



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

Vilniaus Gedimino technikos universiteto
GAMYBOS INŽINERIJA IR VALDYMAS (612H77001)
VERTINIMO IŠVADOS

EVALUATION REPORT
OF PRODUCTION ENGINEERING AND MANAGEMENT
(612H77001)
STUDY PROGRAMME
at Vilnius Gediminas Technical University

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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Gamybos inžinerija ir valdymas</i>
Valstybinis kodas	612H77001
Studijų sritis	technologijos mokslai
Studijų kryptis	gamybos inžinerija
Studijų programos rūšis	universitetinės
Studijų pakopa	pirmoji
Studijų forma (trukmė metais)	nuolatinė (4), iššęstinė (5,5)
Studijų programos apimtis kreditais	240
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	gamybos inžinerijos bakalauras
Studijų programos įregistravimo data	2001-08-02, Nr.1187

INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	<i>Production Engineering and Management</i>
State code	612H77001
Study area	technological sciences
Study field	production and manufacturing engineering
Kind of the study programme	university studies
Level of studies	first
Study mode (length in years)	Full-time (4), part-time (5,5)
Scope of the study programme in credits	240
Degree and (or) professional qualifications awarded	Bachelor of Production and Manufacturing Engineering
Date of registration of the study programme	02-08-2001, No.1187

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The Centre for Quality Assessment in Higher Education

CONTENTS

CONTENTS	3
I. INTRODUCTION.....	4
II. PROGRAMME ANALYSIS	4
1. Programme aims and learning outcomes.....	4
2. Curriculum design	5
3. Staff	6
4. Facilities and learning resources.....	7
5. Study process and student assessment.....	7
6. Programme management	8
III. RECOMMENDATIONS	9
IV. SUMMARY	9

I. INTRODUCTION

The study programme of the *Production Engineering and Management* is proposed with two specializations: *Industrial Enterprises Management*, which purpose is to prepare future production managers, and *Industrial Technology*, which purpose is to prepare future technological experts. For full time students the choice among the two specializations is done at the 4th semester. This programme aims to prepare multidisciplinary engineers, able to combine technological and management knowledge and apply them to many industrial sectors. The programme name was changed into *Production Engineering and Management* in 2011 (previously it was called *Industrial Engineering*). The current name is expected to better reflect the specializations and being more aligned with the name of the study field - Production and Manufacturing Engineering. Strong commonalities in terms of courses, learning objectives and teaching staff exist with other bachelor programme taught in Faculty of Mechanics. Two different departments of this faculty are responsible for managing the two specializations, namely the Department of Industrial Enterprise Management for *Industrial Enterprises Management* and the Department of Machine Engineering for *Industrial Technology*. This programme, as others, suffers from a reduction of the number of students that is mainly related to the country demography and the financing policy (students do not pay for studying, however the number of free places is continuously decreasing).

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.

The impact of professional practice and final work for special skills was recognized, and their importance increased accordingly. Two specializations are proposed: Industrial enterprise Management and Industrial Technology. The subjects of specializations accounts for 35 ECTS.

Despite the effort for creating a comprehensive list of learning outcomes, according to international recommendations, and map them with the proposed courses/subjects the description of the learning outcome has to be improved and managed in a more strategic way (for instance, using the list of identified learning outcomes to modify the study programme and understand which is the most suitable balance among theoretical and practical activities). The following problems have been detected:

- some knowledge learning outcome (for instance Z5 “General knowledge of the technological sciences about fundamentals of applied mechanics; elements of machines; automatic control, management of human resources; industrial management and logistics, fundamentals of CAD/CAM/CAE; control and optimization of quality” and Z6 “General knowledge of the technological sciences about material mechanics, fluid mechanics and thermodynamics; theory and practice of measurement; fundamentals of innovation management; theory of mechanical vibration; corrosion and its prevention; fundamentals of tribology”) are not

homogenous, putting together specialized technical knowledge with general management topics

- some special skills (f.i. SG5 “Abilities to work as industrial enterprise manager or leader, cooperate with technical and business management specialists, achieve further professional growth, implement knowledge about human resources, marketing and logistics in practical activities of the enterprises”) seem too ambitious for a bachelor programme, especially if the time devoted to some of these subjects is limited and generally speaking the focus is mainly on theoretical learning instead of on practical activities
- the heterogeneity at the learning outcome level is reflected in similar problems while mapping learning outcome with study subjects (f.i. how the following subjects: Development of Materials and Technologies, Evolution of Technical Developments can be linked with Z3 “Knowledge of the humanity and social sciences needed for engineering career and for the erudition increase and formation of the philosophical views”)

Due to the strong commonalities with many other VGTU programmes, which in the past raised questions about how this programme is capable to provide competitive advantage and for which sectors/activities, the establishment of suitable learning outcomes can be a major drivers for differentiate this programme from the others and, in case, adapting the curriculum design to the learning outcomes in order to increase its attractiveness.

