



STUDIJŲ KOKYBĖS VERTINIMO CENTRAS

VILNIAUS GEDIMINO TECHNIKOS UNIVERSITETAS
STUDIJŲ PROGRAMOS
AVIACINĖ ELEKTRONIKA (VALSTYBINIS KODAS –
621H43002, 62401T208)
VERTINIMO IŠVADOS

EVALUATION REPORT
OF AVIONICS (STATE CODE – 621H43002, 62401T208)
STUDY PROGRAMME
AT VILNIUS GEDIMINAS TECHNICAL UNIVERSITY

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Išvados parengtos anglų kalba
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DUOMENYS APIE ĮVERTINTĄ PROGRAMĄ

Studijų programos pavadinimas	Aviacinė elektronika
Valstybinis kodas	621H43002, 62401T208
Studijų sritis	technologijos mokslai
Studijų kryptis	aeronautikos inžinerija
Studijų programos rūšis	universitetinės studijos
Studijų pakopa	antroji
Studijų forma (trukmė metais)	nuolatinės (2)
Studijų programos apimtis kreditais	112
Suteikiamas laipsnis ir (ar) profesinė kvalifikacija	aeronautikos inžinerijos magistras
Studijų programos įregistravimo data	2002 m. birželio 14 d.

INFORMATION ON ASSESSED STUDY PROGRAMME

Name of the study programme	Avionics
State code	621H43002, 62401T208
Study area	Technological Sciences
Study field	aeronautical Engineering
Kind of the study programme	university studies
Level of studies	second
Study mode (length in years)	full-time (2)
Scope of the study programme in national credits	112
Degree and (or) professional qualifications awarded	Master of Aeronautical Engineering
Date of registration of the study programme	14 June, 2002

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The Centre for Quality Assessment in Higher Education

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I. INTRODUCTION

The evaluation report is based on the self-assessment report (SAR) prepared by the Assoc. Prof. Algimantas Jakučionis, Head of the Department of Avionics at the Antanas Gustaitis Aviation Institute (AGAI) together with his team. A previous evaluation of study programme was carried out on 8th of February, 2001 by a group of experts formed by the Centre for Quality Assessment in Higher Education. The members of the group were Prof. habil. Dr. V. Laurutis (chairman), Prof. habil. dr. S. Gečys, Prof. habil. Dr. A. Lukoševičius, and doc. dr. K. Maceika. The recommendations of the 2001 review are summarized in appendix 5 of the SAR. Since 2010 the programme is assigned to the field of Aeronautical Engineering and graduates of this programme will receive a Master in Aeronautical Engineering.

The onsite visit took place according to the following agenda on Nov. 11, 2011.

Friday, 11 November	
Visit at Vilnius Gediminas Technical University Avionics (MA programme)	
09.30 – 11.00	Visiting auditoriums, libraries, other facilities (studios, teaching spaces, computer services, etc.)
11.00 – 11.15	<i>Break</i>
11.15 – 11.45	Meeting with faculty administration staff
11.45 – 12.45	Meeting with staff responsible for preparation of SAR
12.45 – 14.00	<i>Lunch</i>
14.00 – 14.45	Meeting with teaching staff
14.45 – 15.30	Meeting with students
15.30 – 16.00	Familiarizing with students' course and final papers (thesis), examination material
16.00 – 16.30	Meeting with alumni
16.30 – 17.00	Meeting with employers
17.00 – 17.15	Experts private discussion and finalisation of the visit
17.15 – 17.30	Introduction of general remarks of the visit to the university

The evaluation report and the recommendations is the consolidated result defined by the entire evaluation team.

