



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VYTAUTO DIDŽIOJO UNIVERSITETO
STUDIJŲ PROGRAMOS *TAIKOMOJI INFORMATIKA*
(*valstybinis kodas – 621113003*)
VERTINIMO IŠVADOS

EVALUATION REPORT
OF *APPLIED INFORMATICS* (*state code -621113003*)
STUDY PROGRAMME
at VYTAUTAS MAGNUS UNIVERSITY

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Išvados parengtos anglų kalba
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	<i>Taikomoji Informatika</i>
Valstybinis kodas	621I13003
Studijų sritis	Fiziniai mokslai
Studijų kryptis	Informatika
Studijų programos rūšis	Universitetinės studijos
Studijų pakopa	Antroji
Studijų forma (trukmė metais)	Nuolatinės studijos, 2 metai
Studijų programos apimtis kreditais	120 ECTS
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	Taikomosios informatikos magistras
Studijų programos įregistravimo data	1997-06-04

INFORMATION ON EVALUATED STUDY PROGRAMME

Title of the study programme	<i>Applied Informatics</i>
State code	621I13003
Study area	Physical Sciences
Study field	Informatics
Type of the study programme	University Studies
Study cycle	Second
Study mode (length in years)	Full-time, 2 years
Volume of the study programme in credits	120 ECTS
Degree and (or) professional qualifications awarded	Master of Applied Informatics
Date of registration of the study programme	04-06-1997

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The Centre for Quality Assessment in Higher Education

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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.	Questionnaires for students about study subjects

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

Vytautas Magnus University was established in 1922. Currently it has around 480 staff and in excess of 8,000 students with around 30% of these being postgraduate students. It prides itself

in being unique within Lithuania in promoting a liberal arts philosophy which allows students a certain latitude in the design of their studies.

This study programme began in 1997. It is offered by the Department of Systems Analysis which is in the Faculty of Informatics. It had been accredited by SKVC in November 2013 for a period of 3 years.

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 by the team on 22-23/03/2016.

1. **Prof. dr. Andrew McGettrick (team leader)**, *Strathclyde University, Professor of Computer Science and Information, United Kingdom.*
2. **Prof. dr. Peeter Normak**, *Tallinn University, Professor, Director of the School of Digital Technologies, Estonia.*
3. **Prof. dr. Jukka Paakki**, *University of Helsinki, Professor in Computer Science, Finland.*
4. **Mr Tomas Urbonas**, *CEO of Information Technology Company JSC "SONARO", Lithuania.*
5. **Mr Žygimantas Benetis**, *student of Kaunas University of Technology study programme System Software.*

The evaluation has been carried out by analyzing the self-evaluation report produced by the institution but they also paid a visit to the institution on Tuesday 22nd and Wednesday 23rd March 2016. During their visit they held meetings with Faculty representatives, with the team who prepared the self evaluation report, with students, teachers, alumni from the programme and with social partners who contributed to it. In addition the review panel looked at a sample of student work and saw documents related to the work of the Study Programme Committee. During their visit, they had a tour of the premises and facilities available to the students.

II. PROGRAMME ANALYSIS

2.1. Programme aims and learning outcomes

The aims of the study programme are set out in the SER and are described as: to produce graduates capable of analyzing big data through the application of data mining techniques and methods from the general area of analytics; creating formal models and / or simulations of complex systems and business processes as well as designing, deploying and maintaining related systems; performing research and development in an industrial or an academic setting, this to be seen as possible preparation for entry to a doctoral programme in Lithuania or abroad.

Each of these three programme aims is further refined into a set of 14 learning outcomes, giving a total of 42 learning outcomes. In the view of the review panel, and although there was overlap, this level of refinement seemed excessive; a smaller number of higher level outcomes would have been preferable. The 42 learning outcomes include skills as wide ranging as: performing interdisciplinary research and development in data analysis and modeling and applying research results in practical applications, design innovative multiplatform services and applications, integrating intelligent and adaptive and cloud technologies, applying parallel programming skills, and planning self-learning. In the view of the review panel, these were ambitious and lacked a certain focus.

The review panel was of the view that, for an advanced Masters study programme, there should be greater focus on particular aims and learning outcomes as well as attention to specific aspects at the frontiers of development and innovation.

Information about the study programme are available in English on the web at <http://if.vdu.lt/en/studies/master-studies-programmes/applied-informatics/>.

The aims of the programme have been devised to meet the goals of the Strategy of Long-Term Development of the Lithuanian Economy as well as the goals of the Information Society and Knowledge Based Economy as formulated in the European Commission's Lisbon declaration. The skills in data mining and natural language processing are viewed as being in high demand.