2. Curriculum design

The curriculum is compliant with national and VGTU university regulations, the study field Production and Manufacturing Engineering accounts for 182 ECTS, the specialization part for 35 ECTS. The duration (4 years for continual studies and 5.5 years for extended studies for a total of 6400 hours in both cases) for 240 ECTS is aligned with the minimum requirement of EU policies. The curriculum has been redesigned taking into account the remarks done on the basis of the last external assessment. The offer of free choice subjects is limited: 8 ECTs out of 207 ECTS of teaching (18 ECTS for Final Work).

For full-time studies overall contact (lectures, practical works and laboratory work) accounts for about 2500 hours, about 39% of the overall effort. For part-time studies overall contact (lectures, practical works and laboratory work) accounts for about 1100 hours, so only about 18% of the overall effort. Effective final work preparation is ensured by its decomposition in 3 modules starting from semester 7 for continual studies (semester 10 for extended). The number of subjects per semester is limited to maximum 7 in order to facilitate students' work.

The courses are taught in Lithuanian. According to previous remarks Professional practices relevance has been increased to 15 ECTS. However, requests for further increasing professional/practical activities are made by both students and employers.

The subjects are spread evenly, also thanks to the meetings organized by the various subjects responsible'. These meetings are done for aligning the theoretical and practical parts, to ensure coherence when various teachers are involved in the same subject, to define the learning outcomes and map the subjects to them.

Current students are satisfied and find the programme aligned with their expectations. Graduates and employers are in general quite satisfied about the programme. However, some remarks are done concerning the need to further increase the management courses and include in the programme subjects related to modern production management software (ERP, CRM, etc.).

The early start of practice and company visits as well as the industrial background of some teaching staff is appreciated by the students, because they help them to understand the context in which they will have to work.

The doubts about the small amount of hours devoted to complex subjects (f.i. Fundamentals of Human Resource Management, Industrial Marketing and Logistics, 3 ECTS and 80 hours) are banished thanks to the feedback obtained from the students.

Teaching methods has to encourage team-work, problem based learning, etc. (a positive example in this sense is the “complex project” in innovation).

It appears from graduates and employers feedbacks that further improvement are necessary for some subjects to align teaching methods and contents to the industrial day-by-day life (f.i. 3D CAD compared to the taught 2D CAD; outdated example about lean manufacturing; outdated references for material sciences).

Mixed statements coming from the graduates about the possibility to be physically directly involved in laboratory activity, suggest the necessity to further improve the organization of the laboratory in order to ensure that everyone and not only the most motivated people will use the equipment.

Starting from a satisfactory basis, some improvements to the curriculum design are required for being able to satisfy the needs of the various stakeholders. In particular, the focus on management courses has to be reinforced. The contents and the way of teaching of some technical courses have to be updated to better reflect the current industrial practices. Despite the recent improvements, the professional/practical activities and the laboratory courses have to be reinforced/improved. The teaching methods should further encourage the use of team-work, problem base learning and interactive/multimedia teaching material.

3. Staff

The great majority of teachers are Doctors, young lecturer and assistant are also present (they should have at least a master degree of an equivalent university level). The teaching load decrease due to a significant decrease of the number of students. The teachers come from many departments and the number of teachers implementing study programme rotate each year. The great majority of the teachers are in common with other bachelor programmes.

The academic exchange takes place, however no information are given about the duration of the exchange that, furthermore, seem often done only by some teachers. Foreign university teachers regularly visited the Faculty of Mechanics for teaching in this specific 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, also 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. Teachers are required to do internships in companies and research centers to improve their skills (at least once every 5 years).

The great majority of the teachers has long teaching experience (above 10 years) and is also involved in research activities. For a significant percentage of the 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.

