



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO
AUTOMATIKA IR VALDYMAS PROGRAMOS
(61201T101 (612H62002))
VERTINIMO IŠVADOS

EVALUATION REPORT
OF AUTOMATION AND CONTROL (61201T101
(612H62002))
STUDY PROGRAMME
AT VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

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Išvados parengtos anglų kalba
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Vilnius
2010

DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Automatika ir valdymas</i>
Valstybinis kodas	61201T101 (612H62002))
Studijų sritis	technologiniai mokslai
Studijų kryptis	elektros inžinerija
Studijų programos rūšis	universitetinės studijos
Studijų pakopa	pirmoji
Studijų forma (trukmė metais)	nuolatinė (4)
Studijų programos apimtis kreditais ¹	160
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	elektros inžinerijos bakalauras
Studijų programos įregistravimo data	1997 m. gegužės 19 d.

¹ – vienas kreditas laikomas lygiu 40 studento darbo valandų

INFORMATION ON EVALUATED STUDY PROGRAMME

Name of the study programme	<i>Automation and control</i>
State code	61201T101 (612H62002))
Study area	technological science
Study field	electrical engineering
Kind of the study programme	university studies
Level of studies	first
Study mode (length in years)	full-time (4)
Scope of the study programme in national credits ¹	160
Degree and (or) professional qualifications awarded	Bachelor of electrical engineering
Date of registration of the study programme	19 May 1997

¹ – one credit is equal to 40 hours of student work

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CONTENTS

I. INTRODUCTION.....	4
II. PROGRAMME ANALYSIS	5
1. Programme aims and learning outcomes.....	5
1.1. Programme demand, purpose and aims.....	5
1.2. Learning outcomes of the programme.....	5
2. Curriculum design	6
2.1. Programme structure.....	6
2.2. Programme content.....	6
3. Staff	7
3.1. Staff composition and turnover	7
3.2. Staff competence	8
4. Facilities and learning resources	8
4.1. Facilities	8
4.2. Learning resources.....	9
5. Study process and student assessment.....	10
5.1. Student admission.....	10
5.2. Study process.....	10
5.3. Student support.....	11
5.4. Student achievement assessment.....	11
5.5. Graduates placement.....	12
6. Programme management	12
6.1. Programme administration	12
6.2. Internal quality assurance	12
III. RECOMMENDATIONS	14
IV. GENERAL ASSESSMENT.....	15

I. INTRODUCTION

This assessment report is based on the material on self-assessing 2010 provided by the Vilnius Gediminas Technical University for the study field „Automation and control“, namely a BA in automation and control. The qualification degree obtained is an electrical engineering bachelor. This curriculum covers some general electronics and some computer and control technology related knowledge as well. The Department of Automation sponsoring this programme is located within the Faculty of Electronics. The remote study of the self-assessment documents was carried out in September/October 2010. The on-site evaluation was performed by the entire evaluation team on October 29, 2010 on the premises of Vilnius Gediminas Technical University.

Friday, 29 October

09.30 – 10.00 Meeting with faculty administration staff

10.00 – 11.00 Meeting with staff responsible for preparation of SARs

11.00 – 11.15 Break

11.15 – 12.15 Meeting with teaching staff

12.15 – 13.15 Meeting with students

13.15 – 14.15 Lunch

14.15 – 15.15 Visiting auditoriums, libraries, other facilities (studios, teaching spaces, computer services, etc.)

15.15 – 16.45 Familiarizing with students' course and final papers (thesis), examination material

16.45 – 17.30 Meeting with alumni and employers

17.30 – 17.45 Experts private discussion and finalisation of the visit

17.45 – 18.00 Introduction of general remarks of the visit to the university

It is worth mentioning that the same programme has been assessed previously and as a result of the critical remarks several changes had been introduced in the curriculum such as

- regulating the credit sizes of courses to 2–5 credits
- the introduction of new optional subjects
- the establishment of a new laboratory (mechatronics)
- new equipment introduced to existing laboratories
- a large amount of English and Lithuanian literature introduced to the library
- some subjects changed in the contents.

All decisions concerning the final evaluation report have been taken unanimously by the entire team.

