



Final Study Programme Evaluation Thermal Engineering (professional bachelor)

at

Vilniaus technologijų ir dizaino kolegija

Assessment report

3 May 2012

Assessment report of the professional bachelor study programme Thermal Engineering. The final evaluation was carried out by evalag as part of the Study Quality Improvement by Updating the Thermal Engineering, Mechanical Technology Engineering, and Rolling Stock Operation Technological Study Programs Project No. VP1-2.2-ŠMM-07-K-01-090.



Vilnius technologijų ir dizaino kolegija (VTDK) commissioned **evalag** with the final programme evaluation of the newly created professional bachelor study programme "Thermal Engineering". The programme evaluation was carried out by an international expert team that assessed the study programme according to the Lithuanian quality assurance standards and the European Standards and Guidelines for Quality Assurance in the European Higher Education Area with the objective of accrediting and registering the programme according to Lithuanian higher education law and awarding **evalag's** international quality label for study programmes.

1. Vilnius technologijų ir dizaino kolegija (VTDK)

VTDK is a public Lithuanian non-university higher education institution that offers college level study programmes which are directed towards a professional activity. The college in its present form was created by merging several colleges in Vilnius in the fields of engineering and design – this gives the college its distinct profile.

According to Lithuanian law, college level higher education institutions (kolegija) offer full-time and part-time professional bachelor degrees that allow graduates to pursue a professional career. Master degrees are not offered. Graduates who want to pursue a master degree at a Lithuanian university need to complete one and a half years of bridge courses to meet the admission requirements.

VTDK has about 4000 students and offers 22 professional bachelor programmes in the fields of engineering and design in the following four faculties:

- Civil engineering faculty
- Faculty of design
- Railway transport faculty
- Faculty of technical sciences

The college's mission is to be a partner in the development of a sustainable society. On the basis of this mission the college has developed a strategic plan for its development and management. VTDK has recently been very active and successful in acquiring EU-funding. The college finished or still carries out a number of projects to renew its study programmes, to renovate its building, to update its equipment, to develop its staff, to collaborate with its European partner institutions and to develop its internal quality management.

The thermal engineering programme is offered by the civil engineering faculty, which offers for its 855 students altogether four study programmes:

- Civil engineering
- Building engineering systems
- Thermal engineering
- Geodesy and cadastre

Responding to the recent higher education reform in Lithuania and an employer's survey carried out by the college, the faculty completely updated the three first-named study programmes in order to adjust the programme contents to the demands of the labour market and to broaden the competences of the graduates.

used as described in Order # 1-01-162. The two sets of criteria are compatible insofar as the criteria for new study programmes are a subset of the criteria for existing programmes taking into account that some information may not be available for newly created study programmes.

The college produced the self-evaluation report according to the Lithuanian guidelines for new study programmes (yet-to-be implemented programmes) as outlined in Order # 1-01-18 and submitted it to **evalag**. **evalag** formed an expert team for the cluster consisting of four professorial experts and one student expert:

- Lena Diekhans, Karlsruhe Institute of Technology
- Prof. Dr.-Ing. Harald Garrecht, Technische Universität Darmstadt
- Prof. Dr. Jens Mischner, Fachhochschule Erfurt
- Prof. Dr. Schmidt-Gönner, Hochschule für Technik und Wirtschaft des Saarlandes
- Prof. Dr.-Ing. Marina Schulz, Bauhaus-Universität Weimar

The site visit took place on 23 to 25 January 2012 at VTDK¹. During the site visit the expert team met with representatives of the three programmes, the college administration, students and teaching staff and visited the laboratories and seminar rooms used by the three programmes.

The expert team produced an assessment report of the programme with an accreditation recommendation which was submitted to **evalag**'s accreditation commission that took the final accreditation decision in March 2012.

From **evalag**'s side, the accreditation was coordinated by Harald Scheuthle with assistance of Katja Götzen.

4. Programme assessment

4.1 Learning outcomes

Current situation

The self-evaluation report describes programme goals and learning outcomes of the thermal engineering programme and links it with the curriculum. The learning outcomes describe both professional knowledge and competences as well as general/soft skills. The module handbook describes the learning outcomes and contents of each module or subject and gives detailed information on the content and working methods of the courses.

The programme intends to "impart knowledge, understanding, skills, and abilities necessary for a modern-day thermal engineering specialist capable of designing and installing energy systems, performing maintenance of them, and solving professional and societal problems under competitive market conditions" in order to educate specialist who are able to apply technological and scientific knowledge, to implement projects and work independently (self-evaluation report, p. 7). Furthermore, the programme intends to give its graduates a general education which enables them to crea-

¹ Prof. Schulz was not able to attend the site visit.

