Use numeric representation algebraic and analytical techniques	H	M			
		1.2 Solve problems of social, technological and/or research	H	H			
		1.3 Interpret relations and functions	H	H			
		1.4 Analyze data, evaluate and interpret results	H	H			
		1.5 Model phenomena	H	H			
		1.6 Use electronic and digital tools	H	M			
		1.7 Visualize abstractly mathematical ideas	H	M			

ABET OUTCOME	PROGRAM OUTCOME		PEO1: Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.	PEO2: To effectively manage, apply and develop his knowledge of engineering, TICs and sci-ences in social projects, research projects and in industry collaborating successfully in disciplinary and multidisciplinary teamwork.	PEO3: Effectively lead in engineering investigation and industry fields.	PEO4: Effectively communicate with other professionals and cooperates in multi-disciplinary groups.	PEO5: Consciously value and respect present day problems, recognizing individual and cultural differences on the basis of professional ethics principles, adhering to quality criteria and standards in order to promote sustainable development.
d	2	2.1 Provide knowledge that build the solution		H	M	M	M
		2.2 Use quality standards		M	M	H	H
		2.3 Integrate the vision of other disciplines		H	M	H	M
		2.4 Use economic, social and environmental aspects to promote		M	L	M	H
		2.5 Play appropriate roles for the success of the working team.		L	H	H	M
c	3	3.1 Abstract and synthesize the particular elements of the problem.	H	H			
		3.2 Evaluate solutions	H	M			
		3.3 Document integrated solutions of the problem whereas the engineering language (blueprints, drawings, diagrams, reports, calculation statements).	H	M			
e,h & k	4	4.1 Evaluate the impact of the solution in the context.	H	H			M
		4.2 Analyze the particular elements of the problem.	H	H			L
		4.3 Apply the engineering tools.	H	M			L
		4.4 Know the global context.	H	H			H
f & j	5	5.1 Know regulations, criteria, and quality standards					H
		5.2 Be aware of the living and working environment					H
		5.3 Know the ethical principles of their profession					H
g	6	6.1 Use all engineering languages (verbal, graphic, written, and technical)				H	
		6.2 Ability to communicate in more than one language				H	
		6.3 Express ideas relevant in the communication environment				H	
		6.4 Express ideas coherently and clearly				H	
		6.5 Use “TICs”				H	

ABET OUTCOME	PROGRAM OUTCOME		PEO1: Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.	PEO2: To effectively manage, apply and develop his knowledge of engineering, TICs and sci-ences in social projects, research projects and in industry collaborating successfully in disciplinary and multidisciplinary teamwork.	PEO3: Effectively lead in engineering investigation and industry fields.	PEO4: Effectively communicate with other professionals and cooperates in multi-disciplinary groups.	PEO5: Consciously value and respect present day problems, recognizing individual and cultural differences on the basis of professional ethics principles, adhering to quality criteria and standards in order to promote sustainable development.
i	7	7.1 Search for different information sources			H		M
		7.2 Participate in national and/or international academic activities			H		M
		7.3 Recognize the importance of learning			H		M

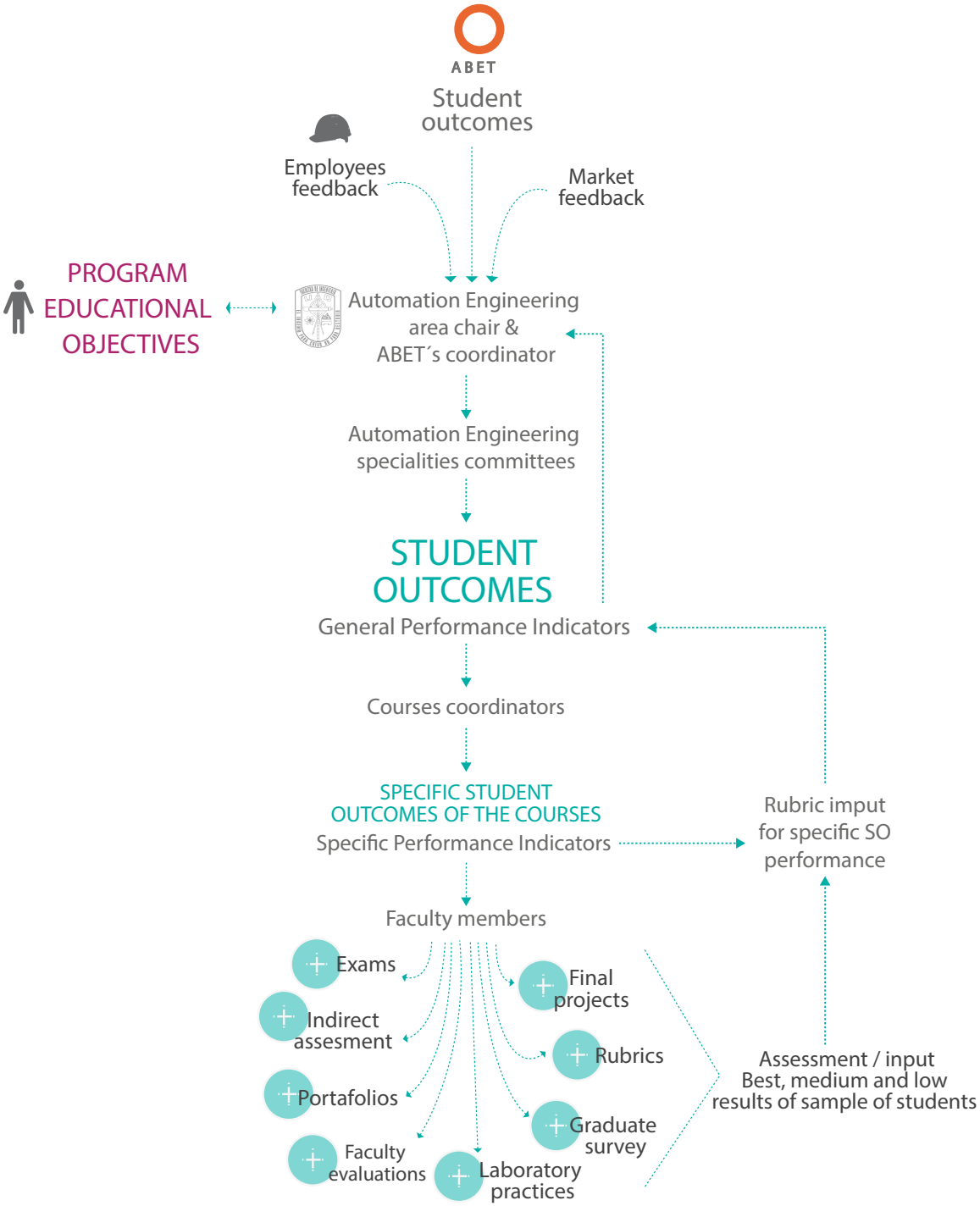
H= High M= Medium L= Low

Table 3.3.- PEO relationship with general performance indicators.

CRITERION 4. CONTINUOUS IMPROVEMENT

A. Student Outcomes

The assessment process involves all Faculty members in different periods and ways. Starting with the Automation Engineering area chair, who is responsible for all meetings, staff hiring and supervising the assessment process, it also designates an ABET coordinator who is responsible for gathering all the information and giving all the necessary feedback to each faculty member and the personnel involved. Since 2013, several educational workshops have been given to most Faculty members of the program. These workshops help them to develop a structured assessment of their own specific outcomes so they can obtain a specific result of their improvement opportunity area. The following graphic shows the complete assessment process for the program:



Graphic 4.1- Assessment method for SO of the program.

In a general picture, each program outcome is classified in its Initial, Middle and Final phases for accomplishing all performance indicators in a satisfactory level. The following graphics show the evolution of the outcome inside the program curricula:

	No	COURSE	STUDENT OUTCOMES 1	ABET´S CORRESPONDALS	Performance Level progress
INA14	203	Linear Algebra	1	a & b	Initial
INA14	811	Differential Calculus	1	a & b	
INA14	204	Chemistry	1	a & b	
INA14	214	Probability and Statistics	1	a & b	
INA14	202	Statics	1	a & b	
INA14	821	Integral Calculus	1	a & b	
INA14	822	Physics	1	a & b	
INA14	215	Programming	1	a & b	
INA14/10	212	Dynamics	1	a & b	
INA14/10	221	Differential Equations	1	a & b	
INA14/10	211	Multivariable Calculus	1	a & b	
INA14/10	213	Electromagnetism	1	a & b	Middle
INA14/10	230	Advanced Programming	1	a & b	
INA14/10	841	Thermodynamics	1	a & b	
INA14/10	231	Signal Analysis	1	a & b	
INA14/10	742	Numerical Methods	1	a & b	
INA14/10	239	Electronics	1	a & b	
INA14/10	237	Electrical Machines I	1	a & b	
INA14/10	851	Control I	1	a & b	
INA14/10	249	Automation I	1	a & b	
INA14/10	248	Electrical Machines II	1	a & b	
INA14/10	853	Electric Systems Design	1	a & b	
INA14/10	861	Control II	1	a & b	
INA14/10	269	Automation II	1	a & b	
INA14/10	862	Informatics Engineering	1	a & b	
INA14/10	271	Instrumentation I	1	a & b	
INA14/10	74	Professional Optional Course I	1	a & b	Final
SIM10/14	888	Robotics	1	a & b	
SIM10/14	361	Manufacturing Engineering	1	a & b	
SIM10	291	Instrumentation II	1	a & b	
SIM10/14	877	Mechatronics	1	a & b	
SIM10/14	298	Servomechanisms	1	a & b	
SIM10/14	887	Mechatronics Project	1	a & b	
SIM10/14	364	Computer Vision	1	a & b	
SIM10/14	85	Specialty Optional Course	1	a & b	

	No	COURSE	STUDENT OUTCOMES 2	ABET´S CORRESPONDALS	Performance Level progress
INA14	811	Differential Calculus	2	d	Initial
INA14	205	Computer Assisted Design	2	d	
INA14	1207	Physical Culture I	2	d	
INA14	206	University and Society	2	d	
INA14	1208	Physical Culture II	2	d	
INA14	1418	Artistic Optional Course	2	d	
INA14/10	212	Dynamics	2	d	
INA14/10	213	Electromagnetism	2	d	
INA14/10	228	Electric Circuits I	2	d	
INA14	1277	Development Workshop of Automation Technology I	2	d	
INA14/10	1209	Physical Culture III	2	d	
INA14/10	841	Thermodynamics	2	d	Middle
INA14/10	237	Electrical Machines I	2	d	
INA14	1278	Development Workshop of Automation Technology II	2	d	
INA14/10	1210	Physical Culture IV	2	d	
INA14/10	343/	INA10 Digital Systems II (INA14Microsystems)	2	d	
INA14	1280	Development Workshop of Automation Technology III	2	d	
INA14/10	226	Social and Human Sciences Optional Course	2	d	
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic)	2	d	
INA14/10	271	Instrumentation I	2	d	
INA14	1282	Development Workshop of Automation Technology IV	2	d	Final
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	2	d	
SIM14		Design of Machines	2	d	
SIM14	1212	Ergonomics and Security	2	d	
SIM10/14	361	Manufacturing Engineering	2	d	
SIM14		Kinematics and Dynamics of Machines	2	d	
SIM14	1284	Development Workshop of Automation Technology V	2	d	
SIM10/14	883	Social Service	2	d	
SIM10	291	Instrumentation II	2	d	
SIM10	354	Digital systems III	2	d	
SIM10/14	877	Mechatronics	2	d	
SIM10/14	882	Degree Seminar	2	d	
SIM10/14	887	Mechatronics Project	2	d	
SIM10/14	85	Specialty Optional Course	2	d	
SIM14	1215	Mobile Devices Programming	2	d	
SIM10/14	891	Professional Internship	2	d	

		COURSE	STUDENTS OUTCOME 3	ABET´S CORRESPONDALS	Performance Level progress
INA14	205	Computer Assisted Design	3	c	Initial
INA14	215	Programming	3	c	
INA14/10	212	Dynamics	3	c	
INA14/10	237	Electrical Machines I	3	c	Middle
INA14/10	238	Electric Circuits II	3	c	
INA14/10	851	Control I	3	c	
INA14/10	343/	INA10 Digital Systems II (INA14Microsystems)	3	c	
INA14/10	861	Control II	3	c	
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic I)	3	c	
INA14/10	862	Informatics Engineering	3	c	
INA14/10	268	Materials Technology	3	c	
INA14/10	74	Professional Optional Course I	3	c	
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	3	c	
SIM10/14	361	Manufacturing Engineering	3	c	
SIM14		Kinematics and Dynamics of Machines	3	c	
SIM10/14	877	Mechatronics	3	c	Final
SIM10/14	298	Servomechanisms	3	c	
SIM10/14	887	Mechatronics Project	3	c	
SIM10/14	364	Computer Vision	3	c	
SIM10/14	85	Specialty Optional Course	3	c	
SIM14	1215	Mobile Devices Programming	3	c	

		COURSE	STUDENTS OUTCOME 4	ABET´S CORRESPONDALS	Performance Level progress
INA14	203	Linear Algebra	4	e, h & k	Initial
INA14	204	Chemistry	4	e, h & k	
INA14	229	Metrology	4	e, h & k	
INA14/10	230	Advanced Programming	4	e, h & k	
INA14/10	228	Electric Circuits I	4	e, h & k	
INA14/10	742	Numerical Methods	4	e, h & k	
INA14/10	239	Electronics	4	e, h & k	Middle
INA14/10	237	Electrical Machines I	4	e, h & k	
INA14/10	238	Electric Circuits II	4	e, h & k	
INA14/10	249	Automation I	4	e, h & k	
INA14/10	250	Advanced Electronics	4	e, h & k	
INA14/10	853	Electric Systems Design	4	e, h & k	
INA14/10	226	Social and Human Sciences Optional Course	4	e, h & k	
INA14/10	269	Automation II	4	e, h & k	Final
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic I)	4	e, h & k	
INA14/10	268	Materials Technology	4	e, h & k	
SIM10/14	888	Robotics	4	e, h & k	
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	4	e, h & k	
SIM10/14	877	Mechatronics	4	e, h & k	
SIM10/14	298	Servomechanisms	4	e, h & k	
SIM10/14	882	Degree Seminar	4	e, h & k	
SIM10/14	85	Specialty Optional Course	4	e, h & k	
SIM14	1214	Productivity and Quality	4	e, h & k	
SIM10/14	891	Professional Internship	4	e, h & k	

		COURSE	STUDENTS OUTCOME 5	ABET´S CORRESPONDALS	Performance Level progress
INA14	1207	Physical Culture I	5	f & j	Initial
INA14	206	University and Society	5	f & j	
INA14	229	Metrology	5	f & j	Middle
INA14	1208	Physical Culture II	5	f & j	
INA14	1418	Artistic Optional Course	5	f & j	
INA14	1277	Development Workshop of Automation Technology I	5	f & j	
INA14/10	1209	Physical Culture III	5	f & j	
INA14	1278	Development Workshop of Automation Technology II	5	f & j	
INA14/10	1210	Physical Culture IV	5	f & j	
INA14	1280	Development Workshop of Automation Technology III	5	f & j	
INA14/10	226	Social and Human Sciences Optional Course	5	f & j	
INA14	1282	Development Workshop of Automation Technology IV	5	f & j	
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	5	f & j	Final
SIM14	1212	Ergonomics and Security	5	f & j	
SIM14	1284	Development Workshop of Automation Technology V	5	f & j	
SIM10/14	883	Social Service	5	f & j	
SIM10	354	Digital systems III	5	f & j	
SIM14	1214	Productivity and Quality	5	f & j	
SIM10/14	891	Professional Internship	5	f & j	

		COURSE	STUDENTS OUTCOME 6	ABET´S CORRESPONDALS	Performance Level progress
INA14	203	Linear Algebra	6	g	Initial
INA14	811	Differential Calculus	6	g	
INA14	1015	Foreign Language I	6	g	
INA14	1207	Physical Culture I	6	g	
INA14	202	Statics	6	g	
INA14	821	Integral Calculus	6	g	
INA14	822	Physics	6	g	
INA14	229	Metrology	6	g	
INA14	1024	Foreign Language II	6	g	
INA14	1208	Physical Culture II	6	g	
INA14	1418	Artistic Optional Course	6	g	
INA14/10	212	Dynamics	6	g	
INA14/10	221	Differential Equations	6	g	
INA14/10	211	Multivariable Calculus	6	g	
INA14/10	213	Electromagnetism	6	g	Middle
INA14/10	1305	Foreign Language III	6	g	
INA14/10	1209	Physical Culture III	6	g	
INA14/10	231	Signal Analysis	6	g	
INA14/10	1046	Additional Language IV	6	g	
INA14/10	1210	Physical Culture IV	6	g	
INA14/10	250	Advanced Electronics	6	g	
INA14/10	1057	Foreign Language V	6	g	
INA14/10	226	Social and Human Sciences Optional Course	6	g	
INA14/10	1064	Foreign Language VI	6	g	
SIM14		Design of Machines	6	g	
SIM14	1212	Ergonomics and Security	6	g	
SIM10/14	1073	Foreign Language VII	6	g	
SIM10/14	883	Social Service	6	g	Final

		COURSE	STUDENTS OUTCOME 7	ABET´S CORRESPONDALS	Performance Level progress
INA14	206	University and Society	7	i	Initial
INA14/10	221	Differential Equations	7	i	
INA14/10	211	Multivariable Calculus	7	i	
INA14		Development Workshop of Automation Technology I	7	i	Middle
INA14		Development Workshop of Automation Technology II	7	i	
INA14/10	853	Electric Systems Design	7	i	
INA14		Development Workshop of Automation Technology III	7	i	
INA14/10	226	Social and Human Sciences Optional Course	7	i	
INA14/10	271	Instrumentation I	7	i	
INA14		Development Workshop of Automation Technology IV	7	i	
SIM14		Design of Machines	7	i	
SIM14		Kinematics and Dynamics of Machines	7	i	Final
SIM14		Development Workshop of Automation Technology V	7	i	
SIM10/14	883	Social Service	7	i	
SIM10	291	Instrumentation II	7	i	
SIM10	354	Digital systems III	7	i	
SIM14	1214	Productivity and Quality	7	i	
SIM14	1215	Mobile Devices Programming	7	i	
SIM10/14	891	Professional Internship	7	i	

Table 4.1 PEO- Reflects how the outcome student is growing inside the curricula. This growing outcomes charts, are used as an method of evaluating where the main problem of general outcome has start inside the curricula.

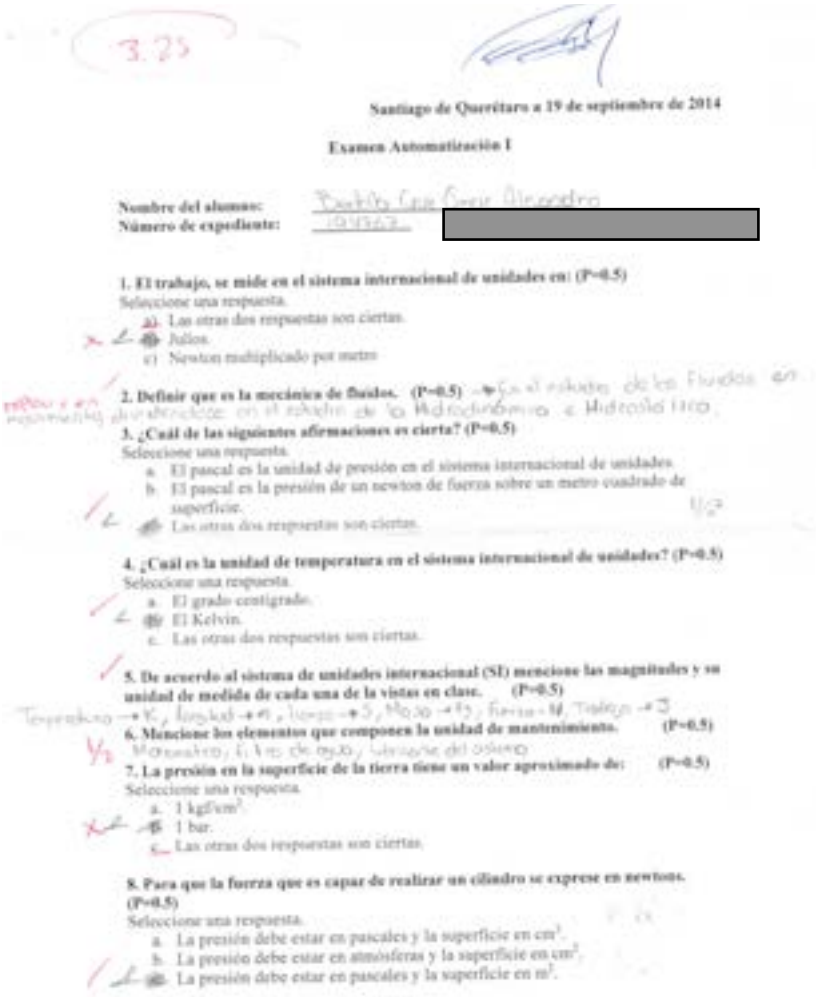
Every ending semester, all Faculty members are encouraged to make their particular assessment outcomes and their course outcome analysis; this helps them to have a better idea of the strategies they can use to modify either their teaching-learning methods or the curricula content of the course (this has to be with the Engineering specialties committees.) Most of the data collection inside courses are made as a direct method (mostly exams, homework's, essays and laboratory practices), although the Automation Engineering area chair and the ABET´s coordinator jointly with others Engineer Departments, collects some indirect data for the outcome assessment process. The results are gathered by the ABET´s coordinator in different semesters for different courses, as well as the Automation Engineering area chair is promoting the use of a Faculty´s portfolio online and some online tools for the easy access and collection of all data. As an example of this, the Automation I course assessment is explained next although more evidence will be displayed at the time of the visit for all courses assessment for this period:

SPECIFIC PERFORMANCE INDICATOR OF THE COURSE

CRITERIA/ PUNCTUATION	100%	75%	50%	25%
He knows and identify the International System of Units.	Correctly identifys the International System of Units.	Partially identifys the International System of Units.	Poorlly identifys the International System of Units.	Do not identifys the International System of Units.
He dominates the conversion of units from the International System to the English System.	Correctly convert units from the International System to the English System.	Partially convert units from the International System to the English System.	Poorly convert units from the International System to the English System.	Do not converts units from the International System to the English System.
He understands correctly the behaviour of fluid mechanics.	Correctly explains the behaviour of fluid mechanics, concepts and definitions.	Partially explains the behaviour of fluid mechanics, concepts and definitions.	Ppoorly explains the behaviour of fluid mechanics, concepts and definitions.	Explains confusedly the behaviour of fluid mechanics, concepts and definitions.
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.	Correctly idintify, interprets and solves engineering problems applied to the conditions of equilibrium in fluids at rest.	Partially idintify, interprets and solves engineering problems applied to the conditions of equilibrium in fluids at rest.	Poorly idintify, interprets and solves engineering problems applied to the conditions of equilibrium in fluids at rest.	Do not idintify, interprets and solves engineering problems applied to the conditions of equilibrium in fluids at rest.
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.	Solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.	Solves and interpret partially engineering problems applied to the conditions of equilibrium in fluids in motion.	Solves and interpret poorly engineering problems applied to the conditions of equilibrium in fluids in motion.	Do not solves and interpret engineering problems applied to the conditions of equilibrium in fluids in motion.

