STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Kauno technologijos universiteto

# STUDIJŲ PROGRAMOS *PRAMONĖS INŽINERIJA IR VADYBA*
# *(valstybinis kodas - 621H77003)*
# VERTINIMO IŠVADOS

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# EVALUATION REPORT
# OF *INDUSTRIAL ENGINEERING AND MANAGEMENT*
# (*state code - 621H77003*)
# STUDY PROGRAMME

at Kaunas University of Technology

1. **Dr. Oluremi Olatunbosun (team leader),** *academic,*
2. **Prof. Marti Casadesus,** *academic,*
3. **Prof. Mats Hanson,** *academic,*
4. **Mr. Audrius Jasėnas,** *representative of social partners,*
5. **Ms. Dovilė Kurpytė,** *students' representative.*

**Evaluation coordinator-**
**Ms. Ina Šeščilienė.**

Išvados parengtos anglų kalba
Report language – English

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2016

## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

| | |
|---|---|
| Studijų programos pavadinimas | ***Pramonės inžinerija ir vadyba*** |
| Valstybinis kodas | 621H77003 |
| 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 | Gamybos inžinerijos magistras |
| Studijų programos įregistravimo data | 2007 |

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## INFORMATION ON EVALUATED STUDY PROGRAMME

| | |
|---|---|
| Title of the study programme | ***Industrial Engineering and Management*** |
| State code | 621H77003 |
| 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 Industrial Engineering |
| Date of registration of the study programme | 2007 |

# 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. | Module assessment summary (example from database) |

### *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.

The Faculty of Mechanical Engineering and Design has 24 study programmes, of which 10 are Bachelor's, 14 are Master's and 4 scientific field of Doctoral studies (the most related to assessed program Mechanical Engineering and Materials Engineering). One of these Master's, is the *Industrial Engineering and Management* Masters' programme to be assessed. It has developed initially in collaboration with BALTECH consortium, and it is quite similar to the ones offered by some of the Universities of the consortium.

According to the aim of the programme, it combines engineering and management courses in order to provide knowledge of production technologies, abilities to design and manage production processes and facilities. It is a 120 ECTS Master's programme that is taught completely in English. A previous evaluation of the programme was carried out in 2012. In this process, the programme was accredited for 3 years and 4 recommendations for improvement had been stressed, mainly:

- Improving the quality and depth of final degree projects.
- Develop one of the research projects subjects into a team-based project subject.
- Develop facilities for supporting team projects.
- Complementing the suite of educational software.

In general, all of these recommendations have been addressed correctly.

### *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 learning outcomes are **well defined, clear and publicly accessible** through the web-site of the KTU.

The **programme aims** and are based on the **professional requirements, public needs and the needs of the labour market.** It is obvious there is a need in the world industry and the Lithuanian one specifically, for this specific type of graduates combining engineering and management courses, and providing multidisciplinary knowledge of production technologies for industry. Similar programmes addressing similar aims and focused on the general requirements of the national industry, rather than specialisation, are developed all around the world. However, although the main aim of the program is presented clearly, it could be more concise.

**The programme learning outcomes** are based on the EUR-ACE standards for second cycle degrees. Not all the aspects of EUR-ACE have been covered (for example "lifelong learning" or "making judgements", but almost all of them. It can be considered that these learning outcomes are founded on the **professional requirements, public needs and the needs of the labour market.**

The programme learning outcomes are in compliance with the European Qualifications Framework, in general with the EUR-ACE framework standards and, according to the self-assessment report, with the descriptor of the study field of engineering of the Republic of Lithuania. Also, the programme aims and learning outcomes are **consistent with the type and level of studies and the level of qualifications offered**.

The name of the programme, its learning outcomes, content and the qualifications offered **are compatible with each other**.

### *2.2. Curriculum design*

The programme is delivered only in English. Its structure comprises 120 ECTS during 2 years in full-time mode. It is divided into 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. All subjects are of 6 ECTS. Consequently, the curriculum design meets **legal requirements for second level study programmes**.

According to the information on the web-site (study modules), the study subjects and/or modules are spread evenly and their **themes** are, in general, **not repetitive**. However, according to the audience with the students, some repetitions have been detected, for example between "*Manufacturing Planning and Control*" and "*Computer-Aided Manufacturing Engineering and*

*Management*", or even in the same subject as for example in "Quality Management". Although it is required to improve the coordination between subjects, in general, the content of the subjects is adequate.