The review panel was of the view that the programme aims and learning outcomes, while ambitious and very broad, are consistent with the type and level of studies and the qualification on offer.

The name of the study programme, its learning outcomes and the qualification were all seen by the review panel to be mutually compatible.

2.2. Curriculum design

The curriculum of the Programme has been designed to comply with the national orders on *Approval of the Descriptor of Study Cycles* (Minister for Education and Science of the Republic of Lithuania, Order No V-2212, 2011) and *Approval of the General Requirements for Master Degree Study Programmes* (Minister for Education and Science of the Republic of Lithuania, Order No V-826, 2010). In addition, the internationally acknowledged education model of Computer Science, the joint *ACM / IEEE-CS Computing Curriculum* has been used as a substance framework for the Programme, along with the *SIGKDD Data Mining Curriculum* proposal.

The curriculum meets the legal requirements on second level Master degree study programmes as follows:

- the scope of the Programme is 120 credit points in ECTS (European Credit Transfer and Accumulation System) (minimum: 90 ECTS, maximum: 120 ECTS)
- the volume of core high-level subjects in the study field is 72 ECTS; basically the whole curriculum except for Research Project 1-3 and Master Thesis (minimum: 60 ECTS)
- the volume of elective or general subjects or free-electives is 30 ECTS (maximum: 30 ECTS)
- the volume of the final project; that is, Master Thesis and the Research Projects 1-3, is 48 ECTS (minimum: 30 ECTS)
- the number of subjects taught per semester is 1 (semester 4) or 5 (semesters 1-3) (maximum: 5)
- the share of self-studies (independent work) varies between 53,1 % and 92,5 % per study subject, being in most cases 62,5 % (minimum: 30 %)

According to the plan (schedule) of the Study Programme and the subject descriptions, the study subjects are spread evenly and their themes are not repetitive.

The Programme has been designed to meet the demand in the Lithuanian labour market of professionals in data analysis and business applications. This goal is implemented quite well in the curriculum, which includes a good number of subjects in both areas. There are enough elective subjects, making it possible for students to concentrate more on one of the two main applied areas of the Programme. Figure 1 in the self-assessment report is informative and helps students to design their individual study path based on their own interests.

The content of the subjects and the possible study paths is consistent with the type and level of the studies, and the scope and content of the Programme are sufficient and appropriate to ensure reaching the learning outcomes. Also, the content of the Programme reflects the latest achievements in science and technologies.

The “final project” has four phases, one for each semester: three Research Projects and the Master’s Thesis. This organization makes it possible for the students to have a break in the process; for instance when encountering problems in Research Project 2, the student can have a one-year leave and then return and continue from Research Project 3. The Review Team finds this as good and student-friendly practice which reduces drop-outs in the final project.

The Team also acknowledges that students can choose their own topic for the final project (and Master’s thesis). The quality of the theses, however, varies too much: while the best theses are convincing in their content, research methods and scientific references, involving in some cases even articles based on the thesis, those with low marks are more like technical reports with no actual analysis or references to scientific articles. Also the language in such theses seems to be rather poor. It is therefore recommended to balance the quality of the Master’s theses by requiring in all the cases proper analysis and real scientific references.

In the previous assessment of the Programme (2013), it was recommended, among other things, to update the curriculum by adding courses or topics addressing state-of-the-art developments such as high performance computing, big data, cloud computing, IT as a service and service oriented systems. The Review Team acknowledges that these improvements have been made; especially the (new or updated) subjects on Distributed and Cloud Computing, Data Visualization, Multimedia Data Mining, Information Retrieval, and Intelligent Web Services and Applications contain the themes recommended. For the subject Distributed and Cloud Computing, grants from Microsoft are available for getting licenses to its cloud platform thus making it possible for students to use a real environment in their studies.

Another recommendation in the previous assessment was to further promote a student-centred learning environment, to utilize problem based learning and collaborative work, and to engage students further and deeper in the research activities of the staff. The Review Team has noticed that improvements have been made in all these directions: problem solving and group/team work are included as studying methods in a good number of (elective) subjects, and some of the Master's theses involve joint research articles with the staff.

The course management system Moodle is widely used in the Programme. The Review Team recommends finding possibilities to provide some of the subjects in a proper e-learning mode, for instance by implementing them as massive open online courses (MOOC). Having subjects available as MOOCs would, in particular, make the studies more flexible for students who have a (full-time) job. An e-learning mode was also one of the (minor) recommendations in the previous assessment.

In general, the teaching methods for the subjects are appropriate for the achievement of the intended learning outcomes.

