



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto  
***PRAMONĖS INŽINERIJA IR INOVACIJŲ VADYBA***  
**(621H77002)**  
**VERTINIMO IŠVADOS**

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**EVALUATION REPORT**  
***OF INDUSTRIAL ENGINEERING AND INNOVATION***  
***MANAGEMENT (621H77002)***  
**STUDY PROGRAMME**  
at Vilnius Gediminas Technical University

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## DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i><b>Pramonės inžinerija ir inovacijų vadyba</b></i>
Valstybinis kodas	621H77002
Studijų sritis	technologijos mokslai
Studijų kryptis	gamybos inžinerija
Studijų programos rūšis	universitetinės
Studijų pakopa	antroji
Studijų forma (trukmė metais)	nuolatinė (2)
Studijų programos apimtis kreditais	120
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	gamybos inžinerijos ir vadybos magistras
Studijų programos įregistravimo data	2001-08-02, Nr. 1187

## INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	<i><b>Industrial Engineering and Innovation Management</b></i>
State code	621H77002
Study area	technological sciences
Study field	production and manufacturing engineering
Kind of the study programme	university studies
Level of studies	second
Study mode (length in years)	full-time (2)
Scope of the study programme in credits	120
Degree and (or) professional qualifications awarded	Master of Production and Manufacturing Engineering and Management
Date of registration of the study programme	02-08-2001, No. 1187

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## I. INTRODUCTION

The study programme of Industrial Engineering and Innovation Management was born in the framework of BALTECH cooperation and it is intended to qualify master students of manufacturing engineering and management, who will be creative and enterprising and will support innovation development and implementation. For doing so, a multidisciplinary profile is required, this explains why the main study field, Production and Manufacturing Engineering (with 60 ECTS) is complemented by the study field of Management Studies (30 ECTS). The graduate study programme is supervised by Department of Industrial Enterprise Management of Faculty of Mechanics of Vilnius Gediminas Technical University. It is offered in English (mainly for foreign people) and Lithuanian, both languages are maintained also due to constraints linked to the number of financed students. The master is offered only as Continuous study and lasts 2 years for 120 ECTS. The recent change of the programme name reflects the need for underlining the innovation aspects, in fact support to mainly incremental but also radical innovation concerning product, process, organization, marketing is required by local companies that are willing to hire graduates with these competences.

## II. PROGRAMME ANALYSIS

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

The programme aims and learning outcomes have been defined according to national regulation and taking into account international recommendations (EUR-ACE, Dublin descriptors, etc.). The learning outcomes have been formally reviewed 3 times (2003, 2007, 2011) also integrating the results of EU supporting activities. Stakeholder representatives, in particular the industrial stakeholders, are members of the Study Committee in charge of the review. The programme seems in phase with the needs of the national industrial sectors as shown by national statistics and reports as well as by the fruitful cooperation with local industries. However, the objectives and learning outcomes, as well as their mapping to the study subjects require additional refinement. Moreover, the learning outcomes are hard to find, their description is rather complete in Annex 8.6 however they cannot be found at the link cited in the self-assessment report <http://medeine.vgtu.lt/programos/prosritys.jsp?pg=s&kva=M&metai=2012> (here only the objectives and the study programme are described). Despite the focus on innovation, creativity, entrepreneurship in the programme description, the list of outcomes and the study subjects' title the content of the programme is not fully aligned with objectives. Thus, the name of the programme only partially represents the contents, because the focus on Innovation Management is too weak as well as that in modern ICT tools for operations and supply chain management. For instance a study subject called "Improvement and Innovation of Manufacturing Process" is just a Lean Manufacturing course that can improve efficiency but not innovation per itself. Despite the fact that one learning outcome is called "Z3.1. Knowledge of the innovation strategy and tactics; human resources and supply chain management in the industrial enterprises" the only course that is completely devoted to the third subject is "Supply Chain Management", but it accounts for only 4 ECTS and furthermore is only an Optional course. A review of the learning outcomes can help to further improve the alignment of the course contents with the requirement of external stakeholders, which underlines the importance of operations management courses and of the specific software supporting these activities. This incomplete alignment between the programme and the local company requirements is confirmed by the fact that the *Industrial Engineering and Innovation Management* study programme

students evaluated opportunities to find a job by using programme help as bad, there was just the average of 2 points, despite 89 per cent of them were employed.

