STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technologijos universiteto

STUDIJŲ PROGRAMOS *MECHATRONIKA* *(valstybinis kodas - 621H73001)* VERTINIMO IŠVADOS

EVALUATION REPORT OF *MECHATRONICS* (*state code - 621H73001*) STUDY PROGRAMME

at Kaunas University of Technology

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Išvados parengtos anglų kalba
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	***Mechatronika***
Valstybinis kodas	621H73001
Studijų sritis	Technologijos mokslai
Studijų kryptis	Gamybos inžinerija
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinė (2)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Mechatronikos magistras
Studijų programos įregistravimo data	1997

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	***Mechatronics***
State code	621H73001
Study area	Technological Sciences
Study field	Production and Manufacturing Engineering
Type of the study programme	University studies
Study cycle	Second
Study mode (length in years)	Full-time (2)
Volume of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Mechatronics
Date of registration of the study programme	1997

CONTENTS

I. INTRODUCTION

1.1. Background of the evaluation process

The evaluation of on-going study programmes is based on the **Methodology for evaluation of Higher Education study programmes,** approved by Order No 1-01-162 of 20 December 2010 of the Director of the Centre for Quality Assessment in Higher Education (hereafter – SKVC).

The evaluation is intended to help higher education institutions to constantly improve their study programmes and to inform the public about the quality of studies.

The evaluation process consists of the main following stages: *1) self-evaluation and self-evaluation report prepared by Higher Education Institution (hereafter – HEI); 2) visit of the review team at the higher education institution; 3) production of the evaluation report by the review team and its publication; 4) follow-up activities.*

On the basis of external evaluation report of the study programme SKVC takes a decision to accredit study programme either for 6 years or for 3 years. If the programme evaluation is negative such a programme is not accredited.

The programme is **accredited for 6 years** if all evaluation areas are evaluated as "very good" (4 points) or "good" (3 points).

The programme is **accredited for 3 years** if none of the areas was evaluated as "unsatisfactory" (1 point) and at least one evaluation area was evaluated as "satisfactory" (2 points).

The programme **is not accredited** if at least one of evaluation areas was evaluated as "unsatisfactory" (1 point).

1.2. General

The Application documentation submitted by the HEI follows the outline recommended by the SKVC. Along with the self-evaluation report and annexes, the following additional documents have been provided by the HEI before, during and/or after the site-visit:

No.	Name of the document
1.	Action plan on solving problems defined by „Round table with students" (example from database)
2.	List of Start-up's
3.	Transcripts of records (examples taken from database)
4.	Marketing and communication activities for the study programmes in the field of Production engineering

5.	Module assessment summary (example from database)
6.	List of laboratories visited on 18th of November at KTU

1.3. Background of the HEI/Faculty/Study field/ Additional information

Kaunas University of Technology (KTU) is a public research university located in Kaunas, Lithuania. With almost 11,000 students, it stands as the largest technical university in the Baltic States. It offers 135 academic studies (bachelors, masters and doctorates), 39 of which are taught in English.

KTU has 135 study programmes, of which 54 are Bachelor's, 63 are Master's and 17 scientific fields of Doctoral studies. One of these Masters' is the *Mechatronic* Masters' programme to be assessed. According to the Self Evaluation Report SER, the programme was started 2001 as a continuation of the bachelor program in Mechatronics that was created 1997. The programme is focused on design and development of mechatronic products. It is 120 credits aligned with ECTS. The Master's programme is taught in English and Lithuanian.

A previous external evaluation of the programme was carried out in 2008. It was assessed and accredited, with three recommendations to improve the programme. It was recommended to:

1. Improve the lab equipment used in the studies,
2. Increase the availability of textbooks,
3. Strengthen the research base of the faculty.

These three recommendations had a positive effect while making improvements in the structure and execution of the programme according to the SER. The programme aims, learning outcomes structure and content of the Programme and study subjects have been improved in order to satisfy the needs of employers as well as to satisfy the requirements of national and European legislation in the area of higher education according to the SER.