Recommendations

The expert team recommends rephrasing the programme goals and learning outcomes of the thermal engineering programme by confining them to “basic scientific knowledge” or “technological knowledge” and avoiding the design competences of energy systems.

The expert team encourages the college to reconsider the emphasis of its general studies subjects and develop an offer of key competences courses customised to the professional needs of an engineer and to emphasise creative thinking of the students. This could include method competence courses (e.g. professional writing and presenting as well as project management for engineers), soft skill/social skill courses (e.g. team-oriented communication, conflict management, leadership skills) and courses which promote creative skills (e.g. technical drawing with regard to finding several adequate technical options/solutions for day-to-day construction work). These courses could be offered as electives of the general studies part and, if necessary, adapted to all other study programmes of the college.

4.2 Curriculum design

Current situation

The curriculum is described in the self-evaluation report, the study plan and more detailed regarding content and working methods in the module handbook. The curriculum is based on a total of 180 ECTS credits which is equivalent to 4800 working hours. 15 credits are devoted to general college study subjects, 156 credits are devoted to study field subjects. Nine credits are devoted to free electives where students can choose from all courses offered by the college or even courses from other higher education institutions. The full-time programme covers six semesters with 30 credits each. The part-time programme lasts eight semesters with workloads of 21 to 24 credits.

The study field subjects include 54 credits of scientific basics for thermal engineering in the first three semesters. In the third semester start the module heat generation systems and the subjects covering the fields of provision, installation and maintenance of heat, cooling and energy as well as the subjects in the field of renewable energies and applied research which cover 54 credits altogether. The semesters three to eight cover additionally 12 credits of economics and law. The remaining 36 credits cover different internships (company internship and final practice) and the bachelor thesis.

The curriculum of the full-time programme has a high proportion of practice hours which reflects the practical and professional orientation of the study programme. Out of the 2406 contact hours, 1076 hours are devoted to laboratory work, 880 to lectures. The remaining hours are individual consultation hours and term papers. 2394 hours are devoted to independent work among which 420 hours are an industrial placement and 100 hours of final practice. The part-time programme has the same distribution of credits with a higher proportion of independent work.

The curriculum covers the main subjects of the thermal engineering field and gives the graduates a solid foundation of the field. The general college study subjects are not subject related and cover language and key competences.

tempts to acquire EU-funded projects in order to provide financial support for staff development. With these funds, lecturers can i.e. attend international or national conferences. Additionally, the college allows lecturers to make long-term internships in companies or acquire a second master degree in another field. The college is also engaged in Erasmus exchange programmes for teaching staff. Nevertheless, the lack of funding for staff development remains a general problem.

Teaching staff is evaluated by the college on a regular basis. The teachers write a yearly self-assessment report which is used for a gratification scheme. Every five years there is an assessment of each lecturer, which also takes into account the lecturer's efforts for their own staff development.

Assessment

The expert team assesses the staff as adequate in qualification to offer an professional college-level study programme and to provide the students with a qualified learning experience. They appreciate the motivation of the teaching staff met during the site visit. The number of teaching staff seems to be sufficient, also to support the newly introduced consultation hours. The students confirm that the teaching staff is easily accessible for them.

The expert team supports the decision of the college directorate to support staff development and encourages the college to provide funding for it.

The team acknowledges the low level of (applied) research at VTDK, which is to a large extent determined by the legal status of the institution and its associated tasks and opportunities. However, looking at the excellent laboratory equipment of the faculty, the team sees a potential for the faculty to strengthen and encourage applied research.

Recommendations

The expert team encourages the college to strengthen its applied research activities. The laboratory equipment of the faculty and its international network allows the teaching staff to engage in applied research. These activities could be used to enrich the education of its students by involving them in applied research.

4.4 Facilities and learning resources

Current status

The seminar rooms, computer rooms and laboratories for the thermal engineering study programme are listed in the self evaluation report and were visited by the expert team during the site visit. Altogether the study programme uses a total of 16 different seminar rooms and four laboratories for the different subject fields according to the self-evaluation report. The rooms and laboratories are shared with other study programmes. The computer rooms are equipped with the common software used in the field. The laboratories are equipped with modern laboratory equipment such as district heating systems, heating systems of buildings, water supply systems and pumps characteristics etc. which was funded by an EU financed project. The library offers textbooks and learning resources for the students and gives access to relevant journals in the field. Most textbooks or methodological publications are prepared by the lecturers and are available in sufficient numbers for the students in the library.