According to the alumni, students and employers, the balance between "*industrial engineering*" and "*management*", is also adequate. However, it is necessary to allow the students, using subjects already existing in similar programmes or designing new ones, to focus more deeply on "industrial engineering" or on "management" according to their interest. Some electives that could be recommended are related to: "Human resources", "Operations management", "Lean management" or the possibility to study other "Foreign languages", in accordance with the increasing expectations for exporting of Lithuanian companies.

After revising the expected learning outcomes and the syllabus of every subject, it is clear that the content of the subjects **is consistent** with the expected content of an European Master. However, it is necessary to increase the focus on some learning outcomes related to soft skills, specially "oral communication" and "technical English". This is clearly a requirement for the programme.

Analysing the selected final degree projects and according to the previous evaluation of the programme, a clear improvement of the outputs is detected. In general, the content of the reports are adequate and they are mainly supported using paper references. The final project reports reviewed, in general, meet the international expectancies of a master thesis.

After revising the information on the web site, it is considered that the content and methods (case studies, team projects, software applications,…) of the subjects are **appropriate** for the achievement of the intended learning outcomes. The average of 40% to 75% of contact hours assigned to theoretical lectures (and the rest to practical laboratories) is adequate. According to the student and alumni audiences, they considered that the relation between theoretical and practices lectures is adequate. However, it is expected for a "Management" Master's programme to include some field trips to companies during the course.

The scope of the programme could be **sufficient** to ensure learning outcomes, however some issues have been detected in relation to the learning outcomes to each subject. For example, the relation between learning outcomes and subject that appears on the table 2.3 in Self Evaluation Report and the ones available on the web-site are quite different (see, for example, differences in learning outcomes on A2 and B3 in "Product development"). Other subjects, for example "Quality management" or "Productivity management", do not present any of the learning outcomes on the website for the programme that are defined in the Self Evaluation Report. This inconsistency shows differences between the planned learning outcomes, and the ones that the teachers develop in their subjects. This is obviously an issue to solve.

Additionally, according to the audiences, the relation between learning outcomes and subjects is not always clear for the teachers. In order to improve their teaching, it is necessary that the staff assume the learning outcomes assigned to their subjects. This will allow each teacher to improve the coordination with other teachers with the same learning outcomes in their subjects.

The content of the programme reflects industrial practices in the area but, in general, some improvements could be made in some subjects in order to develop the **latest achievements** in technologies, and especially in the management "field". This is exactly what the employers expect from a Master student, and what will provide advanced knowledge to them. It is mandatory, according to the employers and alumni, to include a new subject focused on "Project Management", and to reinforce the content of "Lean Management". Both are critical for an up to date programme in engineering production and management.

### *2.3. Teaching staff*

The teaching staff of the programme meets the **legal requirements**: 83% of lecturers of study subjects have a scientific degree, and field of scientific activities of all of them complies with their taught study subjects. 30% of main subject lectures are taught by Professors.

The **qualifications** of the teaching staff of the programme are adequate to ensure 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.

However, 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 on the internationalization of the staff in teaching and research. It is needed to increase the research in collaboration with other worldwide 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.

7 professors, 9 associate professors and 7 members of other academic staff are involved in the programme. Considering the number of students, a ratio of 8.42 of students per teacher is delivered. Then, the **number of the teaching staff** is adequate to guarantee a successful teaching.

During the last five-year period, two main lecturers have been retired, and have been

replaced by younger scientists; and two more have been promoted to different positions. Considering the number of staff of the programme, the **teaching staff turnover** is sufficient to assure an adequate provision of the programme. Additionally, the programme has a balanced composition in terms of age of faculty. However, almost all the teaching staff turnover is based on the PhD students from the same faculty or University. Consequently, it could be interesting to hire recent doctors from other Universities abroad, or at least, to motivate again all the staff to participate in teaching and training interchanges as Erasmus +.