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

The curriculum is compliant with national and VGTU university regulations, the major and the minor are clearly identified, the duration (2 years and 3200 hours) for 120 ECTS are also aligned with EU policies. The curriculum has been redesigned also taking into account the remarks done on the basis of the last external assessment.

The offer of free choice subjects is limited: 3 ECTS out of 90 ECTS of teaching (30 ECTS for master thesis). Overall contact (lectures, practical works and laboratory work) accounts for 630 hours, so only for 19.7% of the overall effort. The courses are organized mainly outside the usual working hours in order to ensure the participation of the majority of the enrolled Lithuanian students who works part or full time. The number of face-to-face lessons is limited, in order to help the students the consultation hours are now organized in a more strict way, and are thus formally scheduled at the end of each lesson day, in order to ensure the students can profit from them.

Effective final work preparation is ensured by the presence of a 3 ECTS module every semester devoted to its preparation. The number of subjects per semester is limited to maximum 5 in order to facilitate students' work. The practical orientation is ensured by the fact that the majority of the students are already working; the practical aspects are mainly developed thanks to the final works and the master thesis. The subject of the master thesis can be proposed by the students, looking at the problems of the company they work for, or by the supervisor, also in this case the subjects are based on company needs. The appointment done since this year, in addition to the academic supervisor, of an industrial supervisor, who acts as a consultant, ensures the industrial relevance of the master thesis.

The great majority of courses are taught in Lithuanian and English, Lithuanian programme started in 2008.

Requests from graduates and employers address the increase of the importance of management and innovation subjects and underline that the study subjects have to cover the architecture and the use of modern IT tools for supporting this kind of activities. Employers would also like reinforced focus on some technical subjects, such as CNC and automation.

Summarizing, these are the main issues concerning the curriculum design. The number of face-to-face hours is small (this can negative influence the learning process and increase the drop-out rate). As already anticipated in section 1, the study programme is not completely aligned with the learning outcomes, especially in what concern innovation management, and is not satisfying completely the wishes of students and employers (increase the number of subjects dealing with modern management software). Considering the wideness of the Innovation management subjects, the number of free choice subjects is too limited. Furthermore, hot topics such as "Supply Chain Management" should not be offered only as optional course.

## ***3. Staff***

All teachers are Doctors, the composition of the teaching staff only slightly changed in the last years. However, due to the increase of the number of students the teaching load increased by 2.4 times. The academic exchange takes place, however no information are given about the duration of the exchange that, furthermore, seem limited to only some teachers. Foreign university teachers regularly visited the Faculty of Mechanics, however no detailed information

is provided about the impact of these visits on *Industrial Engineering and Innovation Management* study programme.

Academic personnel is regularly evaluated, they have to demonstrate every 5 years their suitability for their position and benefit from internship in companies/research centers for improving/updating their knowledge. Only a few teachers (about 10%) attended to these internships because they are not mandatory for teachers who already reached the retirement age and for those who work in parallel in industry. Professional development seminars are attempted by the teachers to improve their qualifications.

All the teachers have long teaching experience (above 10 years) and are also involved in research activities. For various teachers the research activities seem mainly at the national level, only a few European projects are cited. This is also reflected in the list of publications of some teachers. This can partially hinder the possibility to benefit from state of the art improvement achieved in foreign countries.

The age distribution of the teaching staff, with 4 out of 9 above 60 years and only 2 below 40 can create problems in the long term for replacing the retired ones. Considering the difficulties to retain people for doing PhD, measures have to be planned if the required number of teachers should remain stable. The significant percentage of teaching staff above 60 can also have a negative impact in terms of competence update, due to the current rules for internships.

The competence (industrial experience) and the attitude (friendly, helpful) of the teaching staff are appreciated by students and graduates. The teachers continuously interact with the students for asking information about their feelings about the study programme and receive feedbacks about what they would like to study deeper into details. What the students learn in the study programme can help them to solve some problems they currently experience in the company they work, this further foster the collaboration among teachers and students, and indirectly also strengthen the relationships with industrial stakeholders.