2.3. Teaching staff

The study programme *Applied Informatics* is delivered by 7 Professors (33% of the teachers), 4 Associate Professors and 10 lecturers, i.e. 21 in total. 86% of teachers have PhD degree and about 60% of the subjects are taught by professors (some subjects jointly with some other staff members). Therefore, the legal requirements are met. The qualifications of teaching staff are adequate, 80% of teachers are conducting research in the areas directly related to the field of teaching.

The yearly admission to the programme was growing from 9 in 2011 to 13 in 2015. The total number of students is about 25 (slight increase in last years). It is impossible to estimate the student/teacher ratio, as the teaching staff is teaching on different study programmes in parallel. Even if the teaching staff devotes only 25% of their teaching time for teaching courses of the programme, then the student/teacher ratio would be about 8 ($=25/13*4$, only full-time teachers are taken into account). This ratio is completely acceptable.

62% of the teaching staff have full-time employment in VMU. There were 5 new teachers involved since the last programme evaluation in 2013. The average age of teaching staff is about

48 years (46 years of full-time teachers). However, only 4 professors (out of 7) have full-time employment in VMU, including one who already exceeded the retirement age. The age distribution of teaching staff is quite challenging: only 28,6% of teachers are up to 40 years and 38% are close to 50 or more.

The favorable student/teacher ratio creates good conditions for teaching staff to devote enough time to R&D and for preparation of course materials. However, the university has not yet implemented a regular system of sabbaticals for teaching staff. The teachers also complained that the need for participating on international conferences is significantly bigger than the university is able to support.

Some teachers are very productive and have published in high-level international journals and proceedings. On the other hand, the amount of research conducted in international teams is relatively small – only very few teaching staff members have joint international publications with colleagues from other countries. Moreover, the majority of the staff members have published only in national titles, in non-public titles without official references or in titles internal to the university. This is apparently caused by the general policy which values more the quantity rather than quality of publications. This should be reverted as it can lead to production of “scientific noise” and undermines the reputation of science. The abovementioned factors (small number of degrees obtained in foreign universities, non-existing sabbaticals, scarce participation on international conferences and involvement in international research teams) allow conclude that the potential of teaching staff to contribute in international academic activities is not fully exploited.

2.4. Facilities and learning resources

According to the institution’s self evaluation report (SER), the premises for studies are adequate both in their size and quality, it matches requirements for that number of students. SER provides detailed information about the premises. Additional evidence were also found during the institutional visit to VMU, EET was satisfied that good infrastructure. There are 2 new laboratories founded in 2014, also there are 33 private companies funded places in the faculty. High speed Wi-fi accessibility is great, it is covering the whole building. All lecturers have their own working places equipped depending to their needs. VMU Informatics faculty is accessible for students with disabilities. Access to the premises is provided for students with reduced mobility, there is a separate working place for students with visual impairment in the library.

The key items to cover teaching and learning equipment used for this study programme is as follows:

- Seven specialized laboratories are supporting the study process and research work: Multimedia laboratory, Computer Controlled Systems Laboratory, Internet and Mobile Solution Laboratory, Audiovisual technology Laboratory, Neuroscience Laboratory, Computer Networks Laboratory, Computer Graphics labs. Multimedia laboratory is very well equipped with the newest hardware and software solutions.
- Tablets / phones, Raspberry PI, Robots and other smart gadgets are used in laboratories.
- 3 levels of e-learning is used.
- There are two global and mandatory in university level information systems “first class” and “moodle”.
- Computer laboratories with video conferencing equipment and recording possibilities.
- Lecturers are provided with tablets for distance learning purposes.
- There are also consultations, discussions and cooperation between students performed by using a forum tool.

Regarding library services:

- There is a possibility to use VMU library Services virtually - an electronic catalogue provides access to the library data and databases.
- Approximately 18 licensed online databases (EBSCO, ScienceDirect, SpringerLink, Taylor and Francis, Wiley InterScience, etc.) are covering the study subjects of applied informatics are available to the staff and students at VMU via University libraries
- The library webpage also has up-to-date communication tools such as news and information channel subscription (RSS) and a feedback option to provide opinion about the Services provided.
- The library itself is open from 8.00 to 21.00 Monday - Friday and from 9.00 to 18.00 on Saturdays.

2.5. Study process and students' performance assessment

Admissions to the study programme are governed by the recommendations of the Ministry of Education and Science in Lithuania and the admission rules approved by the Rector. Funding quotas are distributed to educational institutions by the Ministry of Education and Science. The

University received 14 state funded positions in 2015 and 11 state funded positions in 2014, these to be share amongst all Masters programmes in informatics and mathematics.