Image 4.2.- Rubric example for Automation I outcome analysis with the specific perdormance indicator of the course as an input of the rubric applied in the final exam.

From their assessment method, Faculty members fill the rubric with their best, average and worst student samples and obtain an average student outcome performance. The following images are some test used as an assessment method input in the rubric from Automation I course.



Santiago de Querétaro a 19 de septiembre de 2014

Examen Automatización I

Nombre del alumno:
Número de expediente:

1. El trabajo, se mide en el sistema internacional de unidades en: (P=0.5)
Seleccione una respuesta.
a) Las otras dos respuestas son ciertas.
b) Julios.
c) Newton multiplicado por metro

2. Definir que es la mecánica de fluidos. (P=0.5)

3. ¿Cuál de las siguientes afirmaciones es cierta? (P=0.5)
Seleccione una respuesta.
a. El pascal es la unidad de presión en el sistema internacional de unidades.
b. El pascal es la presión de un newton de fuerza sobre un metro cuadrado de superficie.
c. Las otras dos respuestas son ciertas.

4. ¿Cuál es la unidad de temperatura en el sistema internacional de unidades? (P=0.5)
Seleccione una respuesta.
a. El grado centígrado.
b. El Kelvin.
c. Las otras dos respuestas son ciertas.

5. De acuerdo al sistema de unidades internacional (SI) mencione las magnitudes y su unidad de medida de cada una de la vistas en clase. (P=0.5)

6. Mencione los elementos que componen la unidad de mantenimiento. (P=0.5)

7. La presión en la superficie de la tierra tiene un valor aproximado de: (P=0.5)
Seleccione una respuesta.
a. 1 kgf/cm².
b. 1 bar.
c. Las otras dos respuestas son ciertas.

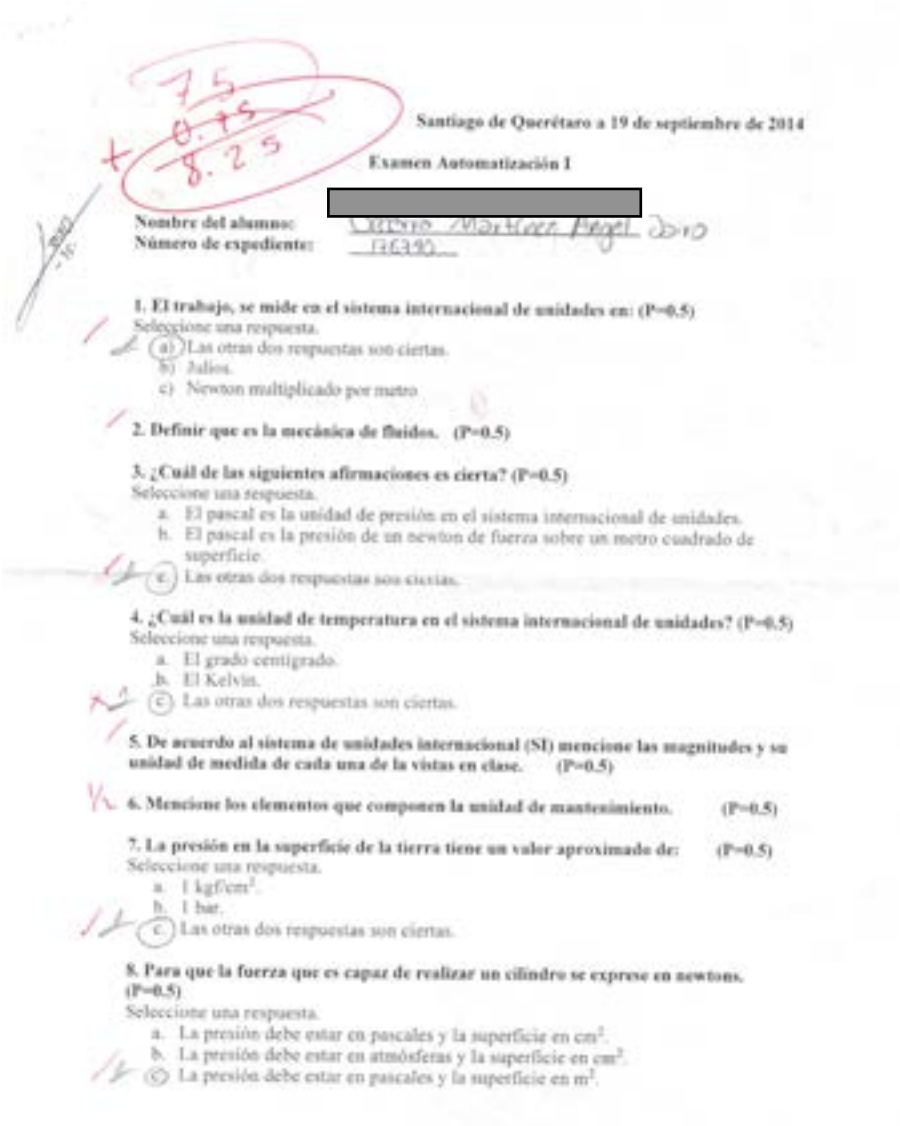
8. Para que la fuerza que es capaz de realizar un cilindro se exprese en newtons. (P=0.5)
Seleccione una respuesta.
a. La presión debe estar en pascales y la superficie en cm².
b. La presión debe estar en atmósferas y la superficie en cm².
c. La presión debe estar en pascales y la superficie en m².

STUDENT 1

CRITERIA/ PUNCTUATION	100%	75%	50%	25%
He knows and identify the International System of Units.	X			
He dominates the conversion of units from the International System to the English System.	X			
He understands correctly the behaviour of fluid mechanics.		X		
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		X		
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.			X	

This rubric does not graduate the exam; the Faculty member uses this method as a way for demonstrating the student specific performance indicator.

Faculty members take a sample of their students , most of the cases they are encourage to take some of the best, some of the average ones and some of the not so good performance students.



7.5
0.75
8.25

Santiago de Querétaro a 19 de septiembre de 2014

Examen Automatización I

Nombre del alumno: [redacted]
Número de expediente: [redacted]

1. El trabajo, se mide en el sistema internacional de unidades en: (P=0.5)
Seleccione una respuesta.
a) Las otras dos respuestas son ciertas.
b) Julios.
c) Newton multiplicado por metro

2. Definir que es la mecánica de fluidos. (P=0.5)

3. ¿Cuál de las siguientes afirmaciones es cierta? (P=0.5)
Seleccione una respuesta.
a. El pascal es la unidad de presión en el sistema internacional de unidades.
b. El pascal es la presión de un newton de fuerza sobre un metro cuadrado de superficie.
c. Las otras dos respuestas son ciertas.

4. ¿Cuál es la unidad de temperatura en el sistema internacional de unidades? (P=0.5)
Seleccione una respuesta.
a. El grado centígrado.
b. El Kelvin.
c. Las otras dos respuestas son ciertas.

5. De acuerdo al sistema de unidades internacional (SI) mencione las magnitudes y su unidad de medida de cada una de la vistas en clase. (P=0.5)

6. Mencione los elementos que componen la unidad de mantenimiento. (P=0.5)

7. La presión en la superficie de la tierra tiene un valor aproximado de: (P=0.5)
Seleccione una respuesta.
a. 1 kgf/cm².
b. 1 bar.
c. Las otras dos respuestas son ciertas.

8. Para que la fuerza que es capaz de realizar un cilindro se exprese en newtons. (P=0.5)
Seleccione una respuesta.
a. La presión debe estar en pascales y la superficie en cm².
b. La presión debe estar en atmósferas y la superficie en cm².
c. La presión debe estar en pascales y la superficie en m².

STUDENT 2

CRITERIA/ PUNCTUATION	100%	75%	50%	25%
He knows and identify the International System of Units.		X		
He dominates the conversion of units from the International System to the English System.		X		
He understands correctly the behaviour of fluid mechanics.				X
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.				X
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.			X	

Image 4.2- Assessment method example as an input for the specific rubric student outcome of the course.

			249 AUTOMATION I			2014-1		2015-1				
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME ANALISIS
249 AUTOMATION I	1, 4	1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the deveolpment of automatic processes using direct and indirect control techniques.	He knows and identify the International System of Units.	Final exam // project	100	75	70	100	50	79	No action will be taken in a short term
249 AUTOMATION I	1, 4	1.3, 4.2		He dominates the conversion of units from the International System to the English System.		100	75	100	70	70	83	
249 AUTOMATION I	1, 4	1.2, 1.3, 4.2, 4.4	To identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to automation engineering.	He understands correctly the behaviour of fluid mechanics.		75	25	100	50	50	60	1. Implement more laboratory practices with real project applications 2. Review themes before exam
249 AUTOMATION I	1, 4	1.2, 4.2, 4.3, 4.4		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		75	25	50	70	70	58	
249 AUTOMATION I	1, 4	1.2, 4.2, 4.3, 4.5		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25	100	70	50	59	

Image 4.3- Assessment delivered to ABET´s coordinator. This is the same format for all Faculty members' uses for their assessment and the ABET´s coordinator can make the direct relationship of all courses outcomes.

The results of each course are gathered and selected to match its general outcome and general performance indicator for having the general result for each phase the outcome is meeting. The following graphic demonstrates how the specific courses student outcomes and specific courses performance indicators matches with the general student outcomes and general performance indicators, in order to have a global and specific analysis of the general student outcomes.

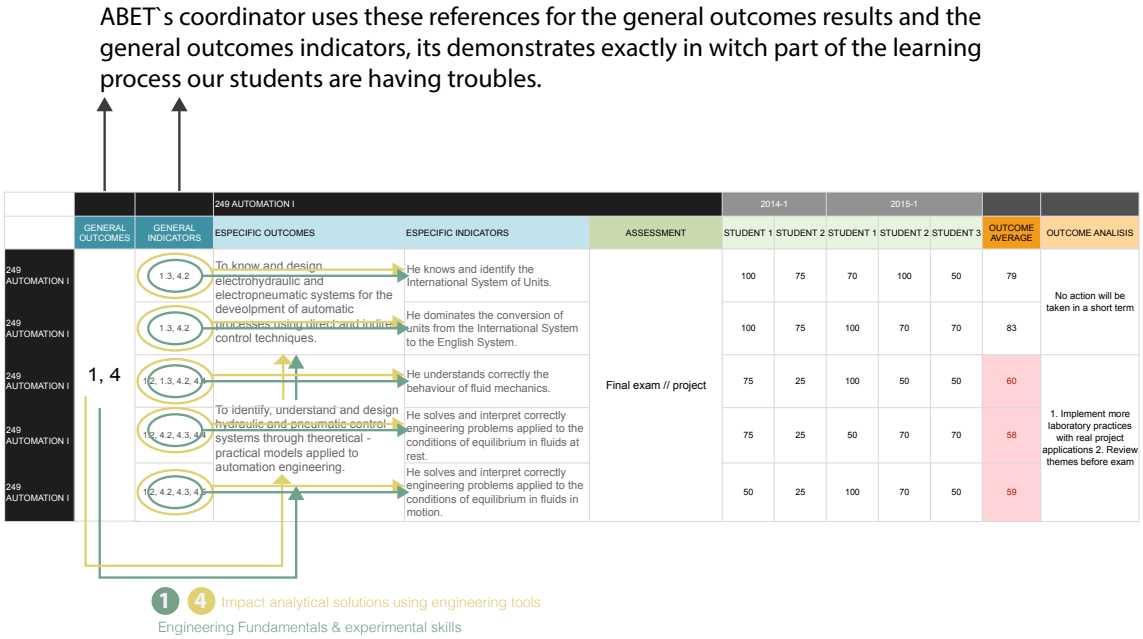


Image 4.4.- Relationship between student outcomes and performance indicators used for student outcomes analysis.

The complete assessment of students is presented in the following tables:

		269 AUTOMATION II			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1 y 4	1.1, 1.2, 1.6, 4.3	To know and understand the use of automation in industrial processes using programmable logic controllers.	He knows and identifies how a PID works	Final Proyect	75	100	100	60	100	100	100	100	75	90.00
1 y 4	1.4, 1.2, 1.6, 4.1, 4.3	To identify, research and design Automation Engineering problems by means of programmable logic controllers.	He controls and tunes properly a PID applied to a PLC		60	75	100	75	100	75	100	100	75	84.44
			He knows correctly programming in ladder diagrams with an PLC		40	60	100	40	60	100	75	75	50	66.67
			He identifies and formulates properly any real automation problem that he may find		40	75	75	40	75	75	75	75	50	64.44
			Knows perfectly the inputs and outputs of a PLC connection		60	100	75	60	100	100	75	100	75	82.78

		853 ELECTRIC SYSTEM DESIGN			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
4, 7	4.2, 4.4, 7.1	To design and carry out electric projects that let innovate the continuous improvement for a better storage, generation and distribution of the electric energy in the student's professional environment and for benefit of society.	He knows how to use properly the electrical connection diagrams of damper lamps and contacts	Review exam	75	100	100	75	100	100	100	75	50	86.11
			He masters the basic concepts of electric circuits and the basic laws of power and electricity		75	75	100	60	75	100	75	75	75	78.89
1, 4	1.2, 1.4, 1.6, 4.1, 4.3	To know how to use appropriate materials and tools to develop and design electrical systems for their application in the solution of commercial, industrial and residential problems in the current automation industry.	He knows and identifies the major materials and equipment that make up an electrical installation		60	60	100	40	75	75	100	50	50	67.78
			He knows the description and use of electrical materials that make up an electrical installation		40	75	75	40	75	100	100	50	50	67.22

		202 STATICS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.1, 1.4, 1.5	To use numerical, algebraic and analytic representation techniques that allow the student to represent real-world issues in a graphic and mathematical way, making possible the analysis of the specific values for their solution.	He analyzes free body diagrams	Homeworks, solution of exercises in class, tests							75	75	100	83.33
	1.4		He makes the vector determination and calculation								60	75	100	78.33
1, 6	6.1, 1.7		He compares the results in order to obtain the resistor values of materials and structural.								75	75	75	75.00
	6.1		He identifies the results according to the standards of measurement following the international system and/or the English system								0	100	100	66.67

		248 ELECTRICAL MACHINES II			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2, 1.3, 1.5, 1.7	To determine and study the behavior of random variables in the first stages of the modelling, by means of the well-known distributions.	He identifies the components of a magnetic field	Homework and review	100	70	50	100	70	50	100	50	50	71.11
			He uses appropriate symbols for electrical systems		100	100	50	100	100	50	70	70	50	76.67
	1.2, 1.4, 1.6	To use statistical software for data processing, specifically software packages designed for sciences and engineering	He fulfills his functions and specific role in a team	Laboratory	100	70	50	100	50	50	100	50	50	68.89
			He analyzes engineering problems mathematically		100	70	70	100	70	70	100	70	70	80.00
	1.2, 1.3, 1.4, 1.5, 1.7	To analyze different datasets in order to be able to make decisions by means of inference processes.	He identifies the parameters that are necessary for the specific operation of the equipment	Homework and review	100	50	70	100	70	70	100	100	70	81.11
			He uses the tools offered by MATLAB software in order to confirm the theoretical analysis		70	70	50	70	50	50	70	100	50	64.44

		212 DYNAMICS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.1, 1.3,	To analyze the position, velocity and acceleration of particles and rigid bodies, which are subject to the type of motion, specified to determine and understand their behavior making use of the knowledge of kinematics and kinetics	He develops the equations for kinematics of a particle and a rigid body, which are subject to the type of movement specified to solve engineering problems.	Solution of exercises in class, individual homeworks, participation in class and written exam				75	75	0	100	75	50	62.50
	1.3, 1.5, 1.4		He develops the equations for kinetics of particle and rigid body, which are subject to the type of motion, specified to solve engineering problems.					75	50	50	75	75	50	62.50
	1.4		He interprets and solves algebraic functions by calculation tools.					75	75	50	100	75	75	75.00
	1.7		He solves problems by means of the modelling of physical phenomena.					75	75	50	75	75	50	66.67
2, 3, 6	3.3	To apply the student's knowledge of this subject to study cases for the development of integral projects by work groups.	He understands and applies the basic concepts of dynamics to prove a solution.	Project in teams, hand in a document and make a presentation.				75	75	50	75	75	50	66.67
	2.1, 2.5		He establishes roles according to his abilities for the development of the project.					50	75	50	100	75	50	66.67
	6.1, 6.4, 7.1		He documents and exposes the results of the project in a clear and coherent way.					50	75	50	75	75	50	62.50
	6.1, 6.4, 7.1		He analyzes different information resources to support the project.					75	75	50	75	75	50	66.67

		291 INSTRUMENTATION II			2013-02			2014-1			2014-2			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2, 1.4, 1.6	To apply the basic research and engineering knowledge to the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced functionalities and to the analysis of mechanical vibrations.	To eloquently explain the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced functionalities and to the analysis of mechanical vibrations.	Questions in partial review in respect of each subject	40	75	100	50	75	100	75	75	75	73.89
1	1.2, 1.4, 1.6	To analize an industrial process to propose the implementation of control loops of process, specific, safety, and mechanical variables as well as its protocols, diagnoses and advanced functionalities.	To select and justify the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced funcionalities and the analysis of mechanical vibration.	Project where a process implemented in a DTI should be complemented with as seen on this course	40	100	100	75	100	100	100	40	100	83.89
2	2.1, 2.3, 2.5	To colaborate and organize in multidisciplinary teams, since the group is conformed by Mecatronics, Electronics and Instrumentation and Control students, to give solution to the homeworks and to the project that includes all topics covered in the curse.	To develop a project team in which at least one member is an student of Instrumentation and Control.	Project where a process implemented in a DTI should be complemented with as seen on this course	40	100	100	75	100	100	100	40	100	83.89
7	7.1, 7.3	To identify and use the reliable and updated sources of information about Instrumentation and Process Control.	To collect tables and standards	Tasks where it is requested to investigate standards and tables	50	75	100	50	75	100	100	100	100	83.33

		249 AUTOMATION I			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1, 4	1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the deveolpment of automatic processes using direct and indirect control techniques.	To know and identify the International System of Units.	Final Review	100	75					70	100	50	79
	1.3, 4.2		To dominate the conversion of units from the International System to the English System.		100	75					100	70	70	83
1, 4	1.2, 1.3, 4.2, 4.4	To identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to automation engineering.	To understand correctly the behaviour of fluid mechanics.		75	25					100	50	50	60
1, 4	1.2, 4.2, 4.3, 4.4		To solve and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		75	25					50	70	70	58
	1.2, 4.2, 4.3, 4.5		To solve and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25					100	70	50	59

		882 DEGREE SEMINAR			2013-02			2014-1			2014-2			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
4, 6, 7	4.1, 4.2, 4.3, 4.4, 6.5, 7.1	To formulate solutions for automation problems, components, systems and processes considering the impact of itself and contributing to the improvement of the global, economic, environmental and social context, using the current techniques and tools.	Research/experiment.	Final project /thesis	75	50	100	75	50		100	75	60	73.125
4, 6	4.2, 4.4, 6.3, 6.4		Conceptual management.		75	50	100	50	50		100	75	75	71.875
4, 7	4.1, 4.2, 4.3, 7.3		Evaluation project.		75	50	100	100	75		100	80	70	81.25
6	6.3, 6.5		Presentation: cover.		100	100	100	100	100		100	80	80	95
4	4.1, 4.2, 4.3		Approach to the problem.		75	50	75	75	75		100	80	80	76.25
4, 6, 7	4.4, 6.5, 7.1, 7.3		State of the art.		50	50	75	100	75		100	80	60	73.75
7	7.3		Objectives.		75	50	100	75	75		100	80	80	79.375
4, 6	4.1, 4.2, 6.4		Justification.		75	50	100	75	75		100	75	80	78.75
2	2.2, 2.5	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Material and methods.		75	75	100	100	100		100	80	60	86.25
	2.1, 2.2, 2.4		Results.		75	50	75	50	25		100	90	60	65.625
2, 4, 6	2.4, 4.1, 4.2, 6.1, 6.3		Discussion:		50	50	75	50	25		100	80	60	61.25
6	6.4		Conclusions.		75	50	75	25	25		100	80	70	62.5
2	2.2		Bibliography.		75	50	75	75	75		100	90	60	75
	2.1, 2.3		Critical attitude.		75	50	75	75	75		100	75	70	74.375

		231 SIGNAL ANALYSIS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2, 1.5, 1.7,	To understand and apply the operations, techniques and concepts between numbers and complex functions to interpret and solve technical situations that require these functions and its operations.	To solve problems with numbers and complex functions, inequalities and to graphically illustrate the solutions in the complex plane.	Solution class exercises and homework to deliver individually, participation and written exam				50	75	75	50	75	100	70.83
1	1.2, 1.5, 1.7, 1.3	To use the Laplace transform to obtain the transfer function of a (mechanic and electric) linear system to analize the system's behavior before different input signals.	To solve linear equations using the Laplace transform by applying the corresponding theorems.	Solution class exercises and homework to deliver individually, participation and written exam				50	75	100	75	75	100	79.17
			To analyze and solve the equations of an electrical and mechanical circuit mesh and node analysis to obtain the transfer function.					50	50	75	50	50	75	58.33
1, 6	1.4, 1.5, 1.7, 6.3	To determine the representation of a system in a state-space and its advantages with the transfer function to analyze the system's behavior.	To know the State space method to analyze systems, to know the advantages of this technique with transfer function and to make conversions from transfer function to state-space and viceversa.	Solution class exercises and homework to deliver individually, participation and written examination and exhibition team				50	75	75	50	75	75	66.67
	1.4, 1.6, 6.1, 6.4	To apply the Fourier series and transform to represent signals and to interpret them.	To know the mathematical foundation of the Fourier series, as well as their properties and convergence of Fourier series	Project equipment, delivery of a document and exposure.				50	75	100	0	75	100	66.67

		229 METROLOGY			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
4,6	4.4	To know the concepts as measurand, the measurement principle, measurement signal, measurement procedure, and magnitudes of influence and uncertainty with the aim to identify and describe properly these parameters in a measurement system through examples or article reading.	To know the concepts: measurand, measurement principle, measurement signal, measurement procedure of magnitudes of influence and uncertainty in a measurement system.	Examination of knowledge and exposure							100	100	75	91.67
	6.4		To identify, describe and appropriately explain concepts such as measurand, measurement, measurement signal, measurement procedure, magnitudes of influence and uncertainty in a measurement system.	Exhibition in class by team.							75	50	0	41.67
4,5,6	4.1, 5.1	To understand the purpose of the measurement standards, calibration and the importance of the traceability in the measurements, with the study of the terms in the International Vocabulary of Metrology, the analysis of examples and articles for its application in specific problems at the industrial or scientific level.	To distinguish the different types of patterns and to learn the concepts of traceability and calibration.	Theory test							100	100	75	91.67
	6.4		To describe the use of patterns, calibration and traceability in measurements.	Approach to the group.										
4	4.1, 4.2, 4.3	To know the basic process to estimate the measurement uncertainty, for a proper interpretation of the subject in measurement systems, through the study of guide publications to estimate the measurement uncertainty (GUM).	To identify the sources of uncertainty of a measurement system.	Reading of articles										
			To estimate uncertainty.	Exam										

