ABET SELF-STUDY QUESTIONNAIRE:

TEMPLATE FOR A SELF-STUDY REPORT 2015-2016 Review Cycle



ENGINEERING ACCREDITATION COMMISSION

ABET

415 N. Charles St. Baltimore, MD 21201 Phone: 410-347-7700 Fax: 410-625-2238 Email: eac@abet.org Website: http://www.abet.org

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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

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BACKGROUND INFORMATION

A. Contact Information

Juvenal Rodríguez Reséndiz, PhD (Automation Engineering area Chair) Universidad Autónoma de Querétaro, Cerro de las Campanas s/n. Colonia Las Campanas C.P. 76010 Santiago de Querétaro, Qro. (México). Phone: (+0052) 442 192-12-00 (Ext: 6015) Fax: (+0052) 442 192-12-00 (Ext: 6015) E-mail: juvenal@uaq.edu.mx

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 I 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



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			responsib	during	the		
acceptance	process	s is	shown	in	the	following	table:
Stage Sequence		Activity				Responsible	
1. Verify applicant's documents	personal	1.1 Receive v small photogr	verification of hi raphs, and paid	gh school receipt	studies,	UAQ School Serv	ices
2 . Present the preparatory course		2.1 During the has the respo as present an	e preparatory c onsibility to assi ny work or exan	Applicant			
3. Group, schedule, and teacher assignments for the preparatory course		3.2 Establish the preparato schedules, gr	the starting and ry course as w roups, and profe	Engineering Department admission process coordinator			
4. Reception and pull of results	blication	4.1 Publish th the UAQ site	ne results in loc	al newspa	pers and	UAQ School Serv	ices
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	9
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

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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:	:
i	.:
When a Faculty Member of the program detects a learning problem in one or more of his	S

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 studentor as pirant 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 This department student: academic life, health and personal wellbeing. programs that has several attend each one of these aspects:

Pair tutor:
The objective of this program is to assist students by students themselves in a bound o
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

Workenone		

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//Loveandsexuality//ReadingCircle//Potentiateyourintelligence // Manage your time // Violence prevention // Sculpture // Painting // Clarification of values.

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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 allowing bring forms of care and integral development society US to 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.

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

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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. Thegraduate'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 employeeengineering 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

Everyfouryears, 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 programe ducational 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.



SO

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

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 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 Design components, systems and automated processes in order to meet specific needs suitable solutions. and propose 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

SO Communications skills SO 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 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		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
				3

INA14	202	Statics	1,6	a, b, g
INA14	821	Integral Calculus	1,6	a, b, g

31

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	203	Stintia Algebra	1,14,66	a, bậeộhgk, g
INA14	821	DifferentialCalesius	1,12,66	aạbþdgg
INA14	804	Chesiastry	1,6	a, ð, þ , ð , k
INA14	229	Metroscopy and Statistics	4,5,6	e, hak, ti, j, g
INA14	205	Rcomputeringssisted Design	2, 3	adþcc
INA14	102 5	Fromeign Language II	Ô	g
INA14	1208	Physical Culture II	2, 5, 6	ch, ff, j, gg
INA14	1240168	Artistic suptional Societse	2,5,67	et, fi, j, g
IN A 144 /410	202	Statlesnics	1, 2, 8, 6	a, b, b, g , g
INA 144/410	821	Differential Equations	1,1,667	aa,bb,ggi
IN A 144 /40	822	Mwww.	1,1,667	aa,bo,ggi
IN1A1441/410	223	Мертид яgnetism	Ъ ,8,6	e,a,k,d,gg
IN1A1441/410	239	Adogramating	1,3	a, þ, þ, ð, k
IN1A1441/410	120284	Felesitric Languitage II	264	d, e ^g h, k
INA14	1208	Development Workshop of Physical Culture II Automation Technology I	2, 5, 6	dļ, f,yjj, ģ
IN IA1241/4 10	1405	Actistion Optional ged Urse	2, 6 ,6	d, fgj, g
INA14/10	1209	Physical Culture III	2, 5, 6	d, f, j, g
INA14/10	221	Differential Equations	1, 6, 7	a, b, g, i
INA14/10	231	Signial Analysisalculus	1,16,67	梢gi
INA14/10	Z4 3	Ellechenical Methods	1,12,46	aabbedhgk
INA14/10	239	Adeatroeic Programming	1,4	a, b, e, h, k
INA14/10	228	Electrical Oldechines I	1, 2 , 3 , 4	a, bddechekh, k
IN1A1441/410	123787	Development.Workshop of Electric Circuits II Automation Technology I	2,35,47	82, 4 , yhj, k
IN IA1⁄4 1/410	1208	Development Workshop of Foreign Language III Automation Technology II	2, 6, 7	d, tgj, i

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
IN N1%1/41 0	893	Thineenanoellgradornacs	1,1,426	a, baebhdk, g
IN N144/4 10	831	Signate Antialy Sisticulus	1,1,266	aabbdgg
IN IA144/4 10	202	Abaneistal Methods	1, 4	a, b, e, h, k
IN IA144/4 10	239	Electrability s and Statistics	1]4	a, bạe,bh, k
IN IA1/41 0	203	Electricale Massistes IDesign	1, 2 , 3 ,4	a, b, d¢c¢e, h, k
IN IA144 /410	1203185	ElectrignClangtsate I	364	c, egh, k
INA14	1208	Development Workshop of Physical Culture I Automation Technology II	2, 5, Ø	ct , f, j, ġ
IN IA1/41 0	120466	Administrative Lanned Saggielly	2, 6 , 7	d, t gj, i
INA14/10	1210	Physical Culture IV	2, 5, 6	d, f, j,
IN IA1241/41 0	821	Cobeogral Calculus	1,6	a, b, g
IN IA1241/41 0	849	Returner l	1,6	a, b, b, ĝ , k
IN NA 4/410	343)	INA10 Digital Systems II Metrology (INA14Microsystems)	4 <u>2</u> 5, 3 9	e, h, <u></u> ,,đ, j, g
INAA4/10	230	Programminglectronics	4,8	e ^a th,k,g
INALA	12224	Everinean angemanes I'n	ဓု	g a, b, e
INA AI	1,20, 8	Elactific Systems Design	7 ; 5 ; 9	a, b, b, h, A, i
INA14	1218	Activelopopeinthal@kshop of Automation Technology III	2,5,6 2, 5, 7	d, f, j, g d, f, j, i
INA14/10	1057	Foreign Language V	6	g
INA14/10 INA14/10	212 226	Social Pairs Human Sciences	1, 2, 3, 6 2, 4, 5, 6, 7	a, b, d, c, g d, e, h, k, f, j, g, i
		Cononal Course		
INA14/10 INA14/10	211 861	Multivariable Calculus Control II	1, 6, 7 1, 3	a, b, g, i a, b, c
INA14/10 INA14/10	213 269	Electromagnetism Automation II	1, 2, 6 1, 4	a, b, d, g a, b, e, h, k
INA14/10	230	Advanced Brogramming	1,4	a, b, e, h, k
INA14/18	270/ 228	(INA14 Digital Systems with Electric Circuits Reconfigurable Logic I)	2,3,4 2,4	d, c, e, h, k d, e, h, k
INA 44/410	18672	Development Workshop of Information Fechnology	2 ₁ 5 ₃ 7	da,ft¥,jci 33
INA14/10	1,236,55	kaleiaal a arguman fil	3 ⁶ 4	c, e ^g h, k

Auto	childidgy in		

INA14/10	1057	Foreign Language V	6	g
INA14/10	226	Social and Human Sciences	2, 4, 5, 6, 7	d, e, h, k, f, j, g, i
PROGRAM APPROVAL	No	Optional Course COURSE NAME	STUDENT OUTCOMES	ABET'S CORRESPONDALS
INAMA/10	803	bong Algebra	1 ₁ 436	a, b _ą ę _b ,h _€ k, g
INAMA4/10	849	Rifferential Galculus	1 ₁ ,246	a ^a b ^b e ^d h ^g k
INA14 INA14/10 INA14	204 270/ 214	INA1A Digital Systems I (INA14 Digital Systems with Reobativityable Statist)cs	1, 4 2, 3, 4 1	a, b, e, h, k d, c, e, h, k a , b
INA14/10	26 3	Informatics Engineering Computer Assisted Design	2; 3	a _d b _c c
INA14/10	126185	Materials Technology Foreign Language 9	³ 6 ⁴	c, e, h, k
INA14/10	12707	Ipstrumentation I	2; 3; 6	a, b, d, i d, i, j, g
INA14	12662	Development Workshop of University and Society IV	2, 5, 7	e, f, j, i
INA14/10	1064	Foreign Language VI	6	g
IN A 1 441/41.0	27042	Staticssional Optional Course I	1, 8	a, b, g
SIM1A0,414	888	Robustics	1, 6	a, a, e, g , k
INA14 SIM10/14 INA14	289/ 1211 215	SIM10 Automation III Metrology (SIM14 Instrumentation for Program icionatrol)	4,5,6 2, 3, 4, 5 1, 3	e, h, k, f, j, g d, c, e, h, k, f, j a, b, c
FNM14	1624	Design of Machines Foreign Language II	2, 6, 7	d, g , i
N M14	1208	Ergonomics and Security Physical Culture II	2, 5, 6 2, 5, 6	d, f, i, g d, f, j, g
SIM10/14	361 1418	Manufacturing Engineering Artistic Optional Course	1, 2, 3 2,5,6	a, b, d, c d, f, j, g
SIM14	12XX	Kinematics and Dynamics of Machines	2, 3, 7	d, c, i
IN SA M 44/40	1221824	Development Workshop of Dynamics Automation Technology V	1225376	a, to , fd.j,o, g
SYA16/19	17773	Poifferential Equations	1, g, 7	a, b _g g, i
57A10/19	883	Social Service Calculus	2, ¹ 5, ⁶ 6, 7	đ;,,f ^b i,g,i
INALAAD	293	Flectromagnetism	1 ^{1,} 2, 67	а, В, d, 9i
INALAY20	339	Advianced Erngramming	2, ¹ 5, ⁴ 7	a, þ, e, h, k
INA14/10	378	Flectric integration seminar	2, 5 ; 6 , 7	ď, ŕ, _{'i} , ʰ, k
INA14	1277	Automation Technology I	2, 5, 7	d, f y j, i
57A10/19	13705	Foreigationsuage III	1, 2 ⁶ , 3, 4	a, b, d, ^g , e, h, k
57A16/19	1200	Bexsical Chathlise III	7 ; 5; 4	a, b ^{d, d} , e, h, k

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
S1114140/414	803	Machatatora	1,124,364	aabbdechekhgk
SIM140/414	898	Sufference and a constant of the constant of t	1, <u>2</u> , 6	a, a, b, d, þ , k
SIM140/414	<u>8</u> 84	Dage and Sugminar	2,1,4,46	લ, ૬, ૬, K, g
SIM140/414	<u>88</u> 4	Mechabring condressed stics	1, 2, 3	a, ø, ø, c
SIMA0/414	26 5	Computer Visionsted Design	2,3	adþcc
SIM140/414	1 8 5	SpecialityLangongeCourse	1,2, 3, 4 6	a, b, d, c, e, h, k g
SIMA0/414	1282	Fengigical Englanged VIII	2, ઉ , 6	d, fgj, g
SIM14	1214	Productivity and Quality	4, 5, 7	e, h, k, f, j, i
SNM14	120125	Stabils Devices Programming	2,1,367	ક્રી, છિ, હું
SIM140/414	822	Professional Internship	2,4 1 ,5 6 ,7	d, e, h, k, f, j , g, i
Tabl enBa14 Ma	inly 229 50	Metrellagionshiop with th	he 🚓 🕫 ricula	ଦେ ଧ୍ୟାନ୍ୟତ୍ ର୍ଣ୍ଣ, g and

direct ABET`s relationship INA14 215 Programming

INA14 1024 Foreign Language II 6 9 Most of the SO assessment is collected from faculty's courses, although indirect methods, as still beys, are frace periodically. (Where detail processes from mention in ^dCfritePion 4). All INLATION BEAGES reviews and stakeholders are involved in the process.

a, b, c

1, 3

INA14/10 212 Dynamics 1, 2, 3, 6 a, b, d, c, g

B. INA HEALION SHIP of Biferential Eventeenes to Progiram Educational, i

Objectives	5 211	Multivariable Calculus	1, 6, 7	a, b, g, i	
INA14/10	213	Electromagnetism	1, 2, 6	a, b, d, g	
Mainly, the	program i	s concern in developi	ng prepared engineer	s with a	high
social sense	e of respo	onsibilities of the impa	ct their solution can	make to	their
environnient	and ²²⁸ With	a grown capability of	applying ² engineering	tools ^{h, k}	their
INA14	1277	Development Workshop of Automation Technology I	2, 5, 7	d, f y j, i	35
INA14/10	1305	Foreign Language III	6	g	
	1200	Discosi a si Ocultura III			

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 tearmwork.	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	х			
d	2	Collaborate on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context.		x	х	Х	Х
с	3	Design components, systems and automated processes in order to meet specific needs and propose suitable solutions.	х	х			
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	х			х
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.					х
g	6	Communicate ideas, concepts and knowledge of engineering in a multicultural context.				Х	
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.	
		1.1 Use numeric representation algebraic and analytical techniques	Н	М				
		1.2 Solve problems of social, technological and/or research	Н	н				
		1.3 Interpret relations and functions	Н	н				
a&b	1.4 Analyze data, evaluate and interpret results	Н	Н					
		1.5 Model phenomena	н	н				
		1.6 Use electronic and digital tools	н	М				
	1.7 Visualize abstractly mathematical ideas	Н	М					
		2.1 Provide knowledge that build the solution		н	М	М	м 3	6
		2.2 Use quality standards		М	М	Н	Н	
		2.3 Integrate the vision of						
and/or research	п	п						
---	---	---						
1.3 Interpret relations and functions	Н	н						
1.4 Analyze data, evaluate and interpret results	Н	Н						

ABET OUTCOME	1.5 Model phenomena 1.6 Use electronic and PRdigital toolsTCOME		H PEO1: Successfully applying engineering tools and knowledge in analyzing and solving engineering problems.	H PEO2: To effectively manage, apply and develop his knowledge of engineering, TICs and sci-et/ces 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.
		1.1 Use numeric representation algebraic and arlaytical techniques		М	М	М	М
		1.2 Solve problems of Scills decembraidiogtead ards and/or research		м	М	н	н
d	2	2.3 linutergræterethætiovisiannobf futhetiodisciplines		н	М	н	М
		2.4 Alar economic social and environmental aspects to promote		М	L	М	Н
		2.5 Play appropriate roles fob Modelelsplocessmenta the working team.		H	Н	н	М
		3.1 Abstract and synthesize the particular elements of the problem.	н	м			
	2	3.2 Evaluate solutions	н	М			
c S	3.3 Document integrated solutions of the problem whereas the engineering language (blueprints, drawings, diagrams, reports, calculation statements).	н	H M M				
		2.3 Everyte the vision of other disclosing the impact of the solution in the context.	н	Ħ			М
		2.4 Use economic, social 4n2d Analyzembretabarsizedas telepmemistef the problem.	н	М			ť
e,h & k	4	2.5 Play appropriate roles #08 Alpoplysthoccessiginoterthg tooolsing team.	н	М			м
		3.1 Abstract and eyhthetsizew thehepartitoubart etenteentis of the problem.	Ħ	Ħ			н
		5.1 Know regulations, criteria, and quality standards					Н
f&j	5	5.2 Be aware of the living and working environment					Н
		5.3 Know the ethical principles of their profession					н
		b.1 Use all engineering failoguagesteeteeting fapanettenthangentext. technical)				н	
		4.2 Analyze the particular 6.2 Analyze the particular 6.3 Analyze than one language				н	
g	g 6	4.3 Apply the engineering ∰3l£xpress ideas relevant in the communication environment 4.4 Know the global				Н	
		context. 6.4 Express ideas soherentiations, criteria and quality				Н	
		standards 6.5 Use "TICs" 5.2 Be aware of the living and working environment				Н	

5.3 Know the ethical principles of their profesation in attional and the satisfies of their profesation and the satisfies of	н	н	H M M	37

6.3 Express ideas relevant communicatio

ы

	6.1 Use all engineering languages (verbal, graphic, written, and technical)				н	
	6.2 Ability to communicate in more than one language				н	
	6.3 Express ideas relevant				Ц	
ABET PF OUTCOME PF	6.4 Express ideas	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.
	7.1 Search for different information sources			н		М
i 🔽	7.2 Participate in national and/or international academic activities			н		М
	7.3 Recognize the importance of learning			н		М
	1.4 Analyze data, evaluate and interpret results	H= High H	M= Medium H	L= Low		
Table 3.3 F	PEO relationship	with gene	eral performanc	e indicat	ors.	
	1.6 Use electronic and digital tools	Н	М			
	1.7 Visualize abstractly mathematical ideas	н	М			
- CRIT		ONTINU	OUS IMPROV	′EM⊡NT	М	М
e #	2.2 Use quality standards		М	М	н	Н
	2.3 Integrate the vision of other disciplines		н	М	н	М
A. SIUCE	2.4 Use economic, social and environmental aspects to promote		М	L.	M	н.