Abbreviations:

SER	Self-evaluating report
BA	Bachelor
MA	Master

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

1.1. Programme demand, purpose and aims

Many new technical products heavily rely on automation and control systems. Usually they form an integral part of many engineering products. Specific aspects are the high complexity of modern control systems and their implementation within large applications. In order to meet the present and future requirements the labour market needs a sufficiently high number of well trained engineers in the field of automatic control systems and in mechatronic systems. Thus there is an unambiguous demand for electrical engineering specialists which fact is clearly supported by the prognoses of the need for specialists in Lithuania published by the Institute of National Development in 2008. The on-site meeting with local and regional employers clearly supported this opinion. While this programme is not unique within Lithuania it is reasonable to assume that VGTU needs to offer an electrical engineering program at BA level (as well as at MA level). Total admission rates are very stable.

The programme well fits into the national policy of Lithuania concerning electrical and related engineering studies, of which the tradition goes back to the 1960's (when Lithuania was still under occupation). BA programmes were evolved according to unified European educational system tendencies while Lithuania had deployed the five year continental educational system in the past. The programme is fully in accordance with the aims of the University to cover most major engineering fields by both BA and MA level curricula. This programme has its direct follow up on MA level (the programme is also assessed by this team). This programme fits well in both the national and the European educational systems.

The programme very well correlates in purpose and aims. It is a first cycle (BA level) programme where theoretical and practical knowledge will be transferred in a well balanced way. The main goal is to provide graduates with the ability to develop and use current technologies in the field.

1.2. Learning outcomes of the programme

The formulation of the comprehensibility of the learning outcomes seems to be entirely satisfactory. The level of complexity of the learning outcomes corresponds to a first cycle graduate level. The areas covered are satisfactory. This BA programme is the major source for the MA programme Automation.

There is a good consistency in the learning outcomes; the subjects cover most important fields that are expected from such a curriculum. In the SER the table for the whole curriculum is missing. Nevertheless on site this table was presented by request and its content is consistent and satisfactory. Thus assessing the sequence and connection among related subjects and the system of sub-specializations is very hard to find out from the subject data sheets.

Remark: Subjects as foreign languages, physical training, etc. are important but might not form an inherent part of the main curriculum. Many similar curricula do not treat such subjects as credit bringing subjects but only as – criteria subjects – that have to be absolved.

It can be unambiguously stated that the curriculum has been transformed as a result of the critical remarks formulated during the previous assessment (in 2001). This is evident from the transformation of the learning outcomes. There is a continuous assessment of the learning outcomes by the teaching staff and the students. The renewal process of both programmes is well defined and considerable attention is given to this process by the responsible members in the staff administration and the teaching staff.

2. Curriculum design

2.1. Programme structure

It should be pointed out that it was a little bit confusing for the experts to analyze SER since the number of credits presented in the in the programme grids (168 national credits) in the main part of the Report and in the Register of Study Programme (160 national credits) (AIKOS) do not coincide. In the SER is written, that “the study volume is 168 credits (252 ECTS credits) plus 4 credits beyond the net for physical training”. However, it could not be that Programme has 4 credits beyond the net. All amount of credits should be counted into the Programme. Since the legal requirements for University first level study programmes have changed there is a need to implement the necessary changes. According to the administration of the faculty the new study plan was implemented in September 2010 and it seems that programme complies with legal requirements. The study volume ~~is~~ sufficient, however it was not clear enough, why credits given for language (etc.) are taken away.

Two industrial practices are included. There is very detailed explanation in SER of the semesters’ and study weeks’ structure.

The study subjects are consistent enough. They represent a well built up but somewhat conservative curriculum of automation and control. Nevertheless, some of the up to date areas like digital control and necessary mathematical bases are also sufficiently included. Computational Intelligence topics, mobile and intelligent robot systems, etc. could be added to

make the programme more attractive. There is a sufficient number of elective and free optional subjects are available. In this respect there are 3-4 alternative subjects available. The study programme is attractive and appeals to students as reflected in the number of graduates during the recent past.

2.2. Programme content

The content of the studies is in accordance with the respective national regulations. This is true for international expectations as well.

