



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

KAUNO TECHNOLOGIJOS UNIVERSITETO

(Panevėžio Technologijų ir verslo fakulteto)

**STUDIJŲ PROGRAMOS *Valdymo technologijos***  
**(621H66001)**

**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**

**OF *Control Technologies (621H66001)***

**STUDY PROGRAMME**

at ***KAUNAS UNIVERSITY OF TECHNOLOGY***

***(Panevėžys Faculty of Technologies and Business)***

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Išvados parengtos anglų kalba  
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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<b><i>Valdymo technologijos</i></b>
Valstybinis kodas	621H66001
Studijų sritis	Technologijos mokslų studijų sritis
Studijų kryptis	Elektronikos ir elektros inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2 metai)
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Valdymo sistemų magistras
Studijų programos įregistravimo data	2001 08 02 , įsak. Nr. 1187; perregistruota 2007 02 19, ISAK – 225.

## INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<b><i>Control Technologies</i></b>
State code	621H66001
Study area	Technological sciences
Study field	Electronics and electrical engineering
Kind of the study programme	University Studies
Study cycle	Second
Study mode (length in years)	Full-time (2 years)
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Control Systems
Date of registration of the study programme	2001 08 02 , Nr. 1187; Re-registered 2007 02 19, ISAK – 225.

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## I. INTRODUCTION

The objective of this Report is to evaluate the *Control Technologies* (state code 621H66001) Master (MA) study programme implemented at Panevėžys Faculty of Technologies and Business of Kaunas University of Technology (KUT).

This second-cycle Programme was started in 2012/2013 academic year. The Programme length is 2 years (for full-time studies). Therefore, only the second group of students is currently studying in this Programme. The first group will graduate in the summer of 2014. At the time of issue of Self-Evaluation Report (September 13, 2013), only first-year implementation experience was available for the survey. The external evaluation team of reviewers (henceforth Reviewers) visited the Programme providers in Panevėžys Faculty of Technologies and Business on March 3-4, 2014 and gained additional on-site information, including a new one about the ongoing second-year implementation. The team consisted of Prof. Dr. László T. Kóczy (team leader), Ass. Prof. Dr. Marios Kasinopoulos, Prof. Dr. Mart Tamre, Prof. Dr. Roma Rinkevičienė, Dr. Arturas Klementavičius and Gražvydas Jakaitis who all visited Panevėžys Faculty of Technologies and Business.

As such, the Programme *Control Technologies* is not new – it was registered under the renewed code in 2007 and has been implemented in Kaunas, in the Faculty of Electric and Control Engineering of KUT (the Faculty was reorganized to the Faculty of Electrical and Electronics Engineering from January 2, 2014).

On the other hand, the current *Control Technologies* Programme is not quite a new even at the Panevėžys Faculty of Technologies and Business as it has replaced the similar 1.5-year length MA study programme *Control Engineering* which was provided in 2001-2012.

Considering other related programmes in the other Lithuanian universities, *Control Technologies* programme is closest to the *Automation* MA study programme in Vilnius Gediminas Technical University, which has two specialisations: *Automation Systems and Mechatronic System Automation*.

## II. PROGRAMME ANALYSIS

### 1. *Programme aims and learning outcomes*

The Reviewers can confirm that the programme aims and learning outcomes are well defined, clear and publicly accessible and they are based on the academic and/or professional requirements, public needs and the needs of the labour market.

The aims of the Study Programme, as formulated in SER, are clear and definitely programme-specific and control-related. First aim states that it is necessary to provide knowledge in process and system control technologies, modern automation control theories and modern automation equipment, robotics and intellectual mechatronic systems. The following one is to improve the skills in application of this knowledge to solve the problems of control tasks for technical systems and technological processes. The next aim is to develop capacity in the formulation of mathematical models for the optimization and control of those systems and processes and in the development of respective algorithms. The last aim is to create competence in the research and development of optimal, adaptive, automatic and computerized control for

electromechanical system taking to account the new scientific achievements and getting ready for the third-cycle studies.

Also the Programme learning outcomes are well defined, clearly and make up a comprehensive list covering as many as 24 items. They are structured to 6 categories, corresponding to Knowledge and Understanding (A), Engineering Analysis (B), Engineering Design (C), Investigation (D), Engineering Practice (E) and Transferable Skills (F). The Reviewers found that there is a good compliance among the aims and learning outcomes, and, as a consequence, most of the learning outcomes are achievable. Both aims and outcomes are based on the academic and professional requirements. Although the Reviewers believe that the number of 24 items is too many and could be reduced for this programme.