1.4. The Review Team

The review team was completed according *Description of experts' recruitment*, approved by order No. 1-01-151 of Acting Director of the Centre for Quality Assessment in Higher Education. The Review Visit to HEI was conducted on *17th November, 2016.*

1. **Dr. Oluremi Olatunbosun (team leader)**, *Head of Vehicle Dynamics Laboratory, School of Mechanical Engineering, University of Birmingham, United Kingdom;*
2. **Prof. Marti Casadesus,** *Full Professor, Department of Management, University of Girona, PhD in Industrial Engineering, Spain;*
3. **Prof. Mats Hanson,** *Professor in Mechatronics, Department of Machine Design, KTH Royal Institute of Technology (until 2014), Sweden;*
4. **Mr. Audrius Jasėnas,** *director of public organization "Intechcentras", Lithuania;*
5. **Ms. Dovilė Kurpytė,** *doctoral student of Vilnius Gediminas Technical University study programme Electrical and Electronics Engineering, Lithuania.*

Evaluation coordinator – Ms. Ina Šeščilienė.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The overall programme aim is perfectly in line with the vison and mission of KTU (research based studies, innovative technologies, innovative growth, creative environment, etcetera). The programme aim is to educate engineers who are able analyse, design, implement and integrate innovative technologies and educate leaders who have abilities and skills to do this. Mechatronic graduates, both Bachelors and Masters, will contribute to the innovative growth of the country as there is a great demand from the labour market to hire graduates in this area. (SER #2 page 4) *"The mission of Kaunas University of Technology is to provide research-based studies, to create and to transfer knowledge and innovative technologies for the sustainable development and innovative growth of the country, to provide open-minded creative environment inspiring leaders and talented individuals. The future vision of Kaunas University of Technology is to be one of the leading European University with knowledge and technology development and transfer-based activities…"*). That means that program should have great support from the top management of KTU (University Council, Rector and rectors office, the Senate, Deans office, etc.).

The Learning Outcomes (LO) are in six categories, the same as many engineering programs at KTU and they are aligned with EUR-ACE standards for the second cycle degree. The LO are formulated according to the Master level of studies (Blooms taxonomy etc.), but they could be more focused on what the graduates actually can do after graduation, avoiding terms like *understand, knows*, etc.

The LO were updated 2014 according to the Descriptor of the Study Fields of Engineering from the Minister of Education and Science in Lithuania. It is stated that the LO will be revised during the next Program review stage (SER #38 page 11 *"Future improvements. The learning outcomes*

will be revised during next Programme review stage with purpose to highlight exclusivity of mechatronics, in particularly in the research field, will be adopted to the new model of Master degree programmes developed at KTU in 2016").

The aim of the program and LO are available on the webpage (https://apply.ktu.edu/courses/course/33-msc-mechatronics), but the LO information is aligned with the information presented in the Self Evaluation Report (SER), whereas SER information on the aim of the programme is not coherent with the description on the webpage.

A description of the program for prospective students is also published on the webpage http://admissions.ktu.edu/study-program/m-mechatronics/#programa , but the webpage is very simple and needs to be improved to attract students to apply to the Mechatronics Master's program. For example, the description of the program is almost identical with the text for the Bachelor program. No progression between the Bachelor and Master level. *("Contemporary technological devices, various machinery, robots, measurement, control and management equipment, even household appliances become complicated technical systems, which are created in accordance with the principles of mechatronics, i.e., using the latest achievements and possibilities of mechatronics, electronics and informatics. Graduates of this programme can create the future systems".* Moreover, the idea to present 3 invited speakers without any context and randomly defined skills /competencies needs more explanation or substantiation.

The labour market and society need more engineers with a mechatronic academic degree and the Learning Outcomes are in line with this need. However, the society needs more innovations that are in harmony with the environment and for a global sustainable world (SER p. 26 "*It is stated in the National Innovation Strategy 2010-2020 that low or middle innovativeness production companies are dominating in Lithuania's economy. Therefore, there is an urgent need for reorientation of production companies towards innovative, high added value production and strengthening of exporting companies").* The Learning Outcomes do not cover this important part (innovation) in a modern engineering education, especially Mechatronics that aims to design and produce new smart systems and products.