2.5 Play appropriate roles The assessmenties involves all Faculty members in different periods and ways. Starting the problem. meetings, staff whiring in and supervising the massessment process, it also designates an ABET coerdination inverted is responsible for gathering all the information and giving solutions of the problem whereas the engineering whereas the engineering 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. the base workshops help them to develop a structured assessment of their own specific outcomessor messor messor between obtain a specific result of their improvement opportunity area. The following an appropriate the complete assessment process for the program:

4.4 Know the global context.	н	н		н
5.1 Know regulations, criteria, and quality standards				Н
5.2 Be aware of the living and working environment				Н
5.3 Know the ethical principles of their profession				н
6.1 Use all engineering languages (verbal, graphic, written, and technical)			н	
6.2 Ability to communicate in more than one language			н	
6.3 Express ideas relevant			Ц	

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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 CORRESPOND ALS	Performance Level progress
INA14	203	Linear Algebra		a&b	Initial
INA14	811	Differential Calculus		a&b	
INA14	204	Chemistry		a&b	
INA14	214	Probability and Statistics		a&b	
INA14	202	Statics		a&b	
INA14	821	Integral Calculus		a&b	
INA14	822	Physics		a&b	
INA14	215	Programming		a&b	
INA14/10	212	Dynamics		a&b	
INA14/10	221	Differential Equations		a&b	
INA14/10	211	Multivariable Calculus		a&b	
INA14/10	213	Electromagnetism		a&b	Middle
INA14/10	230	Advanced Programming		a&b	
INA14/10	841	Thermodynamics		a&b	
INA14/10	231	Signal Analysis		a&b	
INA14/10	742	Numerical Methods		a&b	
INA14/10	239	Electronics		a&b	
INA14/10	237	Electrical Machines I		a&b	
INA14/10	851	Control I		a&b	
INA14/10	249	Automation I		a&b	
INA14/10	248	Electrical Machines II		a&b	
INA14/10	853	Electric Systems Design		a&b	
INA14/10	861	Control II		a&b	
INA14/10	269	Automation II		a&b	
INA14/10	862	Informatics Engineering		a&b	
INA14/10	271	Instrumentation I		a&b	
INA14/10	74	Professional Optional Course I		a&b	Final
SIM10/14	888	Robotics		a&b	
SIM10/14	361	Manufacturing Engineering		a&b	
SIM10	291	Instrumentation II		a&b	
SIM10/14	877	Mechatronics		a&b	
SIM10/14	298	Servomechanisms		a&b	
SIM10/14	887	Mechatronics Project		a&b	
SIM10/14	364	Computer Vision		a&b	
SIM10/14	85	Specialty Optional Course	1	a & b	

	No	COURSE	STUDENT OUTCOMES 2	ABET'S CORRESPON DALS	Performanc 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 CORRESPONDA LS	Performance Level progress
INA14	205	Computer Assisted Design	з	с	Initial
INA14	215	Programming	3	с	
INA14/10	212	Dynamics	3	с	
INA14/10	237	Electrical Machines I	3	с	Middle
INA14/10	238	Electric Circuits II	3	с	
INA14/10	851	Control I	3	с	
INA14/10	343/	INA10 Digital Systems II (INA14Microsystems)	3	с	
INA14/10	861	Control II	3	с	
INA14/10	270/	INA10 Digital Systems I (INA14 Digital Systems with Reconfigurable Logic I)	3	c	
INA14/10	862	Informatics Engineering	3	с	
INA14/10	268	Materials Technology	3	с	
INA14/10	74	Professional Optional Course I	3	с	
SIM10/14	289/ 1211	SIM10 Automation III (SIM14 Instrumentation for Process Control)	3	с	
SIM10/14	361	Manufacturing Engineering	3	c	
SIM14		Kinematics and Dynamics of Machines	3	с	
SIM10/14	877	Mechatronics	3	с	Final
SIM10/14	298	Servomechanisms	3	с	
SIM10/14	887	Mechatronics Project	3	с	
SIM10/14	364	Computer Vision	3	с	
SIM10/14	85	Specialty Optional Course	3	c	
SIM14	1215	Mobile Devices Programming	3	c	

		COURSE	STUDENTS OUTCOME 4	ABET'S CORRESPOND ALS	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 CORRESPO NDALS	Performance Level progress
INA14	1207	Physical Culture I	5	f&j	
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	
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 7	ABET'S CORRESPON DALS	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	

		COURSE	STUDENTS OUTCOME 6	ABET'S CORRESPONDA LS	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
			^	-	
		Foreign Language VIII			

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.

Professional Internship

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:

ш	CRITERIA/ PUNCTUATION	100%	75%	50%	25%
HE COURSI	He knows and identify the	Correctly identifys the	Partially identifys the	Poorlly identifys the	Do not identifys the
	International System of	International System of	International System of	International System of	International System of
	Units.	Units.	Units.	Units.	Units.
ATOR OF T	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.
ANCE INDIC	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.
PERFORM	He solves and interpret	Correctly idintify, interprets	Partially idintify, interprets	Poorly idintify, interprets and	Do not idintify, interprets
	correctly engineering	and solves engineering	and solves engineering	solves engineering	and solves engineering
	problems applied to the	problems applied to the	problems applied to the	problems applied to the	problems applied to the
	conditions of equilibrium in	conditions of equilibrium in	conditions of equilibrium in	conditions of equilibrium in	conditions of equilibrium in
	fluids at rest.	fluids at rest.	fluids at rest.	fluids at rest.	fluids at rest.
SPECIFIC	He solves and interpret	Solves and interpret	Solves and interpret partially	Solves and interpret poorly	Do not solves and interpret
	correctly engineering	correctly engineering	engineering problems	engineering problems	engineering problems
	problems applied to the	problems applied to the	applied to the conditions of	applied to the conditions of	applied to the conditions of
	conditions of equilibrium in	conditions of equilibrium in	equilibrium in fluids in	equilibrium in fluids in	equilibrium in fluids in
	fluids in motion.	fluids in motion.	motion.	motion.	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.

3.25	(and)
	Suntiago de Queritaro a 19 de septiembre de 2014
	Examen Automaticación I
Nombre del alumin: Número de expediente:	Carlos Care Gran Alsondro
1. El trabajo, se mide en e Selacciore una respuesta. 22. Las otras dos respue- 2. de Julios. e) Nordon multiplical	l sistema internacional de unidades en: (P=0.5) stas son ciertas. o pot metro
2. Definir que es la mecia inscrimentales 3. Cesit de las significates Selecciose una respuesta a El pascal es la part b El pascal es la part aspecheire.	ten de Baides. (P=0.5) == 5 (a si estadore de la Fiundeta en helm de la Valencia de la sintema estadore de unidades afiemaciones es cierta? (P=0.5) lad de presión en el sintema internacional de unidades atém de un newton de forma sobre un metro cuadrado de la setto son ciertas.
 4. ¿Casil es la unidad de l' Seleccione una respuesta. a. El grada contigrad de BE Relvin. c. Las noras des respu- unidad de medida de cad unidad de medida de cad temproleccio → V., lorg ked + et , lo S. De accuerdo al vistema a unidad de medida de cad temproleccio → V., lorg ked + et , lo S. De accuerdo al vistema des Montecimes los elementas Montecimes los elementas Montecimes los elementas Montecimes los responsa. a. La presión en la supera Selecciente una responsa. bar. Seleccione una resentas que (P=0.5) 	emperatura en el sistema internacional de unidades? (P=0.5) acutas son riertas. de unidades internacional (SI) mencione las magnitudes y su a una de la vistas en clase. (P=0.5) (====+5, ¹⁰ (>30, -4 ⁻ (5), ¹ (====14, ¹⁰ (>0)(2), -4 ⁻ (5), ^{10}(>0)(2), -4⁻(5), ^{10}(>0)(2), -4⁻(5), ^{10}(>0)(2), -4⁻(5), ^{10}(>0)(2), -4⁻(5), ^{10}(>0)(>0)(>0)(>0)(>0)(>0)(>}}}}}
a. La presión debe e b. La presión debe e La presión debe e	star en pascales y la superfície en em ³ , star en atmósferas y la superfície en em ² , star en pascales y la superfície en m ³ .

STUDENT 1

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

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

199	Nombre del aluma Número de espedi	Kate	Santiago d xamen Automa (CY10 - 2013) (6330	e Querétaro a 19 de septie tización I Chaza Preget Dove	mbre de 2014 D
1	I. El trahajo, se m	ide en el sister	na internacion	d de unidades en: (P=0.5)	
12	Seleccione una resp (a) Las otras do b) Julios.	niesta. 10 responstan so	o ciertas.		
	c) Newton mul	Itiplicado por n	natro ()		
1	2. Definie que es la	mecánica de	fluides. (P=0.	5)	
4	 ¿Cuál de las sigs seleccione una sesp a. El pascal es h. El pascal es superficie. El pascal es superficie. 	aientes afirma ciesta. In unidad de la presión de os respuestas a	ciones es cierta presión eo el si un newton de f ou ciuntas.	? (P=0.5) sterna internacional de uni uerza sobre un metro cuad	lades. rado de
27	 ¿Cuál es la unidi feleccione una resp a. El grado cer b. El Kelvin. (C) Las otras de b. De acuerdo al sis midad de medida - 	ad de tempera oesta. rtigrado. is respuestas s rtema de unid de cada una d	etura en el siste on ciertas. ades internacio e la vistas en el	na internacional de unida nal (SI) mencione las mag ase. (P=0.5)	des? (P=0.5) nitudes y su
1/2 .	Mencione los eles	mentos que co	esponen la uni	lad de mantenimiento.	(P=0.5)
11	La presión en la eleccione una reig a. 1 kgf/cm ² . h. 1 bat. C. Las otras do	superficie de l viesta.	la tierra tiene u m ciertas.	n valor aproximado de:	(P=0.5)
14	Para que la fuerz P=0.5) sleccione una resp a. La presión d b. La presión d (C) La presión d	a que es capa uesta. ebe estar en p ebe estar en p	e de realizar un oscales y la sup mósferas y la sup oscales y la sup	ci lindre se exprese en ne r erficie en cm ² . uperficie en cm ² . erficie en m ² .	stons.
STUDENT 2	2				
	1 <u>00%</u>	6	75%	50%	25%
PUNCTUATION					

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

students.

performance

Faculty members take a

STUDENT 2				
CRITERIA/ PUNCTUATION	100%	75%	50%	25%
He knows and identify the International System of Units.		Х		
He dominates the conversion of units from the International System to the English System.		Х		
He understands correctly the behaviour of fluid mechanics.				х
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.				Х
He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.			Х	

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

			249 AUTOMATION I			20	14-1		2015-1			
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	I 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	He knows and identify the International System of Units.		100	75	70	100	50	79	No action will be
249 AUTOMATION I	1, 4	1.3, 4.2	deveolpment of automatic processes using direct and indirect control techniques.	He dominates the conversion of units from the International System to the English System.		100	75	100	70	70	83	taken in a short term
249 AUTOMATION I	1, 4	1.2, 1.3, 4.2, 4.4		He understands correctly the behaviour of fluid mechanics.	Final exam // project	75	25	100	50	50	60	
249 AUTOMATION I	1, 4	1.2, 4.2, 4.3, 4.4	lo identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to	He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids at rest.		75	25	50	70	70	58	 Implement more laboratory practices with real project applications 2. Review themes before avam
249 AUTOMATION I	1, 4	1.2, 4.2, 4.3, 4.5	automation engineering.	He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25	100	70	50	59	tienes beiore exam

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.

ABET's coordinator uses these references for the general outcomes results and the general outcomes indicators, its demonstrates exactly in witch part of the learning process our students are having troubles.



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:

						0044.4			0044.0			0045.4		
		269 AUTOMATION II				2014-1			2014-2			2015-1		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	T 1	T 2	T 3	T 1	T 2	T 3	T 1	STUDEN T 2	T 3	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		75	100	100	60	100	100	100	100	75	90.00
			He controls and tunes properly a PID applied to a PI C	Einal Provect	60	75	100	75	100	75	100	100	75	84.44
		To identify, research and design Automation	He knows correctly programming in ladder	Fillal Proyect	40	60	100	40	60	100	75	75	50	66.67
1 y 4	1.4, 1.2, 1.6, 4.1, 4.3	Engineering problems by means of programmable logic	He identifies and formulates properly any real		40	75	75	40	75	75	75	75	50	64.44
		controllers.	Knows perfectly the inputs and outputs of a PLC		60	100	75	60	100	100	75	100	75	82.78
			connection											
		853 ELECTRIC SYSTEM DESIGN												
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 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	He knows how to use properly the electrical connection diagrams of damper lamps and contacts		75	100	100	75	100	100	100	75	50	86.11
		energy in the student's professional environment and for benefit of society.	He masters the basic concepts of electric circuits and the basic laws of power and electricity	Review exam	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	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
		residential problems in the current automation industry.	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	GENERAL	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN T 1	STUDEN	STUDEN	OUTCOME
	1.1, 1.4, 1.5	To use numerical, algebraic	He analyzes free body diagrams								75	75	100	83.33
1	1.4	and analytic representation techniques that allow the	He makes the vector determination and								60	75	100	78.33
		student to represent real- world issues in a graphic and	He compares the results in order to obtain the	Homeworks, solution of exercises in class, tests										
1.6	6.1, 1.7	possible the analysis of the specific values for their	resistor values of materials and structural.								/5	/5	/5	75.00
	6.1	solution.	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												
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
	10 10 15	To determine and study the behavior of random variables	He identifies the components of a magnetic field		100	70	50	100	70	50	100	50	50	71.11
	1.2, 1.3, 1.3, 1.7	in the first stages of the modelling, by means of the well-known distributions.	He uses appropriate symbols for electrical systems	Homework and review	100	100	50	100	100	50	70	70	50	76.67
1	12 14 16	To use statistical software for data processing, specifically	He fulfills his functions and specific role in a team	Laboratory	100	70	50	100	50	50	100	50	50	68.89
	,,	software packages designed for sciences and engineering	He analyzes engineering problems mathematically		100	70	70	100	70	70	100	70	70	80.00
	12 13 14	To analyze different datasets	- He identifies the parameters that are necessary for the specific operation of the equipment		100	50	70	100	70	70	100	100	70	81.11
	1.5, 1.7	decisions by means of inference processes.	He uses the tools offered by MATLAB software in order to confirm the theoretical analysis	Homework and review	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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME
	1.1, 1.3,	To analyze the position, velocity and acceleration of	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.					75	75	0	100	75	50	62.50
1	1.3, 1.5, 1.4	particles and rigid bodies, which are subject to the type of motion, specified to determine and understand	He develops the equations for kinetics of particle and rigid body, which are subject to the type of motion, specified to solve engineering problems.	Solution of exercises in class, individual homeworks, participation in class and written examples				75	50	50	75	75	50	62.50
	1.4	their behavior making use of the knowledge of kinematics	He interprets and solves algebraic functions by calculation tools.					75	75	50	100	75	75	75.00
	1.7	and kinetics	He solves problems by means of the modelling of physical phenomena.					75	75	50	75	75	50	66.67
	3.3		He understands and applies the basic concepts of dynamics to prove a solution.					75	75	50	75	75	50	66.67
2, 3, 6	2.1, 2.5	To apply the student's knowledge of this subject to study cases for the	He establishes roles according to his abilities for the development of the project.	Project in teams, hand in a document and make a				50	75	50	100	75	50	66.67
	6.1, 6.4, 7.1	development of integral projects by work groups.	He documents and exposes the results of the project in a clear and coherent way.	presentation.				50	75	50	75	75	50	62.50
	6.1, 6.4, 7.1		He analyzes different information resources to					75	75	50	75	75	50	66.67
			support the project.											

		291 INSTRUMENTATION II				2013-02			2014-1			2014-2		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN	STUDEN T 3	OUTCOME
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, safely 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 functonalities 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
						2014 1			2014.2			2015-1		
GENERAL	GENERAL	249 AUTOMATION T		ADDEDOMENT	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	OUTCOME
OUTCOMES	INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	T 1	T 2	Т 3	T 1	T 2	Т 3	T 1	T 2	Т 3	AVERAGE
1, 4	1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the deveolpment of automatic processes using direct and indicate casted techniques	To know and identify the International System of Units. To dominate the conversion of units from the International System to the English System.		100	75					70	100	50	79 83
		indirect control techniques.												
	1.2, 1.3, 4.2, 4.4	To identify understand and	To understand correctly the behaviour of fluid mechanics.	Final Review	75	25					100	50	50	60
1, 4	1.2, 4.2, 4.3, 4.4	design hydraulic and pneumatic control systems through theoretical - practical models applied to automation	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	engineening.	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	GENERAL	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	OUTCOME
4, 6, 7	4.1, 4.2, 4.3,		Research/experiment.		75	50	100	75	50	13	100	75	13	73.125
4, 6	4.2, 4.4, 6.3, 6.4	To formulate solutions for automation problems,	Conceptual management.		75	50	100	50	50		100	75	75	71.875
4, 7	4.1, 4.2, 4.3, 7.3	components, systems and processes considering the	Evaluation project.		75	50	100	100	75		100	80	70	81.25
4	6.3, 6.5	impact of itself and contributing to the	Approach to the problem.		100	100	100	100	100		100	80	80	95 76.25
4, 6, 7	4.4, 6.5, 7.1, 7.3	economic, environmental and	State of the art.		50	50	75	100	75		100	80	60	73.75
7	7.3	current techniques and tools.	Objectives.	Final project /thesis	75	50	100	75	75		100	80	80	79.375
2	2.2, 2.5		Material and methods.		75	50 75	100	100	100		100	75	80 60	86.25
2.4.6	2.1, 2.2, 2.4 2.4, 4.1, 4.2,	To collaborate in disciplinary and multidisciplinary teams to	Results. Discussion:		75	50	75	50 50	25 25		100	90	60	65.625 61.25
6	6.4	research projects in	Conclusions.		50	50	75	25	25		100	80	60 70	62.5
2	2.2	according to the context.	Bibliography.		75	50	75	75	75		100	90	60	75
	2.1, 2.0				75	50	75				100	75	70	
		231 SIGNAL ANALYSIS				2014 1			2014-2			2015 1		
GENERAL	GENERAL		SPECIFIC INDICATORS	ASSECTION	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	STUDEN	OUTCOME
OUTCOMES	INDICATORS			, COLOGMENT	T1	T 2	Т3	T 1	T 2	Т 3	T 1	T 2	Т3	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	To solve linear equations using the Laplace transform by applying the corresponding theorems. To analyze and solve the equations of an	Solution class exercises and homework to deliver individually, participation and written exam				50	75	100	75	75	100	79.17
		system's behavior before different input signals.	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	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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
	4.4	To know the concepts as measurand, the measurement principle, measurement signal, measurement procedure, and	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
4,6	6.4	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 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
	4.1, 5.1	To understand the purpose of the measurement standards, calibration and the importance of the traceability to the surgestime the traceability	To distinguish the different types of patterns and to learn the concepts of traceability and calibration.	Theory test							100	100	75	91.67
4,5,6	6.4	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 describe the use of patterns, calibration and traceability in measurements.	Approach to the group.										
		To know the basic process to estimate the measurement	To identify the sources of uncertainty of a measurement system.	Reading of articles										
4	4.1, 4.2, 4.3	interpretation of the subject in measurement systems, through the study of guide publications to estimate the measurement uncertainty (GUM).	To estimate uncertainty.	Exam										

		211 MULTIVARIABLE CALCULUS												
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOM
	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, 6	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 interoretation and solution of	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
		basic engineering technical situations.	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	5 1 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 rotationa of a vector field, to know the vector calculus' fundamental theorems.	Solution class exercises and homework to deliver individually, participation and written exam	5 1 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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCON AVERAG
	1.1, 1.2		To employ concepts and an appropriate notation to solve engineering problems.		0	50	75	25	50	75	25	75	100	52.78
	1.4	To calculate the cumulative	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	1.6, 6.1, 6.4	numbers for applications in engineering through the	To use computer algebra systems to acelerate the symbolic computation to integrate.	Homework, review	50	75	100	75	75	100	50	50	100	75.00
	1.7	concept of integration.	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				2013-01			2013-02			2014-2		
GENERAL	GENERAL	SPECIEIC OUTCOMES		ASSESSMENT	STUDEN	OUTCON								
OUTCOMES	INDICATORS	SI EGING OUTCOMES		HOOLOOMENT	T 1	T 2	Т 3	T 1	T 2	Т 3	T1	T 2	Т3	AVERAG
	6.1, 6.3, 6.4, 4.2	To study and analyze the main characteristics and functioning of the Operational	To configure a signal conditioner with operational amplifier.		50	100	100	75	75	75	50	75	75	75.00
		Amplifiers (OPAMPs), the basic applications and the related configurations that can be made with them.	To integrate the theoretical knowledge in practical elements for analog signal processing.	Theoretical exams and laboratory practice	50	75	100	75	50	100	50	75	75	72.22
6, 4	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
		To study and analyze the main characteristics of	To build prototypes based on the OPAMP.		50	75	100	50	75	100	76	76	76	75.00
		OPAMPs in the application of active filters, signal generators, sinusoidal oscillators and conditioning of analog signals.	To filter and generate signals.	Practical examinations, laboratory and final project practices	50	75	100	50	75	100	75	75	75	75.00
											15	15	75	