		211 MULTIVARIABLE CALCULUS			2013-02			2014-1			2014-2			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1, 6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7 y 6.1	To apply the calculus of a vector valued functions to interpret and solve technical situations that require trajectory models.	To solve problems with vector functions,to know how to interpret the results, and to parametrize curves in the plane and space.	Solution class exercises and homework to deliver individually, participation and written exam	50	50	75	75	75	75	75	75	100	72.22
	1.1, 1.2, 1.3, 1.5, 1.6, 1.7 y 6.1	To apply the concepts and techniques of tha calculus of functions of several variables (limits, partial derivates and multiple integration) in the interpretation and solution of basic engineering technical situations.	To know the concept of function of two variables, three variables and variable n, to know how to determine the domain and image of a function, to make the graph of a function of two variables, to know the concepts of limit, continuity, and differentiability, to use these concepts in real problems of optimization.	Solution class exercises and homework to deliver individually, participation and written exam	50	75	75	50	75	75	50	75	100	69.44
			To apply the concepts of multiple integration, change in polar, cylindrical and spherical coordinates. To apply these topics to solve area and volume problems.	Solution class exercises and homework to deliver individually, participation and written exam	0	75	75	50	75	75	50	75	75	61.11
7	7.1	To apply the vector calculus to model and solve basic engineering technical.	To know the concept of divergence and rotational of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	0	50	50	50	75	75	50	50	75	52.78

		821 INTEGRAL CALCULUS			2013-02			2014-1			2014-2			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1, 6	1.1, 1.2	To calculate the cumulative values starting from physical numbers for applications in engineering through the concept of integration.	To employ concepts and an appropriate notation to solve engineering problems.	Homework, review	0	50	75	25	50	75	25	75	100	52.78
	1.4		To abstract the conditions of the problems to their solution using the integration techniques.		50	75	75	50	75	100	50	75	75	69.44
	1.6, 6.1, 6.4		To use computer algebra systems to acelerate the symbolic computation to integrate.		50	75	100	75	75	100	50	50	100	75.00
	1.7		To solve independently integration problems.		0	50	75	25	50	75	25	50	100	50.00
	6.3		To understand the symbolism and to apply it to express pertinent solutions.		0	50	100	25	50	75	50	75	75	55.56

		250 ADVANCED ELECTRONICS			2013-01			2013-02			2014-2			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
6, 4	6.1, 6.3, 6.4, 4.2	To study and analyze the main characteristics and functioning of the Operational Amplifiers (OPAMPs), the basic applications and the related configurations that can be made with them.	To configure a signal conditioner with operational amplifier.	Theoretical exams and laboratory practice	50	100	100	75	75	75	50	75	75	75.00
	4.2, 6.1, 6.2		To integrate the theoretical knowledge in practical elements for analog signal processing.		50	75	100	75	50	100	50	75	75	72.22
		To analyze the existence of frequency limitations of the OPAMP, just as the characteristics that are presented when coupling stages.	To experiment and analyze the behavior of the OPAMP at high frequencies.		50	75	100	50	75	100	75	75	100	77.78
		To study and analyze the main characteristics of OPAMPs in the application of active filters, signal generators, sinusoidal oscillators and conditioning of analog signals.	To build prototypes based on the OPAMP.	Practical examinations, laboratory and final project practices	50	75	100	50	75	100	75	75	75	75.00
			To filter and generate signals.		50	75	100	50	75	100	75	75	75	75.00

		239 ELECTRONICS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1, 4	1.1, 1.2, 1.3, 1.4, 4.1	To develop the necessary knowledge for the analysis of circuits composed of semiconductor devices.	To apply the knowledge of circuit theory to solve diodes configurations, BJT, JFET.	Practical examinations, laboratory and final project practices				50	50	75	50	75	75	62.5
	1.1, 1.2, 1.4, 1.6	To comprehend the behavior of semiconductor devices under the influence of temperature and frequency.	To analyse with the Re model the behavior of BJT configurations					50	75	75	75	75	100	75
	1.1, 1.2, 1.4, 1.6, 4.1	To understand the principle of voltage and current amplyfiers, as well as the necessary calculation to implement them.	To implement different configurations for different profit systems					50	75	100	50	75	100	75

		271 INSTRUMENTATION I			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2, 1.4, 1.6	To apply the basic sciences and selection engineering knowledge, calculus and sizing of the physical process variable instrumentation and to analyze a process to suggest the measurements that the principal control loops implement.	To make DTIs of simple processes . To interpret DTIs of literature	Write the philosophy of operation from a DTI and make a DTI from the philosophy of operation in exercises in the classroom and in the partial test				100	75	50	75	50	100	75.00
	1.2, 1.4, 1.6	To apply the basic science and selection engineering, calculus and sizing of the physical process variable instrumentation and to analyze a process to suggest the measurements that the principal control loops implement.	To make an instrument calculation of each chapter of the course.	Calculations of instruments of variables in each chapter, including the examination of each chapter				50	50	25	75	75	75	58.33
2	2.1, 2.3, 2.5	To colaborate and organize in multidisciplinary teams, since the group is conformed by Mecatronics, Electronics and Instrumentation and Control students, to give solution to the homeworks and to the project that includes all topics covered in the curse.	To solve tasks in group	Tasks in team by subject or unit				75	25	50	100	50	100	66.67
7	7.1, 7.3	To identify and use reliable and updated sources of information about Instrumentation and Process Control, its regulations and standards.	To collect tables and standards	Tasks where it is requested to investigate standards and tables				75	25	50	100	50	100	66.67

		298 SERVOMECHANISM			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
3,4	3.2, 4.3	To analyze, desing and implement position and speed control systems for industrial applications through the development of prototypes.	To identify the elements that make up a position and/or speed control system	exam, presentation	100	100	100	75	75	100	75	25	50	77.78
1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7		To develop and calculate the necessary parameters to achieve the desired performance through differential equations		100	50	50	100	75	75	100	0	100	72.22
3	3.1, 3.2, 3.3		To compare and demonstrate the physical results with analytics and its justification	report	100	50	75	75	75	75	75	25	100	72.22
1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7		To mathematically model the components of the system	exam	100	75	75	75	75	75	75	0	75	69.44
	1.6		To implement the requested drivers	Project	100	100	100	100	75	100	100	75	100	94.44

		215 PROGRAMMING			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1 y 3	1.1, 1.2, 1.6, 1.7	To represent the solution of engineering problems in an analytical and systematic way, using graphic tools and mathematical concepts	He understands, in an integral way, the problem to be solved	exam	100	75	75	100	100	75	100	75	0	77.78
	3.1, 3.2		He formulates algorithms		100	75	75	100	100	75	100	75	0	77.78
	1.6		He uses programming language to solve the problems that have been formulated		100	75	100	100	50	75	75	50	50	75.00
	3.3	To implement problem solving by a programming language, in a concise and efficient way	He knows how to structure programming codes in a clear way		75	100	50	75	75	100	100	75	50	77.78

		206 UNIVERSITY AND SOCIETY			2013			2014			2015			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
2, 5, 7	5.2	To appreciate the importance of university education for the formation of his identity according to his personal and professional development, taking as a reference the present day educational contexts and their history	He identifies the history of the Autonomous University of Queretaro and of his Faculty, their origin and the development of their major areas of training.	Review, tests, project	100	75	75	100	75	75	100	75	75	83.33
	5.1		He identifies and applies the Organic Statute of the Autonomous University of Queretaro		100	50	50	100	75	50	75	75	50	69.44
	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To analyze the social reality in Latin America in order to make a critical evaluation of our identity's structure and the political, economic and social models that exist in a globalized world taking into account its history.	He identifies the impact the present educational contexts have on his professional training.		75	75	50	100	75	50	100	50	50	69.44
		To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11
			He integrates other disciplines' vision		75	50	50	75	75	50	100	75	50	66.67
		To know and analyze the main elements that form and determine a human being's behavior on the basis of a historical moral conception of the events and how they make an impact on our daily and professional life from the history of ethics in sciences.	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44
			He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22

		214 PROBABILITY & STATISTICS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2, 1.3, 1.5, 1.7	To determine and study the behavior of random variables in the first stages of the modelling, by means of the well-known distributions.	He knows the most frequent probability distributions	Homework and exam	100	100	40				100	80	40	76.67
			He identifies correctly when a response has to be modeled with a particular distribution una respuesta		100	100	40				100	60	40	73.33
			He detects promptly the differences between the different distributions		100	100	40				100	100	40	80.00
	1.2, 1.4, 1.6	To use statistical software for data processing, specifically software packages designed for sciences and engineering	He analyzes the study cases of such distributions		100	100	40				100	100	40	80.00
			He knows the inference methods and how each one is justified	Laboratory	100	80	80				100	100	40	83.33
	1.2, 1.3, 1.4, 1.5, 1.7	To analyze different datasets to be able to make decisions by inference processes	He applies these methods correctly		100	60	60				100	60	40	70.00
			He detects the differences between these methods	Homework and exam	100	40	80				100	80	40	73.33
			He detects the deficiencies of these methods as well as their weaknesses		100	40	80				100	80	40	73.33

		237 ELECTRICAL MACHINES I			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.1	To relate the mathematical concepts of vector calculus to the transformation of electrical energy phenomenon and viceversa	1.1 He formulates the equations of a magnetic field in discrete rotational and revolution models	In-class exercises and homeworks				95	75	52	96	80	61	76.50
	1.2		1.2 He solves two-degrees of freedom magnet circuits	In-class exercises and homeworks				90	83	43	96	80	61	75.50
	1.3		1.3 He builds magnetic flux models using computing tools	Reports of the computer simulation models				100	80	90				90.00
	1.4		1.4 He builds mathematical models to represent the transformation of electrical energy to mechanical and viceversa	In-class exercises and homeworks				90	83	43	96	80	61	75.50
	1.5		1.5 He analyzes the responses of the Direct-Current machines with different configurations and connections	In-class exercises and homeworks				95	75	52	96	80	61	76.50
	1.6		1.6 He represents the behavior of electrical machines by engineering diagrams.	In-class exercises and homeworks				100	75	75	100	75	75	83.33
	1.7		1.7 He models electromechanical systems using differential equations	In-class exercises and homeworks				100	75	75	100	75	75	83.33
2, 4	2.1	To understand the principles of Direct-Current motors and generators design and their different configurations	2.1 He interprets the instructions and organizes his team to model the practice	Laboratory sessions' reports				100	80	90	100	80	90	90.00
	2.2		2.2 He interprets the features of the instruments and defines the accuracy of each test	Laboratory sessions' reports				100	90	90	100	90	90	93.33
	2.3, 4.3		2.3 He presents the solution of a physical problem with the tools that are available to him at the moment	Laboratory sessions' reports				100	90	90	100	90	90	93.33
	2.4, 4.1		2.4 He identifies, with his classmates, the theoretical concepts that support the laboratory test	Laboratory sessions' reports				100	90	90	100	90	90	93.33
	2.5		2.5 He differentiates the roles that each person must play when doing a project in teams.	Project's final report				100	80	80	100	80	80	86.67
3, 4	3.1, 4.2	To be able to model the behavior of a Direct-Current motor and generator and to distinguish how they can be used to control the velocity in the applications of automation	3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine	Reports of the projects and simulations' results				100	80	80	100	80	80	86.67
	3.2, 4.2		3.2 He evaluates the effects that the particular elements have in the dynamic response of a Direct-Current Machine	Reports of the projects and simulations' results				100	80	80	100	80	80	86.67
	3.3, 4.1		3.3 He documents in an engineering formal report the results of the projects he does.	Reports of the projects and simulations' results				100	80	80	100	80	80	86.67

		270 DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS DIGITALES I			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
3, 4	3.1, 4.3	To design analog and digital systems for the development of software platforms.	He analyzes and synthesizes the elements of a problem for its solution in analog and digital systems using Boolean expressions	Exam	100	75	50	100	75	50	100	100	75	80.56
	3.2, 4.3		He uses VHDL tools to describe hardware		100	75	75	75	100	75	100	100	100	88.89
4	4.3, 4.2		He uses software for Man-Machine Interfaces		75	50	50	75	100	50	100	100	75	75.00
2, 4	2.1, 4.2		He develops applications in reprogrammable and reconfigurable systems	Final project	100	100	50	100	100	50	100	100	75	86.11
3	3.2, 3.3	To apply methods and techniques for the digital circuits to be efficient in engineering problems	He develops advanced digital electronic circuits	Exam	75	100	25	100	75	50	100	75	75	75.00
2	2.5, 2.1		He leads and promotes participation in collective work	Final project	50	75	75	50	50	75	75	75	100	69.44
3, 4	4.1, 4.2, 3.1	He debugs digital circuits through simulation in order to make efficient the system of an automation project.	He simulates logic circuits with Verilog	Exam	100	50	75	75	75	50	100	100	75	77.78

		85 SPECIALITY OPTIONAL COURSE			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.2	1. To identify the dynamic response of the systems that behave in a way that can de represented with a first or second-order differential equation. To identify what elements in the system determine the time of the transient response.	He formulates dynamic equations of mechatronic systems	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33
	1.2		He solves the dynamic response of a mechatronic system with advanced tools	From the results posed in the mid-term projects	100	96	70	100	85	85	100	85	85	89.56
	1.3		He identifies the transient response of mechatronic systems	Evaluation of in-class participation to get answers to specific	100	100	70	100	85	85	100	85	85	90.00
	1.4		He analyzes and identifies the parameters that determine the transient response of a mechatronic system	Results of the mid-term and final projects	100	96	85	100	85	85	100	85	85	91.22
	1.5		He builds mathematical models of mechatronic systems	In-class exercises and homeworks	100	100		100	85	85	100	85	85	92.50
	1.6		He models mechatronic systems with dynamic simulation tools	Reports of the computer simulation models	100	96	85	100	85	85	100	85	85	91.22
	1.7		He makes comparisons among physical models that are modelled with similar differential equations	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33
2	2.1	2. To integrate individual concepts, of elements and components, in complex problems that cannot be solved only by one engineer and to formulate solutions from a global perspective.	He contributes to build a simulation model of a complex mechatronic system	Reports of the computer simulation models	100	96	70	100	85	85	100	85	85	89.56
	2.2		He interprets the specific rules of electrical, mechanical and pneumatic systems	Results of the mid-term and final projects	100	96	85	100	85	85	100	85	85	91.22
	2.3		He uses the concept of energy conservation to integrate models from different engineering disciplines	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33
	2.4		He identifies the improvements that can be applied to a mechatronic system to have a positive impact on the environment	Results of the mid-term and final projects	100	96	70	100	85	85	100	85	85	89.56
	2.5		He differentiates the roles that must be played when doing a project in teams	Individual evaluation	100	96	70	100	85	85	100	85	85	89.56
3	3.1	3. To justify, with engineering criteria, how the parameters of a dynamic model are determined from real data of components that exist in the professional market and field	He abstracts and summarizes the elements that make up a dynamic mechatronic system	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22
	3.2		He evaluates the effects that specific elements have on the dynamic response of a mechatronic system	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22
	3.3		He documents an engineering formal report with the results of his projects	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22
4	4.1	4. To build mathematical models from technical specifications of the elements used in automatic systems and to simulate the dynamic response of complex systems	He evaluates the results of the mechatronic systems simulations with engineering criteria	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22
	4.2		He analyzes and determines the parameters of the elements of the system from the mechatronic systems' real data	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22
	4.3		He uses simulation tools with engineering criteria	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33
	4.4		He understands the context in which a solution is developed	Individual evaluation	100	96	85	100	85	85	100	85	85	91.22

		343 DIGITAL SYSTEMS II - MICROSYSTEMS			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
2, 3	2.1, 2.2, 3.2, 3.3	To analyze, design and test electronic systems based on microsystems that allow the formulation of possible solutions to engineering problems, using specialized software.	He analyzes, designs and tests electronic circuits based on microsystems	Partial exams, laboratory sessions, mid-term and final projects	100	80	60	80	80	40	80	60	40	68.89
	2.1, 2.2, 3.2, 3.3		He develops diagrams using microsystems as his bases		100	80	60	80	80	60	80	80	40	73.33
	2.2, 3.1, 3.2, 3.3		He compiles codes with specialized software		100	80	60	100	80	60	100	80	40	77.78
	2.2, 3.1, 3.2, 3.3		He designs printed circuits following the design rules, specified by the software he is using.		80	60	60	80	60	40	80	80	40	64.44
	2.5, 3.3	To document the development of firmware the is being used for the formulation of possible solutions by means of diagrams, schemata and desk tests, making use of specialized software.	He documents the development of the firmware of projects and laboratory sessions, developed in the format of a work portfolio	Laboratory sessions' reports, reports of mid-term and final projects, portfolio of projects	100	60	40	80	60	40	80	80	40	64.44

		1418 ARTISTIC OPTIONAL COURSE			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
5	5.1, 5.3	To recognize the importance of possible agents of change in a society so that the student is able to anticipate them in a permanent update.	He thinks about the importance of his work through photography	Photography exhibition	80	100	60	100	80	80	100	100	80	86.67
	5.2		He is aware of his environment by means of photographs		100	80	40	100	80	60	80	80	60	75.56
2	2.1, 2.3, 2.5	To collaborate in multi-disciplinary teams to produce and propose human and technological solutions.	He plays roles according to what is needed		100	100	60	100	100	80	100	100	80	91.11
	2.1, 2.2, 2.3, 2.5		He integrates and participates in collective activities		100	100	80	100	100	100	100	80	100	95.56
5	5.2, 5.3	To raise awareness of the social processes recognizing the cultural differences that allow people to live together with responsibility and harmony.	He thinks about his experiences and evaluations		100	80	60	80	80	80	80	80	60	77.78
6	6.1, 6.3, 6.4, 6.5	To communicate his knowledge in different ways by means of specialized techniques.	He communicates his concerns and interests through photography		80	80	40	100	100	60	100	100	80	82.22

		861 CONTROL II			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1	1.1, 1.4, 1.6, 1.7	To apply the concept of frequency response to the desing of electromechanical control systemsa from specialized tools.	To build speed and position control systems as well as electronic oscillators.	Exam	80	80	70	90	80	60	90	70	60	75.56
	1.4, 1.7		To appropriately choose a controller.	Prácticas	70	60	40	80	70	50	80	60	50	62.22
	1.1, 1.3, 1.4		To interpret the frequency response experimental data toidentify models.	Proyecto teórico-práctico	70	60	50	70	60	50	70	60	50	60.00
	1.1, 1.5, 1.7		To interpret the control systems as filters.		80	70	50	80	60	60	80	60	40	64.44
1, 3	3.2	To apply the state variable approach to the study of control systems.	To modify appropriately the control systems' behavior.		70	60	60	60	70	60	80	80	60	66.67
	1.6, 3.2		To interpret the advantages of a particular desing and to choose alternative solutions.		70	70	50	80	80	50	70	70	60	66.67
	1.4, 1.7, 3.1		To interpret the parameter changes in a control system's response.		80	50	40	70	70	60	70	60	50	61.11
	1.4, 1.1, 1.5, 1.7, 3.1		To interpret the frequency response as the generalization of the alternating current circuits to general linear systems.		60	50	50	70	60	40	70	50	60	56.67
	1.1, 1.3, 1.5, 3.1		To apply the state variable to the control systems' analysis and design.		80	70	60	80	70	50	80	60	50	66.67
	1.1, 1.5, 1.7, 3.1, 3.2		To modify appropriately the method for non linear control systems' analysis and design.		80	60	50	80	60	40	80	70	50	63.33

		226 Social and Human Sciences Optional Course			2014-1			2014-2		2015-1				
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 4	OUTCOME AVERAGE
6	6.1, 6.3, 6.4	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	To contribute and express clearly his point of view.	Foro de discusión						100	100	85	70	88.75
2	2.1, 2.3, 5.2, 6.4		To debate and discuss the proposed ideas before diverse disciplines.	Foro de discusión						85	100	70	70	81.25
6	6.1, 6.4		To write according to the orthographic rules and norms.	Essay						100	85	100	70	88.75
2,4 5, 7	2.1, 4.4, 5.2, 7.1		To support his arguments with factors and facts.	Essay						85	85	85	70	81.25
6, 7	6.1, 7.3	To develop visual and graphic skills in his favor in the techincal execution of his proyects to improve the comunication of his ideas through diverse analog and digital tools.	To compare his graphic learning of the start and the end of the curse.	Prácticas						100	100	85	100	96.25
6	6.1		To be able to express his ideas graphically.	Prácticas y exhibición						100	100	85	100	96.25
6, 7	6.1, 7.2, 7.3	To comunicate graphically or verbally the results of his learning before diverse disciplines.	To present his final work before a forum.	Prácticas y exhibición						100	100	100	100	100.00

		364 COMPUTER VISION			2014-1			2014-2			2015-1			
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE
1 ,3	1.4, 3.1	To apply and anlyze the computer vision basic knowledge to modify a digital image through specialized software.	To recognize and apply the basic filters to improve a digital image.	examen				100	60	40	100	75	60	72.50
1 ,3	1.4, 3.1		To identify stages to digitalize an image.	examen				100	75	60	100	100	100	89.17
1, 3	1.4, 3.1		To recognize the importance of the types of neighborhood and its relation to local filters.	examen				100	60	60	100	60	60	73.33
1	1.6	To design a capture and real-time image processing system to solve an application of the specified problem.	To extract real time information of a video sequence.	prácticas y examen				100	100	75	100	100	100	95.83
1, 3	1.4, 3.1, 3.2		To evaluate the difficulties and to suggest the best possible stage to image improvement.	prácticas y examen				100	60	40	100	75	75	75.00
1, 3	1.4, 1.6, 1.7, 3.1, 3.2		To apply the appropriately tools to extract information of an image.	prácticas y examen				100	40	40	100	60	60	66.67
1, 3	1.2, 1.6, 3.1, 3.2, 3.3		To make decisions from the obtained information of an image for the solution of the given problem.	prácticas y examen				100	60	40	75	40	40	59.17

Tables 4.2 - Assessment gathered from all courses from this period.