KTU creates adequate **conditions for the professional development** of the teaching staff involved in the programme. For example, organises courses for staff in foreign languages, IT, teaching methodologies, …

Although the relation between learning outcomes and subjects of programme is discussed annually in the Department's meetings before presentation of final programme to KTU Studies Office, according to the audiences with staff, unfortunately this relation is not always clear to all the teachers. Consequently, no formal coordination exists between teachers involved in subjects that share the same learning outcomes and no need for participating in specific teaching methodologies courses is detected. Consequently, there is a need for assuring that every responsible lecturer knows exactly the expected learning outcomes assigned in order to improve the coordination between all the staff involved in the achievement of the same learning outcome. Special attention has to be given to the specific learning outcomes related to "oral communication" and "technical English": "F4. Has skills of effective **communication** and representation of the interested of companies and institutions on national and **international level**"

In general, the teaching staff of the programme is **involved in research** related to the programme. Staff of the Department of Production Engineering (30 lecturers = 24.5 full time equivalent during period assessed) publish in average only 22 papers per year in JCR journals (plus other publications and conferences), 9 of them in national journals and 13 on international in 2016. These results are sufficient, but publications in international research journals is still an area of improvement. A desirable ratio, in a long term, could be 1.5 paper in JCR journals per lecturer per year.

### *2.4. Facilities and learning resources*

Although the programme uses different **premises**, the majority of it is carried out at the Faculty of Mechanical Engineering and Design. The programme provides sufficient spaces (spaces for theoretical lectures, seminars and laboratories) for individual learning. Additionally,

most of the classrooms and laboratories of the Faculty has been recently renewed. After the site visit and the audiences with students and alumni, it is confirmed that in general the premises for studies are adequate both in their size and quality.

In general, the **teaching and learning equipment** (laboratory and computer equipment, consumables) are adequate for the programme. Classrooms of the Faculty are equipped adequately in size and quality (with computers, video appliances, etc.). In the Library, there are enough rooms for the individual learning of the students.

Many of the laboratories are recently renewed and correctly equipped for the objectives of the programme. However, during the visit there was no evidence that the laboratory facilities were being utilized very much for projects by students of the study programme. There was hardly any student in the laboratories (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 computer classrooms are sufficient and allow students to work while there are no lessons taking place. However, according to the interviewed students, there is a need for updating the hardware and software, considering its low performance (computers running very slow).

Students have access to many different and actualised software, although the majority of them is focused on mathematics and engineering topics (CAD, CAM,…). Considering the previous evaluation of the programme, during the last years new "management" software have been introduced on the programme (SCCIL and SAT). However, there is still room for improvement. For example, no educational ERP (Navision, SAP,…) or CRM, that can be very useful in different subjects, has been implemented.

The programme offers optional professional practices. There are also other possibilities for students' practices (Erasmus+, Summer Schools, etc.). Additionally, the KTU's Career Center provides an excellent support, according to the students, for arrangement of student practice and contact with the industry (Career days). All of the students have the opportunity to develop practices on the laboratories or in the local industry. Then, it is considered that the programme has **adequate arrangements for students' practice.**

**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.

It is a good practice to encourage the use of e-books resources. Moodle is used in almost all the subjects, facilitating the learning process of the students that can't participate in all the activities.

### *2.5. Study process and students' performance assessment*

The **admission requirements** are adequate. Students with a bachelor's degree in technological or physical sciences can access to the programme. Then, admission is carried out according to a rank (80% the value of the grades of first cycle programme and 20% the evaluation of the grade of their research activities).

The number of students admitted to the programme is adequate and it is increasing. Many international students apply for the programme, consolidating it as an international Master programme at the KTU. However, there is a need for a clear strategy in order to maintain and increase the recruitment of students, especially international. This strategy must include the mandatory publication of a summary of the CV of the staff on the website, as common practice in all the management masters' programmes worldwide.

The organisation of the programme, teaching hours mainly in the afternoon, and the distribution of the academic activities' load assures an **adequate provision of the programme**.

Methods of studies (theoretical lectures, laboratories works, team-work,…) are adequate too, and they are sufficient to ensure an **adequate achievement of the learning outcomes**. According to the students and alumni, there is a general satisfaction with the used methodologies for teaching. Theoretical lectures and practical ones are balanced.

However, much effort has to be devoted to assuring the adequate achievement of personal and social abilities learning outcomes (F1, F2, F3, F4 and F5). Coordination between those responsible for the subjects is needed, in order to ensure that they are correctly and continuously achieved.

Students are encouraged to develop independent works or **research**, discussing in group seminars and finally making presentations in conference for young scientists or in the activities of the KTU students Scientific Association. A good number of students, 13, presented their work in the "Industrial Engineering 2016".