		239 ELECTRONICS				2014-1			2014-2			2015-1		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
	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.					50	50	75	50	75	75	62.5
1, 4	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	Practical examinations, laboratory and final project practices				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.	r To implement different configurations for different profit systems					50	75	100	50	75	100	75
						0044.4			2044.0			0045.4		
GENERAL	GENERAL	271 INSTRUMENTATION I			STUDEN	2015-1	STUDEN	OUTCOME						
OUTCOMES	INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	T 1	T 2	T 3	T 1	T 2	T 3	T 1	T 2	T 3	AVERAGE
	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	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	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN	STUDEN T 3	OUTCOME
3,4	3.2, 4.3		To identify the elements that make up a position and/or speed control system								75	25	50	77.78
1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	To analyze, desing and implement position and speed	To develop and calculate the necessary parameters to achieve the desired performance	exam, presentation	100	100	100	75	75	100	100	0	100	72.22
3	1.7	control systems for industrial applications through the development of prototypes	through differential equations To compare and demonstrate the physical	report	100	50	50	100	75	75	75	25	100	72.22
	1.1, 1.2, 1.3,	development of prototypes.	results with analytics and its justification To mathematically model the components of the	Tapon	100	50	75	75	75	75		25		12.22
1	1.4, 1.5, 1.6, 1.7		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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME
	1.1, 1.2, 1.6, 1.7	To represent the solution of	He understands, in an integral way, the problem to be solved											77.78
	3.1, 3.2	engineering problems in an analytical and systematic	He formulates algorithms		100	75	75	100	100	75	100	75	0	77.78
1 y 3	1.6	way, using graphic tools and mathematical concepts	He uses programming language to solve the problems that have been formulated	exam								-	-	75.00
	3.5	To implement problem solving	He knows how to structure programming codes		100	75	100	100	50	75	75	50	50	77 70
	3.3	in a concise and efficient way	in a clear way		75	100	50	75	75	100	100	75	50	11.78

		206 UNIVERSITY AND SOCIETY				2013			2014			2015		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOM AVERAGE
	5.2	To appreciate the importance of university education for the formation of his identity according to his personal and professional development	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
	5.1	taking as a reference the present day educational contexts and their history	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, 5, 7		To analyze the social reality in Latin America in order to make a critical evaluation of our identify 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.	Review, tests, project	75	75	50	100	75	50	100	50	50	69.44
		To identify the problems that exist in his environment to	He is aware of the environment where he lives and works		100	75	75	100	100	75	100	100	50	86.11
	2.2, 2.3, 5.2, 5.3, 7.1, 7.3	create innovative projects that provide answers to solve them using the knowledge of his discipline and the ethics principles.	t 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 guardened and here there are the set the set of	He analyzes political, economic and social models in a critical way		100	75	25	100	75	50	100	75	25	69.44
		make an impact on our daily and professional life from the history of ethics in sciences.	He knows the ethics principles of his profession		75	75	50	100	75	50	100	75	50	72.22
		214 PROBABILITY & STATISTICS												
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOM AVERAGE
	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	He knows the most frequent probability distributions He identifies correctly when a response has to be modeled with a particular distribution una respuesta	Homowork and even	100	100	40 40				100 100	80 60	40 40	76.67 73.33
		1.5. behavior of random vanables in the first stages of the behavior of the modelling, by means of the well-known distributions. well-known distributions. H To use statistical software for Hara processing, specifically dia processing, specifically for sciences and engineering or sciences and	He detects promptly the differences between the different distributions	Homework and exam	100	100	40				100	100	40	80.00
1	1.2, 1.4, 1.6		He analyzes the study cases of such distributions		100	100	40				100	100	40	80.00
			one is justified	Laboratory	100	80	80				100	100	40	83.33
	1.2, 1.3, 1.4,	To analyze different datasets	He applies these methods correctly He detects the differences between these methods		100	60 40	60 80				100 100	60 80	40 40	70.00 73.33
	1.5, 1.7	by inference processes	He detects the deficiencies of these methods as well as their weaknesses	Homework and exam	100	40	80				100	80	40	73.33
		237 ELECTRICAL										0015.1		
GENERAL	GENERAL	MACHINES I			STUDEN	2014-1	STUDEN	STUDEN	2014-2	STUDEN	STUDEN	2015-1	STUDEN	OUTCOM
DUTCOMES	INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	T 1	T 2	T 3	T 1	T 2	T 3	T 1	T 2	T 3	AVERAGE
	1.1		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	76.5
	1.2		1.2 He solves two-degrees of freedom magnet circuits	In-class exercises and homeworks				90	83	43	96	80	61	75.5
	1.3	To relate the mathematical concepts of vector calculus to	computing tools 1.4 He builds mathematical models to represent	simulation models				100	80	90				90.0
1	1.4	the transformation of electrical energy phenomenon and viceverce	the transformation of electrical energy to mechanical and viceversa 1.5 He analyzes the responses of the Direct-	homeworks				90	83	43	96	80	61	75.5
	1.5		Current machines with different configurations and connections	homeworks				95	75	52	96	80	61	76.5
	1.6		achines by engineering diagrams.	homeworks				100	75	75	100	75	75	83.3
	1.7		differential equations	homeworks				100	75	75	100	75	75	83.3
	2.1		2.1 He interprets the instructions and organizes his team to model the practice	Laboratory sessions' reports				100	80	90	100	80	90	90.0
	2.2	To understand the principles	and defines the accuracy of each test 2.3 He presents the solution of a physical	reports				100	90	90	100	90	90	93.3
2, 4	2.3, 4.3	of Direct-Current motors and generators design and their different configurations	problem with the tools that are available to him at the moment 2.4 He identifies, with his classmates, the	reports				100	90	90	100	90	90	93.3
	2.4, 4.1		theoretical concepts that support the laboratory test	Laboratory sessions' reports				100	90	90	100	90	90	93.3
			must play when doing a project in teams.	Project's final report				100	80	80	100	80	80	86.6
	2.5			- · · ·										
	2.5	To be able to model the behavior of a Direct-Current	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	86.6
3, 4	2.5 3.1, 4.2 3.2, 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	3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine 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 Reports of the projects and simulations' results				100	80	80	100	80	80	86.6

		270 DIGITAL SYSTEMS WITH RECONFIGURABLE LOGIC - SISTEMAS												
05115011	051/5011	DIGITALES I			OTUDEN		OTUDEN	OTUDEN	OTUDEN	0711051	OTUDEN	07110511	OTUDEN	
OUTCOMES	INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	T 1	T 2	T 3	T 1	T 2	T 3	T 1	T 2	T 3	AVERAGE
3, 4	3.1, 4.3		He analyzes and synthesizes the elements of a problem for its solution in analog and digital systems using Boolean expressions		100	75	50	100	75	50	100	100	75	80.56
	3.2, 4.3	To design analog and digital systems for the development	He uses VHDL tools to describe hardware	Exam	100	75	75	75	100	75	100	100	100	88.89
4	4.3, 4.2	of software platforms.	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	He develops advanced digital electronic circuits	Exam	75	100	25	100	75	50	100	75	75	75.00
2	2.5, 2.1	techniques for the digital circuits to be efficient in engineering problems	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
		COURSE				2014-1			2014-2			2015-1		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
	1.2		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		mechatronic system with advanced tools	the mid-term projects	100	96	70	100	85	85	100	85	85	89.56
	1.3	 To identify the dynamic response of the systems that 	He identifies the transient response of mechatronic systems	participation to get answers to specific	100	100	70	100	85	85	100	85	85	90.00
1	1.4	represented with a first or second-order differential equation. To identify what	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	quation. To identify what lements in the system letermine the time of the ransient response.	He builds mathematical models of mechatronic systems	In-class exercises and homeworks	100	100		100	85	85	100	85	85	92.50
	1.6	transient response.	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			100		00	02.22
	2.1		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	83.33
	2.2	2. To integrate individual	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	2.3	concepts, of elements and components, in complex problems that cannot be	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	and to formulate solutions from a global perspective.	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
	3.1	3. To justify, with engineering	He abstracts and summarizes the elements that make up a dynamic mechatronic system	Reports of the projects and simulations' results	400			100						
3	3.2	of a dynamic model are determined from real data of	He evaluates the effects that specific elements have on the dynamic response of a mechatronic	Reports of the projects	100			100		0.	100			51.22
		components that exist in the professional market and field	system He documents an engineering formal report with	Reports of the projects	100	96	85	100	85	85	100	85	85	91.22
	3.3		the results of his projects He evaluates the results of the mechatronic	and simulations' results Reports of the projects	100	96	85	100	85	85	100	85	85	91.22
	4.1	4. To build mathematical	systems simulations with engineering criteria	and simulations' results	100	96	85	100	85	85	100	85	85	91.22
4	4.2	specifications of the elements used in automatic systems	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	and to simulate the dynamic response of complex systems	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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME
				Partial exams laboratory										
	2.1, 2.2, 3.2, 3.3	To analyze, design and test electronic systems based on microsystems that allow the	rie analyzes, designs and tests electronic circuits based on microsystems	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	formulation of possible solutions to engineering	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	problems, using specialized software.	He compiles codes with specialized software		100	80	60	100	80	60	100	80	40	77.78
2, 3	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

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	2.2, 3.1, 3.2, 3.3	problems, using specialized software.	He compiles codes with specialized software		100	80	60	100	80	60	100	80	40	77.78
2, 3	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
		To document the development of firmware the												
	2.5, 3.3	is being used for the formulation of possible solutions by means of	He documents the development of the firmware of projects and laboratory sessions, developed in	Laboratory sessions' reports, reports of mid- term and final projects.	100	60	40	80	60	40	80	80	40	64.44

		diagrams, schemata and desk tests, making use of specialized software.	the format of a work portfolio	portfolio of projects										
		1418 ARTISTIC OPTIONAL COURSE												
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
5	5.1, 5.3	To recognize the importance of possible agents of change in a society so that the	He thinks about the importance of his work through photography		80	100	60	100	80	80	100	100	80	86.67
5	5.2	in a society so that the student is able to anticipate them in a permanent update.	He is aware of his environment by means of photographs		100	80	40	100	80	60	80	80	60	75.56
	2.1, 2.3, 2.5	To collaborate in multi-	He plays roles according to what is needed		100	100	60	100	100	80	100	100	80	91.11
2	2.1, 2.2, 2.3, 2.5	and propose human and technological solutions.	He integrates and participates in collective activities	Photography exhibition	100	100	80	100	100	100	100	80	100	95.56
5	5.2, 5.3	5.3 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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOM AVERAGE
	1.1, 1.4, 1.6, 1.7	To apply the concept of	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	frequency response to the	To appropriately choose a controller.	Prácticas	70	60	40	80	70	50	80	60	50	62.22
1	1.1, 1.3, 1.4	desing of electromechanical control systemsa from specialized tools.	To interpret the frequency response experimental data toidentify models.		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 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 apply the state variable	To interpret the parameter changes in a control system's response.	Proyecto teórico-práctico	80	50	40	70	70	60	70	60	50	61.11
	1.4, 1.1, 1.5, 1.7, 3.1	approach to the study of control systems.	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			201	15-1		
GENERAL OUTCOMES	GENERAL INDICATORS	SPECIFIC OUTCOMES	SPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 4	OUTCOME AVERAGE
6	6.1, 6.3, 6.4	To expand the possibilites of the stablishment of parameters	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	in his field of action to contribute to the understanding of a culture	To debate and discuss the proposed ideas before diverse disciplines.	Foro de discusión						85	100	70	70	81.25
6	6.1, 6.4	offer in related areas to engineering in the mexican	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	territory.	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	To compare his graphic learning of the start and the end of the curse.	Prácticas						100	100	85	100	96.25
6	6.1	comunication of his ideas through diverse analog and digital tools.	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	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE
1,3	1.4, 3.1	To apply and anlyze the	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	computer vision basic knowledge to modify a digital image through specialized	To identify stages to digitalize an image.	examen				100	75	60	100	100	100	89.17
1, 3	1.4, 3.1	software.	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	T	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	o design a capture and real-	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	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
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.

							INA14	1278	Development Workshop of Automation Technology II	2, 5, 7	d, f, j, i		1
							INA14/10	1046	Additional Language IV	6	9		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
T 1							INA14/10	343/	INA10 Digital Systems II	2, 3		1	r
Ine	time	e collecting	g da	ta for	each	COL		IS ₂₅₀ I	INSTRATED	in "tai	JIe., 4.3	and	for
						,	INA14/10	248	Electrical Machines II	1.	a, b, e	1	
each	tui	rns include	es th	ree ser	neste	ersí p	seriod	S .853	I Electrice Systems Quesign I'S C	€S 1, 4, ₩I	th som	e ₁tro	uble
							INA14	1280	Development Workshop of	2, 5, 7	d, f, j, i		1
in st	tude	ents learnii	ng p	rocess,	will	be	revie	W1057	Monor en offer	n tha	in the	othe	rs :
			0 1	,			INA14/10	226	Social and Human Sciences	2.4.5.6.7	d.e.h.k.f.i.a.i	1	
PROGRAM	No	COURSE NAME	STUDENT	ABET'S	2014-2015	2015-2016			Optional Course				
INA14	203	Linear Algebra	1, 4, 6	a, b, e, h, k, g		1	INA14/10	861	Control II	1,3	a, b, c	1	1
INA14	811	Differential Calculus	1, 2, 6	a, b, d, g		1	INA14/10	269	Automation II	1,4	a, b, e, h, k	1	-
INA14	204	Chemistry	1,4	a, b, e, h, k		1			INA10 Digital Systems I				_
INA14	214	Probability and Statistics	1	a,b	1		INA14/10	270/	(INA14 Digital Systems with Reconfigurable Logic I)	2, 3, 4	d, c, e, h, k	1	
INA14	205	Computer Assisted Design	2, 3	d, c		1	INA14/10	862	Informatics Engineering	1,3	a, b, c		1
INA14	1015	Foreign Language I	6	g			INA14/10	268	Materials Technology	3, 4	c, e, h, k		1
INA14	1207	Physical Culture I	2, 5, 6	d, f, j, g			INA14/10	271	Instrumentation I	1, 2, 7	a, b, d, i	1	1
INA14	206	University and Society	2, 5, 7	d, f, j, i	1		INA14	1282	Development Workshop of	2, 5, 7	d, f, j, i		1
							INA14/10	1064	Foreign Language VI	6	g		
INA14	202	Statics	1.6	abo	1		INA14/10	74	Professional Optional Course I	1,3	a, b, c	1	
INA14	821	Integral Calculus	1.6	abo	1	1							
INA14	822	Physics	1.6	a, b, g	-	1	SIM10/14	888	Robotics	1,4	a, b, e, h, k	1	1
INA14	229	Metrology	456	e h k f i a	1	1		200/	SIM10 Automation III				_
INA14	215	Programming	1.3	abc	1		SIM10/14	1211	(SIM14 Instrumentation for Process Control)	2, 3, 4, 5	d, c, e, h, k, f, j	1	
INALA	1024	Foreign Language II	6	g	-		SIM14	12XX	Design of Machines	2, 6, 7	d, g, i		1
INA14	1208	Physical Culture II	256	dfig			SIM14	1212	Ergonomics and Security	2, 5, 6	d, f, j, g		1
INA14	1418	Artistic Ontional Course	256	d; i; j; g	1		SIM10/14	361	Manufacturing Engineering	1, 2, 3	a, b, d, c		1
10121	1110		_,,,,		-		SIM14	12XX	Kinematics and Dynamics of	2, 3, 7	d, c, i		1
TNA14/10	212	Dunamice	1236	abdca	1	1	SIM14	1284	Development Workshop of	257	dfii		1
INA14/10	212	Differential Equations	1.6.7	a, b, c, g	-	1		1201	Automation Technology V				-
INA14/10	221	Multiveriekle Celevitye	1.6.7	a, b, g, i	1	1	SIM10/14	1073	Foreign Language VII	6	g		
INA14/10	211	Electromagnetism	1.2.6	a, b, g, i	-	1	SIM10/14	883	Social Service	2, 5, 6, 7	d, f, j, g, i	1	
INA14/10	215	Advanced Programming	1,2,0	a, b, b, b, k		1	SIM10	291	Instrumentation II	1, 2, 7	a, b, d, i	1	
INA14/10	230	Electric Circuite I	1,4	a, b, e, ii, k		1	SIM10	354	Digital systems III	2, 5, 7	d, f, j, i		1
10014	1277	Development Workshop of	2.5.7	d, d, i, i, k		1	SIM10	316	Proyect integration seminar	2, 5, 6, 7	d, f, j, g, i	_	1
INA14/10	12//	Automation Technology I	2, 5, 7	0,19,1		1						_	
INA14/10	1303	Poreign Language III	0.5.0	g dela			SIM10/14	877	Mechatronics	1, 2, 3, 4	a, b, d, c, e, h, k	_	1
INA14/10	1209	Physical Culture III	2, 5, 6	u, i, j, g			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	_
INA14/10	041	Cignel Analysia	1,2	a, 0, 0		1	SIM10/14	887	Mechatronics Project	1, 2, 3	a, b, d, c	_	1
INA14/10	231	Numerical Math	1,6	a, 0, g	1	1	SIM10/14	364	Computer Vision	1,3	a, b, c a, b, d, c. e. h. k	1	
INA14/10	/42	Numerical Methods	1,4	a, p, e, h, k		1	SIM10/14	85	Specialty Optional Course	-,-, -, -, -	-, -, -, -, -, -, ., ., .	1	
INA14/10	239	Electronics	1,4	a, p, e, h, k	1		SIM10/14	1082	Foreign Language VIII	6	g		1
INA14/10	237	Electrical Machines I	1,2, 3, 4	a, p, d, c, e, h, k	1								
INA14/10	238	Development Workshop of	3,4	c, e, h, k		1	SIM14	1214	Productivity and Quality	4, 5, 7	e, h, k, f, j, i		1
INA14	1278	Automation Technology II	2, 5, 7	d, f, j, i		1	SIM14	1215	Mobile Devices Programming	2, 3, 7	d, c, i		1
INA14/10	1046	Additional Language IV	6	9		1							
INA14/10	1210	Physical Culture IV	2, 5, 6	a, f, j,			SIM10/14	891	Professional Internship	2,4,5,6,7	d, e, h, k, f, j , g, i	1	
		a											
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/	(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	2, 4, 5, 6, 7	d, e, h, k, f, j, g, i	1								

Table 4.3 Automassessment turn by course.

				-		
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
DIRE	CT	ASSESSME	NT	c, e, h, k		1
. JNA14/10 .	271 .	. Instrumentation L	. 1, 2, 7	a, b, d, i,	. 1	· · L

For this Arthon BET's evaluation, the 'courses mention before were selected for assessment result is presented below.