Graduates from a wide variety of first cycle study programmes can be admitted to this study programme; these include informatics, informatics engineering, information systems, software systems, mathematics and computer systems, mathematics, and statistics. Students from certain study programmes in non-university programmes in the above areas can also gain admission but have to complete a specially tailored supplementary programme offered by the Faculty of Informatics. Applicants are rated on the basis of the exam marks in their diploma supplement (weight 0.3), the arithmetic average of the exam marks from their specialty subject (weight 0.6) and the mark from their bachelor's thesis (0.1).

In the years 2011, 2012, 2013, 2014, 2015 the numbers of applicants, the numbers admitted on the basis of state funding, and the numbers of privately funded students have been: 18, 9, 0; 16, 8, 1; 16, 6, 7; 17, 7, 7; 16, 10, 3. So in recent years this study programme has been attracting the majority of the state funding assigned to the Faculty of Informatics. The numbers admitted and graduating in the years 2011, 2012, 2013 were 9,8; 9,6; 13,7.

The reasons for drop outs have been analysed. Of the 11 students excluded in the period 2011-2015, 2 were excluded for non-performance and 9 for personal reasons, such as gaining an attractive job offer. To the credit of staff, steps are taken to try to avoid drop-out, e.g. arranging intensive teaching of certain subjects, devising personalized study plans.

In the view of the review panel the admissions requirements cover a very wide spectrum of achievement and represents a challenge for taking the students forward together. Although the student numbers are relatively low the considerable effort has been made with respect to the marketing of the study programme. A marketing plan has been devised in conjunction with the Marketing and Communication Office and this includes attention to the web site as well as entries in the book 'Study at Vytautas Magnus University'. In addition, Faculty staff attend study fairs; open days are organized by the Faculty, and the College sector is addressed.

The precise admissions requirements can be considered to be well-founded, but they are challenging to staff. In the view of the review panel the numbers of applicants and admitted students is disappointingly low.

Teaching and learning in the study programme is governed by the document General Requirements for Master Degree programmes from the Ministry of Education and Science and by institutional documents covering study regulations, teaching quality assurance, rules for forming an individual study programme and preparation for the final thesis.

The study programme is organized on the basis of 30 credits per semester; in the first three semesters there are 5 classes each attracting 6 credits. Study subjects typically involve 45 hrs of lectures, 15 hrs of seminar or laboratory work and 15 hrs are allocated to online group activity or consultation using the Internet. A semester is viewed as lasting 20 weeks, a study week is seen as involving 5 working days and 40 student work hrs. Giving a total of 800 hrs per semester. As a result of questioning during their visit, the review panel concluded that student did appear to be spending roughly the right amount of time on their studies, taking into account both the formal class time and the independent study time. While there were instances of good practice, the review panel would recommend that *all* staff produce for students material from which they can learn and benefit.

In the view of the review panel, the organization of the study plan is of a high quality and sufficient for the achievement of the learning outcomes. However, when staff were asked by the review panel about the study programme, they would mention modern topics of importance such as data science and the wish to produce graduates who had expertise in such areas. When student were asked about why they entered the study programme, they emphasized the attractiveness of machine learning. In the view of the review panel, there would be merit in reconciling these views.

Skills for carrying out research activity are developed in the research classes and students are encouraged to engage with research endeavours. There were 18 student-teacher publications between 2011 and 2015 at the IT Doctor and Master Student Research Work conference organized annually involving Vytautas Magnus University, Vilnius University and Kaunas University of Technology. Students have also participated in research projects in the Department, e.g. those funded by the EU and involving the Lithuanian language.

The Faculty has Erasmus agreements with some 28 European universities. These are in countries such as Finland, Germany, Greece, Italy, Latvia, Spain, Turkey, UK and USA. On average each year some 3-4 students and 32% of teaching staff engage in Erasmus or other mobility activity. The number of visitors to the study programme has been 4 in 2011, 6 in 2012, 5 in 2013, 4 in

2014 and 7 in 2015 again from a similar range of countries. In the view of the review panel this is impressive but it would have been desirable to see more joint publications in high quality journals emerging.

It is the intention that ample support is provided for students and informal discussion between staff and students is encouraged. Information related to the study programme (such as timetables, regulations, mobility opportunities, etc) is available on the FirstClass intranet system. The Moodle system is used for hosting teaching materials. Every full-time teacher spends at least 20 hrs per semester on face-to-face consultation with students. But Skype, e-mail and discussion forums are also available.