A Mechatronics engineering program is by definition inter- and cross-disciplinary, which means that the LO should be focusing on defining problems and creating sustainable solutions. The content and teaching methods could be more problems based and project organized. See also *2.2 Curriculum design.*

2.2. Curriculum design

The programme complies with legal requirements (SER #6 and #18 page 6). The programme is delivered in English and Lithuanian language. Its structure comprises 120 ECTS over 2 years in full-time mode. It is divided in 60 ECTS in subjects of the study field, 30 ECTS of the final degree project and 30 ECTS of subjects of other field including research projects and elective subjects. Almost all subjects are of 6 ECTS. Mechatronics could be taught in a more problem based and project organized way, often leading to modules larger than 6 ECTS. Now subjects seem to be organized in a traditional disciplinary way (*Finite Element Method, Dynamics of Mechatronic Systems, Mechanical Vibrations*, etc.), which means that the students have to do the integration between subjects on their own. The Research project 1 and 2 seems to be an exception.

The subjects are spread evenly and they are not repetitive. The content and scope of the subjects are appropriate for the achievement of the Learning Outcomes with two exceptions:

1. The programme is lacking a course (subject) in the area of Programming of Realtime Embedded Systems and a course (subject) in the area of Complex System Design.
2. The subjects Finite Element Method and Virtual manufacturing could be electives (in the programme they are compulsory) as these topics normally are related to *Solid Mechanics* and *Production Engineering*.

The programme and its subjects are lacking focus on innovation and entrepreneurship. The content and teaching methods could be more problems based and project organized, as mechatronics is an inter- and cross-disciplinary programme.

The Mechatronic Institute is mentioned in the SER (http://ktu.edu/en/institute-mechatronics/). Several members of the institute participated during the site visit presenting their contribution to the programme. That is an important factor to ensure the integration of the latest achievements in the mechatronic area into the curricula and subjects. It is important for the master's programme but also for encouraging the students to do research and continue in the doctoral programme.

2.3. Teaching staff

The qualifications of the teaching staff of the programme are adequate to ensure the learning outcomes. Additionally, they are periodically improving their qualification. All full-time lecturers of the programme have been successfully certified by the Commission for Academic Staff and Accreditation and Admission Contest (CASA) KTU during the evaluation period.

KTU creates adequate conditions for the professional development of the teaching staff involved in the programme. For example the Education Lab delivers courses in foreign languages, IT, teaching methodologies, how to use Moodle, etc.

It is stated in the SER Table 2.4 page 15, that 38 lecturers are involved in the Mechatronic master programme, which is a lot compared to the number of students, even if academics also are involved in other programmes.

Lecturers of the programme are active in research projects and publish research papers (SER # 69-70 page 17).

In general, it is important to stress that almost all of them had their PhD from KTU (Mechanical Engineering or Business Administration). Although this is not obviously a weakness of the programme, in order to increase the internationalization of the programme, it is necessary to continuously work in the internationalization of the staff in teaching and research. It is needed to increase the research in collaboration with other world renowned Universities, and increase the participation in Erasmus+ interchanges for all the staff. In fact, some teaching staff has several contacts with other European Universities and with Lithuanian companies, but this is not general. Increasing the number of incoming international lecturers to the programme will definitely improve its quality.

The academic staff showed, during the site visit, a strong commitment to the Department and the Programme. No problem with turnover was observed.

The professional development of the lectures in teaching, research and practical activities is regulated (SER #74 page 17). The SER #75 page 17 and the site visit gave clear indication that the lecturers are participating in different courses, workshops and seminars to improve their professional knowledge and skills.

2.4. Facilities and learning resources

The description of facilities (e.g. classrooms, library etc.) in the SER is very comprehensive and seems to be appropriate for all engineering students at KTU.

The following labs were shown during the site visit:

- Laboratory of heat exchange (educational, bachelor studies).
- Laboratory of heat exchange, burning processes (educational, bachelor studies).
- Laboratory of rapid prototyping, tooling (educational/research, bachelor/ master studies).
- Laboratory of robotic systems, automation (educational bachelor/ master studies).
- Laboratory of robotic systems (educational/research, bachelor/ master studies).
- Laboratory of biomechanics (educational/research, bachelor/ master studies).
- Laboratory of materials mechanics (strength of materials), (educational, bachelor studies).