The Programme aims and learning outcomes are publicly available and are presented in the KUT official website, Panevėžys Faculty of Technologies and Business website, the youth-oriented website for university studies in Panevėžys and AIKOS system – the Open Vocational Information, Counselling and Guidance System. Specifically, the Programme aims in these websites are presented in shortened version under the headline *Profile of the Programme* („A graduate has knowledge in control technologies of processes and systems, modern theory of automatic control and modern automation equipment, and is able to analyze and investigate control problems of systems and technological processes, as well as is able to formulate and solve tasks of modeling, optimization and control algorithms development“). To Reviewers’ opinion, for better understanding, this headline could be extended by words *Programme aims* (in parenthesis).

The Programme aims and learning outcomes correspond to public interests, expressed both by regional labour market and regional entrants. The importance for labour market is determined greatly by the fact that Panevėžys historically was an industrial city, with highly developed electronics and electrical engineering products sector. Accordingly, the regional mentality induces the continuous establishment of new industrial companies, rather small, but flexible and innovative. There are more than 20 enterprises in Panevėžys region (including North-Eastern Lithuania) which operate the electromechanical systems provided with automated control. The regional employers appreciate positively Programme aims and learning outcomes as meeting their expectations: they underscore the competences of Programme students and graduates and their readiness for the professional activities in control engineering. Specifically, such a high appreciation is determined by the qualification of graduates from the preceding programme which was delivered before 2012 (*Control Engineering*).

The programme aims and learning outcomes are consistent with the type studies (full-time studies), level of studies (second-cycle studies) and qualification offered (Master of Control Systems) as well as with name of the Programme (*Control Technologies*).

As for the possible improvements in the content of learning outcomes, it could be recommended to reconsider the two outcomes which seem to be repetitive, namely F5 and E3:

- 1) F5 – *Understanding of responsibility for carried out engineering work (in context of law, professional ethics, health care, safety of human and environment)*
- 2) E3 – *A knowledge of ethical, environmental and commercial limitations and non-technical implications of engineering activities.*

Nevertheless, as it was mentioned, the Reviewers find the number of Programme learning outcomes to be very large. They understand that it is not a specificity of the Programme and the same refers to other study programmes within the study field. The Reviewers would recommend

revising the Programme outcomes with the view to reduce their number but keeping their comprehensiveness.

Specifically, to emphasize the preparedness of Programme graduates for Ph.D studies, a new learning outcome could be introduced as, e.g. ability of most advanced students to continue the studies in the third-cycle.

## ***2. Curriculum design***

Despite of the fact that both Department of Technologies in Panevėžys and Faculty of Electronics and Electrical Engineering in Kaunas pursue the same Programme (under the same state code *621H66001*), the Programme curricula in Panevėžys and Kaunas are not identical. The difference lies in the number of sub-specializations. Panevėžys Faculty of Technologies and Business offers the *Mechatronics Systems* sub-specialization only, while the Kaunas Faculty – 4 elective sub-specializations, *Mechatronics Systems* being one of them.

The Curriculum meets all relevant legal requirements, specifically, in terms of number of credits („not more than 120 ECTS”) and their distribution to study subject blocks:

- “study field subjects” make up 114 ECTS (subjected to “not less than 60 ECTS”);
- “optional subjects” make up 6 ECTS (subjected to “not more than 30 ECTS”);

Nevertheless, the number of optional subjects is small (1 subject) and could be extended for student choice. The study subjects are spread evenly across the study cycle, with 5 subjects for each term.

The reviewers investigated the content of the programme, i.e. subject syllabi, and concluded that:

- themes are in good coherence and not repetitive;
- subjects reflect the latest achievements in science and technologies and cover modern themes (e.g, the theme *Advanced methods for modeling of systems (neural networks, fuzzy logic, expert and hybrid systems)* in the subject *Systems Modelling and Identification*) ;
- content and methods of the subjects are appropriate for the achievement of the intended learning outcomes. Each subject has its learning outcomes, at least 3 outcomes (as for *Robotics*) and at most 14 outcomes (as for *Integrated Systems of Mechatronics*). All the subject learning outcomes are logically linked to Programme learning outcomes;
- the subject description are provided with the up-to-date literature sources for student independent work.