Career planning issues are dealt with by the Office of Student Affairs. Seminars are organized and at least once per year face-to-face meetings are organized with alumni. There are also agreements in place with certain social partners committing them to highlight career opportunities for students.

The Office of Students Affairs takes care of social support such as allocating students to dormitory accommodation, providing certain scholarships and subsidies for living. Around 65% of interested students from the Faculty benefit from this. Stimulating scholarships are available to the better students, these being based on exam performance. There is accommodation for disabled students as well as access for all to certain medical facilities.

Criterion-based assessment takes place using a 10 point scale; the lowest passing mark is 5. The final mark for a study subject is typically composed of a mid-term exam mark counting between 15%-35%, practical work and other intermediate assessments counting 15% - 35%, and a final exam mark counting 50%; mid-term exams and final exams are in written form. Results have to be available to students within 5 working days, and feedback is provided to students. Students may appeal against assessments and can request the Dean to undertake a review of the assessment.

The review panel noted that there was typically no requirement to pass the final examination and had concerns about the possibility of students gaining a pass largely on the basis of the first two components. There was insufficient mention of quality control of assessment, e.g. double marking or refereeing of examination papers to give greater confidence in quality issues.

The main work on the final project takes place in the fourth semester; however students are encouraged to start work as early as the first semester when they will select a topic. The latter is approved by the Department. There are certain requirements of the thesis and these and an associated schedule are available to students on the Faculty intranet. A Qualification Commission is formed by the Dean to assess the final theses. The chair of the Commission is recruited from another Lithuanian science and study organization and a representative of the social partners is also present. Minutes of the meetings of the Qualification Commission are recorded. Inputs to the Commission's deliberations include: a report from the student's supervisor; a report from a reviewer who has been assigned by the Department; the student makes a public defense of their work before the Commission. Each member of the Commission gives an independent mark and the average of these is awarded to the student. In the case of conflicts, the chair makes the final decision. A failing mark means that the student has to undertake a new project. In the view of the review panel these arrangements seemed entirely reasonable.

In 2009 the University entered into an agreement with Kaunas Labour Exchange on data collection regarding graduate placements. Data collected suggests that graduates from this study programme do not have difficulty gaining employment. They tend to gain employment as specialists, analysts, consultants, designers, project managers, managers in companies. The statistics suggest that 80% of graduates had jobs after 24 months but 75% seem to have been working prior to the start of their Masters studies.

It is noteworthy that in 2014 the magazine "Veidas" identified the Informatics faculty and its study programmes as top amongst Lithuanian universities.

2.6. Programme management

The administrative units involved in the management of the study programme include: the Applied Informatics Study Programme Committee, the Department of Systems Analysis, the Dean of the Faculty of Informatics and the Faculty Board. The Applied Informatics Study Programme Committee is the main unit involved in ensuring the health and currency of the study programme. It organizes changes and takes care of quality assessment. Changes to the programme involve the Dean, the Faculty Board and the University Academic Commission of the Physical Sciences.

The Applied Informatics Study Programme Committee and the department undertake a detailed review of the study programme at least once every three years. In this process, staff, students and social partners are encouraged to give feedback to the Applied Informatics Study Programme committee. The conclusions are presented to the Dean, the Faculty Board and the University Academic Commission of the Physical Sciences. In the view of the SKVC review team this is very good practice, especially in view of the rapid technological advances.

Following analysis of the findings, the Applied Informatics Study Programme Committee devises improvement plans and implementation is discussed with the Head of Department, the faculty Dean and the Faculty Board. There is a twice yearly check on progress of the implementation.

The review team was satisfied that responsibility for decisions and the monitoring of implementation are clearly allocated.

The internal quality assurance measures are regulated by internal document that include the VMU Statute, VMU Study Regulations and orders of the Rector and Vice-Rector. They rely on extensive surveys:

- Each semester students are invited to be involved in a survey for each study subject; results are summarised and sent by the Office of Academic Affairs to the Department; teachers have access to this information
- Each year the Office of Academic Affairs carries out a survey on the study programme as a whole to identify strengths and weaknesses and to identify areas for improvement are carried out 6 months and one year after graduation. From such a survey carried out in May 2015, graduating students scored 8.60 out of 10 for the quality of the programme but 7.40 out of 10 for practical skills
- Feedback from alumni and social partners is carried out during face-to-face meetings which happen at least twice per year as well as via online surveys.