SIM10/14	888	Robotics	1, 4	a, b, e, h, k	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	
SIM14	1212	Ergonomics and Security	2, 5, 6	d, f, j, g	
SIM10/14	361	Manufacturing Engineering	1, 2, 3	a, b, d, c	
CTM14	1222	Kinematics and Dynamics of	2 2 7	dal	

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

1.4, 1.5, 1.7, system in a st



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 S	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	OUTCOME	OUTCOME AVERAGE 2014-	OUTCOME AVERAGE	OUTCOME AVERAGE 2015-1
		1	1.2, 1.3, 1.5,		He knows the most frequent probability distributions		100	100	40				100	80	40	76.67	80	20142	73.33
		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	He identifies correctly when a response has to be modeled with a particular distribution una respuesta	Homowork and oxam	100	100	40				100	60	40	73.33	80		66.67
		1	1.2, 1.3, 1.5,	distributions.	He detects promptly the differences between	I I I I I I I I I I I I I I I I I I I	100	100	40				100	100	40	80.00	80		80.00
	214	1	1.2, 1.4, 1.6	To use statistical software for data	He analyzes the study cases of such		100	100	40				100	100	40	80.00	80		80.00
	STATISTICS	1	1.2, 1.4, 1.6	processing, specifically software packages designed for sciences and engineering	He knows the inference methods and how		100	80	80				100	100	40	83.33	86.67		80.00
		1	1.2, 1.3, 1.4,		He applies these methods correctly	Laboratory	100	60	60				100	60	40	70.00	73.33		66.67
		1	1.5, 1.7	To analyze different datasets to be able to	He detects the differences between these		100	40	80				100	80	40	73.33	73.33		73.33
		1	1.5, 1.7	make decisions by interence processes	He detects the deficiencies of these methods	Homework and exam	100	40	80				100	80	40	73.33	73.33		73.33
			1.5, 1.7		as well as their weaknesses		100												
		1	11 14 15	-	He analyzes free body diagrams								75	75	100	83.33			83.33
		•	1.4	representation techniques that allow the student to represent real world insues in a	He makes the vector determination and	Homeworks, solution of							60	75	100	79.33			79.33
	202 STATICS		1.4	graphic and mathematical way, making possible the analysis of the specific values	calculation He compares the results in order to obtain	exercises in class, tests							00	75	100	10.55			70.35
		1,6	1.7, 6.1	for their solution.	the resistor values of materials and structural.								75	75	75	75.00			75.00
		1	1.1, 1.2		To employ concepts and an appropriate notation to solve engineering problems.		0	50	75	25	50	75	25	75	100	52.78	41.67	50.00	66.67
	821 INTEGRAL	1	1.4	To calculate the cumulative values starting from physical numbers for applications in	To abstract the conditions of the problems to their solution using the integration techniques.	Homoust	50	75	75	50	75	100	50	75	75	69.44	66.67	75.00	66.67
	CALCULUS	1,6	1.6, 6.1, 6.4	engineering through the concept of integration.	To use computer algebra systems to acelerate the symbolic computation to integrate.	Fomework, review	50	75	100	75	75	100	50	50	100	75.00	75.00	83.33	66.67
\triangleleft		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
Ē																			
\equiv	215	1	1.1, 1.2, 1.6, 1.7	To represent the solution of engineering problems in an analytical and systematic	He understands, in an integral way, the problem to be solved		100	75	75	100	100	75	100	75	0	77.78	83.33	91.67	58.33
Ζ	PROGRAMMING	1	1.6	way, using graphic tools and mathematica concepts	He uses programming language to solve the problems that have been formulated	exam	100	75	100	100	50	75	75	50	50	75.00	91.67	75.00	58.33
_																			
		1	1.1, 1.3,		He develops the equations for kinematics of a particle and a rigid body, which are subject to the type of movement specified to solve an end of the solve solve and the solve solve and the solve solve and the solve the solve the solve the solve the solve the solve the solve t					75	75	0	100	75	50	62.50		50	75.00
	212 DYNAMICS	1	1.3, 1.5, 1.4	To analyze the position, velocity and acceleration of particles and rigid bodies, which are subject to the type of motion, prescripted to determine and understand	He develops the equations for kinetics of particle and rigid body, which are subject to the type of motion, specified to solve	Solution of exercises in class, individual homeworks,				75	50	50	75	75	50	62.50		58.33	66.67
				their behavior making use of the knowledge of kinematics and kinetics	engineering problems.	participation in class and written exam													
		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
		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.		50	50	75	75	75	75	75	75	100	72.22	58.33	75.00	83.33
					To know the concept of function of two variables, three variables and variable n. to														
	211 MULTIVARIABLE CALCULUS	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 perimetring technica	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	66.67	66.67	75.00
		1, 6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7, 6.1	situations.	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
		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 liustrate the solutions in the complex plane.					50	75	75	50	75	100	70.83		66.67	75.00 54
		1	1.2, 1.5, 1.7, 1.3	To use the Laplace transform to obtain the transfer function of a (mechanic and	To solve linear equations using the Laplace transform by applying the corresponding theorems.	Solution class exercises and homework to deliver				50	75	100	75	75	100	79.17		75.00	83.33
		1	1.2, 1.5, 1.7, 1.3	electric) linear system to analize the system's behavior before different input signals.	To analyze and solve the equations of an electrical and mechanical circuit mesh and node analysis to obtain the transfer function.	individually, participation and written exam				50	50	75	50	50	75	58.33		58.33	58.33
				To determine the representation of a	To know the State space method to analyze														

			1.1, 1.2, 1.3,	To apply the calculus of a vector valued	To solve problems with vector functions,to															
		1,6	1.5, 1.6, 1.7 , 6.1	functions to interpret and solve technical situations that require trajectory models.	know how to interpret the results, and to parametrize curves in the plane and space.		50	50	75	75	75	75	75	75	100	72.22	58.33	75.00	83.33	
					To know the concept of function of two variables, three variables and variable n, to know how to determine the domain and	Solution class exercises														
		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	image of a function, to make the graph of a function of two variables, to know the concents of limit continuity and	and homework to deliver individually, participation	50	75	75	50	75	75	50	75	100	69.44	66.67	66.67	75.00	
				variables (limits, partial derivates and multiple integration) in the interpretation and solution of basic engineering technical	differentiability, to use these concepts in real problems of optimization.	and written exam														
		1,6	1.1, 1.2, 1.3, 1.5, 1.6, 1.7,	situations.	To apply the concepts of multiple integration, change in polar, cylindrical and spherical		0	75	75	50	75	75	50	75	75	61.11	50.00	66.67	66.67	
			6.1		coordinates. Io apply these topics to solve area and volume problems.			2014-1			2014-2			2015-1			OUTCOME	OUTCOME		
		GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES To understand and apply the operations, Techniterstandershapply thetoperations,	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1 S	STUDENT 2 S	STUDENT 3 S	TUDENT 1 S	TUDENT 2 8	STUDENT 3	AVERAGE	WERAGE 2014-	AVERAGE	OUTCOME AVERAGE 2015-1	
		1	¹ ,72, 1.5, 1.7, 1,12 ² ,1,13 ⁵ ,1,15 ⁷ ,	techniquscanahoboopleoplishbebwecko miliapiaeteamineuangiteknipidateshaakwas of interdanturangiaeteshaniset.siteateans the	desplet displetions, with qualities and to pressive in the second					50 50	75 75	75 75	100 50 50	80 75 75	40 100 100	70.83 70.83		66.67 66.67	75.00	
		1	1.7	operations. distributions.	to be moveled with a particular distribution GRA Resp Design To solve linear equations using the Laplace	Homework and exam							100	60	40				66.67	
		1	1172, 11.5, 1.7, 1.2, 1.4, 1.6	To use the Laplace transform to obtain the To traesfer Laptaice to as forecter initiation relations for the start for the start of the	Hasher har which be using special pace hashers by applying the corresponding he analyzes the study cases of such	Solution class exercises adultion class decretelises				50 50	75 75	100 100	1/80 75 100	1/080 75 100	160 100 40	99.99 79.17 80.00		75.00 75.00	89.99 83.33 80.00	
	231 SIGNAL 25N-54/55(6)	1	1.2, 1.5, 1.7, 1.2, 1 ,9 , 1.7, 1.2, 1 ,9 , 1.7, 1.2, 1,4, 1.6	processing belausical spirvate of data processing specifically sonvertile factures wesigned of sciences and engineering	As a half zer and solve the equations of an As a half with the head of a solution of a hold and the solution of a head of the solution of a hold and the solution of a head of the solution of a head of the solution of a head of the solution of the solu	indigide allyttparticipation and written exam				50 50	50 50	75 75	50 1500	50 1500	75 46	58.33 58.33		58.33 58.33	58.33 88.00	
	ANALYSIS	1	1.2, 1.3, 1.4, 1,5, 1,7	To determine the representation of a	hode analysis to obtain the transfer function. To know the State space method to analyze sostering, the know the second state in the state of the second state is the second state of the second state is the second state of the	Laboratory							100	60	40				66.67	
		1,6 1, ¹ 6	1.4, 1.5, 1.7, 1 ₁ 24, 1 <mark>633</mark> , 1 <u>1</u> 47, 1.5, 1 ₆ 73	system in an erane-spirate and autor of a an and the spirate states of the spirate states of a an an a	Helternersville territikender of an sent flassake helteriggions iftotratistisfamfotiation to stateke conversions i from dransfer function to state.	Homework and exam				50 50	75 75	75 75	50 1 90	75 99	75 1 8	66.67 66.67		66.67 66.67	66.67 68:87	
		1	1.2, 1.3, 1.4, 1.5, 1.7	analyze the system's behavior.	To know the mathematical foundation of the	Project equipment.							100	80	40				73.33	
		1,6 1,6	1.4, 1.0, 0.1, 1.4, 16.9, 6.1, 6.4	To apply the Pouner series and transform To represent signals and to interpret them.	Founderstreen also and the second sec	deflivejejcbequidpotentent deliværgi ekpodacement and exposure				50 50	75 75	100 100	0	75 75 75	100 100	66.67 66.67		75.00 75.00	58.33 58.33	
		1	1.4	To use numerical, algebraic and analytic representation techniques that allow the student to represent real-world issues in a	He makes the vector determination and	Homeworks, solution of							60	75	100	78.33			78.33	
		1:8	1.1, 1.2, 1.3, 1.1 1.4,26.1 .3,	Topeobic proformations in conversion of the conv	calculation Fle apphptine kituavled gitsoficionalet theoritatio Solversing the view interficted gitsoff containing to the	exercises in class, tests							75	75	75	62.5		58.33	25:87	
	239	1;4	1.4, 4.1	semiconductor devices. To comprehend the behavior of	solvetdiaties configurations, BJT, JFET.	Practical examinations,				50 50	50 50	75 75	50 50	75 75	75 75	62.5		58.33	66.67	
	ELECTRONICS ELECTRONICS	1 1 1	1.1, 1.2 , 1.4, 1.1, 1. 2	seromopoletemcideedeshanderdhe selfbesoreducternijseroseseaddriftequency. influence of temperature and frequency.	To Bun Bigsefigithation Remodel the behavior To Bun Down Boo catalons and an appropriate notation to solve engineering problems	Priactoratexyeanud alircatis, lapurojetotnyracticiasal project practices				25 50 50	50 75 75	75 75	25 75	75 75	100100	75 75 52.78		66.67 66.67 50.00	83.33 83.33 66.67	
		1, 4 1,14	1.1, 1.2, 1.4, 1.11, 6,21 ,1.4,	To understand the principle of voltage and concentrationship/cities, principless(theltage and floctest any phytication, lattives almost starting	To interact the difference of productions for					50 50	75 75	100	50	75 75	75,00	75 697514		75.00 75.00	75.00 \$6.60	
		1.6	16.61.64	rfecesphysical colatibe to for pleptications in engineering through the concept of integration	To use computer algebra systems to seelerate the symbolic computation to	Homework, review	50	75	100	50	75	100	50	75	100	75.00	75.00	83.33	66.67	
		1,0	1.1		highetionialate site equations of a in aghetionialate site equations of a magnetionialate site elevation and magnetic faith and site elevations for the site of	In-class exercises and	00	10	100	25	50	75 ==	25	50	100	50-00	10.00	74.00	79.00	
		I	1.2		revolution models 12 He solves two-degrees of freedom madhetschostswo-degrees of freedom	In-classresevorkes and homeworks				23 95 95	30 75 75	15 52 52	20 96	30 80 80	61	76.50		72.00	79.00	
		1	1.2 1.1, 1.2, 1.6, 1.9	To represent the solution of engineering problems in an analytical and systematic.	magnet circuits the websites the precision of the models using are the models using	Reports of the computer				90	83	43	96	80	61	75.50 77.78		90.68	58.33	
	237 ELECTRICAL	1	1.3	way water a second seco	Exercise in the second	simulation models				100 100	80 80	90 90				90.00 759 0 000		90.00 75.00	58.33	
	23MBORDVIRSOAL MACHINES I	1	1.4	veelactriablueine toytipe enansternonational of electrical energy veheaomenon and viceversa	energy to mechanical and vice versile Direct-					90 90	83 83	43 43	96 96	80 80	61 61	75.50 75.50		72.00	79.00	
		1	1.5 1.1 1.5 .3,		He develops the equations for kinematics of Content and the structure of the Direct content and a rout both which are subject content and state content and the subject to the type of movement, specified to solve	In-class exercises and In-clasereneroises and				75 95	75 75	0 52	100 96	75 ₈₀	50 61	6278950		74.00 7 60 0	79.00 79.00	
Ш			1.6 1.6	To analyze the position, velocity and acceleration of particles and rigid bodies,	Comparison of electrical engineering and commercial avior of electrical fischeres the sentismering the international ectrical He develops the equations for kinetics of machines by engineering disprame	homeworks Solution of exercises in				95	75	52 75	96 100	80 75	61 75	76.50		83.33 83.33	83.33 83.33	
		1	1.3, 1,5 , 1.4 1.7	which are subject to the type of motion, specified to determine and understand their behavior making use of the	Marther Holdens electrometer and systems that young with a system state of the systems and a serie of the system state of the systems	homeworks, participation in class and				75 ¹⁰⁰ 100	50 75 75	50 75 75 75	75 ¹⁰⁰ 100	75 75 75 75	50 50 75 75	83.33 62.50 83.33		85.33 83.33	85.57 83.33	
_		1	1.4	knowledge of kinematics and kinetics	He interprets and solves algebraic functions by calculation tools.	written exam				75	75	50	100	75	75	75.00		66.67	83.33	
		1	1.3, 4.2 1.3, 4.2	To kelevtaphelesigticesystemperations and deelectoppeetuofatidasystemperations for the states	Be solves provident by the arts of the solution at the solution of the solutio		100 100	75 75					70 75	100 100	50 58	79 66-67 79 79 79	87.5 87.5		73.33 99.93 73.33	
h			1.3, 4.2 1.3, 4.2	de vesing rainet bladt and atter to rootestes using dire tetatmidgets ect control techniques.	the duterinaties the seture to the English from Systemernational System to the English		100 100	75 75					100 100	70 70	70 70	83 83	87.5 87.5		80.00 80.00	
	249 AUTOBRITION I	1,6 1,4	12 13 12	functions to interpret and solve technical situations that require trajectory models.	He on we stands to we we we we want to be a stand of the stands of the stands of the stand of th	Final Review Final Review	50 75	80 25					1 /35 0 100	96 50	199 0 50	60 60	5 5 03 50		88.83 66.67	
	AUTOMATION I		1.2, 4.2, 4.3, 1.2, 4.2 , 4.3,	hydfouideratify, understand and design hydfouideratify, prælenationæantidolesjeterns hytörouigh ähelopeticati atjurædirdæbinsystelens	He solves and interpret correctly engineering Backnewstap point option four distribution of the solution participation of the solution of th		75 75	25 25					50 50	70 70	70 70	58 58	50 50		63.33 63.33	
\geq		1,6	4.4 1.2, 4.2, 4.3, 1.5, 4.5, 4.3,	thapplight the automation and includes a second sec	Resultive inclusion to the conversion and ering	Solution class exercises and homework to deliver	50	25					1699	78	f9 0	59	68.67		78.00	
			4:5	tha calculus of functions of several variables (limits, partial derivates and multiple integration) in the interpretation	equisions of initiation of the second	and written exam	50	25					100	70	50	59	37.5		73.33	
			1.2, 1.3, 1.5, 1,2, 1,3, 1.5,	and solution of basic engineering technical To determine and attraction of randotetevariables dratted vittes to be be avior of	Problems of optimization. He identifies the components of a magnetic.	Henry and an inv	100	70 70	50 50	100	70 70	50 50	100	50 50	50 50	71.11	73.33	73.33	66.67	
		1,6	1125.1126.1157. 1.2, 1681 1.5,	randdellivgriab/escantse fittse stagleerof/the modelling, bydistränstiofithe well-known distributions	Epinge in polar, cylindrical and spherical Ecological appropriate sympols for electrical systems appropriate sympols for electrical anatomic appropriate sympols for electrical	Homework and review	100	75 100 100	75 50 50	50 100 100	75 100 100	75 50 50	50 70 70	75 70 70	75 50 50	76.67 76.67	50.00 83.33 83.33	66.67 83.33 83.33	66.67 63.33 63.33	
	248 ELECTRICAL		1.2, 1.4, 1.6 1.2, 1.4, 1.6	To use statistical software for data processing, statistical software rie pdatages	Herefaltings his functions and specific role in a team of the fulfills his functions and specific role in a	Laboratory	100 100	70 70	50 50	100 100	50 50	50 50	100 100	50 50	50 50	68.89 68.89	73.33 73.33	66.67 66.67	66.67 66.67	
	2484-6CHONE8CIAL MACHINES II	1	1.2, 1.4, 1.6 1.2, 1.4, 1.6	tednig0ed and approve operationaps tednig0ed ancicintegrabetwearpering numbers and complex functions to	the tanget is a light of the second s	Laboratory	100 100	70 70	70 70	100	70 70	70 70	100	70 70	70 70	80.00	80.00 80.00	80.00 80.00	80.00 80.00	
		I	1.9, 1.3, 1.4, 1.5, 1.7	interpret and solve technical situations that real/time titles on datasets and otder to be an arbitrary of the solution of the	becide and the specific operation of the equipment	Homework and review	100 100	50 50	70 70	100 100	78 70	18 70	100 100	100 100	70 70	81.11 81.11	73.33 73.33	88:86 80.00	90.00	
		1	1.2, 1.3, 1.4, 1152, 1125, 1147, 1.6, 1173	able to make the catons approximation of inference processes. To use the Laplace transform to obtain the	He uses the tools offered by MAILAB Fortuble Incertaintoffional up ing the Alapisate both for an entropy and the anti-anti-approximation	Homework and review Solution class exercises	70 70	70 70	50 50	70 50	50 30	50 1580	70 75	100 1739	50 1689	64.44 64.44	63.33 63.33	56.67 55.69	73.33 83.33	
			1.2, 1.5, 1.7	transter tunction of a (mechanic and electric) linear system to analize the system's behavior before different input	theorysites. To analyze and solve the equations of an	and homework to deliver individually, participation and written exam														
	855 ELECTRIC	1	1.2, 1.4 , 1.6, 1.24.1,44.3.6,	To know how to user and design and the state of the second state o	Pletkrisals and the homes of errital or mananals and a approximation of the second s		60 60	60 60	100 100	50 40 40	50 75 75	75 75 75	50 100 100	50 50 50	75 50 50	67.78	73.33 73.33	58.33 63.33 63.33	58.33 66.67 66.67	
	SYSTEM DESIGN	1, 4 1, 4 1, 6	4.1, 4.3	andersal sciotter application sign electrical societarian star application sign and a societaria societarian sign application sign and societarial societarian sign application sign and societarial	installation of the state space method to analyze be knows to the description of this telebhigatematter tass that fundation pand to make	Review exam Review exam	40	75	75	50	75	1759	1500	76	76	67.22	63.33	86.67	66.67	
			4. 6 , 3 .3	analyze the systems behavior.	charterations tablet transfer function to state- space and viceversa.								-							
		1,6	1.4, 1.6, 6.9,	To apply the Fourier series and transform	Technom the mathematical foundation of the Fourier segiges as well as their properties	Project equipment, delivery of a document	80	80	70	98	9 8	180	90	79	19 0	75 .59	76.67	76.67	78 :33	
			0:4	To apply the concept of frequency response to the design of planterments	and convergence of Fourier series To appropriately choose a controller.	and exposure. Practices reports	70	60	40	80	70	50	80	60	50	62.22	56.67	66.67	63.33	
		1	1.1, 1.3, 1.4	systemsa from specialized tools.	To interpret the frequency response experimental data toidentify models.		70	60	50	70	60	50	70	60	50	60.00	60.00	60.00	60.00	
		1, 4	4, 4, 4, 13,	the analysis of circuits composed of semiconductor devices.	In apply the knowledge of circuit theory to lointerpret the control systems as hiters. solve diodes configurations, BJT, JFET. To interpret the advantages of a particular		80	70	50	80 50	60 50	60 75	80 50	60 75	40	64.44	66.67	68.03	68.87	
	861 CONTROL II	1	1.6, 3.2 1.1, 1.2, 1.4, 1.4 1.6 3 1	To comprehend the behavior of semiconductor devices under the influence of temporative and foreverse.	Tesing and to choose alternative solutions.	Practical examinations, laboratory and final	70 80	70 50	50 40	80 70	80 70	50 60	70	70 60	60 50	66.67	63.33 56.67	70.00 66.67 66.67	66.67 83.33 60.00	
		4.2	1.4, 1.2, 1.54	To upper the dinaid of the din	system's response. To interpret the frequency response as the To http://www.combourditions.for	Ine#Manshiltficitoppoject	80	50	50	70	· 75	~ 75	70	-~ 75 50	~~100 60	56.67	53.32	56.67	60.00	
		+, 4	1.8, 4.1 1.1, 1.3, 1.5,	necessary calculation to implement them.	different or of the state variable to the control		80	70	60	50 80	75	-100 50	50 80		100	66.67	70.00	66.67	63.32	
			3.1		systems' analysis and design. To modify appropriately the method for non		80	60	50	80	60	40	80	70	50	63.33	63.33	60.00	66.67	
			3-4-1-2		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	
			1.1, 1.2 , 1.6, 4.3		He solves two degrees of freedom Regeletwergheidsidentifies how a PID works		75	100	100	60 90	100 83	100 43	100 96	100 80	75 61	9075050	91.67	72.00 86.67	79.00 91.67	
			1.2, 1,4 ₃ 1.6, 4.1, 4.3	To know and understand the use of and and the use of a state of the st	His chebuldandagnetic flopenydel@lbing eppiledingd@lbC He knows correctly, programming in ladity	Reports of the computer simulation models	60	75	100	75 100	100 80	75 90	100	100	75	84.44	78.33	89.89	91.67	
	269 AUTOMATION II	1 \$4	1.2, 1.4, 1.0, 4.1, 4,4 1.2, 1.4, 1.6	vectoreactive of their association of electrical energy phenomenon and	1.4 He builds matternation of electrical Heiden bing and the state of	Final Proyect	40	60	100	40	60	100	75	75	50	66.67	66.67	66.67 72.00	66.67 79.00	
			4.1, 4.5	To identify, research and design	real automation problem that he may find 1.5 He analyzes the responses of the Direct- Current machines with different	In-class exercises and	40	75	75	40 90	75 83	75 43	75 96	75 80	50 61	04.44	tt3.33	ti3.33 74.00	79.00	
			1.2, 1.4, 1.6, 4.1, 4.6 1.6	Automation Engineering problems by means of programmable logic controllers.	a PLC connections and connections a PLC connection 1.6 He represents the behavior of electrical	homeworks	60	100	75	⁶⁰ 95	100 75	100 52	⁷⁵ 96	100 80	⁷⁵ 61	82778850	78.33	86.67	83.33	
			1.7		machines by engineering diagrams. 1.7 He models electromechanical systems					100	75	75	100	75	75	83.33		83.33	83.33	
					using amerential equations					100	75	75	100	75	75	83.33			4	55
			1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the	He knows and identify the International System of Units.		100	75					70	100	50	79	87.5		73.33	,,
			1.3, 4.2	deveolpment of automatic optients for the using direct and indirect control	He dominates the conversion of units from the International System to the English		100	75					100	70	70	83	87.5		80.00	
			1.2, 1.3, 4.2,	tecnniques.	System. He understands correctly the behaviour of	Einel Deul	75	25					100	50	50	60	50		66 67	
		1,4	4.4	To identify, understand and design	fluid mechanics. He solves and interpret correctly engineering	Hinal Review		20						30					50.07	
			4.4	through theoretical - practical models	problems applied to the conditions of equilibrium in fluids at rest.		75	25					50	70	70	58	50		63.33	