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

Also on the basis of previous negative remarks (see Annex 8.5 page 14-15: “scientific and laboratory equipment base is outdated, what leads to a huge backlog of students' practical skills from the real market needs”, “There is the lack of CNC machines”) the available resources have been improved, further improvements are already planned and takes place every year. Modern CNC machines have recently been acquired also thanks to the collaboration with some industrial partners. Students have access to adequate computer facilities and to a wide range of modern software (especially for what concern CAD, CAM, FEM; more have to be done considering ERP and management software). The available resources, in terms of space, for classrooms and laboratories (informatics and technical) are adequate. The structure available to students is also complemented by good sport facilities and dormitories. The students would like to have a canteen, but they understand the difficulties to create it for a “small” faculty.

The students can access a wide literature thanks to a recent project in collaboration with EC and other Lithuanian university; students are taught how to exploit at best the available resources. These recent developments seem solving the problems cited in by past graduates about the necessity to improve the software and the literature.

The request for stronger recourse to visual aids is also partially solved by the recourse to e-learning through Moodle, which furthermore facilitates learning activities for all the students working part or full time.

Specific teaching materials are prepared by the teaching staff and published by VGTU, the university encourages this kind of activities.

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

No specific requirements for admission, ranking on the basis of first cycle grades. The majority of students, made a bachelor at VGTU or even more specifically in the same faculty. Foreign students come from university with similar study programme, so the study subjects and contents fit well and they are well prepared to following this programme.

The dropout rate was quite high (35-50%) the first 4 years and then astonishing low (4%). This difference is due to a change, allowing the people failing some exams to do them again by extending the duration of the programme (however, the students have to pay for the additional semesters). This decision was taken because there were problems mainly due to incompatibility between study workload and employment duties.

Despite the provided offer, participation of Lithuanian students in mobility programmes is low (many students are also employed and this limits the participation); however participation to the English programme of foreign people ensures enriching cultural exchanges.

The assessment methods are well structured and extensively communicated, a complete description of the evaluation methods for each course is provided in Annex 8.1 while a summary about the assessment typology is shown on the website with the course description (<https://medeine.vgtu.lt/programos/modulis.jsp?fak=4&prog=101&modulis=MEPVM11005&sid=F&rus=U&klb=en>). Students are encouraged to achieve high performance and participate in research activities, participation is voluntary, thanks to awards and grants. Academic and social support is provided even if decrease of national funds is creating some problems. The current job of the graduates and of the working students, fits well with the programme, what is especially liked is the management side.

The majority of students are working, so they can practically apply what they learn and provide feedback about industrial requirements for this study programme. Despite that, there are requests for further reinforcing the interactions with companies and organizing workshops and open discussions. For some subjects there are discrepancies between the examples and applications taught in the programme and the current industrial reality, this decreases the value and applicability of such examples. The teaching staff maintain contacts with companies, because some of them work part-time in the industrial sector and because they offer their help/consulting to companies, integrating when possible the students in such activities. The research and practical part is particularly developed in the final works and in the master thesis, where the objective is often supporting innovation development and implementation.

## **6. Programme management**

The programme management is devoted to the Study Programme Committee, where are represented the Industrial Enterprise Management department, the Machine Engineering Department, the students and the industrial stakeholders. The Study Committee of the Faculty of Mechanics supervises the work of the various Programmes' Committees. Stakeholders and teachers are involved into the study programme preparation. Internal quality at VGTU is managed according to LST EN ISO9001:2008. The study quality assessment takes advantage of the "Alma Informatica" system, containing information about the student survey for all courses. Each lecturer can access the information about his/her courses for improving them. The overall students' survey results are discussed in department and dean office meeting to decide how to improve teaching quality. Feedbacks from students making the practice are also collected. Surveys of companies where the graduates will work are planned.

Students, Graduates and Teachers positively evaluated the programme. The less satisfying point for students and graduates is how much the programme help to find a job and the nature of work compliance with in the studies qualifications. Students, Graduates and Teachers,

with different percentage suggest to further increase practices and interactions with people from the industrial world. Due to the recent modifications, suggestions also concern the curriculum design (when to teach some courses, the utility of some courses, change the balance of the fields of study). Employers, asked for more practical approaches and more technical subjects (survey) but also for more operation management and the related software tool (interview).

Summarizing, the evaluation and improvement suggestions are collected formally and in a structured way. Due to the novelty of the programme, is still unclear how much of the gathered remarks have been and will be integrated in the study programme.