 Laboratory of materials mechanics (strength of materials, structures) (research, bachelor/ master studies).
 Laboratory of mechatronic systems development, testing (research, bachelor/ master studies).
 Laboratory of biomechanics (research, master studies).
 Laboratory of measuring systems (CMMs) (educational/research, master studies).
 Laboratory of materials and microsystems testing, (research, master studies).
 Students work space.
 Laboratory of heat treatment (materials engineering) (educational, bachelor studies).
 Laboratory of materials testing (materials engineering, metallography) (educational/research, bachelor/ master studies).
 Laboratory of materials engineering (educational, bachelor studies).

It is a good mix of labs for teaching and labs for research, and some labs combine the two. It is a mix of old and new instruments and equipment. During the visit the level of activity was generally very low in the labs (it was stated that this was due to the timing of the laboratory visit (14.20 – 15.20) which falls outside the period of study by Masters' students). Nevertheless there was little evidence of on-going student projects. The combination of labs is adequate for students practice. However both the Bachelor and Master programme are lacking an open fast or rapid prototyping lab where the student can practice the prototyping of functional and non-functional mechatronic systems.

Teaching materials available in the KTU library (textbooks, books, scientific journals) are adequate and accessible. Library has a very good access to the material, in data bases, used for the students learning.

Moodle is used as the university wide Learning Management System (LMS) in almost all the subjects and facilitates the learning process. Most of the learning materials are uploaded on Moodle and the students can submit assignments, etc.

2.5. Study process and students' performance assessment

The admission requirements are in line with normal standards and procedures. The admission requirements are stated on the webpage (*"a university Bachelor's degree (min. length – 180 ECTS) in mechanical/electronics engineering or mechatronics with a good average grade (min. CGPA>60%)").* The Mechatronic Master programme has admitted only from 11 to 17 students a year for the last four years, whereof around 40% are self-financed places. Some students drop out after the first semester and the drop-out rate seems to be high (SER #112 page 22 "*Analysing the data on the numbers of admitted students and graduates during the period of 2009 – 2015 the average drop out 24.6 % is determined.").* That means that the programme has few students during the second year.

The admission for next academic year starts Dec 1 2016. The KTU admission webpage https://apply.ktu.edu/courses/course/33-msc-mechatronics is very simple and the question is, if young bachelor students will be impressed and motivated to apply?

The study processes are in line with the university requirements in general with an autumn and spring semester (each 16 weeks duration) and with a 4-week exams session.

While describing the different methods of studies, SER does not include information on basic research, artistic and applied research (SER, #118 page 23 *"Practical and theoretical study activities are performed in order to achieve learning outcomes of the Programme. Methods of studies are presented in descriptions of study subjects. There are used the following forms of auditorium classes: theoretical lectures, practical and laboratory works, seminars and individual or group consultations. Self-education activities are: projects, home works, preparation of papers and reports, preparation for colloquiums and exams, etc.")*

The students have a rich set of opportunities to participate in international mobility programmes through 23 ERASMUS agreements. Unfortunately, on average, only one Lithuanian student of the programme a year uses that opportunity.

The number of incoming international students is 8 in 2015 and 5 in 2016, which is good.

KTU presents on the webpage http://ktu.edu/en/students a rich set of academic and social support.

The students have access to different tutors, advisors and mentors and it seems to be adequate.

- Tutors are normally elder students that could help in a particular subject.
- Academic advisor is a faculty member who guides in the academic and social process.
- Research advisor as active in research and thesis projects
- The Student Union has also a student mentor programme
- The university programme of career mentors started in Feb 2014 (SER 128*" University programme of Mentors has been started at 10 February 2014. Mentors and tutors (members of University staff, representatives of industrial companies and students),").*

All the mentor programmes are voluntary, although the student needs a supervisor for the thesis graduation project.

The student achievement assessment is very well described in the SER. The description of the assessment system of students' performance is publically accessible at KTU web site (and in each subject), clear and adequate. The students know how exactly they will be assessed before starting every subject. The grade of every subject is calculated using a ten grade scale and considering the contribution of individual works tasks (written examination, laboratory

examination, individual work …). Although, the transfer between the KTU 10 grade scale and the ECTS A to F grading scale is not found on the web.