	271 INSTRUMENTATIO	1	1.2, 1.4, 1.6	To apply the basic sciences and selection engineering knowledge, calculus and sizing of the physical process variable	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
	NI		1.2, 1.4, 1.6	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		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	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	comprehend the way in which these machines operate.	He represents the structure and movement of robots manipulators using mathematical models		100						100	100	75	93.75	100		91.67
	291		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
	N II	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	80.00	91.67	80.00
	299		1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7	To analyze, desing and implement position	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
\triangleleft	SERVOMECHANIS	1	1.1, 1.2, 1.3, 1.4, 1.5, 1.6,	and speed control systems for industrial applications through the development of	To mathematically model the components of	exam						76	75	0	75	69.44	83.33	75.00	50.00
			17	prototypes.	To implement the requested drivers	Project	100	/5	/5	/5	/5	/5	100	75	100	94 44	100.00	91.67	91.67
			1.0		to implement the requestes silvers	1 TOJOCK	100	100	100	100	75	100							
~			1.2		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	06	70	100	01		100	05		90.56	88.67	90.00	90.00
			1.3		He identifies the transient response of	In class lectures and	100	50	,0	100	0.5	0.5	100	0.5	05	05.50	90.00	90.00	90.00
	85 SPECIALITY		1.4	 To identify the dynamic response of the systems that behave in a way that can de systems that behave in a way that can de 	He analyzes and identifies the parameters that determine the transient response of a	Middle projects	100	100	70	100	85	85	100	85	85	90.00	93.67	90.00	90.00
	OPTIONAL COURSE	1		differential equation. To identify what	mechatronic system	Expersion and	100	96	85	100	85	85	100	85	85	91.22			
			1.5	of the transient response.	mechatronic systems	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	Excercise and											70.00	90.00	90.00
					differential equations	homework	100	40	70	100	85	85	100	85	85	83.33			
			1.4, 3.1		To recognize and apply the basic filters to					100	60	40	100	75	60	72.50		66.67	78.33
		13	1431	To apply and anlyze the computer vision basic knowledge to modify a digital image through	Improve a digital image.	exam				100	75	60	100	100	100	89.17		78.33	100.00
		- ,,	14.21	specialized software.	To recognize the importance of the types of					100	60		100	60	60	72.22		72.00	79.99
			1.4, 3.1		neighborhood and its relation to local filters.					100	60	60	100	60	60	73.33		/3.33	73.33
	364 COMPUTER VISION	1	1.6		sequence.					100	100	75	100	100	100	95.83		91.67	100.00
			1.4, 3.1, 3.2	To design a capture and real-time image	best possible stage to image improvement.					100	60	40	100	75	75	75.00		66.67	83.33
		1, 3	1.4, 1.6, 1.7, 3.1, 3.2	processing system to solve an application of the specified problem.	To apply the appropriately tools to extract information of an image.	practices and exam				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 failir	ng general perfo	ormance indic
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDE NT 1	STUDE NT 2	STUDE NT 3	STUDE NT 1	STUDE NT 2	STUDE NT 3	STUDE NT 1	STUDE NT 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	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.	project	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.



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

STUDENT OU I'm able to design compone in order to meet specific r	UTCOME onts, systems and automat needs and propose suitable	1 ed processes e solutions.			40 48 12	48% succed SO3 ir 75% level an 40% ii 100%.	n a n a	82	77.24	
Apply and	use the	knowle	edge d	of n	nather	natics,	basic	c sc	cience	and
engineering	to design	and c	carry c	out r	eseard	ch, app	olicatic	on, t	echnolo	gical
and social	innovation	projects	using	spe	cialize	ed metl	hods	and	technic	ques.
I can formulate solutions to systems and processes con the improvement of the glob Analysis t using c	problems of automation, nsidering the impact and c pal, economic, environmen urrent tools and technique	components, ontributing to tal and social s.			36 36 28	36% succed SO4 ir 100% and 36% in a	n a 75%	77	78.79	

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 recognizing individual and cultural differences to live responsibly in beside on the other and outling standards to promote sustainable of the other and physics. The reference and outling standards to promote sustainable of the other and other development. 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 Machine Juille The Strical System Design, Control 41, Automation II, Instrumentation, engineering in a multicultural context. 75% and 28% in a 100% 72 Servomechanism and Computer Vision, just to mention a ferm. 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. I'm continuously seek ways for upgraditing my knowledge to

environment. Conclusion and future actions:

improve their development, adapting to the changing needs of the

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



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.

										2014-2			2015-1					
	GENERAL QUICOMES OUTCOMES	GENERAL INDICATORS INDICATORS	ESPECIFIC OUTCOMES ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS ESPECIFIC INDICATORS	ASSESSMENT ASSESSMENT	STUDENT STUDENT	STUDENT STUDENT 2	STUDENT STUDENT 3	STUDENT STUDENT 1	STUDENT STUDENT 2	STUDENT STUDENT 3	STUDENT STUDENT	STUDENT STUDENT 2	STUDENT STUDENT 3	AVERAGE AVERAGE	000580000E AV2884GE 2014-1	ØUFBORE AVERVIGE 2014-2	0058066 A28566E 2015-1
			To analyze the social reality in Latin Avaenatyze thesecolarisedity circlared Avaenation of der I dentityesstmittarle and the publication of the social standal reaches the publication agriculture and social reaches the publication of the social standal reaches the publication of the social standard standards the social state of the social standard state of the social social state of the social state of the social state of the social social state of the social state of the social state of the social social state of the social state of the so	He identifies the impact the present educational tanlatstifies therinipsptofes signal training tional contexts have on his professional training.		75 75	75 75	50 50	100 100	75 75	50 50	100 100	50 50	50 50	69.44 69.44	75.00 75.00	75.00 75.00	66.67 66.67
208 UNIVERSITY	257	2.2, 2.3, 5.2,	To identify the problems that exist in his environmention the problems that exist in his environmention to problem that the problem is a sub- train monoral of a sub-sub-sub-sub-sub-sub-sub-sub-sub-sub-	He is aware of the environment where he lives alledisvolvare of the environment where he lives and works	Homework, tests,	100 100	75 75	75 75	100 100	100 100	75 75	100 100	100 100	50 50	86.11 86.11	83.33 83.33	91.67 91.67	83.33 83.33
200901996451Yy AND SOCIETY	2, 5, 7	82, 23, 52 , 53, 53, 53, 53, 71, 73	the provide dge wehst discipline and the the knowle dge of principline and the To know and thick principles in elements	He integrates other disciplines' vision He integrates other disciplines' vision	Hom enroject	75 75	50 50	50 50	75 75	75 75	50 50	100 100	75 75	50 50	66.67 66.67	58.33 58.33	75.00 75.00	75.00 75.00
			The know and aleasy arite an hain section as the section of the se	He analyzes political, economic and social models Heaartilyzesysplitical, economic and social models in a critical way		100 100	75 75	25 25	100 100	75 75	50 50	100 100	75 75	25 25	69.44 69.44	66.67 66.67	75.00 75.00	66.67 66.67
			ptblessistaka are impactientisational with an and a second strand and the second strand and the second strand second strand second seco	He knows the ethics principles of his profession He knows the ethics principles of his profession		75 75	75 75	50 50	100 100	75 75	50 50	100 100	75 75	50 50	72.22 72.22	75.00 75.00	75.00 75.00	75.00 75.00
		2.1, 2.3, 2.5 2.1, 2.3, 2.5	To collaborate in multi-disciplinary teams	He plays roles according to what is needed He plays roles according to what is needed	Photography	100 100	100 100	60 60	100 100	100 100	80 80	100 100	100 100	80 80	91.11 91.11	86.67 86.67	93.33 93.33	93.33 93.33
1418 ARTISTIC	2	2.1, 2.2, 2.3, 2.1, 2.5 , 2.3, 2.5	to produce and guide of the second se	He integrates and participates in collective bitivitiegrates and participates in collective activities	Prestrigition exhibition	100 100	100 100	80 80	100 100	100 100	100 100	100 100	80 80	100 100	95.56 95.56	93.33 93.33	100.00 100.00	93.33 93.33
1418" MEMMETIC GRANNIEL COURSE	2, 5, 6 2, 5, 6	2.1, 2.3, 5.2, 2.1, 8,3 , 5.2, 6.4	To expand the possibilities of the field of stabilishmantic/parabilities of the field of stabilishmantic/paratottes/indessfarding/ offerdolhalettabaspeeddseggideetlynghie job tifferriox/elandetarlangs to engineering in the mexican territory.	To debate and discuss the proposed ideas before diversed to the proposed ideas before diverse disciplines.	Foro de discusión Foro de discusión						85 85	100 100	70 70	70 70	81.25 81.25		92.50 92.50	80.00 80.00
217 DYNAMICS 217 DYNAMICS	2 2	2.1, 2.5 2.1, 2.5	To apply the student's knowledge of this Solippt \distuzydantias Knokledge of this solipst \distuzydantias Knokledge of this solipst \distuzydantias knowledge by work geoups.	He establishes roles according to his abilities for the devalighmenrolratacpooling to his abilities for the development of the project.	Project in teams, Project in teams, Handheat and diskinsent and Hiskergation. presentation.				50 50	75 75	50 50	100 100	75 75	50 50	66.67 66.67	50.00 50.00	75.00 75.00	75.00 75.00
	2	2.1 2.1		2.1 He interprets the instructions and organizes Bis telerinterpretsel/theirpstactitions and organizes					100	80	90	100	80	90	90.00 90.00		90.00 90.00	90.00 90.00
	2	2.2 2.2		2.2 He interprets the features of the instruments and defines the accuracy of each test	Laboratory				100	80 90	90 90	100	80 90	90 90	93.33 93.33		93.33 93.33	93.33 93.33
244 ELECTRICAL MACHINES I	2, 4	2.3, 4.3 2.3, 4.3	To understand the principles of Direct- Coursedersbacktaedgeoigratoos Directions Coursed their different condigionations and their different configurations	2.3 He presents the solution of a physical problem 2/dfh/Hsptresisrt/satharea/wtidato/é acphysicat/peoblem withmithettools that are available to him at the momenta tion with his characteristics.	sessions' reports				100	90	90	100	90	90	93.33 93.33		93.33 93.33	93.33 93.33
	2, 4	2.4, 4.1 2.4, 4.1		2:44 ne variations, with this classifiates, the 2:44 net initial interest and the support the laboratory test.					100	90 90	90	100	90	90	93.33 93.33		93.33 93.33	93.33 93.33
	2 2	2.5 2.5		2.5 He differentiates the roles that each person Bi5stteldijfertextiateistha potyschiat teach sperson must play when doing a project in teams.	Project's final Repject's final report				100	80 80	80 80	100	80	80 80	86.67 86.67		86.67 86.67	86.67 86.67
		2.1, 2.2, 3.2, 2.1, 2.2 , 3.2,	To analyze, design and test electronic	He analyzes, designs and tests electronic circuits He analyzes, based us an the tost selectronic circuits He develops based on with over the develops based on the tost of tos	Partial exams	100 100	80 80	60 60	80 80	80 80	40 40 60	80 80	60 60 80	40 40 40	68.89 73.33	73.33 73.33 73.33	66.67 66.67 73.33	60.00 60.00
343 DIGITAL	2.3	3.3 2.2, 3.1, 3.2, 2.2, 3.8 , 3.2,	systempare session time obsystems of a systems to solution obsystems that solutions the engine deling polytochoss bless solutions to pengilized is gfurablems, using specialized software	He develops diagramsasseng microsystems as his bases He compiles codes with specialized software He designs printed circuits following the design	Partarekanys, sessions projects and final projects	100 100 100	80 80 80	60 60 60	80 100 100	80 80 80	60 60 60	80 100 100	80 80 80	40 40 40	77.78 77.78	73.33 80.00 80.00	73.33 80.00 80.00	66.67 73.33 73.33 66.67
MICROSYSTEMS	2, 3	3.3	To document the development of	He uses graching to the straight of the states of the second seco		80	60	60	80	60	40	80	80	40		66.67	60.00	66.67
		2.5, 3.3 2.5, 3.3	Torukacentetetti bi badagedapi fanttibé formvateti dhofsposisigle sæd ribothsøy foran labib die granssi skelsenhaltanertig desk teetss sraffeliggaren sfysterisitikær and desk teeftsarmeking use of specialized	biejdotsumentiatibes/taryslepsions.of/developed and/red projects and februation assessions:titikeeloped in the format of a work portfolio	Laboratory sessions/mappins, repsilend/wijdetsm repsilend/wijdetsm repsilend/set/mijdetsm repsilend/set/mijdetsm portfolio of projects	100 100	60 60	40 40	80 80	60 60	40 40	80 80	80 80	40 40	64.44	60.00	60.00 60.00	66.67
			sottware.															