The short subject themes seem to be satisfactory. There is a combination of theoretical and practical teaching, including laboratory work and industrial practice. It should be mentioned that besides classical Calculus, etc. Discrete Mathematics is also taught. Some of the theoretical foundations, such as z-transform are also included in the material, partly within the frame of the basic engineering subjects. Laboratory practices cover the basic scope of control engineering, modern equipment sponsored by international manufacturers provides the possibility to experience in practice with basic control configurations. Another example is C++ which is taught in addition to the C language.

3. Staff

3.1. Staff composition and turnover

The qualification of teachers is essentially satisfactory. From the CVs it is noted that the staff members have good to excellent teaching experience. It is rather surprising however that over 40 % of the teachers is above 60 years. This may be an unhealthy age statistics and it is questionable whether the programme is sustainable on the long-term. The number of professors is satisfactory now, but soon there is a shortage expected because of the high average age of professors. It is a positive point that some of the teaching staff work also in the industry thus they are in a position to introduce up to date engineering know how in the learning process. The number of students compared to teachers is really not high. This ratio is more than satisfactory. Over 90% of teachers are full time. There is a satisfactory number of technical staff available.

Turnover seems to be relatively low. This might be the explanation why there is so many aged teaching staff. Because of this fact the impact on the study programme is low. There is no clear strategy how the teaching staff will be systematically renewed. The staff turnover is a major issue within the department during the next few years. The turnover of the teaching staff can greatly be improved if more research and publication activities are required by the faculty

administration. As it was mentioned in the SER, VGTU offers the possibility of habilitation procedures. *(P.S. During the visit in Lithuania we have been informed that the habilitation procedure does not exist any more in the country. However, it is still mentioned in the SER. Hence the recommendation remains that more efforts have to be undertaken in order to achieve a systematic and professional career development of junior staff members)*

But the interest of the teaching staff in such a qualification procedure is rather limited.

3.2. Staff competence

As a consequence of the high average age of teachers teaching experience is really very high. This can be less stated about research activities. Judged by evaluating the lists of up to 5 most significant publications we have the impression that the overwhelming majority of the teaching staff has little internationally recognised research results and publications. Many of them have published mainly textbook like written work only. There are a few exceptions, mainly young staff members. Generally speaking, the research and publication activities of the teaching staff are not adequate. Several individual good profiles have been described during the on-site visit. But the basis with respect to the entire the teaching staff is not sufficient. One of the reasons for this situation may be the relative high teaching workload mentioned by several staff members.

It is a fact that in case of a BA programme it is not utterly necessary to have outstanding research results for all teachers, but that the same staff is responsible for the subsequent MA programme and thus the problem is more relevant. More intensive staff turnover, especially the engagement of young PhD holders might improve the situation. The system of training in scientific centres where a publication duty exists might help with the problem.

For the faculty staff members there are compulsory trainings at industrial or scientific institutions in different European countries. However, the mobility of the teaching staff is rather small, a few to zero per year and the readiness to visit international conferences outside Lithuania is very limited. Moreover, these visits focus on educational issues rather than research collaborations. It is recommended that the faculty establishes new scientific contacts with European universities in the field of automatic control. Such an international network may help to improve the research activities whereby the teaching staff can be involved into large EU research projects presently sponsored under FP7. Since the SER addresses Socrates and Erasmus activities it has to be pointed out that these programmes cover teaching aspects only. The listed publications are dominantly in Lithuanian. International, peer reviewed publications or books in English are the exception. The publication activities in international cited journals and the

participation in international conferences should be improved. There seems to be no problem with the teachers' practical experience.

There is a functioning system but practical implementation might be difficult because of the high average age. It is mentioned in the SER that in case a teacher has 15 publications of a necessary level in his/her research area and meets other requirements, he/she can take a habilitation procedure which opens a possibility to become a professor and keep on doing a scientific career. It has been noted that the interest of the teaching staff in professional qualification through a habilitation procedure is very small. It is expected that every year one member of the teaching staff successfully completes a habilitation procedure. More support from the administrative staff is expected e.g. by temporally reducing the teaching load of active habilitation candidates. (see also 3.1.).

4. Facilities and learning resources

4.1. Facilities

The number and occupancy of the premises is sufficient. The students have adequate study rooms. The library on the departmental level is well equipped with journals and books. There is a large university library; however the students do not make frequent use of these facilities.