A significant percentage (> 30%) of teaching staff is above 60, 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 teaching competences are good; the involvement of teachers in international research projects can be improved. A plan for substituting other a medium long time horizon the professors that are going to be retired has to be established.

4. Facilities and learning resources

Also on the basis of previous negative remarks (see Annex 8.5 page 15: “Industrial Engineering field students during practical exercises are using equipment and means from laboratory of Cutting Theory, Instruments, and Machines and laboratory of Machines, which are in use from Soviet times. 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.

There are no problems for ensuring practice works to students, about 90% of which is unemployed. 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 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

There are neither entrance exams nor specific requirements for the applicants in *Production Engineering and Management* study programme. The calculation of a competitive score will cover mathematics and physics grades. Requirements for the general admission to high schools help to enroll the right students for the study programme, but sometimes it gives opportunity to be enrolled for those who are not very interested in *Production Engineering and Management*, despite good school grades.

Number of students -51% in 5 years. The dropout rate in continual studies seems increasing and reaches 46%. Dropout in the first year is due to lack of motivation and/or knowledge. Dropout in 3rd year is linked to conflict between academia and job (students continue to work in the company where they were making practice). Increased workload at the workplace is also the main reason for dropout in extended study; problems for completing successfully final work were particularly important (8 failures). The interviewed students seem motivated; the recent change of name and programme structure could play a positive role in this motivation increase. The possibility to study this programme also as part-time study provides the

opportunity to achieve the degree to the students having problems due to the parallel workplace workload.

Exchange programmes are not extensively used; despite contacts with many universities exist. There are no problems aligning study credits and subjects for foreign students and local students who came back from Erasmus study exchange program.

The evaluation 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/programa.jsp?fak=4&prog=97&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.

Previous survey indicates how graduates evaluated the nature of work compliance with the studies qualifications as medium, positive indications also for the utility of the programme to find a job. The graduates consider that the *Industrial Enterprises Management* specialisation is less useful for finding a job if compared with the *Industrial Technology* specialization, even if the graduates following the *Industrial Enterprises Management* specialisation are judging their programme quality slightly better than what did the graduates of the *Industrial Technology* specialization. The graduates easily found good jobs, where they apply the knowledge and competences learnt during the programme. Some of them maintain close contacts with the teaching staff and the university for solving specific problems and look for candidates. In general the interviewed employers were satisfied by the graduates' competences.

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.

A strong attention is devoted to the feedbacks of the various stakeholders as demonstrated by a series of surveys, targeting various communities that have been planned and already partially undertaken. Data about Graduates and Teachers survey are already available while the survey of companies where the graduates will work is planned but not yet undertaken.

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 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).

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 involvement of the various stakeholders (data are already available and will be collected also in the future).
2. Explore the possibility to increase the ECTS number assigned to the Specialisation part (C1 “Specialization and students’ choice subjects defined by the University” and C2 “Students’ free choice study subjects”) and/or to Professional Practices (B6: Cognitive Practice, Professional Practice 1, Professional Practice 2) to take into accounts the request stemming from graduates and employers.
3. Foster the development of problem-based learning and multidisciplinary and team projects, following the positive example of the complex project in innovation, which is appreciated by students.
4. Reinforce the importance of management subjects and complement the current software offer with industrial engineering IT (ERP system, PLM, PDM, etc.), to be also applied in study subjects.

IV. SUMMARY

The bachelor programme in Production Engineering and Management is appreciated by students for the competence it provides and the good job perspectives it offers. The programme is also appreciated by employers, because they need people with multidisciplinary competences, who can deal with technical and management subjects. However, the employers and partially the students ask for modifications to the contents and structure in order to make the programme more aligned with its name and the stated 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 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 and access to a wide literature.

In order to further improve the programme, according to the remark of previous audits and the requests of students and industrial stakeholders, the Specialization and the practical part have to be increased. A deep review of the Learning outcomes and their mapping to the study subjects is necessary in order to improve the coherence of the mapping and align the programme contents to its name and objectives. The significant modification of the learning outcomes mapping can constitute the opportunity revise the curriculum design to take into account the requirements of the various stakeholders. For instance, speaking about the contents, it is required by both students and especially industrial stakeholders a stronger focus on modern management concepts, which implies the acquisition and use of the related software, in order to help the students to better comply with some tasks they will have to fulfill in their professional life.