The time collecting data for each course, is illustrated in table 4.3 and for each turns includes three semesters´ periods. The courses with some trouble in students learning process, will be review more often than the others :

PROGRAM APPROVAL	No	COURSE NAME	STUDENT OUTCOMES	ABET´S CORRESPONDALS	2014-2015	2015-2016
INA14	203	Linear Algebra	1, 4, 6	a, b, e, h, k, g		1
INA14	811	Differential Calculus	1, 2, 6	a, b, d, g		1
INA14	204	Chemistry	1, 4	a, b, e, h, k		1
INA14	214	Probability and Statistics	1	a , b	1	
INA14	205	Computer Assisted Design	2, 3	d, c		1
INA14	1015	Foreign Language I	6	g		
INA14	1207	Physical Culture I	2, 5, 6	d, f, j, g		
INA14	206	University and Society	2, 5, 7	d, f, j, i	1	
INA14	202	Statics	1, 6	a, b, g	1	
INA14	821	Integral Calculus	1, 6	a, b, g	1	1
INA14	822	Physics	1, 6	a, b, g		1
INA14	229	Metrology	4,5,6	e, h, k, f, j, g	1	
INA14	215	Programming	1, 3	a, b, c	1	
INA14	1024	Foreign Language II	6	g		
INA14	1208	Physical Culture II	2, 5, 6	d, f, j, g		
INA14	1418	Artistic Optional Course	2,5,6	d, f, j, g	1	
INA14/10	212	Dynamics	1, 2, 3, 6	a, b, d, c, g	1	1
INA14/10	221	Differential Equations	1, 6, 7	a, b, g, i		1
INA14/10	211	Multivariable Calculus	1, 6, 7	a, b, g, i	1	
INA14/10	213	Electromagnetism	1, 2, 6	a, b, d, g		1
INA14/10	230	Advanced Programming	1,4	a, b, e, h, k		1
INA14/10	228	Electric Circuits I	2, 4	d, e, h, k		
INA14	1277	Development Workshop of Automation Technology I	2, 5, 7	d, f y j, i		1
INA14/10	1305	Foreign Language III	6	g		
INA14/10	1209	Physical Culture III	2, 5, 6	d, f, j, g		
INA14/10	841	Thermodynamics	1, 2	a, b, d		1
INA14/10	231	Signal Analysis	1, 6	a, b, g	1	
INA14/10	742	Numerical Methods	1, 4	a, b, e, h, k		1
INA14/10	239	Electronics	1,4	a, b, e, h, k	1	
INA14/10	237	Electrical Machines I	1,2, 3, 4	a, b, d, c, e, h, k	1	
INA14/10	238	Electric Circuits II	3, 4	c, e, h, k		1
INA14	1278	Development Workshop of Automation Technology II	2, 5, 7	d, f, j, i		1
INA14/10	1046	Additional Language IV	6	g		1
INA14/10	1210	Physical Culture IV	2, 5, 6	d, f, j,		
INA14/10	851	Control I	1, 3	a, b, c		1
INA14/10	249	Automation I	1, 4	a, b, e, h, k	1	1
INA14/10	343/	INA10 Digital Systems II (INA14Microsystems)	2, 3	d, c	1	
INA14/10	250	Advanced Electronics	4,6	e, h, k, g	1	
INA14/10	248	Electrical Machines II	1	a, b, e	1	
INA14/10	853	Electric Systems Design	1, 4, 7	a, b, e, h, k, i	1	
INA14	1280	Development Workshop of Automation Technology III	2, 5, 7	d, f, j, i		1
INA14/10	1057	Foreign Language V	6	g		
INA14/10	226	Social and Human Sciences Optional Course	2, 4, 5, 6, 7	d, e, h, k, f, j, g, i	1	
INA14/10	861	Control II	1, 3	a, b, c	1	1
INA14/10	269	Automation II	1, 4	a, b, e, h, k	1	1
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic I)	2, 3, 4	d, c, e, h, k	1	
INA14/10	862	Informatics Engineering	1, 3	a, b, c		1
INA14/10	268	Materials Technology	3, 4	c, e, h, k		1
INA14/10	271	Instrumentation I	1, 2, 7	a, b, d, i	1	1
INA14	1282	Development Workshop of Automation Technology IV	2, 5, 7	d, f, j, i		1
INA14/10	1064	Foreign Language VI	6	g		
INA14/10	74	Professional Optional Course I	1, 3	a, b, c	1	
SIM10/14	888	Robotics	1, 4	a, b, e, h, k	1	1
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	2, 3, 4, 5	d, c, e, h, k, f, j	1	
SIM14	12XX	Design of Machines	2, 6, 7	d, g, i		1
SIM14	1212	Ergonomics and Security	2, 5, 6	d, f, j, g		1
SIM10/14	361	Manufacturing Engineering	1, 2, 3	a, b, d, c		1
SIM14	12XX	Kinematics and Dynamics of Machines	2, 3, 7	d, c, i		1
SIM14	1284	Development Workshop of Automation Technology V	2, 5, 7	d, f, j, i		1
SIM10/14	1073	Foreign Language VII	6	g		
SIM10/14	883	Social Service	2, 5, 6, 7	d, f, j, g, i	1	
SIM10	291	Instrumentation II	1, 2, 7	a, b, d, i	1	
SIM10	354	Digital systems III	2, 5, 7	d, f, j, i		1
SIM10	316	Proyect integration seminar	2, 5, 6, 7	d, f, j, g, i		1
SIM10/14	877	Mechatronics	1, 2 , 3, 4	a, b, d, c, e, h, k		1
SIM10/14	298	Servomechanisms	1, 3, 4	a, b, c, e, h, k	1	
SIM10/14	882	Degree Seminar	2, 4, 6	d, e, h , k, g	1	
SIM10/14	887	Mechatronics Project	1, 2, 3	a, b, d, c		1
SIM10/14	364	Computer Vision	1, 3	a, b, c	1	
SIM10/14	85	Specialty Optional Course	1,2, 3, 4	a, b, d, c, e, h, k	1	
SIM10/14	1082	Foreign Language VIII	6	g		1
SIM14	1214	Productivity and Quality	4, 5, 7	e, h, k, f, j, i		1
SIM14	1215	Mobile Devices Programming	2, 3, 7	d, c, i		1
SIM10/14	891	Professional Internship	2,4,5,6,7	d, e, h, k, f, j, g, i	1	

Table 4.3.- Assessment turn by course.

DIRECT ASSESSMENT

For this first ABET´s evaluation, the courses mention before were selected for assessment collecting data, this first assessment result is presented below.

Each Faculty member is responsible of having digitalized all physical evidence of the period they are requested for, and will be available at the visit time. Using the direct relationship of the specific course SO with the general SO, the following tables area presented using only the results of SO1 from each course.

STUDENT OUTCOMES 1 : Analysis results from direct method assessment from courses.

Engineering Fundamentals & experimental skills

Student outcomes 1 direct assessment.

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

INITIAL

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
214 PROBABILITY & STATISTICS	1	1.2, 1.3, 1.5, 1.7	To determine and study the behavior of random variables in the first stages of the modelling, by means of the well-known distributions.	He knows the most frequent probability distributions	Homework and exam	100	100	40				100	80	40	76.67	80		73.33
	1	1.2, 1.3, 1.5, 1.7		He identifies correctly when a response has to be modeled with a particular distribution una respuesta		100	100	40				100	60	40	73.33	80		66.67
	1	1.2, 1.3, 1.5, 1.7		He detects promptly the differences between the different distributions		100	100	40				100	100	40	80.00	80		80.00
	1	1.2, 1.4, 1.6	To use statistical software for data processing, specifically software packages designed for sciences and engineering	He analyzes the study cases of such distributions		100	100	40				100	100	40	80.00	80		80.00
	1	1.2, 1.4, 1.6		He knows the inference methods and how each one is justified	Laboratory	100	80	80				100	100	40	83.33	86.67		80.00
	1	1.2, 1.3, 1.4, 1.5, 1.7	To analyze different datasets to be able to make decisions by inference processes	He applies these methods correctly		100	60	60				100	60	40	70.00	73.33		66.67
	1	1.2, 1.3, 1.4, 1.5, 1.7		He detects the differences between these methods	Homework and exam	100	40	80				100	80	40	73.33	73.33		73.33
	1	1.2, 1.3, 1.4, 1.5, 1.7		He detects the deficiencies of these methods as well as their weaknesses		100	40	80				100	80	40	73.33	73.33		73.33
202 STATICS	1	1.1, 1.4, 1.5	To use numerical, algebraic and analytic representation techniques that allow the student to represent real-world issues in a graphic and mathematical way, making possible the analysis of the specific values for their solution.	He analyzes free body diagrams	Homeworks, solution of exercises in class, tests							75	75	100	83.33			83.33
	1	1.4		He makes the vector determination and calculation								60	75	100	78.33			78.33
	1, 6	1.7, 6.1		He compares the results in order to obtain the resistor values of materials and structural.								75	75	75	75.00			75.00
821 INTEGRAL CALCULUS	1	1.1, 1.2	To calculate the cumulative values starting from physical numbers for applications in engineering through the concept of integration.	To employ concepts and an appropriate notation to solve engineering problems.	Homework, review	0	50	75	25	50	75	25	75	100	52.78	41.67	50.00	66.67
	1	1.4		To abstract the conditions of the problems to their solution using the integration techniques.		50	75	75	50	75	100	50	75	75	69.44	66.67	75.00	66.67
	1, 6	1.6, 6.1, 6.4		To use computer algebra systems to acelerate the symbolic computation to integrate.		50	75	100	75	75	100	50	50	100	75.00	75.00	83.33	66.67
	1	1.7		To solve independently integration problems.		0	50	75	25	50	75	25	50	100	50.00	41.67	50.00	58.33
215 PROGRAMMING	1	1.1, 1.2, 1.6, 1.7	To represent the solution of engineering problems in an analytical and systematic way, using graphic tools and mathematical concepts	He understands, in an integral way, the problem to be solved	exam	100	75	75	100	100	75	100	75	0	77.78	83.33	91.67	58.33
	1	1.6		He uses programming language to solve the problems that have been formulated		100	75	100	100	50	75	75	50	50	75.00	91.67	75.00	58.33
212 DYNAMICS	1	1.1, 1.3,	To analyze the position, velocity and acceleration of particles and rigid bodies, which are subject to the type of motion, specified to determine and understand their behavior making use of the knowledge of kinematics and kinetics	He develops the equations for kinematics of a particle and a rigid body, which are subject to the type of movement specified to solve engineering problems.	Solution of exercises in class, individual homeworks, participation in class and written exam				75	75	0	100	75	50	62.50		50	75.00
	1	1.3, 1.5, 1.4		He develops the equations for kinetics of particle and rigid body, which are subject to the type of motion, specified to solve engineering problems.					75	50	50	75	75	50	62.50		58.33	66.67
	1	1.4		He interprets and solves algebraic functions by calculation tools.					75	75	50	100	75	75	75.00		66.67	83.33
	1	1.7		He solves problems by means of the modelling of physical phenomena.					75	75	50	75	75	50	66.67		66.67	66.67
211 MULTIVARIABLE CALCULUS	1, 6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7 , 6.1	To apply the calculus of a vector valued functions to interpret and solve technical situations that require trajectory models.	To solve problems with vector functions,to know how to interpret the results, and to parametrize curves in the plane and space.	Solution class exercises and homework to deliver individually, participation and written exam	50	50	75	75	75	75	75	75	100	72.22	58.33	75.00	83.33
	1, 6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7 , 6.1	To apply the concepts and techniques of tha calculus of functions of several variables (limits, partial derivates and multiple integration) in the interpretation and solution of basic engineering technical situations.	To know the concept of function of two variables, three variables and variable n, to know how to determine the domain and image of a function, to make the graph of a function of two variables, to know the concepts of limit, continuity, and differentiability, to use these concepts in real problems of optimization.		50	75	75	50	75	75	50	75	100	69.44	66.67	66.67	75.00
	1, 6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 6.1		To apply the concepts of multiple integration, change in polar, cylindrical and spherical coordinates. To apply these topics to solve area and volume problems.		0	75	75	50	75	75	50	75	75	61.11	50.00	66.67	66.67

MIDDLE

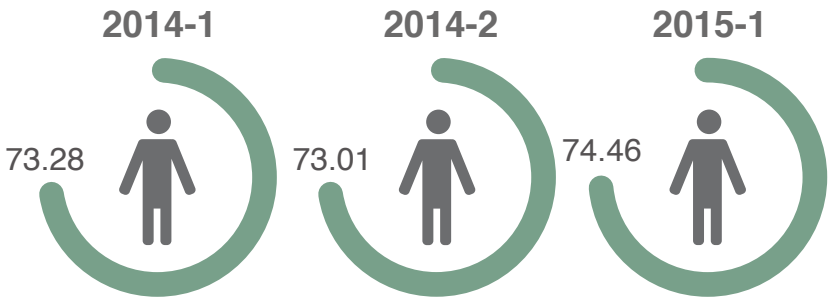
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2015-1
231 SIGNAL ANALYSIS	1	1.2, 1.5, 1.7,	To understand and apply the operations, techniques and concepts between numbers and complex functions to interpret and solve technical situations that require these functions and its operations.	To solve problems with numbers and complex functions, inequalities and to graphically illustrate the solutions in the complex plane.	Solution class exercises and homework to deliver individually, participation and written exam				50	75	75	50	75	100	70.83		66.67	75.00
	1	1.2, 1.5, 1.7, 1.3	To use the Laplace transform to obtain the transfer function of a (mechanic and electric) linear system to analize the system's behavior before different input signals.	To solve linear equations using the Laplace transform by applying the corresponding theorems.					50	75	100	75	75	100	79.17		75.00	83.33
	1	1.2, 1.5, 1.7, 1.3		To analyze and solve the equations of an electrical and mechanical circuit mesh and node analysis to obtain the transfer function.					50	50	75	50	50	75	58.33		58.33	58.33
	1, 6	1.4, 1.5, 1.7, 6.3	To determine the representation of a system in a state-space and its advantages with the transfer function to analyze the system's behavior.	To know the State space method to analyze systems, to know the advantages of this technique with transfer function and to make conversions from transfer function to state-space and viceversa.					50	75	75	50	75	75	66.67		66.67	66.67
	1, 6	1.4, 1.6, 6.1, 6.4	To apply the Fourier series and transform to represent signals and to interpret them.	To know the mathematical foundation of the Fourier series, as well as their properties and convergence of Fourier series	Project equipment, delivery of a document and exposure.				50	75	100	0	75	100	66.67		75.00	58.33
239 ELECTRONICS	1, 4	1.1, 1.2, 1.3, 1.4, 4.1	To develop the necessary knowledge for the analysis of circuits composed of semiconductor devices.	To apply the knowledge of circuit theory to solve diodes configurations, BJT, JFET.	Practical examinations, laboratory and final project practices				50	50	75	50	75	75	62.5		58.33	66.67
	1	1.1, 1.2, 1.4, 1.6	To comprehend the behavior of semiconductor devices under the influence of temperature and frequency.	To analyse with the Re model the behavior of BJT configurations					50	75	75	75	75	100	75		66.67	83.33
	1, 4	1.1, 1.2, 1.4, 1.6, 4.1	To understand the principle of voltage and current amplyfiers, as well as the necessary calculation to implement them.	To implement different configurations for different profit systems					50	75	100	50	75	100	75		75.00	75.00
237 ELECTRICAL MACHINES I	1	1.1	To relate the mathematical concepts of vector calculus to the transformation of electrical energy phenomenon and viceversa	1.1 He formulates the equations of a magnetic field in discrete rotational and revolution models	In-class exercises and homeworks				95	75	52	96	80	61	76.50		74.00	79.00
		1.2		1.2 He solves two-degrees of freedom magnet circuits					90	83	43	96	80	61	75.50		72.00	79.00
		1.3		1.3 He builds magnetic flux models using computing tools	Reports of the computer simulation models				100	80	90				90.00		90.00	
		1.4		1.4 He builds mathematical models to represent the transformation of electrical energy to mechanical and viceversa	In-class exercises and homeworks				90	83	43	96	80	61	75.50		72.00	79.00
		1.5		1.5 He analyzes the responses of the Direct-Current machines with different configurations and connections					95	75	52	96	80	61	76.50		74.00	79.00
		1.6		1.6 He represents the behavior of electrical machines by engineering diagrams.					100	75	75	100	75	75	83.33		83.33	83.33
		1.7		1.7 He models electromechanical systems using differential equations					100	75	75	100	75	75	83.33		83.33	83.33
249 AUTOMATION I	1, 4	1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the deveolpment of automatic processes using direct and indirect control techniques.	He knows and identify the International System of Units.	Final Review	100	75					70	100	50	79	87.5		73.33
		1.3, 4.2		He dominates the conversion of units from the International System to the English System.		100	75					100	70	70	83	87.5		80.00
		1.2, 1.3, 4.2, 4.4	To identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to automation engineering.	He understands correctly the behaviour of fluid mechanics.		75	25					100	50	50	60	50		66.67
		1.2, 4.2, 4.3, 4.4		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		75	25					50	70	70	58	50		63.33
		1.2, 4.2, 4.3, 4.5		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25					100	70	50	59	37.5		73.33
248 ELECTRICAL MACHINES II	1	1.2, 1.3, 1.5, 1.7	To determine and study the behavior of random variables in the first stages of the modelling, by means of the well-known distributions.	He identifies the components of a magnetic field	Homework and review	100	70	50	100	70	50	100	50	50	71.11	73.33	73.33	66.67
		1.2, 1.3, 1.5, 1.7		He uses appropriate symbols for electrical systems		100	100	50	100	100	50	70	70	50	76.67	83.33	83.33	63.33
		1.2, 1.4, 1.6	To use statistical software for data processing, specifically software packages designed for sciences and engineering	He fulfills his functions and specific role in a team	Laboratory	100	70	50	100	50	50	100	50	50	68.89	73.33	66.67	66.67
		1.2, 1.4, 1.6		He analyzes engineering problems mathematically		100	70	70	100	70	70	100	70	70	80.00	80.00	80.00	80.00
		1.2, 1.3, 1.4, 1.5, 1.7	To analyze different datasets in order to be able to make decisions by means of inference processes.	He identifies the parameters that are necessary for the specific operation of the equipment	Homework and review	100	50	70	100	70	70	100	100	70	81.11	73.33	80.00	90.00
		1.2, 1.3, 1.4, 1.5, 1.7		He uses the tools offered by MATLAB software in order to confirm the theoretical analysis		70	70	50	70	50	50	70	100	50	64.44	63.33	56.67	73.33
855 ELECTRIC SYSTEM DESIGN	1, 4	1.2, 1.4, 1.6, 4.1, 4.3	To know how to use appropriate materials and tools to develop and design electrical systems for their application in the solution of commercial, industrial and residential problems in the current automation industry.	He knows and identifies the major materials and equipment that make up an electrical installation	Review exam	60	60	100	40	75	75	100	50	50	67.78	73.33	63.33	66.67
		1.2, 1.4, 1.6, 4.1, 4.3		He knows the description and use of electrical materials that make up an electrical installation		40	75	75	40	75	100	100	50	50	67.22	63.33	71.67	66.67
861 CONTROL II	1	1.1, 1.4, 1.6, 1.7	To apply the concept of frequency response to the desing of electromechanical control systemsa from specialized tools.	To build speed and position control systems as well as electronic oscillators.	Exam	80	80	70	90	80	60	90	70	60	75.56	76.67	76.67	73.33
		1.4, 1.7		To appropriately choose a controller.	Practices reports	70	60	40	80	70	50	80	60	50	62.22	56.67	66.67	63.33
		1.1, 1.3, 1.4		To interpret the frequency response experimental data toidentify models.	Theorical-practice project	70	60	50	70	60	50	70	60	50	60.00	60.00	60.00	60.00
		1.1, 1.5, 1.7		To interpret the control systems as filters.		80	70	50	80	60	60	80	60	40	64.44	66.67	66.67	60.00
	1, 3	1.6, 3.2	To apply the state variable approach to the study of control systems.	To interpret the advantages of a particular desing and to choose alternative solutions.		70	70	50	80	80	50	70	70	60	66.67	63.33	70.00	66.67
		1.4, 1.7, 3.1		To interpret the parameter changes in a control system's response.		80	50	40	70	70	60	70	60	50	61.11	56.67	66.67	60.00
		1.4, 1.1, 1.5, 1.7, 3.1		To interpret the frequency response as the generalization of the alternating current circuits to general linear systems.		60	50	50	70	60	40	70	50	60	56.67	53.33	56.67	60.00
		1.1, 1.3, 1.5, 3.1		To apply the state variable to the control systems' analysis and design.		80	70	60	80	70	50	80	60	50	66.67	70.00	66.67	63.33
		1.1, 1.5, 1.7, 3.1, 3.2		To modify appropriately the method for non linear control systems' analysis and design.		80	60	50	80	60	40	80	70	50	63.33	63.33	60.00	66.67
269 AUTOMATION II	1 y 4	1.1, 1.2, 1.6, 4.3	To know and understand the use of automation in industrial processes using programmable logic controllers.	He knows and identifies how a PID works	Final Proyect	75	100	100	60	100	100	100	100	75	90.00	91.67	86.67	91.67
		1.2, 1.4, 1.6, 4.1, 4.3		He controls and tunes properly a PID applied to a PLC		60	75	100	75	100	75	100	100	75	84.44	78.33	83.33	91.67
		1.2, 1.4, 1.6, 4.1, 4.4		He knows correctly programming in ladder diagrams with an PLC		40	60	100	40	60	100	75	75	50	66.67	66.67	66.67	66.67
		1.2, 1.4, 1.6, 4.1, 4.5		He identifies and formulates properly any real automation problem that he may find		40	75	75	40	75	75	75	75	50	64.44	63.33	63.33	66.67
		1.2, 1.4, 1.6, 4.1, 4.6	To identify, research and design Automation Engineering problems by means of programmable logic controllers.	He Knows perfectly the inputs and outputs of a PLC connection		60	100	75	60	100	100	75	100	75	82.78	78.33	86.67	83.33