In conclusion, the Reviewers confirm that the study subjects are consistent with the type and level of the studies and should ensure the abilities of independent work, creative thinking and innovative solutions for the Programme graduates. The subject learning outcomes are set appropriately at the level of Master, with the emphasis on high-level problem solution, critical evaluation, justification and dissemination of findings.

Specifically, as a minor copy-paste error, we found that 3 subjects (*Research Project 1*, *Research Project 2* and *Final Degree Project*) in study subject descriptions (entitled as SMP – study module programmes) refer to learning outcomes for Master's degree programme in *Electrical Power Engineering*, i.e. to different programme. These subjects and their learning outcomes should be linked to *Control Technologies* programme.

Also the reviewers recommend to reconsider whether the 5<sup>th</sup> learning outcome of subject *Information Technologies for Control Systems* as “Be able to configure software, design applications and modelling control objects” really supports the Programme learning outcome F5 – *Understanding of responsibility for carried out engineering work (in context of law, professional ethics, health care, safety of human and environment).*

As a minor inconsistency, the Reviewers found that recommended literature for the subject *Optimum and Adaptive Control of Electromechanical Systems* includes items of old literature (issued 20-35 years ago). Respectively, the list of the literature could be updated.

### **3. Staff**

The Panevėžys staff of the Programme includes 8 teachers, 7 of them having scientific degree. Upon necessity, in co-operation with the Kaunas Faculty, the visiting lecturers from Kaunas are involved into the teaching process.

The staff meets the legal requirements applicable for the providers of a MA programme. Specifically, staff's qualification conforms with legal requirement for 80% of teachers to have a scientific degree (actual percentage is  $7/8=0.875$ ) and that for 20% of major subject field to be covered by professors (actual percentage corresponds to 3-4 subjects from 14, making a proportion of 0.214-0.285). Nevertheless, there is no evidence for the compliance with requirement for 20% of major study field subjects to be taught by professors.

In discussion with lecturers during the onsite visit, the Reviewers found that they are motivated and smart. A good level of staff satisfaction with programme aims and contents is evident. The Reviewers observed strong commitment by all teachers to the quality of study process and found that their qualifications are adequate to ensure the intended learning outcomes. Nevertheless, the teachers are more or less overloaded by the teaching load. This load mainly ranges from 14 to 20 h of lecture and laboratory work per week and does not include other contact hours like tutorial (consultation) and examinations. As a consequence, it aggravates the implementation of other academic activities.

The Reviewers can confirm that the teaching staff of the programme is involved in research and, specifically, into research directly related to the subjects of study programme being reviewed. However, research activities as well as participation in international conferences (outside the country) and publications are unevenly spread between the staff members. Some of them are very active and productive in terms of number of research projects, presentations on conferences and higher level publications. Others could pursue these activities to greater extent. Particularly, the efforts to publish papers in the international journals should be intensified.

According to their subject profile, several teachers carry out scientific research in Panevėžys Mechatronics Centre, a separate public institution outside the Panevėžys Faculty of Technologies and Business. The Centre has modern facilities for high level research, particularly in microelectronics and nanotechnologies.

Despite of the large number of research projects performed in the last 3 years, the structure of projects could be also improved. The vast majority of projects fall into the category of national governmental projects while the number of contracts with industrial companies is rather modest. It is determined partially by the fact that majority of potential service purchasers are small companies. Nevertheless, this number could be increased, particularly taking to account the good relations between teachers and industry. Also teachers' involvement into international projects should be pursued as a major target.

Although the uploading of lecture notes into virtual environment is not mandatory as yet, 50% of teaching staff did it already (in the *Moodle* environment). Two teachers pursue good activities in publishing original methodological materials as textbooks (printed or as e-books). Other teachers are recommended to undertake such activities as well.

The staff international mobility of the type "outgoing teacher" is still on a small-scale and covers 2 one-week visits according to Erasmus exchanges programme. Both number and duration of visits should be extended.

The age of the Panevėžys teaching staff (8 lecturers) is 49 years, but the personal turnover is rather slow, with one post-graduate student assisting this staff. Taking to account 2 other post-graduate students participating in other study programmes in Panevėžys Faculty of Technologies and Business, as well as one staff member complying with the requirements to take a professor position, the Reviewers conclude that staff turnover is sufficient to ensure the adequate provision of the Programme and consider that the staff balance is appropriate, at least for the time being.