V. GENERAL ASSESSMENT

The study programme Production Engineering and Management (state code – 612H77001) 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
	Total:	16

*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 PIRMOS PAKOPOS STUDIJŲ
PROGRAMOS *GAMYBOS INŽINERIJA IR VALDYMAS* (VALSTYBINIS KODAS –
612H77001) 2012-12-20 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-171 IŠRAŠAS**

<...>

V. APIBENDRINAMASIS ĮVERTINIMAS

Vilniaus Gedimino technikos universiteto studijų programa *Gamybos inžinerija ir valdymas* (valstybinis kodas – 612H77001) 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
	Iš viso:	16

* 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

Bakalauro studijų programą *Gamybos inžinerija ir valdymas* dėl suteikiamų kompetencijų ir gerų įsidarbinimo galimybių gerai vertina studentai. Darbdaviai taip pat gerai vertina programą, kadangi jiems reikia tarpdisciplininių kompetencijų turinčių specialistų, galinčių spręsti technines ir vadybos problemas. Vis dėlto darbdaviai ir dalis studentų prašo tam tikrų programos turinio ir sandaros pakeitimų, kad šie geriau atitiktų programos pavadinimą ir įvardintus tikslus. Prie teigiamo programos vertinimo itin prisideda draugiška atmosfera bei geros teorinės ir praktinės dėstytojų kompetencijos. Studentams sudaryta palanki aplinka: geri bendrabučiai ir sporto bazė, stiprūs kontaktai su įmonėmis, parama moksliniam darbui vykdyti, prieinama programinė įranga ir platus literatūros pasirinkimas.

Norint dar labiau patobulinti studijų programą, būtina atsižvelgti į ankstesnių vertinimų išvadas ir studentų bei pramonės atstovų prašymus sustiprinti specializaciją ir praktinę programos dalį. Būtina atlikti išsamią studijų rezultatų peržiūrą ir studijų rezultatus suderinti su studijų dalykais, kad toks suderinimas būtų nuoseklus, o programos turinys atitiktų programos pavadinimą ir tikslus. Įvairūs studijų rezultatų sandaros pakeitimai gali tapti puikia proga peržiūrėti programos sandarą ir atsižvelgti į įvairių socialinių partnerių reikalavimus. Pavyzdžiui, kalbėdami apie programos turinį tiek studentai, tiek pramonės atstovai pageidavo didesnio dėmesio šiuolaikinėms vadybos koncepcijoms, o tai savo ruožtu reiškia susijusios programinės įrangos

įsigijimą ir naudojimą, kad studentams būtų lengviau atlikti užduotis, su kuriomis jie susidurs profesinėje veikloje.

III. REKOMENDACIJOS

1. Peržiūrėti programos tikslus ir studijų rezultatus siekiant pagerinti jų išdėstymą/ryšius ir išnaudoti šią veiklą potencialių tobulinimo veiksmų numatymui, be to, pasinaudoti įvairių socialinių partnerių įsitraukimu (jau surinktais duomenis ir duomenis, kurie bus surinkti ateityje).
2. Apsvarstyti galimybę padidinti specializacijos daliai (C1 „Specializacija ir studentų pasirenkami universiteto nustatyti dalykai“ arba C2 „Studentų laisvai pasirenkami dalykai“) ir / arba profesinei praktikai (B6: Pažintinė praktika, Profesinė praktika 1, Profesinė praktika 2) skiriamų ECTS kreditų skaičių – tokiu būdu būtų atsižvelgta į absolventų ir darbdavių prašymus.
3. Skatinti problemų analize pagrįstą mokymąsi ir tarpdiscipliniškumą bei komandinius projektus, remiantis teigiamu kompleksinio inovacijų projekto, kurį gerai vertina studentai, pavyzdžiu.
4. Sustiprinti vadybos dalykų svarbą ir papildyti turimą programinės įrangos paketą pramonės inžinerijos IT (ERP sistema, PLM, PDM, pan.), kurias taip pat reiktų taikyti studijų dalykuose.

<...>

Paslaugos teikėja patvirtina, jog yra susipažinusi su Lietuvos Respublikos baudžiamojo kodekso¹ 235 straipsnio, numatančio atsakomybę už melagingą ar žinomai neteisingai atliktą vertimą, reikalavimais.

Vertėjos rekvizitai (vardas, pavardė,
parašas)

¹ Žin., 2002, Nr.37-1341.