The Faculty of Mechanical Engineering and Design has enough ERASMUS+ agreements with international partners to allow students to participate in **student mobility programmes.** The number of students participating (in & out) is increasing, although the number of students from KTU that are going to study abroad for some months is still low (18 from 2010 to 2016). The main reason is that the students are already working part-time. However, this increasing trend during last years is very positive for the programme, considering the challenge to internationalize the programme and the needs for the internationalization of a programme

focused on “engineering” and “management”.

The higher education institution ensures an adequate level **of academic and social support.** According to the audience with students, students evaluate very well the support from academics and administrators in general.

Additionally, the KTU supports for the students are adequate and their use is increasing over time. For example, the University programme of mentors that started in 2014, the Students information centre, the activities organized by the KTU students association are adequate. However, according to the audiences, dormitories should be renovated.

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,…). In every subject the relation between the expected learning outcomes, the teaching learning methods and the assessment methods is defined; although the assigned learning outcomes to each subject is not clear for 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.

Considering the self-evaluation report, knowing that the KTU process to monitor and analyse the employability of the recent graduates is still under construction, the majority of the graduates of the programme are working as engineers or managers on industrial projects. None is unemployed, and the majority is working in the Lithuanian industry.

According to the interviewed alumni, they were all satisfied with the programme and the employment that they get. Their employment corresponds to their degree. Additionally, the interviewed employers confirmed that they are satisfied with the level of the graduates of the programme.

Definitely, **professional activities** of graduates meet the programme providers' expectations. However, in order to improve the satisfaction of the employees in general, still some additional elements which were found lacking in the education - “Oral communication”, “technical English”, “Lean management” and “Project management” – should be introduced.

### *2.6. Programme management*

The **responsibilities for the implementation and monitoring of the programme** are

clearly allocated: 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 structure and content of the programme. Finally, changes of programmes are approved by the Faculty Council where there is a representation of academics, students and social partners.

At last every three years, the study subjects are revised. The Head of the Production Engineering Department certifies every study subject (including minor changes). The Director of the FSCP assures that changes are implemented.

**Information and data for the assessment of the programme are periodically recollected** using a stakeholder's feedback system at KTU. It includes periodical surveys to the students, although there is not enough student participation (only 23% of responses). Although summarized information on results of surveys and programme assessment are published, students and alumni are not familiar with them. However, the main input for the improvement of the programme is the "Round table" meetings. They are used to analyse the obtained data, and defining actions plans. This is a good practice in order to improve continuously the quality of the programme.

The **outcomes of the previous external evaluation** (2012) have been clearly used for the improvement of the programme. Different actions have been carried out in order to implement the four recommendations of the previous evaluation.

Although theoretically **stakeholders, basically graduates and employers, are involved** in the assessment and improvement of programmes, participating on the Faculty Council and the FSPC, their participation is very low. From the audiences with them, it is clear that many of them will like to participate in the improvement of the programme. It is suggested to organise another "Round table" annually to receive the inputs for improving the programme from alumni and employers. Considering that almost all the students are already working, their inputs could be very valuable because they know directly the competences and needs of these students.

The implementation of the internal quality assurance system is partial. For example, the surveys for every subject are in place, but not many inputs are received from employers. Even the Self-evaluation report, as a part of the quality assurance system, could be spread to all the stakeholders in order to gather comments before their final approval.

However, action plans (including who is responsible, timeline, etc.) resulting from the round tables, are used. Following these actions plans is a good practice to improve the programme, so it can be considered that the **internal quality assurance** measures are effective and efficient.

**2.7. Examples of excellence ***

* if there are any to be shared as a good practice

## III. RECOMMENDATIONS

1. Linking correctly subjects and learning outcomes, assuring that all the indented learning outcomes can be achieved. Assuring that every staff responsible for every subject knows exactly the expected learning outcomes assigned and improving the coordination between all the staff involved in the achievement of the same learning outcome. Special attention has to be given to the specific learning outcomes related to "oral communication" and "technical English": "F4. Has skills of effective communication and representation of the interested of companies and institutions on national and international level".
2. The program must ensure that the students could focus more, through the elective subjects, in “Industrial Engineering” or in “Management” depending on their interest. Allowing the students to select subjects taught in other similar programmes (for example “Labour Law”) is suggested.
3. Include “Project management” as a subject and “Lean Management” in the curriculum.
4. Increase the number of field trips to companies during the programme.
5. It is necessary to increase the staff internationalization, in teaching and in research. Balancing the number of interchanges with other European Universities (Erasmus Programme for teachers) and increasing the international impact of the research (projects and publications) is needed.
6. Continuous renewing of the computer classroom is needed. Additionally, educational software for management (ERP, CRM, …) is needed.
7. Increase the use of the laboratories by Masters’ students.
8. Defining and implementing a strategy for maintaining and increasing the recruitment of students, national and internationally. It must include a better access and completeness of the public information of the programme on the web-site (including expected learning outcomes, assessment, teaching methodologies) and, very relevant for the international students, a brief CV of the involved staff.
9. Implementing a process (round table, Study Committee participation,) to assure the periodical participation of social partners and alumni in the continuous improvement of the programme.