So there is input from stakeholders to decision making about the study programme and that is documented in meetings of the Study Programme Committee. However, from questioning at meetings and from scrutinising Study Programme Committee papers during their visit, the

review panel had some concerns: the numbers of students completing questionnaires was 25% or even less; the students did not know who their student representative was; the social partners did not know the identity of their Study Programme Committee representative; the concept of quality control over assessment did not feature. In fact the student representative on the Study Programme Committee was a doctoral student; the review panel felt that it would be far more appropriate to have a student representative from this Masters student body. As far as feedback on courses was concerned, students spoke of a relaxed atmosphere whereby they could provide feedback in the small class settings.

At the meeting between the review panel and social partners, a number of comments were made: on this Masters study programme greater attention should be paid to analytic skills, and to the concept of process from software engineering as well as presentation skills and team building. It was also clear that all social partners employed agile methods, and yet there was insufficient attention to agile methods in the study programme.

Strengths of the Programme

- The admissions requirements allowed students who did not have a first degree in Informatics to join the programme and they had managed to make good progress.
- The alumni and the social partners spoke positively about the study programme and the graduates were highly valued in employment.
- There was a broad curriculum with study paths in data analysis and business informatics.
- The recommendations from the previous SKVC assessment have been taken seriously, and improvements have been made.
- The liberal arts orientation of the institution was appreciated by students and they were exploiting it to their advantage.
- Although many students were employed, the staff were seen to be cooperative and approachable and made allowances for the difficult circumstances; this was greatly appreciated by students.
- The informal atmosphere and the way in which students were treated was attractive to the students (despite the fact that they were often employed). The treatment of students was described as, not personalized, but individualized and students appreciated this.

Areas for improvement in the Programme

- Although generally the staff were producing material that was useful and attractive to students, there were exceptions (one producing no material at all for students and they other producing handwritten notes).

- Staff were having difficulties in gaining funds to help them with continuing professional development.
- Almost all students were employed making the situation challenging for the teachers.
- The student representative on the Study Programme Committee was unknown to the students whom the review panel met.
- There was excessive variation in the quality of the Master's theses.
- The representative of the social partners on the Study Programme Committee was unknown to the social partners whom the review panel met.
- The numbers of students on the study programme are disappointingly low.

III. RECOMMENDATIONS

1. The institution should give appropriate recognition to high quality internationally recognized publications and it should provide appropriate encouragement to staff to become engaged with the international community in producing such publications.
2. Review the learning outcomes associated with the study programme to make them more succinct (and reduce the number from 42 and remove overlap). Ensure that, since students tend to choose their own routes through the set of modules, the full set of learning outcomes continues to be met.
3. Encourage current and prospective university teachers to acquire degrees in leading foreign universities.
4. Introduce attractive and effective sabbatical possibilities for full-time teachers.
5. Put more emphasis on publishing in high-level international journals and proceedings.
6. Staff should exploit the world of MOOCs to help, at least in part, with their continuing professional self development.
7. Continue to strive to attract more students to the study programme, keeping the quality of applicants high.
8. Arrange that the student representative on the Study Programme Committee comes from the student body on this Masters programme and represents student views.
9. As there are no comfortable co-working places for students, faculty should consider establishing at least a few such places with no access restrictions. Moreover, there should be more communication about possibilities to use existing facilities; the process should be clear and well defined.
10. Even though VMU has access to various databases, students and lecturers have outlined that a wider range of different databases should be considered and access to those databases should be provided to them.
11. Update the curriculum to strengthen the Masters dimension and take students to the frontiers of developments in specified areas. One aspect of this is that greater attention should be given to the use of agile methods for software development since this was now the most popular paradigm being currently employed in industry.
12. Both staff and students would benefit from easy exposure to internally regarded top journals and literature, as embodied in, for instance the ACM digital library and the IEEE digital library.

13. Consideration should be given to providing evidence of attention to the quality of assessment so that external scrutineers can be convinced that this is being managed carefully and consistently. In this process there should be disincentives for setting questions that relied purely on memory work, for multiple choice questions, and for the reuse of questions with greater attention being given to questions that involved problem solving.

IV. SUMMARY

This second cycle study programme in Applied Information is offered by the Department of Systems Analysis in the Faculty of Informatics at Vytautas Magnus University. The study programme began in 1997, and had been accredited by SKVC in 2013 for a 3-year period.

There were three main aims for the study programme: analyzing big data through the application of data mining techniques and methods from the general area of analytics; creating formal models and / or simulations of complex systems and business processes as well as designing, deploying and maintaining related systems; performing research and development in an industrial or an academic setting, this to be seen as possible preparation for entry to a doctoral programme in Lithuania or abroad.

The admissions criteria allowed students who did not have a background in Informatics to gain admission provided certain criteria were satisfied. This had been used to good effect by a student who had a background in computational linguistics and another who had completed the bridging course; both had found the process to be challenging but they were now making good progress on the programme.