							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 RECONEICI IRABI	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		100	100	50	100	100	50	100	100	75	86.11	83.33	83.33	91.67
E LOGIC - SISTEMAS DIGITALES I	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	Final project	50	75	75	50	50	75	75	75	100	69.44	66.67	66.67	83.33
			To identify the problems that exist in his environment to create innovative projects	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
INSTRUMENTACIÓN PARA CONTROL DE		2.1, 2.3, 2.5, 3.2	tifiat ordatobratesiwelisciplistary timehmusting this clipical dependences of the tiscipliate and the	He organizes and leads the different parts of the He integrates other disciplicities' vision		75	50	50	895	895	70 50	88o	7 95	65 50	74.17 66.67	80.00 58.33	76.67 75.00	71.67 75.00
PROCESOS (7)-AUTO	2,3	2.1, 2.3, 2.4, 2.5, 3.3	automation etisicarphinpipjests to solve a	He proposes solutions for the development of the project	⊢inai project				95	80	70	90	80	60	79.17	95.00	80.00	76.67
			that form and determine a human being's behavior on the basis of a historical	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
		2.1, 2.3, 2.4, 2.5, 7.3	moral conception of the events and how to collaborate in disciplinary and multi-	He thinks about his collaborative team					100	75	40	100	60	40	69.17	100.00	71.67	66.67
885 SOCIAL SERVICE	2, 7	2.1, 2.4, 2.5, 7.1, 7.3	disciplinary learns producing strategies to professional file from the history of ethics improve his social environment and in sciences.	He bosereden shippoint intersoft his patential of the second service program	Partial and final reports	75	75	50	100 75	75 75	50 60	100 60	100	50 40	72.22 68.33	75.00 75.00	75.00 65.00	75.00 66.67
		2.1, 2.2, 2.4, 7.1, 7.3	continuously updating his knowledge of his discipline.	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
		2.1, 2.3, 2.5	To collaborate in multi-disciplinary teams	He plays roles according to what is needed		100	100	60	100	100	80	100	100	80	91.11	86.67	93.33	93.33
	2	2.1, 2.2, 2.3,	To be and organize human and multidiscitations group	He integrates and participates in collective activities	Photography Projecti where a process	100	100	80	100	100	100	100	80	100	95.56	93.33	100.00	93.33
290418 ARTISTIC INSTREMENTATIO	2	2.1, 2.3, 2.5	is conformed by Mecatronics, Electronics	To develop a project team in which at least one member is an student of Instrumentation and	implemented in a DTI should be	40	100	100	75	100	100	100	40	100	83.89	91.67	100.00	80.00
A II COOKAL	2, 5, 6	2.1, 2.3, 5.2,	BladasfandAtopyparaintierstanthis field of betogwerts and better the participation of the second sec	To debate and discuss the proposed ideas before diverse disciplines	with as seen on Forthatectiscssión						85	100	70	70	81.25		92.50	80.00
			offer in related areas to engineering in the mexican territory.															
273 DIGITAL SYSTEMS WITH	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	Designed in America	100	100	50	100	100	50	100	100	75	86.11	83.33	83.33	91.67
E LOGIC - 217 SVSJAMOS DIGITALES I	2	2.5, 2.5	To apply the student's knowledge of this subjective withow's as a working uses for the dewald provide a student of the student of the groupsering problems	He establishes promoso pains data a billing for the development of the papelect.	hand in a document and make a presentation	50	75	75	59	575	<i>1</i> 59	79 0	715	1 50	699,447	689.690	685,690	875380
		2.2, 2.5		Material and methods. 2.1 He interprets the instructions and organizes		75	75	100	100	100		100	80	60	86.25	91.67	100.00	80.00
	2	2.1, 2.2, 2.4	To collaborate in disciplinary and	Restriction to model the practice		75	50	75	59,00	25 80	90	1100	ஆ	f	90.00 65.63	58.33	90.00 62.50	90.00 83.33
890 DEGREE SEMINAR	2, 4, 6	2.4, 4, 1, 4.2, 6.1, 6.3	multidisciplinary teams to formulate and execute research projects in automation	2.2 He interprets the features of the instruments and defines the accuracy of each test	Final project /thesis	50	50	75	50 100	25 90	90	166	89b	<u>6</u> 9	696,283	58.33	623536	893086
244 ELECTRICAL	2	2.2	to give solution according to the context. To understand the principles of Direct- Current motors and generators design	BiBibgraptsents the solution of a physical problem with the tools that are available to him at the	sessions' reports	75	50	75	75	75		100	90	60	75.00	66.67	87.50 93.33	83.33 93.33
MACHINEST	2,4	2.1, 2.3	and their different configurations	CYRROB/ Attitude. 2.4 He identifies with his classmates the		75	50	75	75100	75 90	90	100 100	矜	, 99	74.38	66.67	87.50	81.67
		2.4, 4.1		theoretical concepts that support the laboratory test					100	90	90	100	90	90	93.33		93.33	93.33
	2	2.1 2.5		He contributes to build a simulation model of a 2.5 He differentiates the roles that each person must play when doing a project in teams	Pr RiesEndiget he	100	96	70	100	85	85	100	85	85	89.56 86.67	88.67	90,00 86.67	90.00 86.67
		2.2		He interprets the specific rules of electrical, mechanical and pneumatic systems	simulation models	100	96	85	100 100	80 85	80 85	100 100	80 85	80 85	91.22	93.67	90.00	90.00
92 SPECIALITY OPTIONAL	2	21 22 32	 To integrate individual concepts, of elements and components, in complex problems that cannot be solved only by 	He uses the concept of energy conservation to He analyzes designs and lines electronic circuits based on microsystems	In-class exercises and homeworks	100	80	60	80	80	40	80	60	40	83:33)	7/28/988	966967	960,960
COURSE		3.3	ofie anglyzer deside ámendete lactorious systems rhas glóbal picepeysteens that	He develops diagrams using microsystems as his He identifies the improvements that can be	Resalistantia	100	80	60	80	80	60	80	80	40	73.33	73.33	73.33	66.67
		2.4	allow the formulation of possible solutions to engineering problems, using	applied to a mechatronic system to have a He cpositiles icoplast with the civilized software	ter#Parter#Part sessionseptid-term and final projects	1900	80 ₉₆	60 ₇₀	1980	80 ₈₅	60 ₈₅	1980	80 ₈₅	40,85	89.56 77.78	88.67 80.00	90.00 80.00	90.00 73.33
343 DIGITAL SYSTEMS II -	2, 3	2.9	specialized software.	He differentiates the release that with the based rules, specified by the software the using.	Individual evaluation	8 <u>0</u> 00	6096	6070	8 <u>0</u> 00	60 ₈₅	4085	8 <u>0</u> 00	8Q ₈₅	4085	894564	888.677	%b.9b	9 0 8097
		21 22 24	To document the development of	He documents the development of the firmware of projects and laboratory sessions, developed in the	Laboratory													
893 PROFESSIONAL	2,5,6	2.1, 2.3, 2.4, 5.32,6,13,6,3, 6.5	To collaborate in interdisciplinary teams formulations of possible solutions of means of dealers and dealers and dealers of dealers	He thinks about that acadeonic pertiblicquired to carry out a task	sessions' reports, reports of mid-term	100	60	40	199	160	<u>64</u> 0	190	79Ð	4 £b	7694.1474	60.00	860.970	7666977
INTERNSHIP	2,5	2.2, 2.5, 5.2, 5.3	testic unglich to the abor that eff, being aware of his environment and applying software his acquired knowledge.	He thinks about work competitiveness	portfoli800 projects				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:

											2015-1							
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	STUDEN T 1	STUDEN T 2	STUDEN T 3	OUTCOME AVERAGE	OUTCOM E AVERAGE 2014-1	OUTCOME AVERAGE 2014-2	OUTCOM E AVERAG E 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

Skale ppW and Generation and carry out research, application, technological and social innovation projects using specialized

methods and techniques

20 76 76 % success

4

0

76 % succed SO1 in a 75% level and 20% in a 79

73.86

75% level and 20% in a 100%

Student outcomes

indirect assessment.



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

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	36 36 28	36% succed SO4 in a 100% and 36% in a 75%	77	78.79
STUDENT COMIES 2		100% and 36% in a 75%		

Collaborate on disciplinary and multi-disciplinary teams to formulate and execute

projects oute au tomation cicululions	that are relevant to	sthe	context		
recognizing individual and cultural differences to live responsibly in the social and labor fields based on professional ethics and sticking		28	52% succed SO5 in a		
to the criteria and quality standards to promote sustainable		20	100% level and 28% in	83	77.38
development.			a 75%.		

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 the engineering in a multicultural context. This outcome has been shared with 5, 7 and the engineering in a multicultural 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 more ther development, adapting to the changing needs of the 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	GENERAL			ACCECCMENT	STUDENT 1	STUDENT 2	2014-1	STUDENT 1	STUDENT 2	2014-2	STUDENT 1	STUDENT 2	2015-1	OUTCOME	2014.1	2014.2	2015.1
	OUTCOMES	INDICATORS		ESPECIFIC INDICATORS	ASSESSMENT	STODENTT	STUDENT 2	STUDENT 3	STUDENTT	STUDENT 2	STUDENTS	STUDENT	STODENT 2	STUDENTS	AVERAGE	2014-1	2014-2	2010-1
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
		3.1, 4.2	To be able to model the	3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine					100	80	80	100	80	80	86.67		86.67	86.67
237 ELECTRICAL MACHINES I	3, 4	3.2, 4.2	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	3.2 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		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
		2.1, 2.2, 3.2, 3.3		He analyzes, designs and tests electronic circuits based on microsystems		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	To analyze, design and test electronic systems based on microsystems that allow the formulation of possible	He develops diagrams using microsystems as his bases	Partial exame	100	80	60	80	80	60	80	80	40	73.33	80.00	73.33	66.67
343 DIGITAL SYSTEMS II - MICROSYSTEMS	2, 3	2.2, 3.1, 3.2, 3.3	solutions to engineering problems, using specialized software.	He compiles codes with specialized software	laboratory sessions, mid-term and final projects	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	to document the development	following the design rules, specified by the software he is		80	60	60	80	60	40	80	80	40	64.44	66.67	60.00	66.67
		2.5, 3.3	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	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		100	75	75	75	100	75	100	100	100	88.89	83.33	83.33	100.00
RECONFIGURABL E LOGIC - SISTEMAS	3	3.2, 3.3	techniques for the digital	He develops advanced digital electronic circuits	Exam	75	100	25	100	75	50	100	75	75	75.00	66.67	75.00	83.33
DIGITALEST	3, 4	3.1, 4.1, 4.2	through simulation in order to	He simulates logic circuits with Verilog		100	50	75	75	75	50	100	100	75	77.78	75.00	66.67	91.67
289/1211 AUTOMATION II- INSTRUMENTATION	23	2.1, 2.3, 2.5, 3.2	To collaborate in disciplinary and multi-disciplinary teams to formulate and do	He organizes and leads the different parts of the project	Exam				80	80	70	80	70	65	74.17		76.67	71.67
FOR PROCESS CONTROL	2,5	2.1, 2.3, 2.4, 2.5, 3.3	automation research projects to solve a problem according to its context.	He proposes solutions for the development of the project	Exam				95	80	70	90	80	60	79.17		81.67	76.67
256	3,4	3.2, 4.3	To analyze, desing and implement position and speed	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
M	3	3.1, 3.2, 3.3	applications through the development of prototypes.	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
		1.4, 3.1		To recognize and apply the basic					100	60	40	100	75	60	72.50		66.67	78.33
		1.4, 3.1	To apply and anlyze the computer vision basic	To identify stages to digitalize an	-				100	75	60	100	100	100	89.17		78.33	100.00
		1.4, 3.1	knowledge to modify a digital image through specialized software.	To recognize the importance of the types of neighborhood and its relation to local filters.	Exam				100	60	60	100	60	60	73.33		73.33	73.33
as4 computer vision	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 design a capture and real- time image processing system to solve an application	To apply the appropriately tools to extract information of an image.	Practices and exam				100	40	40	100	60	60	66.67		60.00	73.33
		1.2, 1.6, 3.1, 3.2, 3.3	of the specified problem.	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
	satoury antone course 3	3.1	3. To justify, with engineering	He abstracts and summarizes the elements that make up a dynamic mechatronic system		100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
85 SPECIALITY OPTIONAL COURSE		3.2	criteria, how the parameters of a dynamic model are determined from real data of	He evaluates the effects that specific elements have on the dynamic response of a	Reports of the projects and simulations' results	100	96	85	100	85	85	100	85	85	91.22	93.67	90.00	90.00
		3.3	professional market and field	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 - MICROSYSTE MS	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 **3** indirect assessment.

	48			
Im able of collaborating on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are relevant to the context.	44 8	48 % succed SO2 in a 100% level and 44% in a 75%.	85	78.88



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

I can assess and take care of the problems facing to Sector and take care of the problems facing to be considered with the construction of the criteria and quality standards to promote su- development.	52 28 20	52% succed SO5 in a 100% level and 28% in a 75%.	83	77.38
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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 """ able of communicate my ideas, concepts and knowledge of a strong effort from the Engineering Dean, Institutional Rector a comparation of the Engineering Dean, Institutional Rector a comparation of 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 other and the model of the second composition of the Size of the second secon

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



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			
	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	To know the concepts: measurand, measurement principle, measurement signal, measurement procedure of	Examination of knowledge and exposure							100	100	75	91.67			100
	4, 5	4.1, 5.1	identify and describe property these 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.	magnitudes of influence and 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													
I COTTONIOS	oncs 1,4	1.1, 1.2,	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,				50	50	75	50	75	75	62.5		50	66.67
LC HONES		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	final project practices				50	75	100	50	75	100	75		62.5	75.00
	2, 4	2.3, 4.3	To understand the principles of Direct-	2.3 He presents the solution of a physical problem with the tools that are available to him at the moment	Laboratory				100	90	90	100	90	90	93.33		95	93.33
		2.4, 4.1	Current motors and generators design and their different configurations	2.4 He identifies, with his classmates, the theoretical concepts that support the laboratory test	reports				100	90	90	100	90	90	93.33		95	93.33
LECTRICAL ICHINES I		3.1, 4.2		3.1 He abstracts and summarizes the elements that make up a Direct-Current Machine					100	80	80	100	80	80	86.67		90	86.67
	3, 4	3.2, 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	3.2 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		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
		1.3, 4.2	To know and design electrohydraulic and electropneumatic systems for the	He knows and identify the International System of Units.		100	75					70	100	50	79			85
		1.3, 4.2	deveolpment of automatic processes using direct and indirect control techniques.	He dominates the conversion of units from the International System to the English System.		100	75					100	70	70	83			85
	1, 4	1.2, 1.3, 4.2, 4.4		He understands correctly the behaviour of fluid mechanics.	Final Review	75	25					100	50	50	60			75
	1, 4	1.2, 4.2, 4.3, 4.4	To identify, understand and design hydraulic and pneumatic control systems through theoretical - practical models applied to automation enzine	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	adomatori dignicoling.	He solves and interpret correctly engineering problems applied to the conditions of equilibrium in fluids in motion.		50	25					100	70	50	59			85
		4.2, 6.1, 6.3, 6.4	To study and analyze the main characteristics and functioning of the	To configure a signal conditioner with operational amplifier.		50	100	100	75	75	75	50	75	75	75.00	75	83.33	66.67