In 2010-2012, the majority of teachers have been attending the training courses to raise their professional qualifications. These courses were held in Lithuania. The University administration could arrange better conditions for the teaching staff to go abroad for training courses, internships and high-level forums as IFAC conferences.

#### ***4. Facilities and learning resources***

The Panevėžys Faculty of Technologies and Business offers good facilities for the students of *Control Engineering* Study Programme. The premises are renovated and are adequate both in their size and quality.

The Programme makes use of 9 lecture rooms, 2 computer classrooms and 3 laboratories: Mechatronics lab, Industrial robots lab and Mobile robots and Image Processing & Recognition lab (all premises are situated in Campus II of the Faculty). Computer classrooms are available with sufficient number of computers for the Programme student groups. Mechatronics laboratory is equipped with FESTO systems. It is rather modern and appropriate for learning and research purposes and fully complies with Programme's sub-specialization *Mechatronics systems*. The robotics profile is strongly expressed in the Programme. Both robots laboratories deserve special evaluation as they are very well equipped. Specifically, part of robot facilities were assembled and programmed by the students particularly devoted to the control field. Some mobile robots could be controlled and programmed in remote mode – via internet. It can be concluded that these laboratories are unique on Lithuanian scale and are known to foreign robot producers. The laboratories could be offered to foreign universities for the purposes of research, practices and internships by the student groups.



The library facilities can be estimated as good. Both the reading hall in the former Faculty of Technologies (Campus II) and that in the Faculty's main library (Campus I) have long working hours. The stock of textbooks is continuously updated. The former shortage of English books in control engineering is considerably reduced.

The students and teachers have access to electronic resources available for KUT users and to the subscribed electronic data bases. They could be accessed not only from reading halls but also from any computer installed at the Faculty. Furthermore, the students and teachers have an access to these databases and e-books from their homes using connection through the VPN network.

In general, the Reviewers conclude that available teaching materials are adequate and accessible. As for future improvements, the Reviewers note that computers in the reading hall of the main library need updating and the respective funds should be raised. Also the stock of printed methodological materials, both in Lithuanian and in English, could be a bit extended.

### ***5. Study process and student assessment***

The admission to the Study Programme is free and currently not subjected to competition: 12 people were enrolled in 2012 and 16 people – in 2013. All these study places are state-funded. The minimum admission mark was not applied as a requirement. The only requirement is bachelor education in the same study field (*Electronics and Electrical Engineering*). If a candidate comes from other study field or has graduated from college in the same field (with the degree of professional bachelor), he/she should have accomplished supplementary studies (bridging courses). Panevėžys Faculty of Technologies and Business provides such courses, with the volume of 60 ECTS for professional bachelors and 90 ECTS for bachelors from other study fields.

The students in the current Study Programme are mostly coming from Panevėžys city and region. Most of them graduated from the BA study programme *Automation and Control* (study code 612H66001) in the same Panevėžys Faculty of Technologies and Business. Several students are graduates from Panevėžys College and have passed the bridging courses. As in the preceding 1.5-year MA Study Programme *Control Engineering*, 1-2 entrants per year come after BA studies (in *Automation and Control*) from Kaunas and Vilnius, but only those who originate from the Panevėžys region.

The Reviewers found that students are motivated and highly appreciate the opportunity to study in this Faculty, i.e. in their native region. It can be seen from their performance as there is no student drop-out due to academic or other reasons.

The Faculty ensures an adequate level of academic and social support. The tutors of academic groups follow the academic needs on permanent basis and, specifically, one teacher from Programme teaching staff was nominated recently as one of the best KUT tutors. The students are encouraged to gain deeper knowledge for better prospects of their professional and managerial career. The teachers offer them tutorials and individual consultations to facilitate and intensify their independent work. Also the seminars are organized as information-exchange forums where the students share their results of independent work in accordance with the assignments previously given by the subject teacher.

The Reviewers confirm that the organisation of the study process is really well-founded and flexible, and ensures an adequate provision of the programme and the achievement of the

learning outcomes. This statement is made without examination of the quality of final theses as they were not available during a visit (the second-year studies will be completed for the first time in the summer of 2014). Despite of it, a high level of theses can be reasonably presumed referring, inter alia, to the good academic quality of reports of laboratory and research works checked by Reviewers.