The curriculum was relatively flexible and students were allowed to pick their route through the modules on offer. Not all students followed the routes suggested by the department; typically the students were employed and they had developed clear views about what was best for their future career paths. Machine learning, for instance, was popular with students, and they did not mention data science; in the view of the review panel, steps should be taken to reconcile the views of staff about the study programme and the views of students regarding the attraction of machine learning.

The social partners whom the review panel met did mention the current popularity of agile methods; although that was mentioned in the study programme curriculum, it was given only sparse attention.

In each of the 4 semesters, the basic study programme involves 800 hrs of student time; successful completion attracts 30 credits. Despite the fact that almost all students were in

employment, the students were spending roughly the right amount of time on their studies, taking account of both formal classes and independent study.

The social partners and the alumni greatly valued this study programme and the graduates were seen to be in demand by in employment. Graduates are expected to be equipped to work in the public sector, in organisations or in the business sector as specialists, analysts, consultants, designers, project managers, or managers in companies. But in fact, most of them were already employed, such was the demand for their skills.

V. GENERAL ASSESSMENT

The study programme Applied Informatics (state code – 621I13003) at Vytautas Magnus University 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	3
2.	Curriculum design	3
3.	Teaching staff	3
4.	Facilities and learning resources	3
5.	Study process and students' performance assessment	3
6.	Programme management	3
	Total:	18

*1 (unsatisfactory) - there are essential shortcomings that must be eliminated;

2 (satisfactory) - meets the established minimum requirements, needs improvement;

3 (good) - the field develops systematically, has distinctive features;

4 (very good) - the field is exceptionally good.

Grupės vadovas: Team leader:	Prof. Dr. Andrew McGettrick
Grupės nariai: Team members:	Prof. Dr. Peeter Normak
	Prof. Dr. Jukka Paakki
	Mr. Tomas Urbonas
	Mr. Žygimantas Benetis

**VYTAUTO DIDŽIOJO UNIVERSITETO ANTROSIOS PAKOPOS STUDIJŲ
PROGRAMOS *TAIKOMOJI INFORMATIKA* (VALSTYBINIS KODAS – 621I13003)
2016-05-23 EKSPERTINIO VERTINIMO IŠVADŲ NR. SV4-113-4 IŠRAŠAS**

<...>

VI. APIBENDRINAMASIS ĮVERTINIMAS

Vytauto Didžiojo universiteto studijų programa *Taikomoji informatika* (valstybinis kodas – 621I13003) vertinama **teigiamai**.

Eil. Nr.	Vertinimo sritis	Srities įvertinimas, balais*
1.	Programos tikslai ir numatomi studijų rezultatai	3
2.	Programos sandara	3
3.	Personalas	3
4.	Materialieji ištekliai	3
5.	Studijų eiga ir jos vertinimas	3
6.	Programos vadyba	3
	Iš viso:	18

* 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

Šią antrosios pakopos Taikomosios informatikos studijų programą vykdo Vytauto Didžiojo universiteto Informatikos fakulteto Sistemų analizės katedra. Studijų programa buvo pradėta vykdyti 1997 m. ir ją 2013 m. SKVC akreditavo 3 metų laikotarpiui.

Studijų programa kėlė tris pagrindinius tikslus: atlikti didelės apimties duomenų analizę, taikant tinkamus duomenų gavybos metodus bei įrankius, kurti, vystyti ir diegti duomenų analitikos sprendimus; formalizuoti ir modeliuoti sudėtingas sistemas ir verslo procesus, kurti, diegti ir palaikyti adaptyvias ir intelektualias sistemas; savarankiškai vykdyti mokslinius tiriamuosius darbus pramoninėje ir akademinėje aplinkoje, tęsti studijas doktorantūroje Lietuvos ir užsienio universitetuose bei mokslo įstaigose.

Priėmimo kriterijai sudaro galimybes informatikos studijų nebaigusiams studentams įstoti į šią studijų programą, jei tenkinami tam tikri kriterijai. Tuo sėkmingai pasinaudojo studentas, turintis kompiuterinės lingvistikos pagrindus, ir dar vienas studentas, baigęs išlyginamąsias studijas. Abiem studentams tai kėlė nemažai iššūkių, bet dabar jie daro pažangą studijuodami šią programą.