Each subject ends with a student assessment. The final subject assessment is composed of at least two different assessment forms and combined according to a predefined formula. This leads to a variety of different examination methods i.e. written exams, tests, practical works, project reports, independent work, which assess different competences. The assessment methods and formulas to create the final mark are described in the module handbook. The individual marks are assessed and processed by the lecturer of the subject and the final mark is submitted to the college administration.

Drop-out rates (in the previous thermal energetics programme) were at about 50%. According to the college this is about the average drop-out rate in Lithuania. The renewed thermal engineering programme has now a larger proportion of individual consultation hours which may contribute to reduce the drop-out rates.

The study programme includes – among other shorter internships or practical placements – a 12 week internship (18 credits) at a company. The students search the companies independently but in case of need, the college provides support through their company contacts. Before the internship, the student, the company and the responsible lecturer agree on the task that should be performed during the internship. In another internship the students follow professionals in a company and observe their regular tasks in order to get acquainted to the technologies used in companies.

The bachelor thesis is mostly written at the college under the supervision of a lecturer; however, the final practice may be used to collect data in a company to prepare the thesis.

Students have the opportunity to participate in mobility programmes. The college takes actively part in the Erasmus programme and has, especially for the building engineering systems programme, partner institutions in Denmark and France. The number of incoming students, however, is low, as the college does not yet offer courses in English. Therefore a module taught in English with 16 credits is planned.

After finishing their studies the majority of the students search – mostly successfully according to the information of the college – a job in their profession. About 20% seek a Master degree. In order to meet the admission requirements for a Master programme at a Lithuanian university the students with a professional bachelor degree need to attend one and a half years of bridge courses.

Assessment

To the expert team the study process of the thermal engineering programme seems to be well organised and balanced. The organisation of the study process seems to be adequate to achieve the intended learning outcomes. This assessment is also confirmed by the students during the site visit who were in general satisfied with their situation at the college and appreciate VTDK due to its good reputation. The students especially emphasised the easy and close contact with their lecturers. The assessment scheme is transparently described and uses multiple assessment methods to check different competences of the students. The study programme documents and module handbook are available on the college's website.

The college also offers its students opportunities for international mobility. The expert team encourages the college to strengthen these mobility programmes and to further motivate students to participate in student exchanges. Therefore, the existing partnerships could be used. Furthermore, the experts emphasise the importance of English courses for local students. One necessary precondition to increase mobility is to provide favourable conditions for incoming mobility. Therefore, the experts see it as indis-

On programme level the department carries out student course evaluations. The results of the evaluations are analysed and discussed in the department or, if needed, between a lecturer and the dean. The results are also presented to the students during special information meetings.

On college level, there exists a quality assurance office that supports the faculties and study programmes in their quality assurance efforts. The college also provides a quality handbook that describes the most relevant processes. Currently the college carries out an EU-funded project to redesign its internal quality assurance system and to develop a quality management system based on a combination of EFQM and ISO. In this project the college will also define strategic performance indicators for its faculties.

Assessment

The expert team assesses the programme management as clearly structured and efficient. The experts appreciate the good involvement of external stakeholders in the improvement of study programmes. The quality assurance of the programme seems to be straightforward. The experts commend the college on its efforts to improve its internal quality management system in an EU-funded project and support the college to fully implement the results of this project. As the project is not yet implemented the quality management system cannot be fully assessed at this stage.

Recommendations

The expert team recommends the college using the opportunity of the EU-funded quality assurance project to design and implement an integrated strategic quality management system that builds on the strategic objectives of the college and the study programmes, uses diverse sources of information to analyse the quality and derives and implements measures for improvement. The college needs to assure that the quality management system supports the lecturers in providing a good learning experience and reduces bureaucracy.

To fully use the capacities of the already build up quality management system the experts invite the college to use statistics more systematically in its internal quality assurance processes.

5. Overall assessment

In general the expert team assesses the professional bachelor study programme "Thermal Engineering" positively. The college provides a solid education and prepares the students well for their future profession. The professional character of the programme is clearly described in the learning outcomes. Curriculum and study process are clearly structured and appropriate to achieve these learning outcomes. The programme management and the quality assurance seem to be appropriate to manage and improve the programme. The expert team values the close cooperation of the college with regional and local employers in order to support the study process and to constantly develop the study programme and focus the competences of the graduates to the needs of the labour market. A great asset of the college is its motivated teaching staff and its excellent laboratory equipment. The efforts of the college in providing good learning opportunities are also valued by the students.

Evaluation scale

Level/Score	Evaluation	Description
1	Unsatisfactory	There are essential irregularities to be eliminate
2	Satisfactory	Meets the minimum requirements, requires improvement
3	Good	The area is systemically developed and possesses original features
4	Very good	The area is exceptionally good