	2,4	2.4, 4.1	Current motors and generators design and their different configurations	2.4 He identifies, with his classmates, the theoretical concepts that support the laboratory test 3.1 He abstracts and	reports				100	90	90	100	90	90	93.33		95	93.33	
		3.1, 4.2	Te be able to model the baby ins of a Direct	summarizes the elements that make up a Direct-Current Machine	Departs of the				100	80	80	100	80	80	86.67		90	86.67	
	3, 4	3.2, 4.2	Current motor and generator and to distinguish how they can be used to control the velocity in the applications of automation	3.2 He evaluates the effects that the particular elements have in the dynamic response of a Direct-Current Machine	projects and simulations' results	_	2014.1		100	80	80	100	80	80	86.67		90	86.67	
a	ENERAL ITCOMES	GENERAL INDICATORS 3.3, 4.1	ESPECIFIC OUTCOMES To know the concente as measurend, the	3.3.He documents in an engineering formal report the results of the projects he does.	ASSESSMENT	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT 1 100	STUDENT 2 80	STUDENT 3 80	STUDENT 1 100	STUDENT 2 80	STUDENT 3 80	OUTCOME AVERACE 86.67	2014-1	2014-2 90	²⁰¹⁵⁻¹ 86.67	
		1.3, 4.2	To know and design electrohydraulic and	He knows and identify the International System of Units.		100	75					70	100	50	79			85	
	4, 5	1.3, 4.2 4.1, 5.1 1.2, 1.3,	Hreascheiment standards: calibration-and the drigshandendingt eactabling hinters. measurements, with the study of the terms in the International Vocabulary of Metrology, the	voitestingular intermeternal system to the English System.	Theory test	100	75					100	70 100	70	83			85 100	
IR AUTOMATION I	1, 4	4.2, 4.4	analysis of examples and articles for its application in specific problems at the industrianty understand design hydraulic to know the basic process to estimate the	beliavation of fluid mechanics. He solves and interpret correctly engineering problems	Final Review	75	25					50	50	70	58			60	
	4	4.3, 4.4 4.1, 4.2, 4.3 1.2, 4.2, 4.3, 4.5	and pneumatic control systems through " Healtherer" hubreathroad and approximation of the altern filling and the study of guide publications to estimate the measurement uncertainty (GUM).	applied to the conditions of Equidibutifuntheflaidscatsrest. Hestlaids/aft/antersterement StateCity engineering problems applied to the conditions of	Reading of articles	50	25					100	70	50	59			85	
		4.2, 6.1,	To develop the necessary knowledge for the analysis of circuits composed of Tentudwand analyze-the main	equilibrium in fluids in motion. To apply the knowledge of Enconflautry acianat diodes confliguer with operational	Practical	50	100	100	50 75	50 75	75 75	50 50	75 75	75	75.00	75	50 83.33	66.67 66.67	
	1, 4	6.5, 6.4 1.3, 1.4, 4.1 4.2, 6.1, 6.2	characteristics and functioning of the Operatienstandhtplifierisc(DRAMIRe)table aadic epplications) she soladil a solne guratissary tradudatione toriad plantile the time.	To implifications for the first state of the	laboratory and final project Theoretical practices exams and laboratory	50	75	100	50 75	75 50	100 100	50 50	75 75	75	72.22	62.5	62.5 75.00	75.00 75.00	
250 ADVANCED ELECTRONICS	4, 6	4.2, 6.1, 2.3 ,⊉ .3	To analyze the existence of frequency limitations of the OPAMP, just as the characteristics that are presented when	processing. 20345800000000000000000000000000000000000	practice	50	75	100	1 690	35	1999	1750	35	100	77.78	62.5	7 5 .90	9 3:33	
	2, 4	4.2, 6.1, 6.2 2.4, 4.1	Coupling stages the principles of Direct- Current motors and generators design and The study and a comparison of OPAMPs in the application of active filters circul account of the state	the moment Zoubyeld are the series on the son and series and on the son and series that support the	Laboratory Practical exalfilinations, laboratory and	50	75	100	50 100	75 90	100 90	75 100	75 90	75	75.00	62.5	75.00 95	83.33 93.33	
		4.2, 6.1, 6.2	of active filters, signal generators, sinusoidal oscillators and conditioning of analog signals.	Reference in a support free in	final project practices	50	75	100	50	75	100	75	75	75	75.00	62.5	75.00	83.33	
		3.1, 4.2 4.2, 4.4, 7.1	To designeatchradel the devariop of a clariter	make up a Direct-Current He knows how to use properly He electrical connection diagrams of dampe lamps and	Reports of the	75	100	100	75	100	80	100	80 75	50	86.11	87.5	90 91.67	91.67	
	3, 4 4, 7	3.2, 4.2	Ediment/watertheadrogimenationgno/coment for distinguistohage tigeneartibe asedtilstobation tiftahe leidchine threagpincatie studeatilstration professional environment and for benefit of	that the particular elements have in the dynamic response of a Direct-Current Machine He masters the basic concepts	projects and simulations' results				100	80	80	100	80				90	86.67	
853 ELECTRIC PYSTEM DESIGN		4.2, 4.4, 3.3, 4.1	society.	ôfeldetdocuroeitssindline basic enginerpiogéranaleregencity results of the projects he does.	Review exam	75	75	100	60 100	75 80	100 80	75 100	75 80	75	78.89	75	78.33 90	83.33 86.67	
		1:2, 1:4 1:6, 4:1, 4:3	To know and design electrohydraulic and Tektownewneticsesippofaetbematerials dateologicentefededgoodiceprocessestusing	He knows and identifien the main materials and equipment that make up an electrical Hetathation tes the conversion of	f	100 60	75 60	100	40	75	75	70 100	100 50	50	67.78	60	71.67	85 75.00	
	1, 4	1.3, 4.2 1:2, 1:5, 1:6, 4.1,	distense to the commercial industrial and residential problems in the current automation industry.	units from the International System to the English System. He knows the description and Use Ordestands fraterials that behaviour of fluid mechanics		100 7ð	75 2 5	75	40	75	100	100	70 50	50	67.22	57.5	63.33	85	
	1, 4	4.3 1.2, 4.2, 4.3, 4.4	To identify, understand and design hydraulic and pneumatic control systems through	Hake up an electrical number installation and interpret correctly engineering problems applied to the conditions of	Final Review	75	25					50	70					60	
6 Social and 2, man Sciences fonal Course	, 4, 5, 7	2.1, 4.4, 5.2, 4.2, 4.3, 4.5	If recerptional therapticabilities of a state shall be been of paramities shall be for a state of a culture that spreads gradually the job offer in related areas to engineering in the mexican territory.	equilibrium in fluids at rest. The suppost and interpretits with factors and interpretits with factors and interpretits and interpreting and interpreting applied to the conditions of equilibrium in fluids in motion.	Essay						85	85 100	85 70	70	81.25			85	
		4.2, 6.2, 6.8, 9.3	To know and understand the use of automation and analysis and most sees using characteristics and functionize of the	To configure a signal Hankawe-awaidopolitano haw a Riko-warks		5 9	199	199	7 9	750	755	£98	755	75	90.00	8755	88:8 7	ftb:570	
		1.2, 1.4, 1.6, 9, 1, 4.3	operational Amplifiers (DPAMPs), the basic applications and the related configurations that can be made with them.	To integrate the theoretical kteowdetigesianplatutices properly elefteetspleedateatogls@nal	Theoretical exams and laboratory	50	75	100	75	1500	17050	1500	1750	75	84.44	62.5	95.60	95.60	
9 AUTOMATION 8	1, 4 4, 6	1.2, 1.4, 1.6, 4.1, 4.24,6.1,	To analyze the existence of frequency In identity, research and design automation Initiations of the Oban and the second second	He knows correctly rookamming in laddinalyze the diagrams with a property of high	Final Proyect	40 50	60 75	100 100	40 50	60 75	100 100	75 75	75 75	50	66.67	50	66.67	83.33	
		1.6, 4.1,	To study and analyze the main	property any real automation problem that he may find to build prototypes based on He knows perfectly the inputs	Practical	40	75	75	40	75	75 100	75 75	75 75	50	64.44	57.5 62.5	63.33 75.00	75.00	
		1.6, 4.1, 4.2, 6.1,	characteristics of OPAMPs in the application of active filters, signal generators, sinusoidal oscillators and conditioning of analog signals.	and outputs of a PLC connection To filter and generate signals.	examinations, laboratory and final project	60 50	100 75	75	60 50	100 75	100	75	100 75	75	82.78	80 62.5	78.33 75.00	91.67 83.33	
		24.40	<u> </u>	He analyzes and synthesizes the elements of a problem for	practices	100	75	50	400	75	50	400	100	75	00.50	07 5	75.00	02.00	
	3, 4	3.1, 4.3 4.2, 4.4, 7 1	To design and carry out electric projects that	HE SCHUNG HE WIG BEADS AND A SCHUNG AND A SC	Exam	75	100	100	75	100	100	100	75	75	80.56	87.5	91.67	83.33 91.67	
270 DIGITAL	4 7	3.2, 4.3	nd incoverence and the second providence of the event of the event of the event of the second providence of the second pr	Handware	•	100	75	75	75	100	75	100	100	100	88.89	87.5	83.33	91.67	
SYSTEMS WITH CONFIGURATE CONFIGURATE CONFIGURATE CONFIGURATES I	4	4.3, 4.2	of the electric energy in the student's professional environment and for benefit of	He uses software for Man- Mechanters of the basic concepts		75	50	50	75	100	50	100	100	75	75.00	62.5	75.00	83.33	
	2, 4	7.1 2.1, 4.2		Please the provide the provide the providence of	Final project Review exam	75 100	75 100	100 50	60 100	75 100	100 50	75 100	75 100	75	86.11	75 100	78.33 83.33	83.33 83.33	
	3, 4	3.1, 4.1, 1.2, 2.4, 1.6, 4.1, 4.3	To debug digital circuits through simulation in order to make efficient the system of an automation project. To know how to use appropriate materials and tools to develop and design electrical	He knowstandogiantifiesith with Majorgnaterials and equipment that make up an electrical installation	Exam	100 60	50 60	75 100	75 40	75 75	50 75	100 100	100 50	75	77.78	75 60	75.00 71.67	83.33 75.00	
r Kollottics	1, 4 4	14 2, 1.4 , 1.6, 4.1, 4.3	Restrong for other and design releanced restrong and the standard standard standard standard early a called standard standard standard standard early a called standard standard standard standard early a called standard standard standard standard early standard standard standard standard standard standard early standard standard early standard	He differentiates between the various modes of operation and the knows the description and covorinate systems used in the uses of electrical materials that make up an electrical manufators.	Final project	100 40						100 100	100 50	75	93.75	100 57.5	63.33	100 83.33	
28()3311 ALFIOMATION II-	4.5	4.3, 4.4, 5.2	To formulate solutions to problems of የວອະຊຸຊອກເອີດເອດອອອອສາແລະ ອາຊາຈິດາອີດອີກອີກment ອາວຣາສາສະຊອງຖະເປີຊາທີ່ແລະການແລະເລີ້າ ເອີດອີກອີດເລື້ອງ	He identifies the components of a problem	Final arcticit				100	80	70	85	75	70	80.00		90.00	76.67	
NETRIMENTATION 2,	,º4,>5, 7	2.1, 4.4, 4.1, 4.2, 5.1	eentributies in the indexe wording of a teacheal, man sprue any indexe indexe wording of a teacheal, man sprue any index in the indexe and inclusion snesses to any indexnizy in the indexe and incly.	To support his arguments with factorsoand facts propriate tools to do the project	Essay				100	75	85 70	85 90	85 80	70	80.83		87.50	80.00	
		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		75	100	100	60	100	100	100	100	75	90.00	87.5	86.67	100.00	7(
	6 7	1.2, 1.4, 4.6, 4.2,		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	
4	, <u>,</u> , <i>,</i> 1, 4	6. 5 , 7.4, 1.6, 4.1,	To identify research and design Automation	He knows correctly programming in ladder	Final Proyect	40	60	100	40	60	100	75	75	50	66.67	50	66.67	83.33	
	4, 6	4.24,44.4, 6.2, 6.4,	To rominate sorations for aditionation from the soration of th	diagrams with an BL Cent. He identifies and formulates		75	50	100	50	50	76	100	75	75	71.88	62.5	66.67	87.50	
	4, 7	4.0, 4.2 , 4. 3.5 .3	and contributing to the improvement of the	property any real automation Evaluation project problem that he may find		7 9	5ð	100	100	7 5	/5	100	58	袑	81:25	62.5	81:67	68:88	

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
	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
	4	4.3, 4.4, 5.2	To formulate solutions to problems of engineering, components, systems and	He identifies the components of a problem					100	80	70	85	75	70	80.00		90.00	76.67
GEN OUTO	5 NERAL COMES	GENERAL INDICATORS 4.1, 4.2, 5.1	contributing to the improvement of the global, economic, environmental and social contexts, bsing today stectmiques and tools.	He chooses the appropriate tools	Final project ASSESSMENT	STUDENT 1	2014-1 STUDENT 2	STUDENT 3	STUDENT 1 100	2014-2 STUDENT 2 75	STUDENT 3 70	STUDENT 1 90	2015-1 STUDENT 2 80	STUDENT 3 70	OUTCOME AVERAGE 80.83	2014-1	^{2014.2} 87.50	²⁰¹⁵⁻¹ 80.00
омесничем З	3,4	3.2, 4.3	To analyze, desing and implement position and speed control systems for industrial applications in the system of RNR/N/RAF standards, calibration and the	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
4 4,	, 5 6, 7	4 1 , 5 2 , 4.3, 4.4, 6.5, 7.1	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	To distinguish the different types of patterns and to learn the constant of the second	Theory test	75	50	100	75	50		100 100	100 75	60	73.13	62.5	75.00	100 87.50
4	, 6	4.2, 4.4, 6.3, 6.4 4.1, 4.2	Tratarnal ale seal with a social to mation work low the passes of the standard the measurement of the seal of the	Conceptual management.		75	50	100	50	50		100	75	75	71.88	62.5	66.67	87.50
4	, 7 4 4	4.8, 47.2, 4.14.4.2,	And pretakuling the beine ray measure thent global s canonin the bound of the social context wat to be managed to be a social	Evailention the jectron of a measurement – AVSTROACH to the problem.	Reading of articles Final project	75 75	50 50	100 75	100 75	75 75		100	80 80	70 80	81.25 76.25	62.5 62.5	91.67 75.00	90.00 90.00
4, 1	6, 7	4.4, 6.5, 7.1, 7.3	tନ୍ମଧିêrtainty (GUM).	State of the art.	/thesis	50	50	75	100	75		100	80	60	73.75	50	83.33	90.00
4	, 6	4.1, 4.2, 6.4 1.1, 1.2,	To develop the necessary knowledge for the analysis of circuits composed of semiconductor.devices.	To apply the knowledge of cheftin theory to solve diodes configurations, BJT, JFET.	Practical examinations.	75	50	100	3 ð	39		1990	75	80	78.75	62.5	83,33	86:89
1 2, ·	, 4 4, 6	2.3, 4.4, 4.24.6.1, 6.3	To collaborate in disciplinary and To life signary teams on the private and concern among the private in a the mecessary encuration to among the mecessary encuration to among the mecessary encuration to among the mecessary	Disconsistonent different configurations for different profit systems	laboratory and final project practices	50	50	75	50 50	25 75		100 50	80 75	60	61.25	50	50	90
		4.1		He evaluates the results of the machanonesis tensolution of a physical problem with the	Reports of the	100	96	85	100	85	85	100	85	85	91.22	98	90	90
,	. 4	2.3, 4.3 4.2	To tendenstanstitien pricesiphescel Direct- Current motors and cenerators design and	the analyzes and determines tools that are available to him at the parameters of the elements of the system from the	projects and simulations' Labouratory sessions'	100	96	85	100 100	90 85	90 85	100 100	90 85	85	91.22	98	95 90	93.33 90
PECIALITY NAL COURSE	4	2.4, 4.1	theindifferences of the elements used theindifferences of the elements used theindifferences of the elements used dynamic response of complex systems	prepartment for the support of the s	reports In-class exercises and	100	40	70	100	90	<u>86</u>	100	<u>90</u>	85	83.33	70	85	93.33
		4.4		Engineering criteria laboratory test He understands the context in	homeworks Individual	100	96	85	100	85	85	100	85	85	91.22	98	90	90
		3.1, 4.2		withmanzes the elefticitis that make up a Direct-Current Machine	evaluation				100	80	80	100	80				90	86.67
ROFESSIONAL 3	.4	4.2, 4.3, 7.1, 7.3	To blevableptactivities treaded an bisopao Description	He carries out activities related to 2his open fassions the effects that the particular elements	Reports of the projectsamed				100	100	60	100	100	60	86.67		100	86.67
		3.2, 4.2 4.1, 4.3, 7.1, 7.3	displiyingisthetenedworkeydganhechasealchuidendtrol theringidinetypinoghanapplications of automation	have in the dynamic response He thinks about his learning of a Direct-Current Machine process	sinalletipors' results				100 75	80 75	80 60	100 75	80 75	40	66.67		90 75	70
		3.3, 4.1		3.3 He documents in an engineering formal report the results of the projects be does					100	80	80	100	80	80	86.67		90	86.67
able	e 4	4 <mark>1</mark> .3	General result a	RESEASED ENT	s for S	Q.4	iņ a	all c	cou	rse	es fo	oŗ₀tl	าเร	p₅e	rigc	as	sess	men
			electropneumatic systems for the	international official of onito.									100					
		1.3, 4.2	direct and indirect control techniques.	He dominates the conversion of units from the International		100	75					100	70	70	83			85
		1.3, 4.2 1.2, 1.3,	direct and indirect control techniques.	He dominates the conversion of units from the International System to the English System. He understands correctly the behaviourt of fluid mechanics		100 75	75 25					100 100	70	70	83 <mark>60</mark>			85 75
he₁	.a\	1.3, 4.2 1.2, 1.3, Vera 1.2, 4.2	direct and indirect control techniques.	He dominates the conversion of units from the International System to the English System. He understands correctly the behaviour of fluid mechanics the solves and interpret correctly engineering problems	, I ⊧i∂l ƙ⊕∞∦	100 75 Dre	75 Ser	nteo	d o	n t	he	100 f01	70 50	[™]	®ta	ıble,	alth	³⁵ noug
he¹ ve t	.av ak	1.3, 4.2 1.2, 1.3, 1.2, 4.3, 1.2, 4.2, 4.3, 4.4 (e th	direct and indirect control techniques. Ge results from a To identify understand and design hydraulic and pneumatic control systems through IFOCO 255055771011	He dominates the conversion of units from the International System to the English System. He understands correctly the behaviour full that methanics behaviour full that methanics or rectly engineering problems applied to the conditions of equipped 14 (19) (2) (2) (3) (4) (4) (4) (4) (4) (4) (4) (4) (4) (4	I⊧ar⊕∝r /erage	100 Dre: 75 8 as	75 Ser 25 S a	nteo di	d o rec	nt tre	he esu	100 fool µlt 0	⁷⁰ low of t	™ incon	³ g ta ₫e	ible,	, alth al st	™ noug uder
⁻ he₁ ve t outc	.a. :ak or	1.3, 4.2 1.2, 1.3, 1.2, 1.3, 1.2, 4.2, 1.2, 4.2, 4.3, 4.4 (e th 1.2, 4.2, 1.2, 4.2, 4.2, 1.2, 4.2, 4.2, 4.2, 4.2, 4.2, 4.2, 4.2, 4	development of aductinate processes using direct and indirect control techniques. De results from To identify, understand and design hydraulic and pneumatic control systems through interest and systems through interest and systems through	He dominates the conversion of units from the International System to the English System. He understands correctly the Deave of fluid methods applied to the constitutions of extension of the constitution of extension of the constitution of the constitution of the constitution of the constitution of the extension of the constitution of the constitution extension of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution of the constitution of the constitution of the extension of the constitution o	i l⊧a⊧⊛⊧ /erage	100 Dres 75 8 As	⁷⁵ Ser Sa 25 25	nteo di	d o rec	n t t re	he esu	100 fol ult 00 100	⁷⁰ lo ⁵⁰ w of t	²⁰ 'nc he ₅₀	⁸³ ge	ıble, nera	alth al st	^{₅₅} uder
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			TARGET PERFORMANCE INDICATOR
STUDENTS OUT	COME 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:

										2014-2						Frequently fail	ling general perform	hance 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
882 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
I can apply and use the knowledge of mathematics, basic science	20			
and engineering to design and carry out research, application,	76	76 % succed SO1 in a		
technological and social innovation projects using specialized	4	75% level and 20% in a	79	73.86
	0	100%		

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 destricted to the context and the context are an working in projects with relevant to the context. industry outreach application.

Course 882: A new course was included in the curricula: TDTA, which is oriented among

other things to apply multidisciplinary projects I'm able to design components, systems and automated processes in order to meet specific needs and propose suitable solutions.

40			
48	48% succed SO3 in a		
12	75% level an 40% in a	82	77.24
	100%.		

Student outcomes

indirect assessment.



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



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.

	52			
I'm continuously seek ways for upgraditing my knowledge to improve their development, adapting to the changing needs of the environment.	32 16	52% succed SO7 in a 100% and 32% in a 75%.	84	76.63
A 1 1				

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





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	. GENERAL S INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT	STUDENT 2	STUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
5 To appreciate the importance of university education for the formation of his identity accordin to his personal and professional development taking as a		To appreciate the importance of university education for the formation of his identity according to his personal and professional doublement tabling on a	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	educational contexts and their history	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
	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	75	75.00	66.67
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	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 74
_, 0, 1	5.2, 5.3, 7.1, 7.3	knowledge of his discipline and the ethics principles. To know and analyze the main	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		elements that form and determine a human being's behavior on the basis of a historical moral	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,	conception of the events and how they make an impact on our daily	He knows the ethics principles of his														