The organisation of the study process is fitted to the full-time jobs of students. Majority of students work in Panevėžys and would hardly refuse them in exchange for MA degree studies in Kaunas or Vilnius. On the other hand, students confirmed their interests (market-dictated) in the Programme: wishing to move to the positions of chief engineers and division heads, they need to have MA degree education.

The students are very satisfied with the assessment system of their performance. It is clear, adequate and publicly available. Students are also suitably encouraged to participate in the research activities and are involved into rather intensive research activities. They are allowed to use the facilities of laboratories for own research needs whenever they will. They participate in the University's young researchers exhibition "KUT Technorama", as well as in the international mobile robot competitions "Robot Intelligence". The Reviewers found these implementations as very positive steps for this programme.

On the other hand, the Reviewers found that students' future outlooks are not linked with scientific research career and only one student from the targeted audience expressed willingness to go to the third-cycle studies. Respectively, the students could be more distinctly oriented to scientific research and the greater distinction could be made between the concepts of original/unique scientific and ordinary scientific research. MA degree students could be better informed that original/unique scientific research yields a new scientific knowledge on a worldwide level and will be a requirement for PhD students. The criterion to identify whether the result of research is a new scientific knowledge is its suitability for publication in a higher-level scientific journal. If no, the research is an ordinary scientific research which only uses the known scientific information.

Despite of the teachers' efforts and encouragements to move under ERASMUS exchanges, the student activity in mobility programmes is modest. In 2013, only one student has used the ERASMUS opportunity. One of the reasons for this is their jobs which adheres them to local studies throughout all 3 semesters (the 4<sup>th</sup> semester is assigned for final theses). However the major reason is probably that they seem to be locally-minded people, which does not directly relate to the programme.

The programme has no incoming students under ERASMUS exchange programme yet. The Reviewers recommend the Faculty to offer its services for such students, particularly relating their visits to the work in Robots laboratories and public institution *Mechatronics Centre*.

Despite of the really good academic culture at the Faculty, the students could also be familiarized with *academic code of ethics* of the KUT. They could be familiarized with it in a due manner for better application of academic principles and further dissemination of academic culture in the society.

## **6. Programme management**

Although being new in Panevėžys Faculty of Technologies and Business, the Programme is adequately managed, mainly using the practice and experience gained in the management of preceding programme *Control Engineering*. Also the Programme management in the areas as

*Aims and learning outcomes* and *Curriculum design* is shared with Kaunas Faculty, both in the joint Study Programme Committee, and in the meetings of staffs and their administrations.

The responsibilities for decisions and monitoring of the implementation of the Programme in Panevėžys Faculty of Technologies and Business are clearly allocated. The implementation problems and challenges as well as opportunities are regularly discussed in the Department meetings.

The regional employers and other stakeholders see this Programme as well-known for them but actually keeping in mind the preceding programme *Control Engineering*. The stakeholders are also contacted by teaching staff to give their comments and recommendations for the implementation of the Programme. The employers often suggest the topics for final thesis or the topics are taken as those originating from the student work in the company.

The information and data on the implementation of the programme are regularly collected and analysed. The feedback from students on the quality of subjects (comments and responses in the questionnaires) is taken seriously into account. Nevertheless, the students are not informed as how their proposals were (or will be) implemented. Therefore a way should be found how they could be informed about effectiveness of the submitted proposals.

The experts learned that few of the Programme students have jobs not related to their profession. This situation could be counteracted by the teachers who might use their personal relations with industry and to head such students towards the profession-related jobs.

The Study Programme Committee does not include a student member from Panevėžys Faculty of Technologies and Business. This place is taken by the student from Kaunas Faculty. This is one but not the single reason why the joint Study Programme Committee is not optimal for the Programme in Panevėžys. The Reviewers insist the administration to analyse the possibility to establish separate committees in Kaunas and Panevėžys and in such a way to reflect better the regional specificity of Panevėžys Faculty of Technologies and Business.

### III. RECOMMENDATIONS

1. Increase the international mobility of teachers as “outgoing teachers”, as participants at high-level conferences and as trainees (visitors) at foreign research centres. Strive for more active motivation for students to go to Erasmus exchanges.