Studijų turinys buvo gana lankstus ir studentams buvo leista patiems pasirinkti modulius. Ne visi studentai rinkosi tuos modulius, kuriuos siūlė katedra. Paprastai studentai jau dirbo ir turėjo aiškia viziją, ko labiausiai reikės jų būsimoje karjeroje. Pavyzdžiui, tarp studentų buvo populiarius mašininis mokymasis, bet jie neminėjo duomenų mokslo. Vertinimo grupės manymu, reikėtų suderinti personalo ir studentų požiūrius į studijų programą dėl mašininio mokymosi patrauklumo.

Socialiniai partneriai, su kuriais buvo susitikusi vertinimo grupė, neminėjo, kad šiuo metu populiarius aktyvūs metodai; nors tokie metodai buvo paminėti studijų programos turinyje, jiems buvo skiriamas tik nedidelis dėmesys.

Kiekvienam iš 4 pagrindinės studijų programos semestrų reikia skirti 800 valandų studentų laiko, norint sėkmingai baigti semestrą, reikia surinkti 30 kreditų. Nepaisant to, kad beveik visi studentai dirbo, apytiksliai tiek laiko jie ir skyrė studijoms, įskaitant oficialias paskaitas ir savarankišką darbą.

Socialiniai partneriai ir buvę studentai itin vertina šią studijų programą, o absolventų paklausa darbo rinkoje – didelė. Absolventai turi būti pasirengę dirbti viešajame sektoriuje, organizacijose ar verslo sektoriuje specialistais, analitikais, konsultantais, projektuotojais, projektų ar bendrovių vadovais. Iš tiesų, dauguma studentų jau dirba, nes jų gebėjimų paklausa rinkoje didelė.

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III. REKOMENDACIJOS

1. Institucija turėtų atitinkamai pripažinti aukštos kokybės tarptautiniu lygiu pripažįstamas publikacijas ir turėtų paskatinti personalą įsitraukti į tarptautinę bendruomenę skelbiant tokio pobūdžio publikacijas.
2. Peržiūrėti studijų programos studijų rezultatus ir juos sutrumpinti (kad būtų mažiau nei 42, pašalinti pasikartojimus). Nors studentai ir yra linkę rinktis savus modulius, užtikrinti, kad būtų įgyvendintas visas studijų rezultatų rinkinys.
3. Skatinti esamus ir būsimus universiteto dėstytojus įgyti laipsnius pirmaujančiuose užsienio universitetuose.
4. Įvesti patrauklias ir veiksmingas mokslinių atostogų galimybes visu etatu dirbantiems dėstytojams.
5. Labiau skatinti skelbti publikacijas aukšto lygio tarptautiniuose žurnaluose ir leidiniuose.
6. Personalas turėtų išnaudoti MOOC, kad jie bent iš dalies padėtų jiems tobulėti.
7. Toliau stengtis į studijų programą pritraukti daugiau studentų, drauge išlaikant aukštą kandidatų lygį.
8. Siekti, kad studentų atstovas Studijų programos komitete būtų iš šios magistro programos studentų organizacijos ir atstovautų studentams.
9. Kadangi studentai neturi patogios erdvės bendram darbui, fakultetas turėtų sukurti bent kelias tokias erdves, į kurias būtų galima patekti be apribojimų. Be to, reikėtų plačiau informuoti apie galimybes naudotis esamomis patalpomis, procesas turėtų būti aiškus ir apibrėžtas.
10. Nors VDU turi prieigą prie įvairių duomenų bazių, studentai ir dėstytojai nurodė, kad reikėtų apsvarstyti galimybę pasirinkti daugiau duomenų bazių ir jiems suteikti prieigą prie jų.
11. Atnaujinti programos turinį, kad būtų sustiprintas magistro laipsnio aspektas, o studentams suteikta galimybė tobulėti specifinėse srityse. T. y. reikėtų skirti daugiau dėmesio aktyvių metodų naudojimui programinės įrangos tobulinimo srityje, kadangi šiuo metu tai yra pati populiariausia ūkio sektoriuje naudojama paradigma.
12. Tiek personalui, tiek studentams būtų naudinga turėti prieigą prie populiariausių vidinių žurnalų bei literatūros, pavyzdžiui, ACM skaitmeninės bibliotekos ir IEEE skaitmeninės bibliotekos.
13. Vertėtų skirti ypatingą dėmesį įrodymams, kad rūpinamasi vertinimo kokybe, tam, kad išorės vertintojai galėtų įsitikinti, jog ši sritis valdoma atsakingai ir nuosekliai. Šis procesas neturėtų skatinti kelti klausimų, atsakymus į kuriuos galima išmokti ar pasirinkti

atsakymą iš kelių variantų, bet skatintų pateikti tokius klausimus, į kuriuos atsakant reikėtų pritaikyti problemų sprendimo įgūdžius.

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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)