In every subject, the relation between the expected learning outcomes, the teaching and learning methods and the assessment methods are defined. However, the assigned Learning Outcomes to each subject are not clear to some of the staff.

The document "General regulations of preparation, presentation and keeping of degree projects", defines the requirement for defending and assessing them. The designed process, with a committee of 7 members (academics and representative of the employers) is clear and adequate. However, it is not clear if the Final Degree Projects are published in an Open Access format from the KTU library in the eLaba system.

Most of the graduates, 60-70% (SER #157 page 28) are working in the Lithuanian industry with positions related to the mechatronic specialization. Interviews with social partners and alumni, during the site visit, also conforms the employability of the students.

2.6. Programme management

Programme management is very well described in the SER. There are a number of levels of decision-making: the KTU Senate, Vice Rector for studies, University Study Programme Committee, Faculty Council and Field Study Programme Committee (FSPC), Director of the study programme. (A chart over the decision making structure should help to understand the programme management process.)

The responsibilities for the implementation and monitoring of the programme are clearly allocated and the same for several of the programmes at the Department. It is the Field's Study Programme Committee (FSCP) that is responsible for the strategy and development of the programme. This Committee together with the Director of the study programme monitors and revises (annually), the structure and content of the programme. Changes of programmes are approved by the Faculty Council where academics, students and social partners are represented.

The process of the administration and the quality of the programme is reflected in the Academic Information System (AIS). There is also an electronic document management system (DVS). Both systems are a base for data and documents for an active internal quality assurance.

For external evaluation, a university wide stakeholder feedback system is in use. The system with Social Partners is quite active and good for the development of the programme and the placement. There seems to be an even greater potential to raise the quality of the programme, if Social Partners can actively contribute in the learning process by providing real engineering problems to solve and resources to facilitate it.

Students evaluate the content of study subjects (SER #183 page 30*"Students evaluate content of study subjects and programmes by filling electronic questionnaire placed in the AIS on the University website in personal work fields of students. It is aimed that each study subject would be evaluated by the students which have selected it, putting their personal input to the improvement of the subjects. Long term results of the questioning are used by FSPC for study subject's certification, by attestation commission, Faculty administration for teacher performance assessment and by Student Union. General results of the questioning are discussed at the meetings of the Dean's office and Departments. The summarized statistics of the questioning are presented publicly").*

The students have a low motivation to fill in electronic questionaries' for its own rights and purpose. Students reported that the results from the exams will be delayed if they did not fill in the form. The introduction of punitive action for not filling in the forms could have negative consequences for the quality and reliability of the result of the survey.

The main input for the improvement of the programme is the "Round table" meetings. They are used to analyse the obtained data, and define actions plans. This is a good practice in order to improve, continuously, the quality of the programme. The student's (and Student Union's) participation is very active and fruitful.

The excellence in curricula, teaching methods, lab facilities, faculty competencies and student achievements need to be addressed. The programme management need to be more proactive to demonstrate the importance and excellence of the Mechatronic Master (and Bachelor) Programme, internally but most important externally.

2.7. Examples of excellence *
* if there are any to be shared as a good practice

No explicit example of excellence is mentioned in the self-evaluation report or was stated or showed at the site visit.

The management and students need to show signs of excellence, internally for motivation and externally to attract attention to the programme, its faculty, students and graduates.

III. RECOMMENDATIONS

1. Admit more students to the programme for many reasons: need in the industry, efficient utilization of resources etcetera. Recruit broadly nationally and internationally.

2. Encourage the students to study full-time. Decrease the dropout rate to increase the number of graduates.

3. Programme aim and learning outcomes should focus more in early stages on product development, design, systems engineering and programming. Include innovation and entrepreneurship in the curriculum. The use of English by all students, as the professional engineering language, needs to be addressed.

4. It is recommended to align the responsibility to teach and train the students in each LO by coordinating the main lecturers responsible for each of them. It is important that each single LO will be correctly and continuously achieved and assessed.

5. Create courses that combine and include different disciplinary fields and give those courses more credits. Students can solve problems in teams, with support from academic and industrial supervisors.