2. Reduce the number of Programme learning outcomes making them more concise and essential. Emphasize the preparedness of Programme graduates for Ph.D studies, include a respective learning outcome, e.g. as an ability of most advanced students to continue the studies in the third-cycle.

3. Do more research contracts for local companies. Engage in more work and projects with the business world.

4. Try to reduce the teaching load for teachers in order to intensify their preparation of publications to high-level international journals and participation in international research projects.

5. Offer both Robots laboratories for foreign students groups to come for practice and research tasks.

6. Consolidate the efforts of Programme staff in Panevėžys and Kaunas for better results, e.g. using Kaunas staff capacity in international publications and Panevėžys staff capacity and facilities in robotics.

7. Analyse possibility to establish a separate Study Programme Committee in Panevėžys for *Control Technology* Programme (or several programmes) in order to increase effectiveness of programme(s) management.

8. When teaching your subjects, make a greater distinction between the concepts of original/unique scientific and ordinary scientific research. It is recommended to explain the MA degree students that an original/unique scientific research yields a new scientific knowledge on worldwide level and will be a requirement for PhD students. The criterion to identify whether the result of research is a new scientific knowledge is its suitability for publication in a higher-level scientific journal. If no, the research is an ordinary scientific research

#### IV. SUMMARY

The second-cycle programme *Control Technologies* is new at the Panevėžys Faculty of Technologies and Business and was started in 2012. The first group will graduate in the summer of 2014.

The Programme aims and learning outcomes are set appropriately at the level of Master degree with the emphasis on high-level solutions of complicated control problems needing scientific research. The Programme aims and learning outcomes correspond to public interests, expressed both by regional labour market and regional entrants. Nevertheless, the list of Programme learning outcomes seems to be too extended (24 outcomes, partly redundant). On the other hand, to emphasize the preparedness of Programme graduates for Ph.D. studies, an important missing learning outcome should be introduced namely, the ability of the graduates to continue the studies in the third-cycle.

The curriculum meets all relevant legal requirements. The subject learning outcomes are logically linked to Programme learning outcomes. The subject themes are in good coherence and not repetitive. Specifically, the number of optional subjects is small and could be extended.

The staff qualifications are adequate to ensure the intended learning outcomes. Teachers are motivated, qualified and have good relations with the industry. They are engaged into scientific research. Nevertheless, the teachers are more or less overloaded by the teaching load. In the future, the teachers' involvement into more international research projects should be pursued as a major target. Also their efforts to publish papers in international professional journals should be intensified. Their international mobility as visiting teachers is expected to be increased as well.

The Faculty offers good facilities for the programme students. The mechatronics laboratory is adequately equipped. The laboratories of industrial and mobile robots are on particularly good level and could be used by incoming student groups from other Lithuanian and foreign universities, as well. In addition, the public institution "Mechatronics Centre" in Panevėžys city is used for scientific research, particularly in microelectronics, by agreement. The library

provides all the necessary services including access to subscribed important electronic databases. Nevertheless, the stock of printed methodological materials, both in Lithuanian and in English, could be further extended.

The students are motivated and perform well, without drop-out due to academic or other reasons. The organisation of the study process is well-founded and flexible ensuring an adequate provision of the programme and achievement of the learning outcomes. This organisation is fitted to the full-time jobs of students. The teachers offer students tutorials and individual consultations to facilitate and intensify their independent work. The students are suitably encouraged to participate in individual research activities and are involved into rather intensive innovative work. Nevertheless, the students are local-minded people and, as a consequence, their international mobility is modest. The programme has no incoming students at all as far.

Although being new at the Panevėžys Faculty of Technologies and Business, the Programme is adequately managed, mainly using the practice and experience gained in the management of the preceding related programme *Control Engineering*. The Programme management relies on the joint Study Programme Committee consisting of representatives from both the Panevėžys Faculty of Technologies and Business and the Kaunas Faculty. The regional stakeholders are satisfied with the Programme and are involved to sufficient extent into the Programme improvement. The feedback from students on the quality of subjects (comments and responses in the questionnaires) is taken seriously into account. Nevertheless, the joint Study Programme Committee seems to be not optimal case for the Programme implementation in Panevėžys, a split into two independent committees or at least a division into two sub-committees, with an individual student representative in each division might enhance the efficiency of the study process management.