## IV. SUMMARY

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

### 1. Programme aims and learning outcomes

Strengths:

*The Industrial Engineering and Management* master programme at KTU addresses the needs of production companies of the region. Its graduates are very likely to find employment. Its aims are comparable to similar programmes all around the world. It prepares for management roles in Lithuanian industry, particularly production management. Learning outcomes are, in general, derived from EUR-ACE specifications, validating the programme to international standards.

Weaknesses:

Considering the different expectations of the students, opportunity for a better focus on specific issues (industrial engineering or management) is needed through a wider choice of elective subjects.

### 2. Curriculum design

Strengths:

The programme has an adequate balance between theory and practice. Proportion between industrial engineering and management parts is also appropriate.

Weaknesses:

About the curriculum, there is a need to further develop different soft skills, especially the ones related to “oral communication” and “technical English” as defined in the expected learning outcome: “F4. Has skills of effective communication and representation of the interested of companies and institutions on national and international level”.

Additionally, it is detected a lack of “Project management” and “Lean management” in the curriculum, and some repetitive contents between subjects. It is detected also an impossibility to choose some elective subjects that the KTU already teaches in other programmes at the University that can be of interest for individual students, as for example “Labour Law” or others related to “Human resources”.

Finally, a low number of fieldtrips to companies during the programme is detected too.

### 3. Teaching staff

Strengths:

All teachers, who are involved in the implementation of the programme, are well qualified, sufficiently experienced and meet the qualification requirements. Teachers are becoming increasingly involved in the international mobility programmes (even though visits are very short). Teachers carry out research that is directly related to the study programme. Relations between teaching staff and students, alumni and social partners are excellent.

Weaknesses:

There is still room for improvement on the internationalisation of the programme. Although the number of incoming international lecturers to the programme, a higher internationalisation of staff is needed. Additionally, participation in Erasmus+ interchanges can increase, improving the internationally impact of research.

Additionally, the relation between learning outcomes and subjects is not always clear to the teachers. Consequently, there is no formal coordination between teachers implied in subjects that share the same learning outcomes.

### 4. Facilities and learning resources

Strengths:

The facilities (classrooms, laboratories and computer classrooms) that are used for the programme implementation are adequate. Some of them have been renovated thus proving the development of the programme. Students and teachers have good access to services of the library.

Weaknesses:

There is a lack of ERP software or any educational software useful for MRP, Shop-floor control, etc. Additionally, it is detected a low use of the laboratories by masters' students and a low performance of the computers (very slow running computers).

### 5. Study process and student assessment

Strengths:

The admission to the study programme is adequate including international students. In fact, as a result, it is detected a very positive increasing number of students.

There is general satisfaction of the students, alumni and social partners with the Masters' programme. This is related, for example, to a general satisfaction of the students with the teaching methodologies and subjects' assessment, an adequate scheduling of the programme and to high employment rates of graduates.

Weaknesses:

There is a lack of strategy for maintaining the recruitment of students. In a programme focused on management, with international perspectives, information about the CV of the staff on the web-site is totally necessary for this strategy.

## 6. Programme management

Strengths:

Administration and Study Programme Committee organize *Round table* discussions and questionnaire for the students – these tools are useful for the continuous improvement of the programme.

Weaknesses:

In order to improve the programme, there is a need to increase the participation of the social partners on the continuous improvement of the programme and to spread the Self-evaluation report to all stakeholders in order to gather all the opinions.