### III. RECOMMENDATIONS

1. Revise the objective and learning outcomes in order to improve their coherence and exploit this work for identify potential improvement actions, also thanks to the already collected feedbacks of the various stakeholders (students, graduates, teaching staff, employers).
2. Develop further the concept of Innovation Management and Entrepreneurship and reinforce the number of study subjects mainly devoted to these issues.
3. Further increase the practical side (company visit, seminars done by industry people, etc.) and the recourse to not traditional teaching approaches (workshops, open discussions). Continue to apply problem-based learning and multidisciplinary team projects that seem appreciated by students.
4. Due to mixed requirements, request for reinforcing the management side but also the technological side, with specific topics (CNC, automation) consider the possibility to provide more free choice courses. Anyway, due to the name and the objectives of the programme, as well as specific requests from graduates and employers reinforce the focus on modern software belonging to industrial engineering IT (ERP system, PLM, PDM, etc.), both at the theoretical and practical level.

### IV. SUMMARY

The master programme in *Industrial Engineering and Innovation Management* study programme is generally appreciated by students for the competence it provides and the good job perspectives it offers, as well as by employers, who seeks people that can help them in managing the innovation process (high job opportunities for this profile in the future). The decision to focus on innovation management and the multidisciplinary approach, integrating technical and management subjects, is liked by the employers. However, some improvements are requested by students and stakeholders to better align the programme contents and structure with the programme name and objectives. The friendly attitude as well as the good theoretical and practical competences of the teaching staff strongly contributes to the positive evaluation of the programme. The teachers are well-prepared; their involvement in international research projects can be reinforced. A strategic action has to be planned in order to ensure that good candidates will replace the significant percentage of teachers that are going to soon retire. The whole ecosystem is favorable for students: good dormitories and sport facilities, strong contacts with enterprises, supporting actions for participating to research work, good availability of software, technical equipment, computers as well as access to a wide literature. The student assessment is based on theoretical exams and project works, thus allowing to comprehensively evaluating the competences of the students.

The objectives of the *Industrial Engineering and Innovation Management* study programme are really ambitious and its specific focus on innovation is appealing. However, in order to be fully compliant with its objectives the study programme has to be further improved. The feedbacks from the stakeholders, structurally collected by VGTU, can help to undertake a deep review of the Learning outcomes and their mapping to the study subjects in order to improve the coherence of the mapping. Depending on the nature of the job position different competences are required. For instance, stronger focus on modern management concepts, which implies the acquisition and use of the related software, will help the students to better comply with some tasks they will have to fulfill in their professional life. However, some employers and graduates ask for more technical subjects concerning CAD/CAM, CNC and automation. These diverse requirements can be achieved by increasing the number of ECTS linked to free choice subjects.

## V. GENERAL ASSESSMENT

The study programme Industrial Engineering and Innovation Management (state code – 621H77002) at Vilnius Gediminas Technical University is given positive evaluation.

*Study programme assessment in points by fields of assessment.*

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	2
2.	Curriculum design	2
3.	Staff	3
4.	Material resources	3
5.	Study process and assessment (student admission, study process student support, achievement assessment)	3
6.	Programme management (programme administration, internal quality assurance)	3
	<b>Total:</b>	<b>16</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.

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**VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETO ANTROS PAKOPOS STUDIJŲ  
PROGRAMOS *PRAMONĖS INŽINERIJA IR INOVACIJŲ VALDYMAS* (VALSTYBINIS  
KODAS – 621H77002) 2012-12-20 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-172  
IŠRAŠAS**

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**V. APIBENDRINAMASIS ĮVERTINIMAS**

Vilniaus Gedimino technikos universiteto studijų programa *Pramonės inžinerija ir inovacijų valdymas* (valstybinis kodas – 621H77002) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	2
2.	Programos sandara	2
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	<b>Iš viso:</b>	<b>16</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**