## V. GENERAL ASSESSMENT

The study programme Control Technologies (state code – 621H66001) at Kaunas University of Technology (Panevėžys) is given **positive** evaluation.

*Study programme assessment in points by evaluation areas.*

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	3
2.	Curriculum design	3
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	4
6.	Programme management (programme administration, internal quality assurance)	3
	<b>Total:</b>	<b>19</b>

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

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

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

4 (very good) - the field is exceptionally good.

Grupės vadovas:  
Team leader:

Prof. dr. Laszlo T. Koczy

Grupės nariai:  
Team members:

Ass. prof. dr. Marios Kasinopoulos

Prof. dr. Mart Tamre

Prof. dr. Roma Rinkevičienė

Dr. Arturas Klementavičius

Gražvydas Jakaitis

<...>

## V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijų universiteto (Panevėžys) studijų programa *Valdymo technologijos* (valstybinis kodas – 621H66001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	4
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>19</b>

\* 1 - Nepatenkinamai (yra esminių trūkumų, kuriuos būtina pašalinti)

2 - Patenkinamai (tenkina minimalius reikalavimus, reikia tobulinti)

3 - Gerai (sistemiškai plėtojama sritis, turi savitų bruožų)

4 - Labai gerai (sritis yra išskirtinė)

<...>

## IV. SANTRAUKA

Panevėžio technologijų ir verslo fakultete antrosios pakopos programa Valdymo technologijos yra nauja programa, ją buvo pradėta dėstyti 2012 m. Pirmoji absolventų grupė turėtų baigti 2014 m. vasarą.

Programos tikslai ir studijų rezultatai yra atitinkamai nustatyti magistro laipsnio studijoms, daugiausia dėmesio skiriama sudėtingų valdymo problemų, kurioms išspręsti reikalingi moksliniai tyrimai, aukšto lygio sprendimams. Programos tikslai ir studijų rezultatai sutampa su viešaisiais interesais, išreikštais vietos darbo biržos ir stojančiųjų iš regiono. Tačiau programos studijų rezultatų sąrašas atrodo šiek tiek per ilgas (24 rezultatai, kurie iš dalies kartojasi). Kita vertus, reikėtų pabrėžti tai, kad programos absolventai bus pasirengę studijuoti doktorantūros studijose, reikėtų įrašyti svarbų studijų rezultatą: „Absolventai gebės toliau studijuoti trečiosios pakopos studijose.“

Studijų turinys atitinka visus susijusius teisinius reikalavimus. Dalykų studijų rezultatai yra logiškai sujungti su programos studijų rezultatais. Studijų dalykų temos yra susijusios tarpusavyje ir nesikartoja. Tačiau pasirenkamųjų dalykų skaičius yra labai mažas, jį būtų galima padidinti.

Personalo kvalifikacija tinkama numatomiems studijų rezultatams užtikrinti. Dėstytojai motyvuoti, kvalifikuoti ir palaiko gerus ryšius su pramone. Jie vykdo mokslinius tyrimus. Tačiau dėstytojams daugiau ar mažiau tenka per didelis dėstyimo valandų krūvis. Ateityje dėstytojai turėtų siekti vykdyti daugiau tarptautinių mokslinių tyrimų projektų. Jie taip pat turėtų dėti

daugiau pastangų publikacijoms profesiniuose žurnaluose skelbti. Be to, tikimasi, kad suaktyvės jų kaip kviestinių dėstytojų tarptautinis judumas.

Fakultetas programos studentams siūlo gerus materialiuosius išteklius. Mechatronikos laboratorija yra atitinkamai įrengta. Pramonės ir mobiliųjų robotų laboratorijos yra ypač aukšto lygio, jomis taip pat būtų galima leisti naudotis ir studentams iš kitų Lietuvos bei užsienio universitetų. Be to, viešoji įstaiga Panevėžio mechatronikos centras pagal susitarimą yra naudojamas moksliniams tyrimams, ypač mikroelektronikos. Biblioteka teikia visas būtinas paslaugas, įskaitant prieigą prie svarbių prenumeruojamų elektroninių duomenų bazių. Tačiau spausdintinės metodologinės medžiagos skaičius tiek lietuvių, tiek anglų kalba galėtų būti dar labiau didinamas.