The number of computer work places and other laboratory work stations is sufficient. In view of the actual number of students the size and equipment of the laboratories seems to be adequate. Modernisation of the laboratory equipment is an ongoing process. The computer facilities are modern and correspond to the requirements even of an MA programme.

The amount and ratio of practical training places for students seems to be satisfactory. During the discussion with potential employers and alumni it was highlighted that a number of companies, even some international ones having a branch in the region, offer places for practical training for the students in question. All these companies have activities where the employment of automation and control engineers is necessary and where there is a number of problems to solve where such engineers are involved. There seems to be sufficient number of such places.

4.2. Learning resources

There has been an essential increase in the number of available literature. The main textbooks (those not older than 10 years) are available in a satisfactory number. (electrical engineering, fundamentals of electronics, automatic control theory, electric machines, electronic devices, etc.) There seems to be a problem with major international periodicals such as IEEE

transactions; however IEEE Xplore is accessible just like Science Direct and other electronic databases (especially in the recent years the number increased). The library provides the necessary information for the students by means of textbooks and journals. Publications are only purchased according to the teachers' recommendations and wishes. The students do not make sufficient use of the library facilities.

Some subject data sheets contain rather old literature. It would be advisable to recommend only up-to-date literature. (partly aviation electrical drives: 1974, digital control technologies: 1986, 1987, aviation equipment and systems: 1983, microprocessors control equipment: 1987, etc.) There are many textbooks supporting the main subjects; some methodological learning aids will be published in the near future (a list has been provided). Good efforts have been noted with respect to updating several lecture notes. This might substitute for missing up to date textbooks.

5. Study process and student assessment

5.1. Student admission

Admission is executed according to national regulations based on high school graduation results. Minimum admission level is determined by the competition. Results for the last few years are given in the SER. From 2008 the lowest admission level went down drastically. Our opinion is that while the admission requirements conform with current regulations in Lithuania, the lack of stricter criteria, and setting a higher minimum admission level might influence the average student niveau in a negative way.

Open days, national higher educational exhibitions, practical demonstrations and other means help to enhance the motivation of interested applicants. New students take part in special fresher camps. The university maintains an interesting internet page giving all the necessary information concerning the programmes.

5.2. Study process

The academic year is organized in two semesters. Timetables are scheduled rationally. The study classes are well distributed during a week and a semester. The sequence of the different courses follows a consistent and well elaborated scheme. The examination sessions are carefully planned and fit well into the study programmes.

There is a reasonable failure rate at some of the courses (around 25%) which might correspond to the relatively liberal admission policy. There is an interesting remark in section 143 (page 28) of the SER concerning too high study load. It seems that working parallel with

study affects the performance in a negative way. The drop-out rate is within acceptable limits. Due to the limited research activities of the teaching staff there is a considerable lack of possibilities for students to actively participate in research.

Mobility of staff is documented. There is however a decreasing tendency in the amount of both outgoing and incoming staff. There are several cooperations with universities and technical colleges outside Lithuania. Some of the teachers make use of the exchange programme but the number of actual exchanges is rather small. The mobility of outgoing students is low to satisfactory, but there seems to be a too small number of students arriving, in some years actually zero. The main reason against mobility given by students is their necessity to work for covering the costs of living. The missing mobility of the students decreases their chances to be successful within the European labour market.

5.3. Student support

There is special individual support given to disabled and foreign students. (But this is a mere theoretical possibility.) It is not quite clear to what degree regular student counselling exists. Even students did not articulate clearly what needs they have and what formal arrangement for such counselling is available. However, no complaints were formulated during the visit. The information provided by all institutional entities at VGTU for students is very good. VGTU pays much attention to familiarize the students with career possibilities. The students have close contacts to the teaching staff with respect to study issues and career possibilities. Personal interests of the students are taken into consideration as far as the free and elective studies are concerned. Some voluntary laboratory work under guidance of MA students was shown. (various simple mobile robots).

Social scholarships do exist. The efficiency of such a system is however questionable as we have not seen reliable data concerning the ratio of the amount of such scholarships to the costs of living. Onetime cultural and sports scholarships are also granted. The number of dormitory places is limited. This latter might cause a problem as some students have to find rental accommodation for themselves.