FINAL	271 INSTRUMENTATION I	1	1.2, 1.4, 1.6	To apply the basic sciences and selection engineering knowledge, calculus and sizing of the physical process variable instrumentation and to analyze a process to suggest the measurements that the principal control loops implement.	To make DTIs of simple processes . To interpret DTIs of literature	Write the philosophy of operation from a DTI and make a DTI from the philosophy of operation in exercises in the classroom and in the partial test				100	75	50	75	50	100	75.00		75	75.00
			1.2, 1.4, 1.6		To make an instrument calculation of each chapter of the course.	Calculations of instruments of variables in each chapter, including the examination of each chapter				50	50	25	75	75	75	58.33		41.67	75.00
	888 ROBOTICS (7)	1	1.1, 1.4, 1.5, 1.6, 1.7	Obtain the kinematic model of an industrial manipulator through mathematical tools in order to comprehend the way in which these machines operate.	He identifies the components of a robotic cell, differentiate the architectures of existing robots, as well as their main advantages and disadvantages for certain applications,	Final project	100						100	75	75	87.5	100		83.33
			1.1, 1.4, 1.7		He represents the structure and movement of robots manipulators using mathematical models		100						100	100	75	93.75	100		91.67
	291 INSTRUMENTATION II	1	1.2, 1.4, 1.6	To apply the basic research and engineering knowledge to the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced functionalities and to the analysis of mechanical vibrations.	To eloquently explain the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced functionalities and to the analysis of mechanical vibrations.	Questions in partial review in respect of each subject	40	75	100	50	75	100	75	75	75	73.89	71.67	75.00	75.00
			1.2, 1.4, 1.6	To analize an industrial process to propose the implementation of control loops of process, specific, safety, and mechanical variables as well as its protocols, diagnoses and advanced functionalities.	To select and justify the selection of instruments of specific, safety and mechanical variables, for industrial applications, its protocols, diagnoses and advanced funcionalities and the analysis of mechanical vibration.	Project where a process implemented in a DTI should be complemented with as seen on this course	40	100	100	75	100	100	100	40	100	83.89	80.00	91.67	80.00
	299 SERVOMECHANISM	1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7	To analyze, desing and implement position and speed control systems for industrial applications through the development of prototypes.	To develop and calculate the necessary parameters to achieve the desired performance through differential equations	exam, presentation	100	50	50	100	75	75	100	0	100	72.22	66.67	83.33	66.67
			1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7		To mathematically model the components of the system	exam	100	75	75	75	75	75	75	0	75	69.44	83.33	75.00	50.00
			1.6		To implement the requested drivers	Project	100	100	100	100	75	100	100	75	100	94.44	100.00	91.67	91.67
	85 SPECIALITY OPTIONAL COURSE	1	1.2	1. To identify the dynamic response of the systems that behave in a way that can de represented with a first or second-order differential equation. To identify what elements in the system determine the time of the transient response.	He formulates dynamic equations of mechatronic systems	Excercise and homework	100	40	70	100	85	85	100	85	85	83.33	70.00	90.00	90.00
			1.2		He solves the dynamic response of a mechatronic system with advanced tools	Middle projects	100	96	70	100	85	85	100	85	85	89.56	88.67	90.00	90.00
			1.3		He identifies the transient response of mechatronic systems	In class lectures and verbal approched	100	100	70	100	85	85	100	85	85	90.00	90.00	90.00	90.00
			1.4		He analyzes and identifies the parameters that determine the transient response of a mechatronic system	Middle projects	100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
			1.5		He builds mathematical models of mechatronic systems	Excercise and homework	100	100		100	85	85	100	85	85	92.50	100.00	90.00	90.00
			1.6		He models mechatronic systems with dynamic simulation tools	Computer reports	100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
			1.7		He makes comparisons among physical models that are modelled with similar differential equations	Excercise and homework	100	40	70	100	85	85	100	85	85	83.33	70.00	90.00	90.00
	364 COMPUTER VISION	1 ,3	1.4, 3.1	To apply and anlyze the computer vision basic knowledge to modify a digital image through specialized software.	To recognize and apply the basic filters to improve a digital image.	exam				100	60	40	100	75	60	72.50		66.67	78.33
			1.4, 3.1		To identify stages to digitalize an image.					100	75	60	100	100	100	89.17		78.33	100.00
			1.4, 3.1		To recognize the importance of the types of neighborhood and its relation to local filters.					100	60	60	100	60	60	73.33		73.33	73.33
		1	1.6	To design a capture and real-time image processing system to solve an application of the specified problem.	To extract real time information of a video sequence.	practices and exam				100	100	75	100	100	100	95.83		91.67	100.00
		1, 3	1.4, 3.1, 3.2		To evaluate the difficulties and to suggest the best possible stage to image improvement.					100	60	40	100	75	75	75.00		66.67	83.33
			1.4, 1.6, 1.7, 3.1, 3.2		To apply the appropriately tools to extract information of an image.					100	40	40	100	60	60	66.67		60.00	73.33
			1.2, 1.6, 3.1, 3.2, 3.3		To make decisions from the obtained information of an image for the solution of the given problem					100	60	40	75	40	40	59.17		66.67	51.67

Table 4.4 General result assessments for SO1 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.2.- SO1 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENT OUTCOME 1	3 Periods average results	**73.86**	85
1.1	1.1 Use numeric representation algebraic and analytical techniques	71.46	80
1.2	1.2 Solve problems of social, technological and/or research	73.86	80
1.3	1.3 Interpret relations and functions	72.87	80
1.4	1.4 Analyze data, evaluate and interpret results	73.93	80
1.5	1.5 Model phenomena	73.34	80
1.6	1.6 Use electronic and digital tools	73.76	80
1.7	1.7 Visualize abstractly mathematical ideas	74.03	80

Table 4.5.- General performance indicator results for 3 period average result. Final SO1 results.

For these general performance indicators, the future corrective action are listed below:

1.1 Call for special committee member's reunion for discussing alternatives in the teaching of analytic methods.

1.2 The TDTA course (will start in 2015-2) was implemented in new 2014 curricula.

1.3 Encourage more lectures about engineer functions analysis.

1.4 Focus attention on applying real application solutions to solve.

1.5 Encourage Faculty members the use of specialized engineering software's.

1.6 More courses will be attending this area in INA14 curricula.

1.7 Increase mathematics tutoring with faculty members.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1				equently failing general performance indic		
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
821 INTEGRAL CALCULUS	1	1.7	To calculate the cumulative values starting from physical numbers for applications in engineering through the concept of integration.	Solve integration problems independently	Tasks, review	0	50	75	25	50	75	25	50	100	50.00	41.67	50.00	58.33
863 CONTROL II	1	1.1, 1.3, 1.4	To apply the concept of frequency response to the desing of electromechanical control systemsa from specialized tools.	To apply the concept of frequency response to the desing of electromechanical control systemsa from specialized tools.	Theorical-practical project	70	60	50	70	60	50	70	60	50	60.00	60.00	60.00	60.00
868 CONTROL II	1, 3	1.4, 1.1, 1.5, 1.7, 3.1	To apply the state variable approach to the study of control systems.	To apply the state variable approach to the study of control systems.		60	50	50	70	60	40	70	50	60	56.67	53.33	56.67	60.00

Table 4.6.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:

Course 821: Regarding the autonomy for learning, students take some extra courses. This includes, the International Congress of Engineering, CONIIN. Also workshop fairs outside the institution are push by the program chair.

Course 861: At the end of the curricula, students are encouraged to take electronics' exam. Here, they must demonstrate the skills regarding analysis of frequency.

Student outcomes  **direct assessment.**

The Automation Area Chair, the ABET`s coordinator and the Faculty members involved in Seminar Degree course, applies a final survey measuring students appreciation of their learning outcomes, to undergrad students of the periods 2014-2, 2015-1. This same survey was applied to some graduate students of 2013. The following graphics is a comparison between the direct analysis obtain from the courses and the exit survey results.

A sample of these assessment method is referenced in Appendix E. Physical evidence will be display at visit.

SO1 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I can apply and use the knowledge of mathematics, basic science and engineering to design and carry out research, application, technological and social innovation projects using specialized methods and techniques.	100%	5	20	76 % succed SO1 in a 75% level and 20% in a 100%	79	73.86
	75%	19	76			
	50%	1	4			
	0%	0	0			
	TOTAL	25	100			

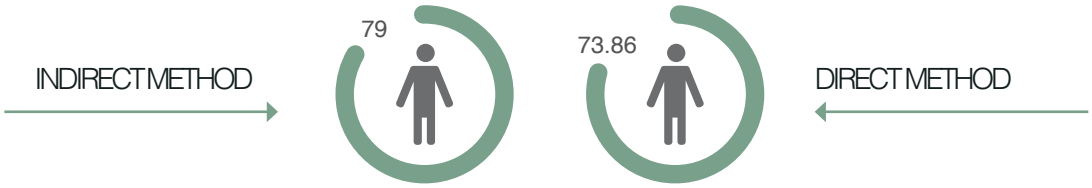


Image 4.1.- SO1 match between direct and indirect assessment.

STUDENT OUTCOME 1

Apply and use the knowledge of mathematics, basic science and engineering to design and carry out research, application, technological and social innovation projects using specialized methods and techniques.

Analysis

Taking into account the results shown in the subjective assessment, this competence is only shared by outcomes 4 and 3. Probability and statistics, Integral Calculus and Multivariable Calculus belong to the Basic Science. In these courses students learn the basis of Mathematics, Chemistry and Physics. Therefore, professors in these courses apply different techniques to improve abilities regarding analysis and engineering issues and use the results to solve research problems, which students later implement mainly in advanced courses such as: Signal Analysis, Electronics, Automation, Electrical Machines II, Electrical System Design, Control II, Automation II, Instrumentation, Servomechanism and Computer Vision, just to mention a few. All these courses pursue real world projects. Then, this outcome is well attended in these semesters. However, at the very beginning of the major, not all Faculty ask students to accomplish a project. Therefore, they cannot use the outcome by implementing a specific research in a project.

Conclusion and future actions:

It is necessary to implement certain research projects even at the beginning of the major that allow students to develop thinking skills such as synthesis and analysis, among others. So, it is expected that Faculty coordinator of Mathematics use final projects as a way to fulfill this point. Besides, for advanced courses it is recommended to Faculty recruit students for research projects since almost all full time professors have industrial application systems.

STUDENT OUTCOMES 2 : Analysis results from direct method assessment from courses.

Teamwork skills

Student outcomes 2 direct assessment.

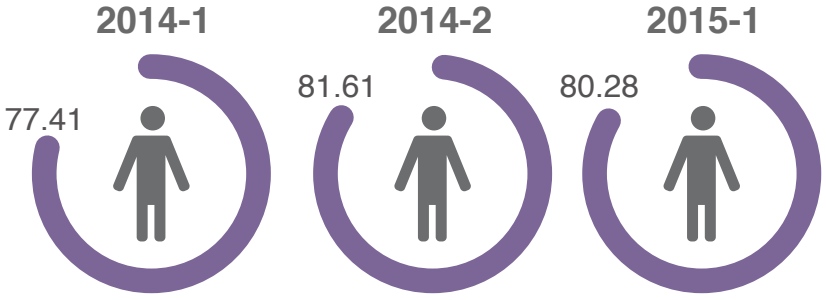
The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

						2014-1			2014-2			2015-1						
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
208 UNIVERSITY AND SOCIETY	2, 5, 7	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To analyze the social reality in Latin America in order to make a critical evaluation of our identity's structure and the political, economic and social models that exist in a globalized world taking into account its history.	He identifies the impact the present educational contexts have on his professional training.	Homework, tests, project	75	75	50	100	75	50	100	50	50	69.44	75.00	75.00	66.67
			To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11	83.33	91.67	83.33
				He integrates other disciplines' vision		75	50	50	75	75	50	100	75	50	66.67	58.33	75.00	75.00
			To know and analyze the main elements that form and determine a human being's behavior on the basis of a historical moral conception of the events and how they make an impact on our daily and professional life from the history of ethics in sciences.	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44	66.67	75.00	66.67
				He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22	75.00	75.00	75.00
1418 ARTISTIC OPTIONAL COURSE	2	2.1, 2.3, 2.5	To collaborate in multi-disciplinary teams to produce and propose human and technological solutions.	He plays roles according to what is needed	Photography exhibition	100	100	60	100	100	80	100	100	80	91.11	86.67	93.33	93.33
		2.1, 2.2, 2.3, 2.5		He integrates and participates in collective activities		100	100	80	100	100	100	100	80	100	95.56	93.33	100.00	93.33
	2, 5, 6	2.1, 2.3, 5.2, 6.4	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	To debate and discuss the proposed ideas before diverse disciplines.	Foro de discusión						85	100	70	70	81.25		92.50	80.00
217 DYNAMICS	2	2.1, 2.5	To apply the student's knowledge of this subject to study cases for the development of integral projects by work groups.	He establishes roles according to his abilities for the development of the project.	Project in teams, hand in a document and make a presentation.				50	75	50	100	75	50	66.67	50.00	75.00	75.00
244 ELECTRICAL MACHINES I	2	2.1	To understand the principles of Direct-Current motors and generators design and their different configurations	2.1 He interprets the instructions and organizes his team to model the practice	Laboratory sessions' reports				100	80	90	100	80	90	90.00		90.00	90.00
		2.2		2.2 He interprets the features of the instruments and defines the accuracy of each test					100	90	90	100	90	90	93.33		93.33	93.33
	2, 4	2.3, 4.3		2.3 He presents the solution of a physical problem with the tools that are available to him at the moment					100	90	90	100	90	90	93.33		93.33	93.33
		2.4, 4.1		2.4 He identifies, with his classmates, the theoretical concepts that support the laboratory test					100	90	90	100	90	90	93.33		93.33	93.33
	2	2.5		2.5 He differentiates the roles that each person must play when doing a project in teams.	Project's final report				100	80	80	100	80	80	86.67		86.67	86.67
343 DIGITAL SYSTEMS II - MICROSYSTEMS	2, 3	2.1, 2.2, 3.2, 3.3	To analyze, design and test electronic systems based on microsystems that allow the formulation of possible solutions to engineering problems, using specialized software.	He analyzes, designs and tests electronic circuits based on microsystems	Partial exams, laboratory sessions, mid-term and final projects	100	80	60	80	80	40	80	60	40	68.89	73.33	66.67	60.00
				He develops diagrams using microsystems as his bases		100	80	60	80	80	60	80	80	40	73.33	73.33	73.33	66.67
		2.2, 3.1, 3.2, 3.3		He compiles codes with specialized software		100	80	60	100	80	60	100	80	40	77.78	80.00	80.00	73.33
				He designs printed circuits following the design rules, specified by the software he is using.		80	60	60	80	60	40	80	80	40	64.44	66.67	60.00	66.67
		2.5, 3.3	To document the development of firmware the is being used for the formulation of possible solutions by means of diagrams, schemata and desk tests, making use of specialized software.	He documents the development of the firmware of projects and laboratory sessions, developed in the format of a work portfolio	Laboratory sessions' reports, reports of mid-term and final projects, portfolio of projects	100	60	40	80	60	40	80	80	40	64.44	60.00	60.00	66.67

						2014-1			2014-2			2015-1						
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
273 DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS DIGITALES I	2, 4	2.1, 4.2	To design analog and digital systems for the development of software platforms.	He develops applications in reprogrammable and reconfigurable systems	Final project	100	100	50	100	100	50	100	100	75	86.11	83.33	83.33	91.67
	2	2.5, 2.1	To apply methods and techniques for the digital circuits to be efficient in engineering problems	He leads and promotes participation in collective work		50	75	75	50	50	75	75	75	100	69.44	66.67	66.67	83.33
INSTRUMENTACIÓN PARA CONTROL DE PROCESOS (7)-AUTO III	2,3	2.1, 2.3, 2.5, 3.2	To collaborate in disciplinary and multi-disciplinary teams to formulate and do automation research projects to solve a problem according to its context.	He organizes and leads the different parts of the project	Final project				80	80	70	80	70	65	74.17	80.00	76.67	71.67
		2.1, 2.3, 2.4, 2.5, 3.3		He proposes solutions for the development of the project					95	80	70	90	80	60	79.17	95.00	80.00	76.67
885 SOCIAL SERVICE	2, 7	2.1, 2.3, 2.4, 2.5, 7.3	To collaborate in disciplinary and multi-disciplinary teams producing strategies to improve his social environment and continuously updating his knowledge of his discipline.	He thinks about his collaborative team	Partial and final reports				100	75	40	100	60	40	69.17	100.00	71.67	66.67
		2.1, 2.4, 2.5, 7.1, 7.3		He observes his improvements in the social service program					75	75	60	60	100	40	68.33	75.00	65.00	66.67
		2.1, 2.2, 2.4, 7.1, 7.3		He thinks about the application of his profession and his knowledge					100	75	75	100	100	40	81.67	100.00	83.33	80.00
293 INSTRUMENTATION II	2	2.1, 2.3, 2.5	To colaborate and organize in multidisciplinary teams, since the group is conformed by Mecatronics, Electronics and Instrumentation and Control students, to give solution to the homeworks and to the project that includes all topics covered in the curse.	To develop a project team in which at least one member is an student of Instrumentation and Control.	Project where a process implemented in a DTI should be complemented with as seen on this course	40	100	100	75	100	100	100	40	100	83.89	91.67	100.00	80.00
273 DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS DIGITALES I	2, 4	2.1, 4.2	To design analog and digital systems for the development of software platforms.	He develops applications in reprogrammable and reconfigurable systems	Final project	100	100	50	100	100	50	100	100	75	86.11	83.33	83.33	91.67
	2	2.5, 2.1	To apply methods and techniques for the digital circuits to be efficient in engineering problems	He leads and promotes participation in collective work		50	75	75	50	50	75	75	75	100	69.44	66.67	66.67	83.33
890 DEGREE SEMINAR	2	2.2, 2.5	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Material and methods.	Final project /thesis	75	75	100	100	100		100	80	60	86.25	91.67	100.00	80.00
		2.1, 2.2, 2.4		Results.		75	50	75	50	25		100	90	60	65.63	58.33	62.50	83.33
	2, 4, 6	2.4, 4.1, 4.2, 6.1, 6.3		Discussion:		50	50	75	50	25		100	80	60	61.25	58.33	62.50	80.00
	2	2.2		Bibliography.		75	50	75	75	75		100	90	60	75.00	66.67	87.50	83.33
		2.1, 2.3		Critical attitude.		75	50	75	75	75		100	75	70	74.38	66.67	87.50	81.67
92 SPECIALITY OPTIONAL COURSE	2	2.1	2. To integrate individual concepts, of elements and components, in complex problems that cannot be solved only by one engineer and to formulate solutions from a global perspective.	He contributes to build a simulation model of a complex mechatronic system	Reports of the computer simulation models	100	96	70	100	85	85	100	85	85	89.56	88.67	90.00	90.00
		2.2		He interprets the specific rules of electrical, mechanical and pneumatic systems		100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
		2.3		He uses the concept of energy conservation to integrate models from different engineering disciplines	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33	70.00	90.00	90.00
		2.4		He identifies the improvements that can be applied to a mechatronic system to have a positive impact on the environment	Results of the mid-term and final projects	100	96	70	100	85	85	100	85	85	89.56	88.67	90.00	90.00
		2.5		He differentiates the roles that must be played when doing a project in teams	Individual evaluation	100	96	70	100	85	85	100	85	85	89.56	88.67	90.00	90.00
893 PROFESSIONAL INTERNSHIP	2,5,6	2.1, 2.3, 2.4, 5.3, 6.1, 6.3, 6.5	To collaborate in interdisciplinary teams promoting his professional growth and integration to the labor market, being aware of his environment and applying his acquired knowledge.	He thinks about the academic level required to carry out a task	Partial and final report				100	100	60	100	75	40	79.17		86.67	71.67
	2,5	2.2, 2.5, 5.2, 5.3		He thinks about work competitiveness					100	75	75	100	75	40	77.50		83.33	71.67

Table 4.7 General result assessments for SO2 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes. Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.3.- SO2 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 2		78.88	85
2.1	2.1 Provide knowledge that build the solution	79.79	85
2.2	2.2 Use quality standards	78.88	85
2.3	2.3 Integrate the vision of other disciplines	78.91	85
2.4	2.4 Use economic, social and environmental aspects to prom	77.90	85
2.5	2.5 Play appropriate roles for the success of the working tear	79.72	85

Table 4.8.- General performance indicator results for 3 period average result. Final SO2 results.

For these general performance indicators, the future corrective action are listed below:

2.1 Promote open seminars for engineering problem discussion solving.

2.2 Shown organizations standards as for ISA and IEEE.

2.3 The TDTA course (will start in 2015-2) was implemented in new 2014 curricula.

2.4 Promote students between researcher faculties.

2.5 The TDTA course (will start in 2015-2) was implemented in new 2014 curricula.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1						
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
347 DIGITAL SYSTEMS II - MICROSYSTEMS	2, 3	2.5, 3.3	To document the development of firmware the is being used for the formulation of possible solutions by means of diagrams, schemata and desk tests, making use of specialized software.	He documents the development of the firmware of projects and laboratory sessions, developed in the format of a work portfolio	Laboratory sessions' reports, reports of mid-term and final projects, portfolio of projects	100	60	40	80	60	40	80	80	40	64.44	60	60	66.67
891 DEGREE SEMINAR	2	2.1, 2.2, 2.4	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Results.	Final project /thesis	75	50	75	50	25		100	90	60	65.63	58.33	62.5	83.33
892 DEGREE SEMINAR	2, 4, 6	2.4, 4.1, 4.2, 6.1, 6.3	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Discussion:	Final project /thesis	50	50	75	50	25		100	80	60	61.25	58.33	62.5	80

Table 4.9.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:

Course 343: When we started with ABET process, almost all Faculties asked for appropriated spaces for developing this knowledge area.

Course 882: In the new INA14, TDTA course has been included, where the multidisciplinary skill will be pushed.

Student outcomes 2 indirect assessment.

SO2 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
Im able of collaborating on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context.	100%	12	48	48 % succed SO2 in a 100% level and 44% in a 75%.	85	78.88
	75%	11	44			
	50%	2	8			
	0%					
	TOTAL	25	100			

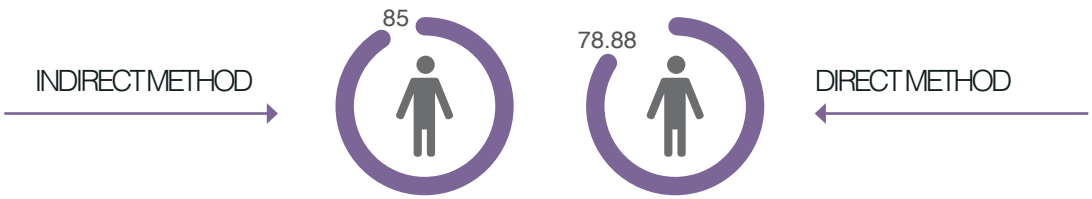


Image 4.2.- SO2 match between direct and indirect assessment.

STUDENT OUTCOMES 2

Collaborate on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context

Analysis

Regarding the survey performed to the employers, this is a very important skill that students should have when they get graduate. This outcome has been shared with 5, 7 and 4 mainly due to the importance of solving engineering problems in certain context. SO courses that develop this include University and Society, Dynamics, Social Service, Degree Seminar, Digital Systems with Reconfigurable Logic, among others. Most of these subjects require a final project, which is carried out in teams. Currently students work in team in order to discuss results, to document software for human machine interfaces, to research different topics, etc.

Conclusion and future work

Thanks to the Institution´s President a new program called FOPER, (Rectory Fund for Special Projects), has helped to push real-society engineering projects. Around ten projects have been supported by this fund. Examples of these projects include: Laser Printing on PET for Water Bottling, Set of Electronic Starter Kit for Educative Tasks, Image Processing for Preventing Neonatal Deaths, and so forth. It should be mentioned that all projects are worked in teams that may include other disciplines such as: Chemistry, Psychology, Medicine, and others. Other similar Calls for projects are: PEI2015, which is the most important economic grant that Mexico has; FOMIX, which is the Mix Founding; FESE, which is the University-Industry Foundation, just to mention a very few. This allows students to win in different ways: they get economical support, work on real industry systems; learn “hands on” by practice, interacting with other professionals as well as other benefits.

To conclude, these opportunities should be profited and promoted; the dean should give additional support to Faculty working with students in this way.

STUDENT OUTCOMES 3 : Analysis results from direct method assessment from courses.