Studentai yra motyvuoti ir gerai mokosi, nėra asmenų, nebaigusių studijų dėl akademinio ar kitų priežasčių. Studijų procesas yra gerai organizuojamas ir lankstus, taip užtikrinama, kad programa bus teikiama tinkamai, o studijų rezultatai bus pasiekti. Toks organizavimas pritaikytas studentams, dirbantiems visą darbo dieną. Norėdami palengvinti ir suintensyvinti studentų savarankišką darbą dėstytojai teikia studentams individualias konsultacijas. Studentai tinkamai skatinami dalyvauti individualioje mokslinių tyrimų veikloje ir gana intensyviai vykdo inovacinį darbą. Nepaisant to, studentai dažniausiai planuoja likti Lietuvoje, dėl to jų tarptautinio judumo lygis yra žemas. Kol kas programoje nesimoko nei vienas atvykstantis studentas.

Nors ši studijų programa Panevėžio technologijų ir verslo fakultete yra nauja, ji – tinkamai valdoma, daugiausiai pasinaudojant praktika ir patirtimi, įgyta valdant prieš tai buvusią Valdymo inžinerijos programą. Programos vadybą vykdo Studijų programos komitetas, kurį sudaro Panevėžio technologijų ir verslo fakulteto bei Kauno fakulteto atstovai. Regiono socialiniai dalininkai yra patenkinti programa ir pakankamai prisideda prie jos tobulinimo. Į studentų atsiliepimus apie studijų dalykų kokybę (komentarų ir anketų atsakymus) yra rimtai atsižvelgiama. Tačiau panašu, kad jungtinis Studijų programos komitetas nėra optimalus pasirinkimas įgyvendinant šią programą Panevėžyje. Studijų proceso vadyba pagerėtų komitetą padalijus į du nepriklausomus komitetus ar bent į du pakomitečius, kuriuose dalyvautų atskiri studentų atstovai kiekviename padalinyje.

### III. REKOMENDACIJOS

1. Didinti dėstytojų tarptautinį judumą kaip „išvykstančių dėstytojų“, kaip aukšto lygio konferencijų dalyvių ir kaip stažuotojų (lankytojų) užsienio mokslinių tyrimų centruose. Aktyviau motyvuoti studentus dalyvauti „Erasmus“ mainų programose.
2. Sumažinti programos studijų rezultatų skaičių pateikiant juos glausčiau ir tik esminius. Pabrėžti programos absolventų pasirengimą doktorantūros studijoms, įtraukti atitinkamą studijų rezultatą, pvz., kaip gebėjimą patiems pažangiausiems studentams tęsti studijas trečiosios pakopos studijose.
3. Sudaryti daugiau mokslinių tyrimų sutarčių su vietos bendrovėmis. Vykdyti daugiau darbų ir projektų su verslo pasauliu.
4. Stengtis sumažinti dėstytojų darbo krūvį siekiant skatinti juos rengti publikacijas aukšto lygio tarptautiniams žurnalams ir dalyvauti tarptautiniuose mokslinių tyrimų projektuose.
5. Leisti į abi robotikos laboratorijas atvykti užsienio studentų grupėms praktikai ir mokslinių tyrimų užduotims atlikti.



6. Suvienyti Panevėžyje ir Kaune dėstomų programų personalo pastangas geresniems rezultatams pasiekti, pvz., panaudojant Kauno personalo pajėgumus tarptautinėms publikacijoms rengti, o Panevėžio personalo pajėgumą ir materialiuosius išteklius robotikai vystyti.

7. Analizuoti galimybes Panevėžyje įsteigti atskirą Valdymo technologijų programos (ar kelių programų) Studijų programos komitetą, siekiant padidinti programos (-ų) vadybos efektyvumą.

8. Dėstydami savo dalyką dėstytojai turėtų aiškiau pabrėžti skirtumą tarp originalaus ar unikalaus mokslinio ir įprasto mokslinio tyrimo sąvokų. Rekomenduojama magistro studijų studentams paaiškinti, kad originaliame ar unikaliame moksliniame tyrime reikalingos naujausios mokslinės žinios pasauliniu lygiu, kurių bus reikalaujama stojant į doktorantūros studijas. Kriterijus, leidžiantis nustatyti, ar tyrimo rezultatas gali būti traktuojamas kaip naujausios mokslinės žinios, yra jo tinkamumas publikuoti aukščiausio lygio moksliniuose žurnaluose.

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