6. Introduce problem based courses in the area of Programming of Real-time Embedded Systems and in the area of System Design of Complex Systems. Courses like Finite Element Method and Virtual Manufacturing should be electives.

7. Integrate more contact with the industry. Lecturers from industry are welcomed. Moreover, the cooperation could increase by adding more joint course projects, master thesis projects, internships, and co-curricular activities.

8. Increase the level of activity in the labs. Integrate more practical, experimental hands-on activities in the learning process.

9. Fight for an interdisciplinary curriculum with a strong focus on electives in combination with committed faculty advisors who will guide the students to active choices. The

Diploma Supplement will define the individual student's profile with specialisations and in-depth studies.

10. The programme management needs to be more proactive to demonstrate the importance and excellence of the Mechatronic Master (and Bachelor) Programme, internally but most important externally.

11. All the webpages connected to the Mechatronic Master programme need to be improved, especially the webpages that will attract students to apply to the programme.

IV. SUMMARY

The main strengths and weakness of the master programme in *Mechatronics* at Kaunas University of Technology, according to each one of the analysed standards, are:

4.1 Programme aims and learning outcomes

Strengths:

The overall programme aim and is perfectly in line with the vison and mission of KTU. That means that programme should have the greatest support from the top academic and administrative management of KTU. The programme aims are in line with the need of the society and labour market and the learning outcomes are well defined and according to international standards.

Weaknesses:

The learning outcomes could be improved by clearly stating the student's abilities in innovative technologies, innovation skills, internationalization and English language skills. The webpages describing the programme are hard to find and are lacking comprehensive information.

4.2 Curriculum design

Strengths:

The overall six categories of Learning Outcomes are well implemented in the compulsory and elective subjects. The curriculum design has a good balance between compulsory and elective courses in terms of number of credits.

Weaknesses:

The compulsory subjects are not optimal for a Mechatronic programme. The students are not trained to work in the interdisciplinary field of the design and creation of innovative and complex products. The computer science and programming part of the programme is weak. The students don't get enough English language skills to be international professional engineers.

4.3 Teaching staff

Strengths:

The academic staff (teaching staff) is well prepared and motivated and they have a student centred learning approach. The balance between teaching, research and contact with industry seems to be well balanced among the academic staff.

Weaknesses:

Low internationalisation of staff: low participation in Erasmus+ interchanges, and low impact of the research internationally. Lack of internationalization spirit among the academics in the programme.

4.4 Facilities and learning resources

Strengths:

The Department of Production Engineering has a large number of laboratory facilities, around half of them with an education focus and half of them with applied research focus.

Weaknesses:

The activity in the labs is low and could certainly increase. The lack of an open rapid prototyping mechatronic lab, including programming of embedded controllers.

4.5 Study process and student performance assessment

Strengths:

The students are very satisfied with the programme and have been successful to enter the labour market. Most of the teaching in English is in the first year.

Weaknesses:

The total number of students in HEI seems to decrease for demographic and other reasons, which can be a threat in the near future. Much effort has been done in assuring the adequate achievement of programme learning outcomes in each single course (subject). However, coordination between the responsible academic of each individual subject is needed in order to ensure that each LO is correctly and continuously achieved and assessed. Most of the theses are still written in Lithuanian language.

4.6 Programme management

Strengths:

The *Round Table* concept for continuous improvements of courses, programme, faculty and facilities.

Weaknesses:

The SER report, or a summary of it, was distributed to neither for the students nor for the social partners. No examples of excellence in curricula, teaching methods, lab facilities, faculty competencies or student achievements was presented in the SER nor at the site visit. The programme management needs to be more proactive to demonstrate the quality, importance and excellence of the Mechatronic Master Programme, internally but most important externally.

V. GENERAL ASSESSMENT

The study programme *Mechatronics* (state code – **621H73001**) at Kaunas University of Technology is given **positive** evaluation.

Study programme assessment in points by evaluation areas.