5.4. Student achievement assessment

Assessment structure of each study subject is announced in advance. The assessment criteria correlate very well with the intended learning outcomes. They are well publicised. There

is no ambiguity on the side of the students with respect to the required criteria. The composition of the assessment grade is well and rationally defined.

After the examination students have access to the correct solutions. They can discuss the exams with the teacher and improve their marks with an additional oral part. This is a generally accepted and efficient method that can be applied when the number of students is not too high.

Final thesis assessment corresponds to university regulations. The level of theses is satisfactory and it reflects in the assessment sheets examined onsite. This is a generally applied method and acceptably efficient.

5.5. Graduates placement

Most of the graduates are able to find a job corresponding to their qualifications. There are some who get employment with companies less in the focus of their respective specialisation, while a few are jobless.

6. Programme management

6.1. Programme administration

Programme management is done primarily at the departmental level. There is a group of new programme organizers and such programmes are approved by the Faculty Study Committee, Faculty Council and Study Committee of the University. Only new specializations are discussed by the Senate. There is participation by industrial representatives. In this case the head of department takes the main responsibility for the programme management. Student representatives actively participate in developing new or changing existing programmes. The well defined internal structures (at the university level: the Senate and the rector's office and at the faculty level: the faculty council and the deanery) ensure the high study quality. This structure is able to give a stable level of quality control if systematically applied.

6.2. Internal quality assurance

Quality evaluation is done by the above mentioned set of various bodies and involved stakeholders. A specific study committee at the faculty is appointed to solve all ongoing study issues including quality evaluation. In particular the committee considers newly prepared or improved study programmes and subject modules and submits them for approval. However, he

committee does not seem to pin point specific lectures which need to be updated. Students award best teachers. Details of study programmes are available to all involved parties.

Based on a permanent procedure of study quality assessment quality improvement is targeted. The initiator is always the departmental level. When employers express their requests on any curriculum contents change this is also incorporated in the standard quality improvement procedure. However this refers usually only to practical knowledge, employers are satisfied with the theoretical basis. Generally, the programme assessment frequency is four years. The efficiency of this process can be improved because the current curricula still contains lectures whose content is not abreast with comparable programmes at other European universities. This statement is obvious when it is considered that textbooks twenty or even more than thirty years are used! No aspect of computational intelligence and related subjects was included in the curriculum.

According to the above procedures both students and external stakeholders might have an influence on study quality. Teaching staff have a chance to express their opinions and suggestions at departmental meetings. The students are regularly invited to take part in the course evaluation. Since this is done on a personalized manner the efficiency of this process is low. Furthermore the results of the students' course evaluation are not published and hence no feedback is offered to the students.

III. RECOMMENDATIONS

3.1. Consider enhancing the quality of research publications by teaching staff members. Consider deploying external resources, such as EU and national projects, industrial projects, etc. Especially increase publication activities on an international level.

3.2. Encourage more professional career development procedures in view of the teaching staff turnover.

3.3 Provide the students with sufficient and adequate information with respect to the mobility programmes.

3.4 Try to increase student mobility, especially on the incoming side. Offer subjects/ projects taught or supervised in English (German) for visiting students.

3.5. Increase the number of doctoral students at the department and involve them in the educational procedure in BA level.

3.6. Make the teaching staff questionnaire anonymous and communicate the results to the students.

3.7. Form an IEEE student branch at the VGTU.

IV. GENERAL ASSESSMENT

The study programme *Automation and control* (state code – 61201T101 (612H62002)) is given **positive** evaluation.

Table. *Study programme assessment in points by evaluation areas.*

No.	Evaluation area	Assessment in points*
1	Programme aims and learning outcomes	4
2	Curriculum design	3
3	Staff	3
4	Facilities and learning resources	3
5	Study process and student assessment (student admission, student support, student achievement assessment)	3
6	Programme management (programme administration, internal quality assurance)	3
	Total:	18

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated

2 (poor) - meets the established minimum requirements, needs improvement

3 (good) - the area develops systematically, has distinctive features

4 (very good) - the area is exceptionally good

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