Design skills

Student outcomes 3 **direct assessment.**

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
215 PROGRAMMING	3	3.1, 3.2	To represent the solution of engineering problems in an analytical and systematic way, using graphic tools and mathematical concepts	He formulates algorithms	exam	100	75	75	100	100	75	100	75	0	77.78	83.33	91.67	58.33
		3.3	To implement problem solving by a programming language, in a concise and efficient way	He knows how to structure programming codes in a clear way		75	100	50	75	75	100	100	75	50	77.78	75.00	83.33	75.00
212 DYNAMICS	3	3.3	To apply the student's knowledge of this subject to study cases for the development of integral projects by work groups.	He understands and applies the basic concepts of dynamics to prove a solution.	Project in teams, hand in a document and make a presentation.				75	75	50	75	75	50	66.67		66.67	66.67
237 ELECTRICAL MACHINES I	3, 4	3.1, 4.2	To be able to model the behavior of a Direct-Current motor and generator and to distinguish how they can be used to control the velocity in the applications of automation	3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine	Reports of the projects and simulations' results				100	80	80	100	80	80	86.67		86.67	86.67
		3.2, 4.2		3.2 He evaluates the effects that the particular elements have in the dynamic response of a Direct-Current Machine					100	80	80	100	80	80	86.67		86.67	86.67
		3.3, 4.1		3.3 He documents in an engineering formal report the results of the projects he does.					100	80	80	100	80	80	86.67		86.67	86.67
343 DIGITAL SYSTEMS II - MICROSYSTEMS	2, 3	2.1, 2.2, 3.2, 3.3	To analyze, design and test electronic systems based on microsystems that allow the formulation of possible solutions to engineering problems, using specialized software.	He analyzes, designs and tests electronic circuits based on microsystems	Partial exams, laboratory sessions, mid-term and final projects	100	80	60	80	80	40	80	60	40	68.89	80.00	66.67	60.00
		2.1, 2.2, 3.2, 3.3		He develops diagrams using microsystems as his bases		100	80	60	80	80	60	80	80	40	73.33	80.00	73.33	66.67
		2.2, 3.1, 3.2, 3.3		He compiles codes with specialized software		100	80	60	100	80	60	100	80	40	77.78	80.00	80.00	73.33
		2.2, 3.1, 3.2, 3.3		He designs printed circuits following the design rules, specified by the software he is using		80	60	60	80	60	40	80	80	40	64.44	66.67	60.00	66.67
		2.5, 3.3	To document the development of firmware the is being used for the formulation of possible solutions by means of	He documents the development of the firmware of		100	60	40	80	60	40	80	80	40	64.44	66.67	60.00	66.67
270 DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS DIGITALES I	3, 4	3.2, 4.3	To design analog and digital systems for the development of software platforms.	He uses VHDL tools to describe hardware	Exam	100	75	75	75	100	75	100	100	100	88.89	83.33	83.33	100.00
	3	3.2, 3.3	To apply methods and techniques for the digital circuits to be efficient in	He develops advanced digital electronic circuits		75	100	25	100	75	50	100	75	75	75.00	66.67	75.00	83.33
	3, 4	3.1, 4.1, 4.2	To develops digital circuits through simulation in order to make efficient the system of	He simulates logic circuits with Verilog		100	50	75	75	75	50	100	100	75	77.78	75.00	66.67	91.67
280/1211 AUTOMATION IN INSTRUMENTATION FOR PROCESS CONTROL	2,3	2.1, 2.3, 2.5, 3.2	To collaborate in disciplinary and multi-disciplinary teams to formulate and do automation research projects to solve a problem according to its context.	He organizes and leads the different parts of the project	Exam				80	80	70	80	70	65	74.17		76.67	71.67
		2.1, 2.3, 2.4, 2.5, 3.3		He proposes solutions for the development of the project					95	80	70	90	80	60	79.17		81.67	76.67
298 SERVOMECHANISM	3,4	3.2, 4.3	To analyze, desing and implement position and speed control systems for industrial applications through the development of prototypes.	To identify the elements that make up a position and/or speed control system	exam, presentation	100	100	100	75	75	100	75	25	50	77.78	100.00	83.33	50.00
	3	3.1, 3.2, 3.3		To compare and demonstrate the physical results with analytics and its justification	report	100	50	75	75	75	75	75	25	100	72.22	75.00	75.00	66.67
364 COMPUTER VISION	1 ,3	1.4, 3.1	To apply and anlyze the computer vision basic knowledge to modify a digital image through specialized software.	To recognize and apply the basic filters to improve a digital image.	Exam				100	60	40	100	75	60	72.50		66.67	78.33
		1.4, 3.1		To identify stages to digitalize an image.					100	75	60	100	100	100	89.17		78.33	100.00
		1.4, 3.1		To recognize the importance of the types of neighborhood and its relation to local filters.					100	60	60	100	60	60	73.33		73.33	73.33
		1.4, 3.1, 3.2	To design a capture and real-time image processing system to solve an application of the specified problem.	To evaluate the difficulties and to suggest the best possible stage to image improvement.	Practices and exam				100	60	40	100	75	75	75.00		66.67	83.33
		1.4, 1.6, 1.7, 3.1, 3.2		To apply the appropriately tools to extract information of an image.					100	40	40	100	60	60	66.67		60.00	73.33
		1.2, 1.6, 3.1, 3.2, 3.3		To make decisions from the obtained information of an image for the solution of the given problem.					100	60	40	75	40	40	59.17		66.67	51.67
85 SPECIALITY OPTIONAL COURSE	3	3.1	3. To justify, with engineering criteria, how the parameters of a dynamic model are determined from real data of components that exist in the professional market and field	He abstracts and summarizes the elements that make up a dynamic mechatronic system	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
		3.2		He evaluates the effects that specific elements have on the dynamic response of a mechatronic system		100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
		3.3		He documents an engineering formal report with the results of his projects		100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00

Table 4.10.- General result assessments for SO3 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.

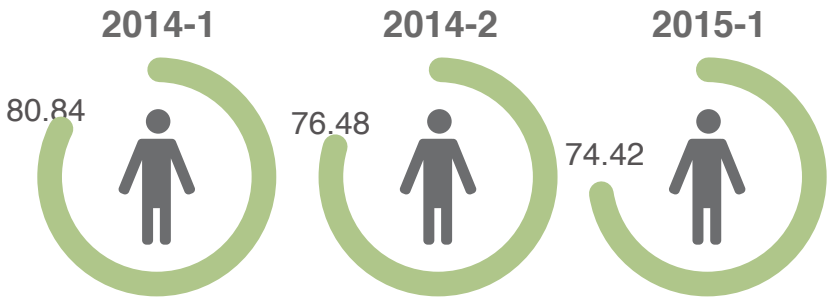


Image 4..- SO1 match between direct and indirect assessment.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 3		**77.24**	85
3.1	3.1 Abstract and synthesize the particular elements of the problem.	76.13	85
3.2	3.2 Evaluate solutions	76.71	85
3.3	3.3 Document integrated solutions of the problem whereas the engineering language (blueprints, drawings, diagrams, reports,	77.22	85

Table 4.11.- General performance indicator results for 3 period average result. Final SO3 results.

For these general performance indicators, the future corrective action are listed below:

3.1 Increase real application projects and research scholarships.

3.2 Increase number of software licenses for the program.

3.3 With the Faculties and students portfolio´s workshops given to the faculty, the area chair can promote this outcome.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1						
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
343 DIGITAL SYSTEMS II - MICROSYSTEMS	2, 3	2.2, 3.1, 3.2, 3.3	To analyze, design and test electronic systems based on microsystems that allow the formulation of possible solutions to engineering problems, using specialized software.	He designs printed circuits following the design rules, specified by the software he is using.	Partial exams, laboratory sessions, mid-term and final projects	80	60	60	80	60	40	80	80	40	64.44	66.67	60.00	66.67
	2, 3	2.5, 3.3	To document the development of firmware the is being used for the formulation of possible solutions by means of diagrams, schemata and desk tests, making use of specialized software.	He documents the development of the firmware of projects and laboratory sessions, developed in the format of a work portfolio	Laboratory sessions' reports, reports of mid-term and final projects, portfolio of projects	100	60	40	80	60	40	80	80	40	64.44	66.67	60.00	66.67
364 COMPUTER VISION	1, 3	1.4, 1.6, 1.7, 3.1, 3.2	To design a capture and real-time image processing system to solve an application of the specified problem.	To apply the appropriately tools to extract information of an image.	prácticas y examen				100	40	40	100	60	60	66.67		60.00	73.33

Table 4.12.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:

Course 343: New software for electronic analysis has been purchased by the Administrative Department, which includes: Multisim, LabVIEW, and in the long-term Altium Designer will be purched.

Course 343: ABET process at UAQ has allow Faculty members to work with the Student Portfolios, this will help students to get their evidence arranged (homeworks, practices, diagrams, research, and other) and generate a reflection about their learning.

Course 364: Real-time projects are being increased since last year in the following courses: Real Time Systems (as an optative courses), Digital Systems with Rebuilt Logic, Microsystems, just to mention a few. These student outcomes will be assessed from the first generation coursing INA14 in 2016-1. Design components, systems and automated processes in order to meet specific needs and propose suitable solutions.

Student outcomes  **indirect assessment.**

SO3 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I´m able to design components, systems and automated processes in order to meet specific needs and propose suitable solutions.	100%	10	40	48% succed SO3 in a 75% level an 40% in a 100%.	82	77.24
	75%	12	48			
	50%	3	12			
	0%					
	TOTAL	25	100			

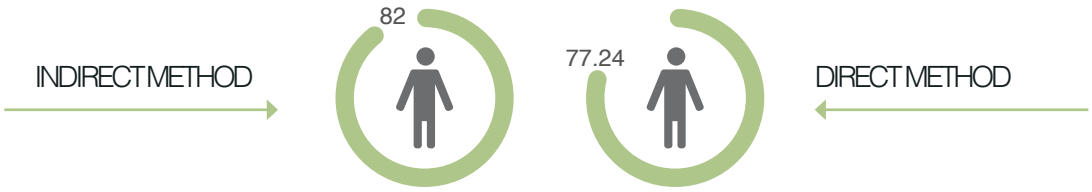


Image 4.3.- SO3 match between direct and indirect assessment.

STUDENT OUTCOMES 3

Analysis

The outcome is basically shared with the 2 and 1. Dynamics, Microsystems and Computer Vision are the subjects where this outcome is assessed. There has been a strong effort from the Engineering Dean, Institutional Rector, Faculty members, graduate students and other instances to provide equipment for the Automation Laboratory and others related. However, it has not been enough. Since engineering changes as soon as producers launch new technology, material and equipment should be bought to work with contemporary topics. For instance, Digital Systems five years ago was taught by means of ASIC semiconductors, but nowadays, it is learned through advanced reconfigurable logic. The Institutional program for this, PIFI (Spanish acronym), aims to keep labs well equipped, but additional funding is required. It must be mentioned that the Engineering Department is one of the biggest beneficiaries of this program in Mexico due to the excellence of the academic results. Professors that have research projects supported by industry help the laboratory in different ways, such as: buying measuring materials, multimedia equipment, and taking students to congresses and industry visits.

Conclusion and future work

There are different ways to promote this outcome, but more equipment in the laboratory

is needed. Faculty members must designate a budget rate from the industry research projects for this purpose. There must be an introductory class in the beginning of the career to teach students how to prevent damages to the material and equipment. The Dean might acknowledge faculty members supporting the labs.

STUDENT OUTCOMES 4 : Analysis results from direct method assessment from courses.

Impact analytical solutions using engineering tools

Student outcomes 4 direct assessment.

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
[illegible] METROLOGY	4	4.4	To know the concepts as measurand, the measurement principle, measurement signal, measurement procedure, and magnitudes of influence and uncertainty with the aim to identify and describe properly these	To know the concepts: measurand, measurement principle, measurement signal, measurement procedure of magnitudes of influence and	Examination of knowledge and exposure							100	100	75	91.67			100
	4, 5	4.1, 5.1	To understand the purpose of the measurement standards, calibration and the importance of the traceability in the measurements, with the study of the terms in the International Vocabulary of Metrology, the analysis of examples and articles for its application in specific problems at the industrial or scientific level.	To distinguish the different types of patterns and to learn the concepts of traceability and calibration.	Theory test							100	100	75	91.67			100
	4	4.1, 4.2, 4.3	To know the basic process to estimate the measurement uncertainty, for a proper interpretation of the subject in measurement systems, through the study of guide publications to estimate the measurement uncertainty (GUM).	To identify the sources of uncertainty of a measurement system.	Reading of articles													
[illegible] ELECTRONICS	1, 4	1.1, 1.2, 1.3, 1.4, 4.1	To develop the necessary knowledge for the analysis of circuits composed of semiconductor devices.	To apply the knowledge of circuit theory to solve diodes configurations, BJT, JFET.	Practical examinations, laboratory and final project practices				50	50	75	50	75	75	62.5		50	66.67
			To understand the principle of voltage and current amplyfiers, as well as the necessary calculation to implement them.	To implement different configurations for different profit systems					50	75	100	50	75	100	75		62.5	75.00
[illegible] ELECTRICAL MACHINES I	2, 4	2.3, 4.3	To understand the principles of Direct-Current motors and generators design and their different configurations	2.3 He presents the solution of a physical problem with the tools that are available to him at the moment	Laboratory sessions' reports				100	90	90	100	90	90	93.33		95	93.33
		2.4, 4.1		2.4 He identifies, with his classmates, the theoretical concepts that support the laboratory test					100	90	90	100	90	90	93.33		95	93.33
	3, 4	3.1, 4.2	To be able to model the behavior of a Direct-Current motor and generator and to distinguish how they can be used to control the velocity in the applications of automation	3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine	Reports of the projects and simulations' results				100	80	80	100	80	80	86.67		90	86.67
		3.2, 4.2		3.2 He evaluates the effects that the particular elements have in the dynamic response of a Direct-Current Machine					100	80	80	100	80	80	86.67		90	86.67
		3.3, 4.1		3.3 He documents in an engineering formal report the results of the projects he does.					100	80	80	100	80	80	86.67		90	86.67

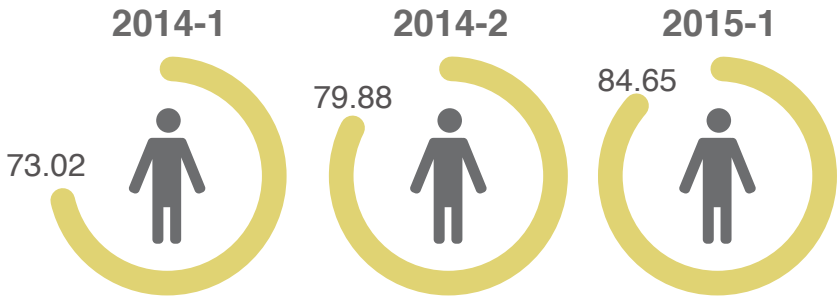
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
			To know the concepts as measurand, the	To know the concepts:														
9II AUTOMATION I	1, 4	1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the deveolpment of automatic processes using direct and indirect control techniques.	He knows and identify the International System of Units.	Final Review	100	75					70	100	50	79			85
		1.3, 4.2		He dominates the conversion of units from the International System to the English System.		100	75					100	70	70	83			85
		1.2, 1.3, 4.2, 4.4	To identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to automation engineering.	He understands correctly the behaviour of fluid mechanics.		75	25					100	50	50	60			75
		1.2, 4.2, 4.3, 4.4		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		75	25					50	70	70	58			60
		1.2, 4.2, 4.3, 4.5		He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25					100	70	50	59			85
9ES ADVANCED ELECTRONICS	4, 6	4.2, 6.1, 6.3, 6.4	To study and analyze the main characteristics and functioning of the Operational Amplifiers (OPAMPs), the basic applications and the related configurations that can be made with them.	To configure a signal conditioner with operational amplifier.	Theoretical exams and laboratory practice	50	100	100	75	75	75	50	75	75	75.00	75	83.33	66.67
		4.2, 6.1, 6.2		To integrate the theoretical knowledge in practical elements for analog signal processing.		50	75	100	75	50	100	50	75	75	72.22	62.5	75.00	75.00
		4.2, 6.1, 6.2	To analyze the existence of frequency limitations of the OPAMP, just as the characteristics that are presented when coupling stages.	To experiment and analyze the behavior of the OPAMP at high frequencies.		50	75	100	50	75	100	75	75	100	77.78	62.5	75.00	83.33
		4.2, 6.1, 6.2	To study and analyze the main characteristics of OPAMPs in the application of active filters, signal generators, sinusoidal oscillators and conditioning of analog signals.	To build prototypes based on the OPAMP.	Practical examinations, laboratory and final project practices	50	75	100	50	75	100	75	75	75	75.00	62.5	75.00	83.33
		4.2, 6.1, 6.2		To filter and generate signals.		50	75	100	50	75	100	75	75	75	75.00	62.5	75.00	83.33
8ES ELECTRIC SYSTEM DESIGN	4, 7	4.2, 4.4, 7.1	To design and carry out electric projects that let innovate the continuous improvement for a better storage, generation and distribution of the electric energy in the student's professional environment and for benefit of society.	He knows how to use properly the electrical connection diagrams of damper lamps and contacts	Review exam	75	100	100	75	100	100	100	75	50	86.11	87.5	91.67	91.67
		4.2, 4.4, 7.1		He masters the basic concepts of electric circuits and the basic laws of power and electricity		75	75	100	60	75	100	75	75	75	78.89	75	78.33	83.33
	1, 4	1.2, 1.4, 1.6, 4.1, 4.3	To know how to use appropriate materials and tools to develop and design electrical systems for their application in the solution of commercial, industrial and residential problems in the current automation industry.	He knows and identifies the major materials and equipment that make up an electrical installation		60	60	100	40	75	75	100	50	50	67.78	60	71.67	75.00
		1.2, 1.4, 1.6, 4.1, 4.3		He knows the description and use of electrical materials that make up an electrical installation		40	75	75	40	75	100	100	50	50	67.22	57.5	63.33	83.33
5 Social and Human Sciences ational Course	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	To support his arguments with factors and facts.	Essay						85	85	85	70	81.25			
9II AUTOMATION II	1, 4	1.1, 1.2, 1.6, 4.3	To know and understand the use of automation in industrial processes using programmable logic controllers.	He knows and identifies how a PID works	Final Proyect	75	100	100	60	100	100	100	100	75	90.00	87.5	86.67	100.00
		1.2, 1.4, 1.6, 4.1, 4.3	To identify, research and design Automation Engineering problems by means of programmable logic controllers.	He controls and tunes properly a PID applied to a PLC		60	75	100	75	100	75	100	100	75	84.44	67.5	91.67	91.67
		1.2, 1.4, 1.6, 4.1, 4.4		He knows correctly programming in ladder diagrams with an PLC		40	60	100	40	60	100	75	75	50	66.67	50	66.67	83.33
		1.2, 1.4, 1.6, 4.1, 4.5		He identifies and formulates properly any real automation problem that he may find		40	75	75	40	75	75	75	75	50	64.44	57.5	63.33	75.00
		1.2, 1.4, 1.6, 4.1, 4.6		He Knows perfectly the inputs and outputs of a PLC connection		60	100	75	60	100	100	75	100	75	82.78	80	78.33	91.67
9TD DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS DIGITALES I	3, 4	3.1, 4.3	To design analog and digital systems for the development of software platforms.	He analyzes and synthesizes the elements of a problem for its solution in analog and digital systems using Boolean expressions	Exam	100	75	50	100	75	50	100	100	75	80.56	87.5	75.00	83.33
		3.2, 4.3		He uses VHDL tools to describe hardware		100	75	75	75	100	75	100	100	100	88.89	87.5	83.33	91.67
	4	4.3, 4.2		He uses software for Man-Machine Interfaces		75	50	50	75	100	50	100	100	75	75.00	62.5	75.00	83.33
	2, 4	2.1, 4.2		He develops applications in reprogrammable and reconfigurable systems	Final project	100	100	50	100	100	50	100	100	75	86.11	100	83.33	83.33
	3, 4	3.1, 4.1, 4.2	To debug digital circuits through simulation in order to make efficient the system of an automation project.	He simulates logic circuits with Verilog	Exam	100	50	75	75	75	50	100	100	75	77.78	75	75.00	83.33
9I ROBOTICS	4	4.2, 4.3	To program routines for an industrial robot using a generic software with the finality of solve a problem in a flexible manufacturing line.	He differentiates between the various modes of operation and coordinate systems used in the programming of robots manipulators.	Final project	100						100	100	75	93.75	100		100
2IRS2011 AUTOMATION III - INSTRUMENTATION & PROCESS CONTROL	4, 5	4.3, 4.4, 5.2	To formulate solutions to problems of engineering, components, systems and processes considering their impact and contributing to the improvement of the global, economic, environmental and social contexts, using today's techniques and tools.	He identifies the components of a problem	Final project				100	80	70	85	75	70	80.00		90.00	76.67
		4.1, 4.2, 5.1		He chooses the appropriate tools to do the project					100	75	70	90	80	70	80.83		87.50	80.00

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	2014-1 STUDENT 1	2014-1 STUDENT 2	2014-1 STUDENT 3	2014-2 STUDENT 1	2014-2 STUDENT 2	2014-2 STUDENT 3	2015-1 STUDENT 1	2015-1 STUDENT 2	2015-1 STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
			To know the concepts as measurand, the	To know the concepts:														
[illegible]	3,4	3.2, 4.3	To analyze, desing and implement position and speed control systems for industrial applications through the development of prototypes.	To identify the elements that make up a position and/or speed control system	exam, presentation	100	100	100	75	75	100	75	25	50	77.78	100	83.33	66.67
882 DEGREE SEMINAR	4, 6, 7	4.1, 4.2, 4.3, 4.4, 6.5, 7.1	To formulate solutions for automation problems, components, systems and processes considering the impact of itself and contributing to the improvement of the global, economic, environmental and social context, using the current techniques and tools.	Research/experiment.	Final project /thesis	75	50	100	75	50		100	75	60	73.13	62.5	75.00	87.50
	4, 6	4.2, 4.4, 6.3, 6.4		Conceptual management.		75	50	100	50	50		100	75	75	71.88	62.5	66.67	87.50
	4, 7	4.1, 4.2, 4.3, 7.3		Evaluation project.		75	50	100	100	75		100	80	70	81.25	62.5	91.67	90.00
	4	4.1, 4.2, 4.3		Approach to the problem.		75	50	75	75	75		100	80	80	76.25	62.5	75.00	90.00
	4, 6, 7	4.4, 6.5, 7.1, 7.3		State of the art.		50	50	75	100	75		100	80	60	73.75	50	83.33	90.00
	4, 6	4.1, 4.2, 6.4		Justification.		75	50	100	75	75		100	75	80	78.75	62.5	83.33	87.50
	2, 4, 6	2.4, 4.1, 4.2, 6.1, 6.3	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Discussion:		50	50	75	50	25		100	80	60	61.25	50	50	90
[illegible] SPECIALITY TIONAL COURSE	4	4.1	4. To build mathematical models from technical specifications of the elements used in automatic systems and to simulate the dynamic response of complex systems	He evaluates the results of the mechatronic systems	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22	98	90	90
		4.2		He analyzes and determines the parameters of the elements of the system from the mechatronic systems' real data		100	96	85	100	85	85	100	85	85	91.22	98	90	90
		4.3		He uses simulation tools with engineering criteria	In-class exercises and homeworks	100	40	70	100	85	85	100	85	85	83.33	70	85	90
		4.4		He understands the context in which a solution is developed	Individual evaluation	100	96	85	100	85	85	100	85	85	91.22	98	90	90
[illegible] PROFESSIONAL INTERNSHIP	4, 7	4.2, 4.3, 7.1, 7.3	To develop activities related to his profession acquiring the necessary experience and applying the knowledge he has acquired during the program.	He carries out activities related to his profession	Partial and final report				100	100	60	100	100	60	86.67		100	86.67
		4.1, 4.3, 7.1, 7.3		He thinks about his learning process					75	75	60	75	75	40	66.67		75	70

Table 4.13.- General result assessments for SO4 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.5.- SO4 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 4		78.79	90
4.1	4.1 Evaluate the impact of the solution in the context.	78.53	85
4.2	4.2 Analyze the particular elements of the problem.	78.51	85
4.3	4.3 Apply the engineering tools.	78.27	85
4.4	4.4 Know the global context.	78.88	85

Table 4.14.- General performance indicator results for 3 period average result. Final SO4 results.