No.	Evaluation Area	Evaluation of an area in points*
1.	Programme aims and learning outcomes	4
2.	Curriculum design	3
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	4
6.	Programme management	3
	Total:	**20**

*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:	Dr. Oluremi Olatunbosun
Grupės nariai: Team members:	Prof. Marti Casadesus
	Prof. Mats Hanson
	Mr. Audrius Jasėnas
	Ms. Dovilė Kurpytė

Vertimas iš anglų kalbos

KAUNO TECHNOLOGIJOS UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ PROGRAMOS *MECHATRONIKA* (VALSTYBINIS KODAS - 621H73001) 2017-01-18 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-12 IŠRAŠAS

<…>

V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Mechatronika* (valstybinis kodas – 621H73001) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	4
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	4
6.	Programos vadyba	3
	Iš viso:	**20**

*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

Kauno technologijos universiteto vykdomos magistrantūros studijų programos *Mechatronika* pagrindinės stiprybės ir silpnybės pagal kiekvieną išanalizuotą sritį:

4.1 Programos tikslai ir studijų rezultatai

Stiprybės
Programos tikslai puikiai atitinka KTU vizijos ir misijos nuostatas. Tai reiškia, kad studijų programą turėtų aktyviai palaikyti KTU akademiniai ir administracijos vadovai. Programos tikslai atitinka visuomenės ir darbo rinkos poreikius; studijų rezultatai apibrėžti tinkamai ir atitinka tarptautinius standartus.

Silpnybės

Reikėtų tikslinti studijų rezultatus, nurodant studentų gebėjimus inovacinių technologijų srityje, inovacinius įgūdžius, tarptautiškumą ir anglų kalbos įgūdžius. Sunku rasti tinklalapius, kuriuose aprašyta ši studijų programa, trūksta išsamios informacijos.

4.2 Programos sandara

Stiprybės

Visos šešios studijų rezultatų kategorijos yra įgyvendintos privalomuosiuose ir pasirenkamuosiuose dalykuose. Programos sandaroje privalomieji ir pasirenkamieji dalykai pagal skiriamų kreditų skaičių subalansuoti tinkamai..

Silpnybės

Privalomieji dalykai nėra optimalūs studijų programai *Mechatronika*. Studentai nėra mokomi dirbti tarpdalykinėje inovacinių ir sudėtingų produktų projektavimo ir kūrimo aplinkoje. Studijų programos kompiuterių mokslo ir programavimo dalis silpna. Studentų anglų kalbos įgūdžiai nėra pakankami, kad baigę studijas studentai galėtų dirbti profesionaliais inžinieriais tarptautinėje erdvėje.

4.3 Personalas

Stiprybės

Akademinis personalas (dėstytojai) yra gerai pasirengęs, motyvuotas ir taiko į studentus orientuotą mokymo metodą. Pusiausvyra tarp dėstytojų dėstymo, mokslinių tyrimų ir ryšių su pramonės atstovais tinkama.

Silpnybės

Menkas dėstytojų tarptautiškumas: neaktyviai dalyvaujama „Erasmus+“ mainų programose, žemas mokslinių tyrimų poveikis tarptautiniu mastu. Studijų programos dėstytojams trūksta tarptautiškumo pojūčio.

4.4 Materialieji ištekliai

Stiprybė

Gamybos inžinerijos katedra turi daug laboratorijų: beveik pusė iš jų skirtos mokymui, o pusė – taikomiesiems moksliniams tyrimams.

Silpnybės

Laboratorijų užimtumas yra menkas ir būtų galima suaktyvinti jų naudojimą. Trūksta atviros greitojo prototipavimo mechatronikos laboratorijos, taip pat įmontuotų valdiklių programavimo.

4.5 Studijų eiga ir jos vertinimas

Stiprybės

Studentai šia studijų programa yra labai patenkinti ir sėkmingai įsilieja į darbo rinką. Dauguma anglų kalba dėstomų dalykų dėstomi pirmaisiais metais.

Silpnybės

Bendras studentų skaičius aukštojoje mokykloje, atrodo, mažėja dėl demografinių ir kitų priežasčių, kas gali kelti grėsmę ateityje. Daug pastangų skirta, siekiant užtikrinti adekvatų programos studijų rezultatų pasiekimą kiekviename kurse (dalyke). Tačiau būtina užtikrinti dėstytojų, kurie atsako už kiekvieną dalyką, veiklos koordinavimą, norint, kad kiekvienas studijų rezultatas būtų tinkamai pasiektas ir įvertintas. Dauguma jų pateikti lietuvių kalba.