ESPECIFIC INDICATORS

ASSESSMENT STUDENT STUDENT STUDENT STUDENT STUDENT STUDENT STUDENT STUDENT OUTCOME 1 2 3 1 2 3 1 2 3 AVERAGE

		5.2		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
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT	STUDENT	STUDENT 3	STUDENT	STUDENT 2	STUDENT 3	STUDENT	STUDENT	STUDENT 3	OUTCOME AVERAGE	2014-1	2014-2	2015-1
206 UNIVERSITY AND SOCIETY		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	He identifies the impact the present educational contexts have on his professional training. He identifies and applies the Organic	Homework, tests,	75	75	50	100	75	50	100	50	50	69.44	75	75.00	66.67
	257	2.2, ⁵ 2, ¹ 3, 5.2, 5.3, 7.1, 7.3	To identify the problems that exist in his environment to create in available process at a plativite Latin America in order to make a	Statute of the Autonomous University of Bedsctarare of the environment where he lives and works	project	100 100	50 75	50 75	100 100	75 100	50 75	75 100	75 100	50	86.11	75 87.5	75.00 91.67	66.67 91.67
	_, _, .	2.2, 2.3, 8.2, 8.3, 5.4, 5.3, 7.1, 7.3	Rritical and the solve them as ing the Rritical and the discussion of the structure and an angle by political, coordon and an angle model at that	He identifies the impassion and the identifiest of the second network of the second netw		75 75	50 75	50 50	75 100	75 75	50 50	100 100	75 50	50	66.67	62.5	66.67	75.00
		2.2, 2.3, 5.2, 5.3, 2.2, 2.3, 5.2, 5.3, 9.2, 2.3,	exemutes grap approximation of the second se	He analyzes political, economic and social models in a critical way He is aware of the environment where he lives and works		100 100	75 75	25 75	100 100	75 100	50 75	100 100	75 100	25	69.44	87.5 87.5	66.67 91.67	75.00 91.67
	2, 5, 7	5.2, 5.3, 5.2, 5.3, 5.2, 5.3, 7.1, 7.3	they value arojectist an providely and variations in the	He knows the ethics principles of his profession He integrates other disciplines' vision		75 75	75 50	50 50	100 75	75 75	50 50	100 100	75 75	50	72.22	75 62.5	75 66.67	75 75.00
		2.2, 2.3, 5.2, 5.3,	To know and analyze the main elements that form and determine anuman standards .	He analyzes political, economic and social models in a critical way								100	75					75.00
229 METROLOGY	4, 5	7.1, 7.3 2.2, 2.3, 5.2, 5.3, 74!1,75?1	Dases or a mistorical moreal calification and rules vients fande of any provide the provide the provide and any provide the provide the provided many set of the provided and the provided vocabulary of Metrology, the analysis of examples and articles for its application in specific proteinestantiding uspose of the seesance reseasting standards.	He knows the ethics principles of his polestinguish the different types of patterns and to learn the concepts of traceability and calibration.	Theory test							100 100	75 100	75	91.67			75 100
			calibration and the importance of the traceability in the															
	4, 5	4.1, 5.1 5.1, 5.3	measurements, with the study of the terms in the International of Yorsabile actions of the Property of the a palaysis, of examples and articles	To distinguish the different types of Pattering and to learn the concepts of Work through photography.	Theory test	80	100	60	100	80	80	100 100	100 100	80	86.67	90	80.00	100 93.33
1418 ARTISTIC OPTIONAL COURSE	5	5.2	to afficience and the student is able to afficience them in specific anent problems at the industrial or scientific level.	He is aware of his environment by means of photographs	Photograph y exhibition	100	80	40	100	80	60	80	80	60	75.56	90	73.33	73.33
		5.2, 5.3	Io 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
		5.1, 5.3	To recognize the importance of possible agents of change in a society so that the studies of the	He thinks about the importance of his work through photography	Destate	80	100	60	100	80	80	100	100			90	80.00	93.33
226 Social and Human Sciences Optional Course	2, 5 , 6	2.1.2.3, 5.2, 6.4	Scaniscination to contribute to the Understanding of scould the shatal	interestantial of discernational people of the discernation of the discernation of the discrete discre	gissustitution						65	1800	80	70	81.25			85.00
	2, 4, 5, 7	2:7; 4:4, 5.2, 7.1	processing acceduration of the second state of	To augments with factors and facts.	Essay						80 85	80 85	80 85	70	81.25			80.00 85
	2, 5, 6	2.1, 2.3, 5.2, 46.4	To expand the possibilites of the stablishment of paramters in his	To debate and discuss the proposed ideas before diverse disciplines. He identifies the components of a problem	Foro de discusión				100	80	85 70	100 85	70 75	70	80.00		90.00	85.00 76.67
288/1221 AUTOMATION IN-INSTRUMENTATION FOR PROCESS CONTROL	2, 4, 5, 475	5.2 2.1, 4.4, 5.2, 7.1	9heestanding.oronananarethat apsteros grad panyaneesob offer in ronatidesingsheireingnatenng in the contributing to the improvement of	To support his arguments with factors and facts.	Essay Final project						85	85	85					85
		4.1, 4.2, 5.1	environmental and social contexts, using today's techniques and tools.	He chooses the appropriate tools to do the project					100	75	70	90	80	70	80.83		87.50	80.00
		4.3, 4.4, 5.2	To formulate solutions to problems of engineering, components, systems and processes	He identifies the components of a problem					100	80	70	85	75				90.00	76.67
RER SOCIAL SERVICE	4, 5 5, 6	6.1, 6.3, 4.16.4.2,	Considering also in separational and อุณาร้องของสารอิเมเทร account and the อิเมษิศาครรภณาพังก่อน he	He carries out activities that are	Final project Partial and final				100 100	60 75	40 70	100 90	60 80	40	66.67		80.00 87.50	66.67 80.00
		5.1, 6.1, 6.3, 6.4	eeveropsesiagane sociaitaanaasis, apeganziay istanbringleesind tools.	He generates products related to his profession	reports				75	75	75	100	100	40	77.50		75.00	91.67
	2,5,6	8.2, 8.3, 8.4, 5.3.	To develop a sense of social and	He thinks about the asset emissionevel	Derive				100	1620	60	100	65	40	79.17		1800,000	68.87
RIS PROFESSIONAL INTERNISHP	5, 6 5,6	6.16.0.3, 5.1, 6.1, 6.2, 6.3,	enircarresponsability to improve the resonance in the second second second geowibes during the too is that abor market, being aware of bisson	HE HERE THE SOCIETY LOSK HE HERE THE SOCIETY LOSK HARLES ARREITE OF his profession	Partial and final Partial and final report				1,040	75	9 9	100	17050	40	75.00		93:50	<u>38:8</u> 7
	2,5	e:#; e:5 2.2, 2.5, 5.2, 5.3	environment and applying his acquired knowledge.	He thinks about work competitiveness					100	75	75	100	75	40	77.50		87.50	83.33
	2,5,6	2.1, 2.3, 2.4, 5.3, 6.1, 6.3.	To collaborate in interdisciplinary	He thinks about the academic level required to carry out a task					100	100	60	100	75	40	79.17		100.00	78.33
Tabl	e⁵.4.	5.1, 6.1, 9.2, 6.3, 0.406.5	growth and integration to the labor	He uses the language and terminology பல்லா பிருக்கு Hor	Partial and	in a	all c	ou	rse	s″fo	r⁰t⊦	ni≌¢	oër	ið℃	äs:	ses	ទំវិញ	ent.
	2,5	2.2, 2.5, 5.2, 5.3	acquired knowledge.	He thinks about work competitiveness					100	75	75	100	75	40	77.50		87.50	83.33

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 Know regulations, criteria, and quality 5.1 standards	77.04	85
5.2 Be aware of the living and working 5.2 environment	77.38	85
5.3 Know the ethical principles of their 5.3 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.

I can apply and use the knowledge of mathematics, basic science and engineering to design and carry out research, application, 20

76

and engineering to design and carry out research, application, Due the remotopical and social inpovation projects using specialized Due the remotods and technological and social inpovation projects using specialized Due the remotods and technological and social inpovential attention and corrective action whole be implemented "3 % these courses:

courses:

																	1
	GENERAL GENERAL	ESPECIFIC OUTCOMES NDERGRADUATE SURVEY	ESPECIFIC INDICATORS RUBRIC %	ASSESSMENT No OF UNE	STUDENT 1	STUDENT 2	STUDENT 3	STU 3ENT 1	STUDENT 2	SOUDENT 3	STUDENT 1	STUDENT 2	STUDENT 3		Toomeer Average /Erage r	ACULANE AVERAGE ESULA	OUTCOME AVERAGE 2015-1
206 UNIVERSITY AND SCCHVIC O to formul	2.2, 2.3, 2, 5, 7 5.2, 5.3, f collabo r atin 3 or ate and execute	To identify the problems that exist in his environment to create innovative projects that provide also and the provide the provide the also and the provided of this disclining and the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided of the provided o	He integrates other disciplines' vision teams hat are	Homework, tests, project	75	50	48 50 44 8	75 48 % s	75 succed S	50 602 in a	100	75	ст) 50	66.67	(DIREC 62.50 78.8	66.67	75.00
	rele	vant to the context.					0	100/01	- 750/			05				-	

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

Corrective actions for these courses for improving student learning:

Gourse 206: Meetings are planned by Faculty members in order to enhance the objective in order to meet specific needs and propose suitable solutions. of teaching students how to connect to real-world problem⁵⁰ with theory.

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



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

I'm continuously seek ways for upgraditing my knowledge to AS" an additional addition addition of the changing needs of the 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	EE%/
20	4	4	4	3	4	3	2	3	4	2	15	33%
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	. /0

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



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 guality 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



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		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			
			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	75.00	75.00	66.67
06 UNIVERSITY AND	257	2.2, 2.3, 5.2,	To identify the problems that exist in his environment to create innovative projects that provide answers to colucities that provide and the knowledge of the knowledge of the second secon	He is aware of the environment where he lives and works	Homework, tests,	100	75	75	100	100	75	100	100	50	86.11	87.50	91.67	91.67
SCOLIV	2, 0, 1	5.3, 7.1, 7.3	his discipline and the ethics principles.	He integrates other disciplines' vision	project	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	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
			impact on our daily and professional life from the history of ethics in sciences.	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
1 MULTIVARIAGLE N.CORUS	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
13 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
	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1	To expand the possibilities of the stablishment of paramiters 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
di Social and Human Sciences Optional Course	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
1 INSTRUMENTATIO	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
		2.1, 2.3, 2.4, 2.5, 7.3		He thinks about his collaborative team					100	75	40	100	60	40	69.17		87.50	66.67
NES NOCIAL SHIPVICE	2, 7	2.1, 2.4, 2.5, 7.1, 7.3	To collaborate in disciplinary and multi-disciplinary teams producing strategies to improve his social environment and continuously updating his knowledge of his	He observes his improvements in the social service program	Partial and final reports				75	75	60	60	100	40	68.33		75.00	73.33
		2.1, 2.2, 2.4, 7.1, 7.3	aiscipline.	He thinks about the application of his profession and his knowledge					100	75	75	100	100	40	81.67		87.50	91.67
	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
	4, 7	4.2, 4.3, 7.1, 7.3	To develop activities related to his profession acquiring the necessary experience and applying the	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	knowledge he has acquired during the program.	He thinks about his learning process					75	75	60	75	75	40	66.67		75.00	70.00



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. and engineering to design and carry out research, application, 6.124117049631411047631431197610-197655159514146411705 documentation.

20 76 76 % succed SO1 in a 4 75% level and 20% in a 79 73.86 0 100%

77.24

6.5 Increase laboratory equipment.

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

COME SOLUTION OF A CONTRACT OF							48 44 8	48 100	% succi % level a 7	ed SO2 and 44 '5%.	in a 1% in		85			78.88		
							2014-1			2014-2			2015-1		1	Frequen	ly failing general perfo	mance indicator
	GENERAL OUTCOMES	GENERAL INDICATORS	ESPECIFIC OUTCOMES	ESPECIFIC INDICATORS	ASSESSMENT	STUDENT 1	STUDENT 2	800ent s	STUDENT 1	STUDENT 2	STUDENT 3	STUDENT	STUDENT 2	STUDENT 3	OUTCOME AVERAGE	OUTCOME AVERAGE 2014-1		OUTCOME AVERAGE 2015-1
HI MULTIVARIALE DALCULUS	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 COME S RAG R	52.78 SURVEY ESULT	25.00 OUT(AVE	58.33 COME FACU RAGE RESU	5833 ILTY ILT

Table 4.22.- Courses with no improvement during
in order to meet specific needs and propose suitable solutions.340
48
48
12riod of assessment.
48%
12340
48%
48% succed SO3 in a
12340
48%
48% succed SO3 in a
12340
48%
48% succed SO3 in a
12340
48%
100%340
100%

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

I can formulate solutions to problems of automation, components, Withins and Godskes childs of the automation and social the improvement of the global, economic, environmental and social context using current tools and techniques. Not have the profile of Engineering. ³⁶ professor that give mathematics do ³⁶ ³⁶

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

multicisciplinany skills has been pushed	
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	

52			
28	52% succed SO5 in a		
20	100% level and 28% in	83	77.38
	a 75%		

Student outcomes 6

indirect assessment.

SOG UNDERGRADUATE SURVEY	RUBRIC %	No OF UNDERGRAD	FINAL %	OUTCOME SURVEY RESULTS (INDIRECT)	OUTCOME SURVEY AVERAG RESULT (INDIRECT)	OUTCOME FACULTY AVERAGE RESULT (DIRECT)
	100%	7	28			
I'm able of communicate my ideas, concepts and knowledge of	75%	10	40	40% succed SO6 in a		
engineering in a multicultural context.	50%	7	28	75% and 28% in a 100%	72	74.35
	0%	1	4	and 50%.		
	TOTAL	25	100			
INDIRECTMETHOD 72 I'm continuously seek ways for upgradition my knowledge to improve their development, adapting to the changing new is of the environment.		74.35	52 32 16	DIREC 2% succed SO7 in a 50% and 32% in a 75%.	ET METHOD 84	76.63

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

STUDENT OUTCOMES



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



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	2014-1	2014-2	2015-1
28 (MACCONT AND SOCIETY		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	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	Homework, tests, project	100	75	75	100	100	75	100	100	50	86.11	87.50	91.67	91.67
	2, 5, 7			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	6	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
853 ELECTRIC SYSTEM DESKIN	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
235 Social and Human Sciences Optional Churks	2, 4, 5, 7	2.1, 4.4, 5.2, 7.1	To expand the possibilities 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
		2.1, 2.3, 2.4, 2.5, 7.3		He thinks about his collaborative team					100	75	40	100	60	40	69.17		87.50	66.67 86
	2, 7	2.1, 2.4, 2.5, 7.1, 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 observes his improvements in the social service program	Partial and final reports				75	75	60	60	100	40	68.33		75.00	73.33

He thinks about the

			through diverse analog and digital tools.	end of the curse.														
	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
	7 General	7.1, 7.3	To identify and use reliable and updated sources of information about Instrumentation and Process Control, its regulations and	He collecst tables and standards	Tasks where it is requested to investigate standards and tables	STUDENT 1	STUDENT 2	STUDENT 3	75	25	50	100	50	100	66.67	2014.1	50.00	66.67
	OUTCOMES														AVENAGE			
		2.1, 2.3, 2.4, 2.5, 7.3	, To collaborate in disciplinary and	He thinks about his collaborative team					100	75	40	100	60	40	69.17		87.50	66.67
REI SOCIAL MENICE	2, 7	2.1, 2.4, 2.5, 7.1, 7.3	multi-disciplinary teams producing strategies to improve his social To ternity the productor that best in his epytronomic to the production of projects that scorific answers to projects that scorific answers to	He observes his http:soawaeetsfithtehe social eewitcemeetsrathere he lives and works	Partial and final reports	100	75	75	75 100	75 100	60 75	60 100	100 100	40 50	68.33 86.11	87.50	75.00 91.67	73.33 91.67
		2.1, 2.2, 2.4, 7.1, 7.3	his discipline and the ethics principles. To know and analyze the main	He thtelysates utilitie diggligitatiest of shisk profession and his knowledge He analyzes political.		75	50	50	100	75	7 9	188	7选	 \$8	89:67	62.50	89 :57	35:89
			human being's behavior on the basis To identify and use the conception of	economic and social models in a critical way	Homework where it is	100	75	25	100	75	50	100	75	25	69.44	87.50	66.67	75.00
291 INSTRUMENTATION I	7	7.1, 7.3	Control from the history of ethics in sciences.	standards He knows the ethics principles of his profession	investigate standards and tables	50 75	75 75	100 50	50 100	75 75	100 50	100 100	100 75	100 50	83.33 72.22	62.5 75.00	75.00 75.00	100.00 75.00
RES PROFESSIONIS	4.7	4.2, 4.3, 7.1, 7.3	To develop activities related to his profession acquiring the necessary	He carries out activities related to his profession reknows the concept of	Solution class				100	100	60	100	100	60	86.67		100.00	86.67
CALCULUS	7	4.1, 4.3 , 7.1, 7.3	modelladge.dieebasicquigidebuing technical. the program.	vectorrisedabout rosvietaening perbassalculus' fundamental theorems.	homewofk deliver individually, participation and written exam	0	50	50	7 9	75	68	5 8	5 9	 48	52.78 66.67	25.00	7 8:88	5 8:88
Table 4.23 Codesign and cany out electric transmoster of a better continuous improvement for a better continuous improvement for a better continuous improvement for a better continuous improvement and distribution of the electric energy in the students areas of damper tampes and contacts Sector SO7 in all courses for this period Better tampe and control tampe and control tampe and contacts 4.7 4.2,44,7.1 storage, generation and distribution of the electric energy in the students and contacts Review exam 75 100 100 100 75 50 86.11 87.50 91.67 91.67 assessment. professional environment and for benefit of society. and contacts Review exam 75 100 100 100 75 50 86.11 87.50 91.67 91.67																		
The	².₄.₅.7 ave	2.1, 4.4, 5.2, eraĝe	To expand the possibilities of the stablishment of paramters in his field of action to contribute to the understanding of a guiture that the bar of the the stable store on the store of th	He supports his arguments	are pre	ser	nte	d o	n t	he	föl	lo⁵w	/iʰ̇́o	g"ta	able	e, alt	thoug	gh⁵
wo t	ako	throc	mexican territory.	periode ave	rado a	2	dir	00	t rc	Ser 1	lt o	f th		nor	org	aleti	Idan	+
outc	6, 7 OM	6.1, 7.3 es.	In his tavor in the techincal III 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	5 a	un		L IC	Jou	100	100	85	100	96.25	ai 30	uuun	95
Also	the	eave	To comunicate graphically or cataly the calification of carding O before diverse disciplines.	rie esenschie in eerorg e	eneral p	bert	orr	ma	nce	e ir	nolio	cat	ors	øk	otai	n fro	om ev	/eny
cour impl	se i eme	matcl ^{7.1, 7.3} ented	updated sources of information about Instrumentation and Process Control, its regulations and standards.	He collecst tables and standards	Cator is Tasks where it is requested to investigate standards and tables	s sh	NON	n ۱/	vitl ⁷⁵	1 fu 25	tur ₅₀	еа 100	acti ₅₀	100 100	s th 66.67	nat v	vill be 50.00	66.67
		2.1, 2.3, 2.4, 2.5, 7.3	2014	He thinks about his collaborative team	201	4-2	2		100	75	2 (100	5-1 60	40	69.17		87.50	66.67
	2, 7	2.1, 2.4, 2.5, 7.1, 7.3	To collaborate in disciplinary multi-disciplinary teams producing strategies to improve his social environment and continuou underline his level date of the	He ob. is his improved in the social service provide in the social	Partial and final				75	80). <u>4</u> 9	•	100	4	68.33		75.00	73.33
		2.1, 2.2, 2.4, 7.1, 7.3	discipline. 70.31	te thinks ab ne pplication o professi and his knoy ge					10	75	75		0	40	67		87.50	91.67
			To identify and the reliable and		ork where it is							Π						
	7	7.1, 7.3	about Instrumentation. Control.	He at tables and ards	investig and to.			100	50	75		100		.JO	83.33	62.5	75.00	100.00
Grap	ohic	42,4.3,7.1, 47.8	Todevelop activities related to his polession according the hocession experience and applying the	He carries out activities	achpe	riod	da	SSE	e\$s	éd	60	100	100	60	86.67		100.00	86.67
	., .	4.1, 4.3, 7.1, 7.3	knowledge he has acquired during the program.	He thinks about his learning process	report				75	75	60	75	75	40	66.67		75.00	70.00
													TA	RGE	ET PE INDI	ERFOF CATO	RMANC R	E
	STU	DENTS O	UTCOME 7							76.	63					90		
		7.1	. 7	7.1 Search for diffe 2 Participate in na	erent inform itional and/	natior or int	n sou erna	urces ation	s al	76.	63					90		
		7.2		acader	mic activitie	es so of	locr			100	.00					100		
		/.3				e ur	edi	my		76.	03					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:

4

0

	40			
Im able of collaborating on disciplinary and multi-disciplinary teams to formulate and execute projects of automation solutions that are	44	48 % succed SO2 in a		
relevant to the context.	8	100% level and 44% in	85	78.88
		a 75%		

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 Maternational Congress launched by I'm able to design components, systems and automated processes in order to meet specific needs and propose suitable solutions. IEEE. 100%. 12 75% level an 40% in a 12 75% level an 40% in a 12 75% level an 40% in a 100%.

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

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

L can assess and take care of the problems facing today's society Cooperizing hitting affiftences to be approved by increases for improving students learning: the social and labor fields based on professional ethics and sticking to the criteria and quality standards to promote sustainable Encourage Fater ethics to augment solution class exercises and ⁷³ momework to deliver

individually, participation and written exam





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

STUDENT OUTCOMES



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.

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



Image 4.9.- Contious improvement process. Cloosing 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.



Distribución de las competencias demostradas Ingeniería en Automatización

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.