Magistro studijų programa *Pramonės inžinerija ir inovacijų vadyba* dėl suteikiamų kompetencijų ir gerų įsidarbinimo galimybių gerai vertina tiek studentai, tiek darbdaviai, ieškantys žmonių, galinčių padėti jiems valdyti inovacijų procesą (geros įsidarbinimo ateities perspektyvos šioje srityje). Darbdaviams patinka sprendimas akcentuoti inovacijų vadybą ir programos tarpdiscipliniškumas, integruojantis techninius ir vadybos dalykus. Vis dėlto studentai ir socialiniai partneriai prašo kai kurių patobulinimų, kad programos turinys ir sandara geriau

atitiktų programos pavadinimą ir tikslus. Draugiška atmosfera bei geros dėstytojų teorinės ir praktinės kompetencijos itin prisideda prie teigiamo programos vertinimo. Dėstytojai yra gerai pasirengę, bet jų dalyvavimą tarptautiniuose mokslinių tyrimų projektuose reiktų stiprinti. Reiktų suplanuoti strateginius veiksmus, siekiant užtikrinti, jog geri kandidatai pakeistų didelę dalį greitai į pensiją išėisiančių dėstytojų. Studentams sudaryta palanki aplinka: geri bendrabučiai ir sporto bazė, stiprūs kontaktai su įmonėmis, parama moksliniam darbui vykdyti, prieinama programinė įranga, techninė įranga, kompiuteriai bei suteikiamas platus literatūros pasirinkimas. Studentų vertinimas yra grindžiamas teoriniais egzaminais ir projektiniais darbais, kurie leidžia išsamiai įvertinti studentų kompetencijas.

Studijų programos *Pramonės inžinerija ir inovacijų vadyba* tikslai yra tikrai ambicingi ir jos dėmesys inovacijoms yra patrauklus. Vis dėlto norint įgyvendinti tikslus studijų programą reikia gerinti. Socialinių partnerių atsiliepimai, kuriuos struktūriškai renka VGTU, gali padėti atlikti išsamią studijų rezultatų peržiūrą ir rezultatus suderinti su studijų dalykais, t.y. sustiprinti jų ryšius. Priklausomai nuo užimamų pareigų reikalingos skirtingos kompetencijos. Pavyzdžiui, didesnis dėmesys šiuolaikinėms vadybos koncepcijoms, kuris savo ruožtu reiškia ir susijusios programinės įrangos įsigijimą ir naudojimą, padėtų studentams geriau atlikti kai kurias užduotis, su kuriomis jie susidurs profesinėje veikloje. Vis dėlto dalis darbdavių ir absolventų prašo daugiau techninių dalykų, susijusių su CAD/CAM, CNC ir automatika. Šiuos skirtingus poreikius galima patenkinti padidinant ECTS skaičių skiriamą laisvai pasirenkamiems dalykams.

### III. REKOMENDACIJOS

1. Peržiūrėti programos tikslus ir studijų rezultatus siekiant pagerinti jų išdėstymą/ryšius ir išnaudoti šią veiklą nustatyti potencialių tobulinimo veiksmų numatymui, be to, pasinaudoti jau surinktais įvairių socialinių partnerių (studentų, absolventų, dėstytojų, darbdavių) atsiliepimais.
2. Toliau vystyti inovacijų vadybos ir verslumo koncepciją ir padidinti studijų dalykų, daugiausia skirtų šiems klausimams, skaičių.
3. Toliau stiprinti praktinę programos pusę (vizitai į bendroves, pramonės atstovų seminarai, pan.) ir taikyti netradicinius dėstymo metodus (praktiniai seminarai, atviros diskusijos). Toliau taikyti problemų analize pagrįstą mokymosi metodą ir tarpdisciplininius komandinius projektus, kurie studentų yra mėgiami.
4. Dėl įvairių reikalavimų, pavyzdžiui, sustiprinti ne tik vadybos, bet technologinę pusę specifinėmis temomis (CNC, automatika), apsvaistyti galimybę siūlyti daugiau laisvai pasirenkamų dalykų. Bet kuriuo atveju dėl programos pavadinimo ir tikslų, taip pat specifinių absolventų ir darbdavių prašymų daugiau dėmesio skirti pramonės inžinerijos IT programinei įrangai (ERP sistema, PLM, PDM, pan.) tiek teoriniame, tiek praktiniame lygmenyse.

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Paslaugos teikėja patvirtina, jog yra susipažinusi su Lietuvos Respublikos baudžiamojo kodekso<sup>1</sup> 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė,  
parašas)

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<sup>1</sup> Žin., 2002, Nr.37-1341.