For these general performance indicators, the future corrective action are listed below:

4.1 Increase real application projects and research scholarships.

4.2 Generates rubric achievements for TDTA course.

4.3 Laboratory and software increase acquisition.

4.4 Increase international mobility by scholarship diffusion and special opening courses in foreign languages.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1				Frequently failing general performance indicator		
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
853 ELECTRIC SYSTEM DESIGN	1, 4	1.2, 1.4, 1.6, 4.1, 4.3	To know how to use appropriate materials and tools to develop and design electrical systems for their application in the solution of commercial, industrial and residential problems in the current automation industry.	He knows the description and use of electrical materials that make up an electrical installation	Review exam	40	75	75	40	75	100	100	50	50	67.22	57.5	63.33	83.33
269 AUTOMATION II	1 y 4	1.2, 1.4, 1.6, 4.1, 4.5	To identify, research and design Automation Engineering problems by means of programmable logic controllers.	He identifies and formulates properly any real automation problem that he may find	Final Proyect	40	75	75	40	75	75	75	75	50	64.44	57.5	63.33	75.00
982 DEGREE SEMINAR	2, 4, 6	2.4, 4.1, 4.2, 6.1, 6.3	To collaborate in disciplinary and multidisciplinary teams to formulate and execute research projects in automation to give solution according to the context.	Discussion:	Final project /thesis	50	50	75	50	25		100	80	60	61.25	50	50	90

Table 4.15.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:

Course 853: Currently, the Administrative Department has already redirected some budget founding for electrical materials acquisitions and from getting systems for

solutions making, regarding automation issues.

Course 269: More than 3,000,000.00 USD dollars has been earned to the program by means of different contests, mainly by CONCACyT projects. This resource was designated for research programs in which our students are working in projects with industry outreach application.

Course 882: A new course was included in the curricula: TDTA, which is oriented among other things to apply multidisciplinary projects

Student outcomes 4 indirect assessment.

SO4 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I can formulate solutions to problems of automation, components, systems and processes considering the impact and contributing to the improvement of the global, economic, environmental and social context using current tools and techniques.	100%	9	36	36% succed SO4 in a 100% and 36% in a 75%	77	78.79
	75%	9	36			
	50%	7	28			
	0%					
	TOTAL	25	100			

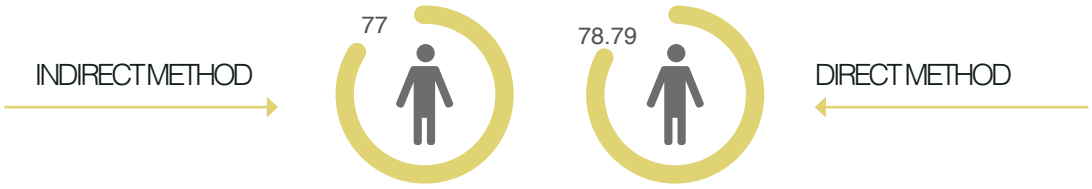


Image 4.4.- SO4 match between direct and indirect assessment.

STUDENT OUTCOMES 4

Formulate solutions to problems of automation, components, systems and processes considering the impact and contributing to the improvement of the global, economic, environmental and social context using current tools and techniques.

Analysis

Electronics, Advanced Electronics, Electronics Design, Automation, Professional Internship, and other subjects assess this outcome. Then, automation process may be carried out in engineering cluster subjects, which go from third to fifth semesters. Skills

as learning the development of FET, PLCs, Electrical Installation, oriented to sustainable contexts are taught in these courses. In such a way that students have the opportunity to accomplish projects using current tools and techniques. For instance, in Electrical Installation the professor ask to students to make a quote for a certain outside university installation. So, students work in teams and earn money from this project. As a result, they have chance to put in operation measurement equipment and put in practice the lectures of the classroom, etc.

Conclusion and future work

Additional effort is needed to link the University with social and industrial sectors in order to give students the chance to play a role when solving engineering issues. Currently, there is a department that manages this, but nowadays, it has no projects involving students from the Automation program. Students who work on projects linked with these sectors are enrolled thanks to the effort of the professors, the dean, and the academic secretary.

STUDENT OUTCOMES 5 : Analysis results from direct method assessment from courses.

Ethics & contemporary issues

Student outcomes  **direct assessment.**

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

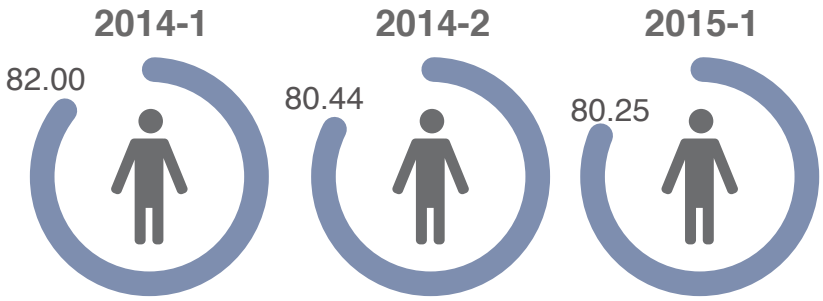
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
[redacted]	5	5.2	To appreciate the importance of university education for the formation of his identity according to his personal and professional development, taking as a reference the present day educational contexts and their history	He identifies the history of the Autonomous University of Queretaro and of his Faculty, their origin and the development of their major areas of training.		100	75	75	100	75	75	100	75	75	83.33	87.5	83.33	83.33
		5.1		He identifies and applies the Organic Statute of the Autonomous University of Queretaro		100	50	50	100	75	50	75	75	50	69.44	75	75.00	66.67

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
206 UNIVERSITY AND SOCIETY	2, 5, 7	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To analyze the social reality in Latin America in order to make a critical evaluation of our identity's structure and the political, economic and social models that exist in a globalized world taking into account its history.	He identifies the impact the present educational contexts have on his professional training.	Homework, tests, project	75	75	50	100	75	50	100	50	50	69.44	75	75.00	66.67
		2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11	87.5	91.67	91.67
		2.2, 2.3, 5.2, 5.3, 7.1, 7.3		He integrates other disciplines' vision		75	50	50	75	75	50	100	75	50	66.67	62.5	66.67	75.00
		2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To know and analyze the main elements that form and determine a human being's behavior on the basis of a historical moral conception of the events and how they make an impact on our daily and professional life from the history of ethics in sciences	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44	87.5	66.67	75.00
		2.2, 2.3, 5.2, 5.3, 7.1, 7.3		He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22	75	75	75
220 METROLOGY	4, 5	4.1, 5.1	To understand the purpose of the measurement standards, calibration and the importance of the traceability in the measurements, with the study of the terms in the International Vocabulary of Metrology, the analysis of examples and articles for its application in specific problems at the industrial or scientific level.	To distinguish the different types of patterns and to learn the concepts of traceability and calibration.	Theory test							100	100	75	91.67			100
1418 ARTISTIC OPTIONAL COURSE	5	5.1, 5.3	To recognize the importance of possible agents of change in a society so that the student is able to anticipate them in a permanent update.	He thinks about the importance of his work through photography	Photography exhibition	80	100	60	100	80	80	100	100	80	86.67	90	80.00	93.33
		5.2		He is aware of his environment by means of photographs		100	80	40	100	80	60	80	80	60	75.56	90	73.33	73.33
		5.2, 5.3	To raise awareness of the social processes recognizing the cultural differences that allow people to live	He thinks about his experiences and evaluations		100	80	60	80	80	80	80	80	60	77.78	90	73.33	80.00
226 Social and Human Sciences Optional Course	2, 5, 6	2.1, 2.3, 5.2, 6.4	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	To debate and discuss the proposed ideas before diverse disciplines.	Foro de discusión							85	100	70	70	81.25		85.00
	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1		To support his arguments with factors and facts.	Essay							85	85	85	70	81.25		85
2881211 AUTOMATION IN INSTRUMENTATION FOR PROCESS CONTROL	4, 5	4.3, 4.4, 5.2	To formulate solutions to problems of engineering, components, systems and processes considering their impact and contributing to the improvement of the global, economic, environmental and social contexts, using today's techniques and tools.	He identifies the components of a problem	Final project				100	80	70	85	75	70	80.00		90.00	76.67
		4.1, 4.2, 5.1		He chooses the appropriate tools to do the project					100	75	70	90	80	70	80.83		87.50	80.00
883 SOCIAL SERVICE	5, 6	5.2, 5.3, 6.1, 6.3, 6.4	To develop a sense of social and ethical responsability to improve the environment in which he develops using the tools that are specialized for his profession.	He carries out activities that are benefits for the society	Partial and final reports				100	60	40	100	60	40	66.67		80.00	66.67
		5.1, 6.1, 6.3, 6.4		He generates products related to his profession					75	75	75	100	100	40	77.50		75.00	91.67
891 PROFESSIONAL INTERNSHIP	2,5,6	2.1, 2.3, 2.4, 5.3, 6.1, 6.3,	To collaborate in interdisciplinary teams promoting his professional growth and integration to the labor market, being aware of his environment and applying his acquired knowledge.	He thinks about the academic level required to carry out a task	Partial and final report				100	100	60	100	75	40	79.17		100.00	78.33
	5,6	5.1, 6.1, 6.2, 6.3, 6.4, 6.5		He uses the language and terminology that is specific for his profession					100	75	60	100	75	40	75.00		87.50	78.33
	2,5	2.2, 2.5, 5.2, 5.3		He thinks about work competitiveness					100	75	75	100	75	40	77.50		87.50	83.33

Table 4.16.- General result assessments for SO5 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.6.- SO5 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 5		77.38	85
5.1	5.1 Know regulations, criteria, and quality standards	77.04	85
5.2	5.2 Be aware of the living and working environment	77.38	85
5.3	5.3 Know the ethical principles of their profession	77.48	85

Table 4.17.- General performance indicator results for 3 period average result. Final SO5 results.

For these general performance indicators, the future corrective action are listed below:

5.1 With the Faculties and students portfolio´s workshops given to the faculty, the area chair can promote this outcome.

5.2 Increase international mobility by scholarship diffusion and special opening courses in foreign languages.

5.3 Promote organizations free lectures as for ISA and IEEE about ethics in practice.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1						
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
206 UNIVERSITY AND SOCIETY	2, 5, 7	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He integrates other disciplines' vision	Homework, tests, project	75	50	50	75	75	50	100	75	50	66.67	62.50	66.67	75.00

Table 4.18.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:
Course 206: Meetings are planned by Faculty members in order to enhance the objective of teaching students how to connect to real-world problems with theory.

In the new re-structured curricula, TDTA has been included, where the multidisciplinary skill has been pushed

Student outcomes **5** **indirect assessment.**

SO5 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I can assess and take care of the problems facing today's society recognizing individual and cultural differences to live responsibly in the social and labor fields based on professional ethics and sticking to the criteria and quality standards to promote sustainable development.	100%	13	52	52% succed SO5 in a 100% level and 28% in a 75%.	83	77.38
	75%	7	28			
	50%	5	20			
	0%					
	TOTAL	25	100			

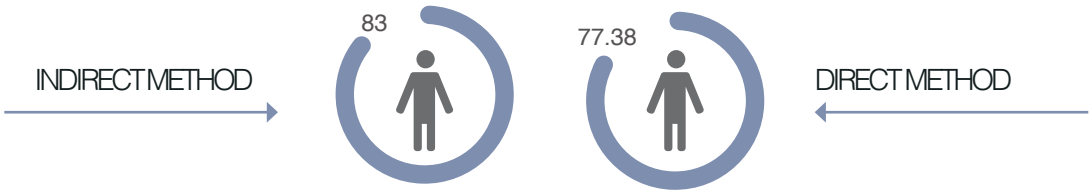


Image 4.5.- SO5 match between direct and indirect assessment.

As an additional assessment for this student outcome, an ethics exam is presented by all candidates for graduation, demonstrating in a tangible way the professional and personal training that Faculty and the department members have succeed through the curricula time.

The following cases were presented for answer:

1.- You have just graduate from school and you do not have stable income. You found a job offered and the profile requested is exactly for someone you know; actually you're not so thrill about this job because you're seeking for something else in the long term but the economic remuneration is really good. What would you do?

1.- Go for the interview and give the best, somehow your friend will found something else. (1 point)

2.- You go to the interview and if you succeed and get the job, you recommend your friend. (2 points)

3.- You encourage your friend for going both for the interview; the best can stay. (3 points)

4.- You really don't want to work in that area so you tell your friend about the interview; expecting one day he do the same for you. (4 points)

2.- If one day you have to do a job to two rival companies. What would you do?

1.- Work for both and received two incomes. (1 point)

2.- Work for the one that offers the best for you and for the clients. (4 points)

3.- Work for the one that pays the best. (2 points)

4.- Work for none of them. (3 points)

3.- You're asked to make a business case knowing that competitors have the same product but with a lower quality. What would you do considering a limited budget?

1.- Do the job with the best possible quality, regardless of the cost rise: you know that client will always appreciate a well done job. (4 points)

2.- You make a better quality job that your competitors, but at the same price: you know quality may not be the best, but is not so bad after all. (2 points)

3.- You make a minimum improvent over your competitor, but with a lower price: you know this is the way to beat your competitors. (1 point)

4.- You develop two business cases, one with a high cost, and another one with a slight improvement but cheaper than competitors: and let the client decide. (3 points)

4.- You have the chance to take a course that is exactly what you need to visibly increase

your productivity, but your company wont pay for it due to the price, still you could afford it yourself. What would you do

1.- You attend even if its expensive, its always more expensive not to know. (4 points)

2.- You negotiate with the company and let them know that you can afford a part of it without affecting your economy and that the company can pay the rest in exchange for proposals and improvements for them, you know the course could help this way. (3 points)

3.- You know a friend is attending and you ask for his/her notes, that way you can learn something. (2 points)

4.- You wont attend. The company would show lack of vision if they don't send you. (1 points)

5.- You were assigned a very important task that would be rewarded in the company an possibly a wage rise, but you're too busy, and still is an opportunity you cant let go.

1.- You take it, even if it means extra hours or not sleeping: you are determined to finish the work. (3 points)

2.- You know it would be easier if done with help, you speak with a friend and decide to teamwork, in this way you get it done faster. What's the problem with credit? It's still a company policy to do teamwork! (4 points)

3.- You would not lend the opportunity of letting go this project, but you know that if you do this without any company member help and in time you will be good regarded, so you call a friend and pay him well to help you doing the job; after all he needs the income and you the help, all won! (1 point)

4.- You're gratefully but let the opportunity passed. Maybe you don't need that raise so much and it is not even a 100 % sure they gave it to you. You can wait for another job opportunity for the credit. (2 point)

As a result, the following answers' were collected and analyzed as a prove of students ethics.

STUDENT	UNDERGRAD ANSWER PROBLEM1	POINTS FOR ANSWER	UNDERGRAD ANSWER PROBLEM 2	POINTS FOR ANSWER	UNDERGRAD ANSWER PROBLEM 3	POINTS FOR ANSWER	UNDERGRAD ANSWER PROBLEM 4	POINTS FOR ANSWER	UNDERGRAD ANSWER PROBLEM 5	POINTS FOR ANSWER	SURVEY STUDENT RESULT	SURVEY AVERAGE RESULT
1	4	4	2	4	4	3	2	3	2	4	18	
2	3	3	2	4	1	4	2	3	2	4	18	
3	3	3	2	4	4	3	2	3	2	4	17	
4	3	3	2	4	4	3	2	3	2	4	17	
5	3	3	2	4	4	3	2	3	2	4	17	
6	3	3	2	4	4	3	2	3	2	4	17	38%
7	3	3	2	4	4	3	2	3	2	4	17	
8	4	4	3	2	1	4	2	3	2	4	17	
9	2	2	2	4	1	4	2	3	2	4	17	
10	3	3	2	4	4	3	2	3	2	4	17	
11	4	4	2	4	2	2	2	3	2	4	17	
12	2	2	2	4	1	4	2	3	1	3	16	
13	4	4	3	2	4	3	2	3	2	4	16	
14	3	3	2	4	3	1	1	4	2	4	16	
15	3	3	2	4	4	3	2	3	1	3	16	
16	3	3	2	4	4	3	2	3	1	3	16	
17	2	2	2	4	1	4	2	3	4	2	15	
18	3	3	3	2	4	3	2	3	2	4	15	
19	3	3	3	2	4	3	2	3	2	4	15	
20	4	4	4	3	4	3	2	3	4	2	15	55%
21	2	2	3	2	4	3	2	3	2	4	14	
22	3	3	1	1	4	3	1	4	1	3	14	
23	3	3	3	2	4	3	2	3	1	3	14	
24	2	2	1	1	4	3	2	3	2	4	13	
25	3	3	3	2	4	3	2	3	4	2	13	
26	1	1	3	2	4	3	2	3	2	4	13	
27	3	3	1	1	4	3	2	3	1	3	13	
28	3	3	1	1	4	3	2	3	3	1	11	7%
29	1	1	2	4	2	2	3	2	3	1	10	

Table 4.19.- Assessment result of ethic survey

FROM 9 TO 12 POINTS

7% of our undergrads present a clearly personal interest without offering an extra effort for the quality of the job or its social impact if this does not represents an economical interest for him or the industry.

FROM 13 TO 16

55% of our undergrads have good professional and personal principals. They intend to achieve all expectations of his context and personal interested. Although, they does not have a clear idea of the social impact of their work.

FROM 17 TO 20

38% of our undergrads are interested in their own wellbeing and professional development as well as social progress. The student manages with respect and good principals in a personal and professional level. He founds important to achieve not only the necessary requisites for a good job, instead he manage to offered a quality job and with a high social impact.

STUDENT OUTCOMES 5

Assess and take care of the problems faced by today's society, recognizing individual and cultural differences to live responsibly in the social and labor fields based on professional ethics and sticking to the criteria and quality standards to promote sustainable development.

Analysis

Social Service course as well as University and Society are some of subjects where students learn the importance of interaction with other disciplines; knows and applies Institutional Laws and Norms, as well as other engineering relevant regulations. In addition, this outcome is shared with 2, 6 and 7. As a skill, its somehow difficult to measure, when ABET assessment showed the first results a final test was implemented for undergraduate students in 2014, in order to have indirect data assessment about this learning outcome. Sustainable Development, mainly focused in ecology, economy and society, is currently an important topic, especially Automation field where machines could help to improve living conditions. The last indirect assessment on this matter shows that we can strengthen this point inviting certified engineering institutions for lectures, reviews and workshops. Still in general terms, the test demonstrated that our students are aware of their social impact and ethics involved in their professional practice.

Conclusion and future work

When the major was restructured (INA14), more optative subject were offered considering these learning outcomes, such as Humanities, and Artistic Optatives. Recommendations from the Mexican accreditation, which is named CACEI, were taken into account when designing these courses. Currently Faculty members are trained to be prepared in this outcome, like Professional Formative Courses, provided by the Academic Department. Even though authorities have made a great effort in this matter and a lot has been accomplished, there are certain policies, which could further foster it. Most of them are related to industrial visits which have projects with great social impact.

STUDENT OUTCOMES 6: Analysis results from direct method assessment from courses.

Communications skills

Student outcomes 6 direct assessment.

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

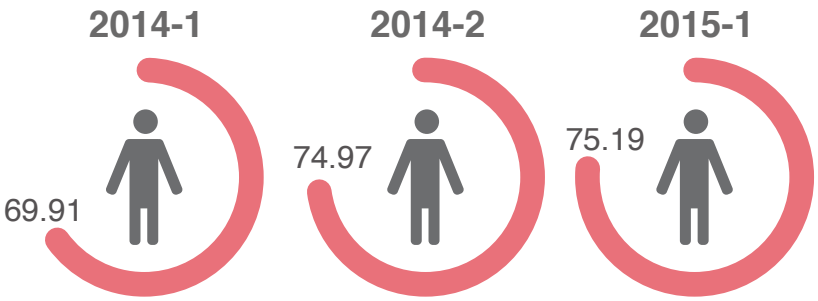
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
[redacted] UNIVERSITY AND SOCIETY	2, 5, 7	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To analyze the social reality in Latin America in order to make a critical evaluation of our identity's structure and the political, economic and social models that exist in a globalized world taking into account its history.	He identifies the impact the present educational contexts have on his professional training.	Homework, tests, project	75	75	50	100	75	50	100	50	50	69.44	75.00	75.00	66.67
			To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11	87.50	91.67	91.67
				He integrates other disciplines' vision		75	50	50	75	75	50	100	75	50	66.67	62.50	66.67	75.00
			To know and analyze the main elements that form and determine a human being's behavior on the basis of a historical moral conception of the events and how they make an impact on our daily and professional life from the history of ethics in sciences.	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44	87.50	66.67	75.00
				He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22	75.00	75.00	75.00
[redacted] MULTIVARIABLE ALCULUS	7	7.1	To apply the vector calculus to model and solve basic engineering technical.	He knows the concept of divergence and rotational of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	0	50	50	50	75	75	50	50	75	52.78	25.00	58.33	58.33
[redacted] ELECTRIC STEM DESIGN	4, 7	4.2, 4.4, 7.1	To design and carry out electric projects that let innovate the continuous improvement for a better storage, generation and distribution of the electric energy in the student's professional environment and for benefit of society.	He knows how to use properly the electrical connection diagrams of damper lamps and contacts	Review exam	75	100	100	75	100	100	100	75	50	86.11	87.50	91.67	91.67
[redacted] Social and Human Sciences Optional Course	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	He supports his arguments with factors and facts.	Essay						85	85	85	70	81.25			85
	6, 7	6.1, 7.3	To develop visual and graphic skills in his favor in the techincal execution of his proyects to improve the comunication of his ideas through diverse analog and digital tools.	He compares his graphic learning of the start and the end of the curse.	Practices						100	100	85	100	96.25			95
	6, 7	6.1, 7.2, 7.3	To comunicate graphically or verbally the results of his learning before diverse disciplines.	He presents his final work before a forum.	Practices and exhibition						100	100	100	100	100.00			100
[redacted] INSTRUMENTATION	7	7.1, 7.3	To identify and use reliable and updated sources of information about Instrumentation and Process Control, its regulations and standards.	He collecst tables and standards	Tasks where it is requested to investigate standards and tables				75	25	50	100	50	100	66.67		50.00	66.67
[redacted] SOCIAL SERVICE	2, 7	2.1, 2.3, 2.4, 2.5, 7.3	To collaborate in disciplinary and multi-disciplinary teams producing strategies to improve his social environment and continuously updating his knowledge of his discipline.	He thinks about his collaborative team	Partial and final reports				100	75	40	100	60	40	69.17		87.50	66.67
		2.1, 2.4, 2.5, 7.1, 7.3		He observes his improvements in the social service program					75	75	60	60	100	40	68.33		75.00	73.33
		2.1, 2.2, 2.4, 7.1, 7.3		He thinks about the application of his profession and his knowledge					100	75	75	100	100	40	81.67		87.50	91.67

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
[redacted]	7	7.1, 7.3	To identify and use the reliable and updated sources of information about Instrumentation and Process Control.	He collecst tables and standards	Homework where it is requested to investigate standards and tables	50	75	100	50	75	100	100	100	100	83.33	62.5	75.00	100.00
[redacted]	4, 7	4.2, 4.3, 7.1, 7.3	To develop activities related to his profession acquiring the necessary experience and applying the knowledge he has acquired during the program.	He carries out activities related to his profession	Partial and final report				100	100	60	100	100	60	86.67		100.00	86.67
		4.1, 4.3, 7.1, 7.3		He thinks about his learning process					75	75	60	75	75	40	66.67		75.00	70.00

Table 4.20.- General result assessments for SO6 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.7.- SO6 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 7		**76.63**	90
7.1	7.1 Search for different information sources	76.63	90
7.2	7.2 Participate in national and/or international academic activities	100.00	100
7.3	7.3 Recognize the importance of learning	76.63	90

Table 4.21.- General performance indicator results for 3 period average result. Final SO6 results.