4.6 Programos vadyba

Stiprybės
Apskritojo stalo diskusijos, siekiant užtikrinti nuolatinį dalykų, studijų programos ir materialinės bazės tobulinimą, dėstytojų kvalifikacijos kėlimas.

Silpnybės
Savianalizės suvestinė arba bent jos santrauka nebuvo išplatinta nei studentams, nei socialiniams partneriams. Nei savianalizės suvestinėje, nei vizito metu nebuvo pateikta studijų turinio, mokymo metodų, laboratorijų įrangos, dėstytojų kompetencijų ar studentų pasiekimų išskirtinės kokybės pavyzdžių. Programos vadyba turi būti aktyvesnė, siekiant atskleisti magistrantūros studijų programos *Mechatronika* kokybę, svarbą ir išskirtinumą tiek universiteto viduje, tiek, svarbiausia, išorėje.

<…>

III. REKOMENDACIJOS

1. Priimti daugiau studentų į šią studijų programą dėl daugelio priežasčių: specialistų poreikio pramonėje, veiksmingo išteklių panaudojimo ir t. t. Priimti studentus iš Lietuvos ir užsienio.

2. Skatinti studentus pasirinkti nuolatines studijas. Mažinti studijų nebaigiančiųjų ir didinti absolventų skaičių.

3. Studijų programos tikslas ir studijų rezultatai jau ankstyvuose etapuose turi būti nukreipti į produkto kūrimą, projektavimą, sistemų inžineriją ir programavimą. Į studijų turinį įtraukti inovacijas ir verslumą. Visus studentus skatinti vartoti anglų kalbą kaip profesinę inžinerijos kalbą.

4. Rekomenduojama, kad studentai būtų mokomi ir lavinami atsižvelgiant į kiekvieną studijų rezultatą, koordinuojant pagrindinių dėstytojų, atsakingų už konkrečius studijų rezultatus, veiklą. Svarbu, kad kiekvienas studijų rezultatas būtų tinkamai ir nepertraukiamai pasiektas ir tinkamai įvertintas.

5. Parengti dalykus, kurie sujungtų ir įtrauktų skirtingų disciplinų kryptis, ir tokiems dalykams skirti daugiau kreditų. Studentai problemas gali spręsti grupėse, padedami vadovų iš akademinio sluoksnio ir pramonės.

6. Į sritį *Realaus laiko įterptinių sistemų programavimas* ir į sritį *Sudėtingų sistemų projektavimas* įtraukti problemos sprendimu pagrįstus dalykus. Dalykai *Baigtinių elementų metodas* ir *Virtualioji gamyba* turėtų būti pasirenkamieji.

7. Aktyviau užmegzti ryšius su pramonės atstovais. Ypač laukiami dėstytojai, dirbantys pramonėje. Be to, bendradarbiavimas taptų aktyvesnis įtraukus daugiau jungtinių kursų projektų, magistrantūros baigiamųjų darbų projektų, specialiųjų praktikų ir pan.

8. Aktyviau naudoti laboratorijas. Į mokymo procesą integruoti daugiau praktinės, eksperimentinės-praktinės veiklos.

9. Siekti tarpdalykinio programos turinio, kur ypatingas dėmesys būtų skiriamas pasirenkamiesiems dalykams, o patyrę fakulteto patarėjai studentams padėtų pasirinkti dalykus. Diplomo priedėlyje bus pateiktas individualus studento studijų aprašymas ir nurodytos studijos, į kurias buvo gilinamasi.

10. Studijų programos vadyba turėtų būti aktyvesnė universiteto viduje ir, ypač, išorėje, būtina atskleisti *Mechatronikos* magistrantūros (ir bakalauro) studijų programos svarbą ir išskirtinumą.

11. Tobulinti visus interneto puslapius, kurie susiję su *Mechatronikos* magistrantūros studijų programa, ypač skirtuosius pritraukti studentų į šią studijų programą.

<…>

Paslaugos teikėjas patvirtina, jog yra susipažinęs su Lietuvos Respublikos baudžiamojo kodekso 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė, parašas)