## V. GENERAL ASSESSMENT

The study programme *Industrial Engineering and Management* (state code – 621H77003) 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:<br>Team leader: | Dr. Oluremi Olatunbosun |
| Grupės nariai:<br>Team members: | Prof. Marti Casadesus |
| | Prof. Mats Hanson |
| | Mr. Audrius Jasėnas |
| | Ms. Dovilė Kurpytė |

<…>

## V. APIBENDRINAMASIS ĮVERTINIMAS

Kauno technologijos universiteto studijų programa *Pramonės inžinerija ir vadyba* (valstybinis kodas – 621H77003) 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 *Pramonės inžinerija ir vadyba* pagrindinės stiprybės ir silpnybės pagal kiekvieną išanalizuotą sritį:

### 1. Programos tikslai ir studijų rezultatai

Stiprybės
KTU vykdoma magistrantūros studijų programa *Pramonės inžinerija ir vadyba* skirta regiono gamybos įmonių poreikiams tenkinti. Ją baigę absolventai nesunkiai randa darbą. Jos tikslai atitinka panašių studijų programų tikslus visame pasaulyje. Ji rengia specialistus eiti vadovaujamas pareigas Lietuvos pramonėje, ypač gamybos vadybos srityje. Studijų rezultatai iš esmės parengti vadovaujantis EUR-ACE specifikacijomis, kas užtikrina, kad programa atitinka tarptautinius standartus.

Silpnybės

Vertinant skirtingus studentų lūkesčius, reikia suteikti galimybę daugiau dėmesio skirti konkretiems klausimams (pramonės inžinerijai arba vadybai) ir pasiūlyti daugiau pasirenkamųjų dalykų.

## 2. Programos sandara

Stiprybės
Teorinė ir praktinė dalys studijų programoje suderintos tinkamai. Pramonės inžinerijai ir vadybai skirtų dalių santykis taip pat tinkamas.

Silpnybės
Kalbant apie studijų turinį, reikia toliau ugdyti įvairius studentų socialinius įgūdžius (angl. *soft skills*), ypač susijusius su žodine komunikacija ir technine anglų kalba, kaip apibrėžta numatomame studijų rezultate: „F4. Gebėtų veiksmingai bendrauti ir atstovauti suinteresuotoms įmonėms ir institucijoms nacionaliniu ir tarptautiniu lygiu.“
Be to, nustatyta, kad programoje trūksta dalykų *Projektų valdymas* ir *Taupi vadyba (angl. Lean Management)*, kai kurių dalykų turinys kartojasi. Nustatyta, kad negalima rinktis pasirenkamojo dalyko, jei jis KTU dėstomas kitoje studijų programoje, bet kuris gali būti įdomus atskiriems studentams, pavyzdžiui, *Darbo teisės* arba kitų su žmogiškaisiais ištekliais susijusių dalykų.
Taip pat pastebėta, kad į studijų programą įtraukta labai mažai pažintinių vizitų į įmones.

## 3. Personalas

Stiprybės
Visų šią studijų programą vykdančių dėstytojų kvalifikacija yra labai gera, jie turi pakankamai patirties ir atitinka kvalifikacijai keliamus reikalavimus. Dėstytojai vis aktyviau dalyvauja tarptautinėse judumo programose (nors vizitai ir labai trumpi). Dėstytojai vykdo mokslinius tyrimus, kurie tiesiogiai susiję su studijų programa. Personalo ir studentų, alumnų ir socialinių partnerių santykiai yra puikūs.

Silpnybės
Dar galima gerinti studijų programos tarptautiškumą. Nors iš užsienio atvykstančių dėstytojų programoje yra, pasigendama aktyvesnio dėstytojų tarptautiškumo. Be to, galima aktyviau dalyvauti „Erasmus+“ mainų programose ir pagerinti mokslinių tyrimų tarptautinį poveikį.
Studijų rezultatų ir dalykų ryšys dėstytojams nėra visuomet aiškus. Dėstytojai, kurių studijų dalykuose siekiama tų pačių studijų rezultatų, turėtų daugiau bendradarbiauti ir koordinuoti veiklą.

## 4. Materialieji ištekliai

Stiprybės
Programai vykdyti naudojamos patalpos (auditorijos, laboratorijos ir kompiuterių klasės) yra tinkamos. Kai kurios iš jų buvo atnaujintos, kas liudija studijų programos tobulinimą. Studentams ir dėstytojams sudarytos geros sąlygos naudotis bibliotekos paslaugomis.