For these general performance indicators, the future corrective action are listed below:

6.1 Increase student's participation inside the local International Congress launched by IEEE.

6.2 Faculties meeting are already taking place for discussing this outcome.

6.3 Promote students portfolios documentation.

6.4 Promote students portfolios documentation.

6.5 Increase laboratory equipment.

Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1			Frequently failing general performance indicator		
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
TI MULTIVARIABLE CALCULUS	7	7.1	To apply the vector calculus to model and solve basic engineering technical.	He knows the concept of divergence and rotational of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	0	50	50	50	75	75	50	50	75	52.78	25.00	58.33	58.33

Table 4.22.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:

Course 821: Many meetings and meetings are planed by professors in order to enhance the objetive of teaching to the students how to connect real-world problems with theory. This problem is mainly because of the professor that give mathematics do not have the profile of Engineering.

Course 882: In the new re-structured curricula, TDTA has been included, where the multidisciplinary skill has been pushed

Student outcomes 6 **indirect assessment.**

SO6 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I´m able of communicate my ideas, concepts and knowledge of engineering in a multicultural context.	100%	7	28	40% succed SO6 in a 75% and 28% in a 100% and 50%.	72	74.35
	75%	10	40			
	50%	7	28			
	0%	1	4			
	TOTAL	25	100			

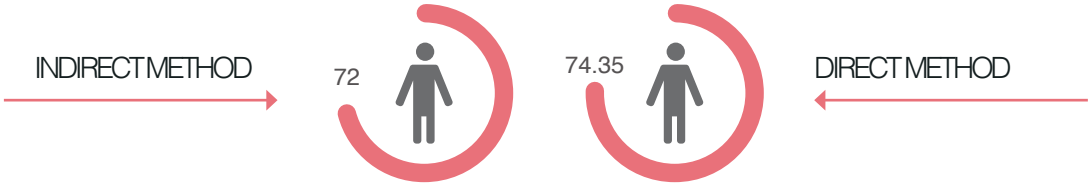


Image 4.7.- SO6 match between direct and indirect assessment.

STUDENT OUTCOMES 6

Communicate ideas, concepts and knowledge of engineering in a multicultural context.

Analysis

Statistics, Integral Calculus, Metrology, Dynamics, Multivariable Calculus, Signal Analysis and Degree Seminar are some of the courses where this outcome is encouraged. Subjects that teach this outcome also include 1, 7 and 2 mainly. In 2002, the previous program named Instrumentation and Process Control wouldn´t include multicultural topics at all. In 2008 where included as mandatory to take six semesters courses of English Language. In 2014 it was extended to eight semesters. This allows students to learn another approach in a multicultural context. Furthermore, painting, dancing, ceramics, music, and many other subjects are addressed in Optative courses. Also, visits to industry are being carried out to show students: To know the concept of function of two variables, three variables and variable n, to know how to determine the domain and image of a function, to make the graph of a function of two variables, to know the concepts of limit, continuity, and differentiability, to use these concepts in real problems of optimization. Currently, with the portfolios that professors ask to the students, it can be seen the documentation of software, basic engineering in advanced projects, calculus, and other interesting data that the professor may take into account to improve this skill. The University, since time ago, bought the right of IEEE xplore, Elseviere (some journals), Scopus, The Web of Knowledge, just to mention a very few. This expand the scenery of the students because in these web sites they can found interesting research materials to cover the aforementioned points.

Conclusion and future work

Contests such as the National Robotic Cup, RoboUAQ, are specially targeted for students and they are assisted by Faculty Members. For instance, students themselves organize RoboUAQ, authorities help with, budget and installations. In events like this,

they get “hands on” experience; challenge their knowledge against other local and national institutions. In RoboUAQ 2016, there will be a special category involving multidisciplinary teams to solve environmental problems, sponsored by ISA and IEEE student branches. It is expected that in 2016 more than 10 students can perform an academic stay in the universities that have agreements with UAQ.

Life-long learning

Student outcomes 7 direct assessment.

The tables below show the specific indicator outcome for each course in an increasing way of the learning student process, and the general outcome average.

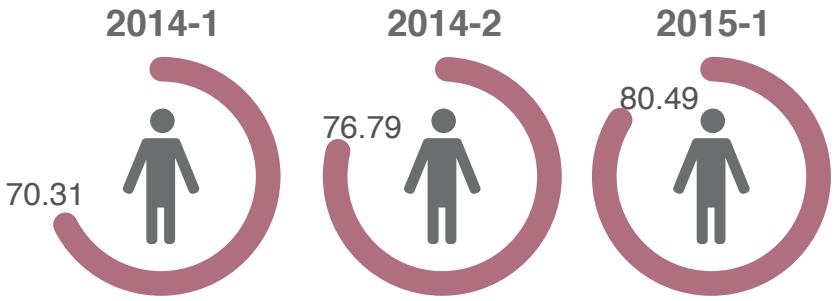
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
206 UNIVERSITY AND SOCIETY	2, 5, 7	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	To analyze the social reality in Latin America in order to make a critical evaluation of our identity's structure and the political, economic and social models that exist in a globalized world taking into account its history.	He identifies the impact the present educational contexts have on his professional training.	Homework, tests, project	75	75	50	100	75	50	100	50	50	69.44	75.00	75.00	66.67
			To identify the problems that exist in his environment to create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11	87.50	91.67	91.67
				He integrates other disciplines' vision		75	50	50	75	75	50	100	75	50	66.67	62.50	66.67	75.00
			To know and analyze the main elements that form and determine a human being's behavior on the basis of a historical moral conception of the events and how they make an impact on our daily and professional life from the history of ethics in sciences.	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44	87.50	66.67	75.00
				He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22	75.00	75.00	75.00
211 MULTIVARIABLE CALCULUS	7	7.1	To apply the vector calculus to model and solve basic engineering technical.	He knows the concept of divergence and rotational of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	0	50	50	50	75	75	50	50	75	52.78	25.00	58.33	58.33
303 ELECTRIC SYSTEM DESIGN	4, 7	4.2, 4.4, 7.1	To design and carry out electric projects that let innovate the continuous improvement for a better storage, generation and distribution of the electric energy in the student's professional environment and for benefit of society.	He knows how to use properly the electrical connection diagrams of damper lamps and contacts	Review exam	75	100	100	75	100	100	100	75	50	86.11	87.50	91.67	91.67
226 Social and Human Sciences Optional Course	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1	To expand the possibilites of the stablishment of paramters in his field of action to contribute to the understanding of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	He supports his arguments with factors and facts.	Essay						85	85	85	70	81.25			85
	6, 7	6.1, 7.3	To develop visual and graphic skills in his favor in the techincal execution of his proyects to improve the comunication of his ideas through diverse analog and digital tools.	He compares his graphic learning of the start and the end of the curse.	Practices						100	100	85	100	96.25			95
	6, 7	6.1, 7.2, 7.3	To comunicate graphically or verbally the results of his learning before diverse disciplines.	He presents his final work before a forum.	Practices and exhibition						100	100	100	100	100.00			100
271 INSTRUMENTATION	7	7.1, 7.3	To identify and use reliable and updated sources of information about Instrumentation and Process Control, its regulations and standards.	He collecst tables and standards	Tasks where it is requested to investigate standards and tables				75	25	50	100	50	100	66.67		50.00	66.67

	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
883 SOCIAL SERVICE	2, 7	2.1, 2.3, 2.4, 2.5, 7.3	To collaborate in disciplinary and multi-disciplinary teams producing strategies to improve his social environment and continuously updating his knowledge of his discipline.	He thinks about his collaborative team	Partial and final reports				100	75	40	100	60	40	69.17		87.50	66.67
		2.1, 2.4, 2.5, 7.1, 7.3		He observes his improvements in the social service program					75	75	60	60	100	40	68.33		75.00	73.33
		2.1, 2.2, 2.4, 7.1, 7.3		He thinks about the application of his profession and his knowledge					100	75	75	100	100	40	81.67		87.50	91.67
284 INSTRUMENTATION	7	7.1, 7.3	To identify and use the reliable and updated sources of information about Instrumentation and Process Control.	He collecst tables and standards	Homework where it is requested to investigate standards and tables	50	75	100	50	75	100	100	100	100	83.33	62.5	75.00	100.00
915 PROFESSIONAL INTERNSHIP	4, 7	4.2, 4.3, 7.1, 7.3	To develop activities related to his profession acquiring the necessary experience and applying the knowledge he has acquired during the program.	He carries out activities related to his profession	Partial and final report				100	100	60	100	100	60	86.67		100.00	86.67
		4.1, 4.3, 7.1, 7.3		He thinks about his learning process					75	75	60	75	75	40	66.67		75.00	70.00

Table 4.23.- General result assessments for SO7 in all courses for this period assessment.

The average results from each period are presented on the following table, although we take three assessment periods average as a direct result of the general student outcomes.

Also the average of each one of the general performance indicators obtain from every course matching the performance indicator is shown with future actions that will be implemented.



Graphic 4.8.- SO7 average result for each period assessed.

			TARGET PERFORMANCE INDICATOR
STUDENTS OUTCOME 7		**76.63**	90
7.1	7.1 Search for different information sources	76.63	90
7.2	7.2 Participate in national and/or international academic activities	100.00	100
7.3	7.3 Recognize the importance of learning	76.63	90

Table 4.24.- General performance indicator results for 3 period average result. Final SO7 results.

For these general performance indicators, the future corrective action are listed below:

7.1 Increase student's participation inside the local International Congress launched by IEEE.
7.2 Increase international mobility by scholarship diffusion and special.
7.3 Increase student's participation inside the local International Congress launched by IEEE.
Due the results, special attention and corrective action will be implemented in these courses:

						2014-1			2014-2			2015-1				Frequently failing general performance indicator		
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOME AVERAGE 2015-1
211 MULTIVARIABLE CALCULUS	7	7.1	To apply the vector calculus to model and solve basic engineering technical.	He knows the concept of divergence and rotational of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	0	50	50	50	75	75	50	50	75	52.78	25.00	58.33	58.33

Table 4.25.- Courses with no improvement during 3 period of assessment.

Corrective actions for these courses for improving student learning:
Encourage Faculty to augment solution class exercises and homework to deliver individually, participation and written exam

Student outcomes 7 **indirect assessment.**

SO7 UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
I´m continuously seek ways for upgraditing my knowledge to improve their development, adapting to the changing needs of the environment.	100%	13	52	52% succed SO7 in a 100% and 32% in a 75%.	84	76.63
	75%	8	32			
	50%	4	16			
	0%					
	TOTAL	25	100			

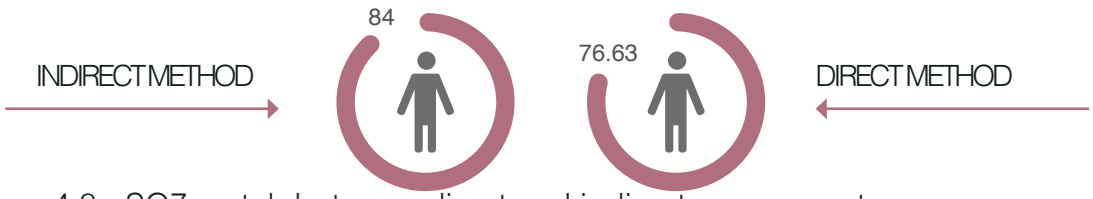


Image 4.8.- SO7 match between direct and indirect assessment.

STUDENT OUTCOMES 7

Upgrade continuously the knowledge to improve their development, adapting to the changing needs of the environment

Analysis

This outcome is assessed in Professional Internship, Social Service, Multivariable Calculus, University and Society. Abilities such as: analyzing political, economical and social models in a critical way; collaborate in disciplinary and multi-disciplinary teams producing strategies to improve their social environment and continuously updating their knowledge of their discipline; develop activities related to their profession acquiring the necessary experience and applying the knowledge gained in the classroom. It is essential, in this outcome, to encourage students to join IEEE societies, ISA chapters, ASME journals, Mexican Society of Mechatronics, and now, Mexican Association of Robotics Magazine, now placed at UAQ, to mention a few.

Nowadays our master degree program is certified as a quality program which allows us to grant a large number of full scholarships to our best students if they are willing to continue their studies.

Conclusion and future work

Additional work needs to be done regarding this skill. The Automation chair has implemented a special found to help students joining associations related with automation. Recruiting students from earlier semesters is a task that students from 6th to 9th semesters will develop. The Automation chair must foster participation in events like competitions, lectures, congresses, workshops, visits to industry and other events organized by the Automation Department. In this way, learning can be done from different viewpoints.

INDIRECT ASSESSMENT

Most of the indirect assessment and improvement areas of knowledge inside the courses are given by an optional exit survey applied by the Faculty member who is encouraged to publish the results in its personal portfolios´ site. Before the time of graduation, inside the seminar degree course, an exit survey is applied to graduate candidates about their outcomes learning inside the program. The products of these surveys were matched to the outcomes obtained inside the courses. At the same time, an ethics exam is presented by all candidates for graduation, demonstrating in a tangible way the professional and personal training that Faculty and the department members have succeed through the curricula time.

After two years of graduation, the Engineering Graduate Department applies another graduate survey measuring how the students feel about their outcomes. These results are used as input for reviewing the PEO of the program and are collected every year.

Image results of graduate survey from SO1 to SO7.

B. Continuous Improvement

The general process for closing the loop is presented in the chart below. Further explanation of the process is described below:

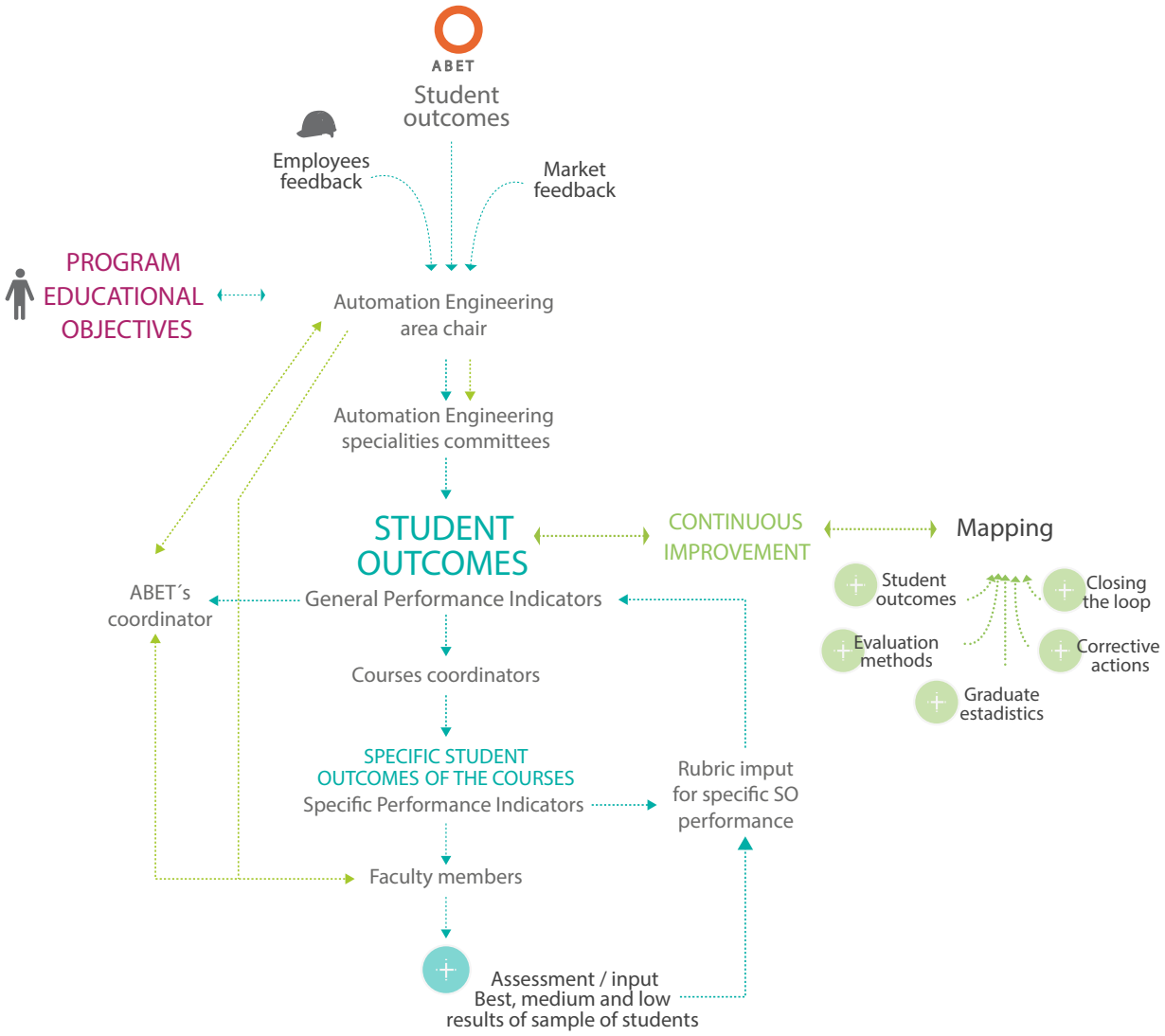
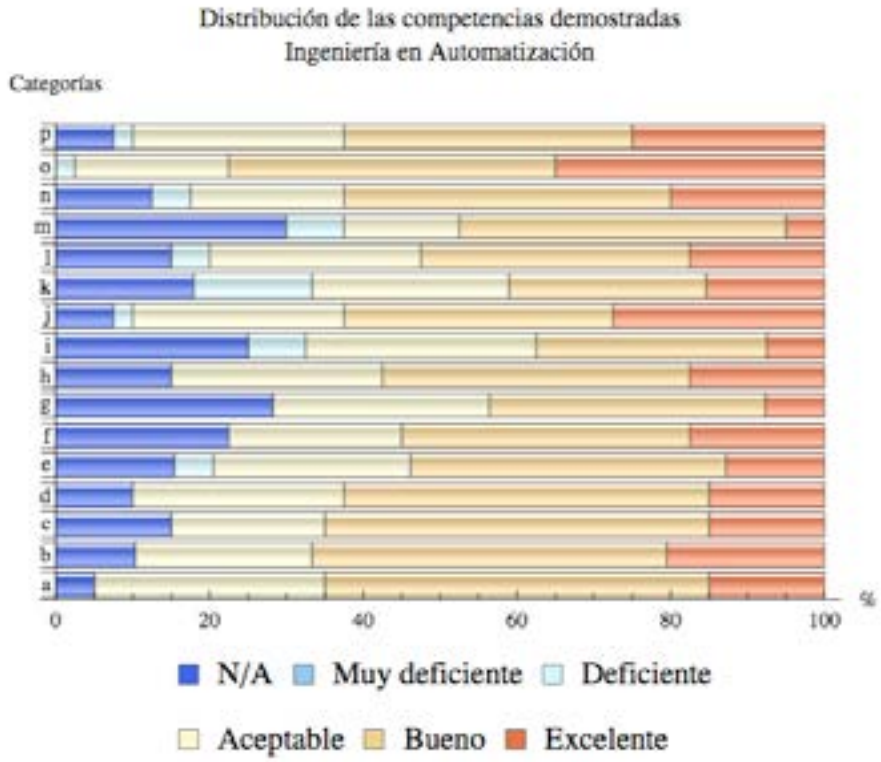


Image 4.9.- Contious improvement process. Closing the loop.

Every four years, an employer survey is applied in a collaborated work of the Automation Engineering area chair and the Engineer Graduate Department searching for the actual needs in engineer industry and for evaluating our graduate's performance. This is one of the primary inputs for reviewing de PEO of the program. The results

from the 2013 survey and were used as an input in the 2014 review of the program.



Once the PEO and SO of the program are evaluated and accepted by all committees involved, the review of the specific outcomes of the courses are given by all constituencies of the course and the corresponding Engineering specialties committees. Each course coordinator is in charge of generating all specific performance indicator matching the general performance indicators and gathering its period assessment analysis. During this process, Faculty members are aware of the weaknesses presented by their students, they are encourage to reflect about new strategies, seeking improvement in the students learning. Therefore, the Automation Engineering Area Chair along with ABET´s coordinator collect all assessment material and outcomes analysis for the general outcomes analysis in all

levels inside the curricula. Once the result is ready, a general statement about the critical points in the students learning are shared with the Specialty committees' members and the Faculty involved. From this point, all responsibilities are given for each one of the consistencies. Mostly, Faculty members make correctional actions in their teaching-learning methodology; the Specialty Engineer committee evaluates the needs of modifying the syllabus course or the departmental exams and practices, and the Automation Engineering Area Chair offers optional courses, workshops to the students and faculties´ members, or increases tutoring guidance to those who need special help in succeeding the SO.

The program is constantly submitted to external evaluations by two important national organisms, which are experts on the area, CIEES and CACEI. In 2007, the program obtained the best category classified as 1 by CIEES with observations that were attained at the moment, and others were considered for the next restructure of the program in 2010. By 2012, the program was classified in the best CACEI level (1) with minor observations but the best intention for improving educational quality, which led the program to seek a competence-based education and an international certification. Since then, the Chief of the program formed a small committee responsible for teaching the Faculty members how to achieve a competency-based teaching. A good response has been shown from the Faculty members. Most of the full-time teachers, and some partial-time teachers of the program have taken at least two workshops with experts of how they can ensure and evaluate students' outcomes in their courses.

C. Additional Information

Copies of any of the assessment instruments or materials referenced in 4.A. and 4.B will be available for review at the time of the visit. Other information such as minutes from meetings where the assessment results were evaluated and where recommendations for action were made also be display at the time of visit.