Silpnybės
Trūksta įmonės išteklių planavimo (ERP) programinės įrangos ar kitų mokymui skirtų programinių priemonių: MTP, *Shop-floor control* ir kita. Be to, nustatyta, kad magistro studijų studentai menkai naudojasi laboratorijomis ir prastai dirbančiais kompiuteriais (kompiuteriai veikia labai lėtai).

## 5. Studijų eiga ir jos vertinimas

Stiprybės
Studentų priėmimas į studijų programą yra tinkamas, įskaitant studentus iš užsienio. Iš esmės dėl šios priežasties pastebėtas studentų skaičiaus didėjimas.
Apskritai, studentai, alumnai ir socialiniai partneriai šia magistrantūros studijų programa yra patenkinti. Tai susiję, pavyzdžiui, su tuo, kad studentai bendrai patenkinti taikomais dėstymo metodais, tinkamo programos grafiko sudarymu ir aukštu absolventų įsidarbinimo lygiu.

Silpnybės
Trūksta strategijos didesniam stojančiųjų skaičiui išlaikyti. Studijų programa yra orientuota į vadybą ir tarptautines perspektyvas, todėl būtina numatyti, kad Universiteto internetinėje svetainėje būtų pateikiami dėstytojų gyvenimo aprašymai.

## 6. Programos vadyba

Stiprybės
Administracija ir Studijų programos komitetas studentams organizuoja apskritojo stalo diskusijas ir rengia klausimynus – šios priemonės yra naudingos siekiant užtikrinti nuolatinį studijų programos tobulinimą.

Silpnybės
Norint patobulinti studijų programą reikia, kad nuolatiniame studijų programos tobulinimo procese aktyviau dalyvautų socialiniai partneriai, taip pat savianalizės suvestinę verta išplatinti visiems dalininkams susipažinti.

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## III. REKOMENDACIJOS

1. Tinkamai susieti dalykus su studijų rezultatais ir užtikrinti, kad būtų galima pasiekti visus numatomus studijų rezultatus. Užtikrinti, kad visi už kiekvieną dalyką atsakingi dėstytojai tiksliai žinotų priskirtus numatomus studijų rezultatus. Gerinti dėstytojų, siekiančių to paties studijų rezultato veiklos koordinavimą. Ypatingą dėmesį skirti konkretiems studijų rezultatams, kurie susiję su žodine komunikacija ir technine anglų kalba: „F4. *Gebėtų veiksmingai bendrauti ir atstovauti suinteresuotoms įmonėms ir institucijoms nacionaliniu ir tarptautiniu lygiu.*“

2. Studijų programa turi užtikrinti, kad studentai galėtų dėmesį labiau sutelkti (remdamiesi pasirenkamaisiais dalykais) į *Pramonės inžineriją* arba *Vadybą* priklausomai nuo to, kuo domisi. Siūloma leisti studentams pasirinkti dalykus, dėstomus kitose panašiose studijų programose (pavyzdžiui, *Darbo teisę*).

3. Į studijų turinį kaip dalykus įtraukti *Projektų valdymą* ir *Taupią vadybą (angl. Lean Management).*

4. Padidinti pažintinių apsilankymų įmonėse skaičių studijų metu.

5. Būtina skatinti personalo tarptautiškumą dėstymo ir mokslinių tyrimų srityse. Subalansuoti apsikeitimų skaičių su kitais Europos universitetais („Erasmus“ programa, skirta dėstytojams) ir stiprinti tarptautinę mokslinių tyrimų įtaką (projektai ir publikacijos).

6. Nuolat atnaujinti kompiuterių klasę. Be to, reikia ir mokomosios programinės įrangos, skirtos vadybai (ERP, CRM ir kt.).

7. Skatinti magistrantūros studentus aktyviau naudotis laboratorijomis.

8. Parengti ir įgyvendinti strategiją, kaip išlaikyti ir padidinti studentų priėmimą nacionaliniu ir tarptautiniu lygiu. Šiuo tikslu būtina užtikrinti geresnę prieigą prie viešos informacijos apie studijų programą, ją išsamiai pateikti internetinėje svetainėje (įskaitant numatomus studijų rezultatus, vertinimą, mokymo metodikas), pateikti trumpus dėstytojų gyvenimo aprašymus, kas labai aktualu studentams iš užsienio.

9. Užtikrinti periodišką socialinių partnerių ir alumnų dalyvavimą nuolatiniame studijų programos tobulinimo procese (apskritojo stalo diskusijose, Studijų komiteto veikloje).

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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)