II. PROGRAMME ANALYSIS

1. Programme aims and learning outcomes

Preparation of higher education specialists in electronics engineering has crucial importance for the Lithuanian new industry. During the next decade the need for highly qualified electronics engineers duplicates probably in 2020. But the need of specialists in avionics, which is a very specific branch of electronics engineering, the situation differs strongly from the general development curve. Namely, the needs for extremely highly qualified engineers in avionics does not need to rapid increase in such a small country like Lithuania not having internationally recognized aviation and space industry. Therefore the quality demands for such study programme should be very highly specified and carefully followed, and the in-depth knowledge and creative thinking is required from the graduates. An international orientation of the syllabus is mandatory in order to satisfy the future requirements of specialists in the field of avionics. To close the gap between theory and practical applications requires innovative and creative thinking and well equipped laboratory base. Unfortunately the quality level of the specific study laboratories presented to the evaluation team was partly out-of-the-date and equipped with the old soviet type measurement devices and boards. Therefore, it is difficult to believe that the adequate transfer of practical knowledge could take place in all subjects under this particular study programme. The program aims and learning outcomes are based clearly on academic requirements. The public and labour market needs are unclear, because the comparable financial analysis is missing whether it has sense to keep the study program alive in Lithuania or could it be much more effectively realized (financially cheaper) preparing the need of few avionics specialists somewhere else in Europe on much higher practical training quality level. The programme aims and learning outcomes are described in a standardized way in three statements, and they seem to be in agreement with the all national legislation rules. The statements are understandable and cover almost the key topics to be expected from the Avionics MA degree. The second statement is rather long and, but still acceptable by the content. On base of SAR in brief the Avionics MA program is aimed to prepare master-degree holders, who are able to work at aviation administration, enterprises providing design and production service regarding the aviation electronic techniques. The graduates also acquire specific knowledge in the field of air law, aviation safety and understanding and skills contiguous with the field of avionics. Such an enough wide description of aims indicates to the possibility that at least two different specializations are needed. One of them is strongly dedicated to the understanding of electronics and communication design engineering, which means strong electronics engineering

base with additional specific knowledge in aircraft control, communication and navigation. And another should be oriented to management, business, control, and administration skills development, based on strong electronics and communication engineering knowledge base as well.

The program learning outcomes are grouped into the four groups, knowledge, understanding, special skills, and general abilities. Within the group understanding the phrases “ability of understand” and “understanding” has been used. Some doubts rise how these phrases could be evaluated by the readers. In general the learning outcomes are clear, but cover only a part of the program general aims. Therefore the program aims and study outcomes only partly coincide with each other.

Looking the content of the specialization courses like Aviation Navigation Equipment, Satellite Navigation Methods and Systems, Measurement of Electronic Aviation Systems, Aviation Computer Systems, Radar Theory and On-board and ground Systems, etc., the term aviation or avionics seems to be very often simply added to the course name or content, because in reality the course generally is rather traditional electronics engineering course with minor orientations or focuses to aviation applications. So, the whole program looks pretty much like a conceptual overview for electronics systems and to these systems tailored specific aircraft or space applications, and therefore did not give the assuredness to the evaluation team about the acceptable quality level to the whole avionics master program.

Weakness

- The present study programme is rather a conceptual overview of electronic systems associated with the aircraft industry;
- Programme aims only partly coincide with the study outcome.

2. Curriculum design

The avionics study programme comprises 112 ECTS credits with the duration of two year study cycle. The “Avionics” programme executed in the period 2006-2010 was assigned to the area of Technological sciences, field of Electronic Engineering and, after completion of this programme the graduates received a Master degree in Electronic Engineering. After 2010 the awarded degree will be the Master degree in Aeronautical Engineering (H400). The specialisation study

programme starts already from the first semester with a total of 18 credits. The volume of optional courses is 6 ECTS and the degree theses add 22 ECTS credits. According to SAR the study load is in average 35.5 hours weekly.

In previous point titled “**Programme aims and learning outcomes**” we recognise that only one specialization is today available for the curriculum, and there is no evidence whether there have been any discussions about possible opening of the second specialization for the curriculum dedicated to the management, business, control, and administration orientation in the near future. One reason, why it is so as it is concludes clearly from the study program itself: only two “non-electronic/non-communication” oriented courses are available today, namely “Aviation Safety” and “Air Law” courses, which are prepared and included into this curriculum. The second, but more serious reason concludes clearly from the availability of competent staff. The teaching methods comprise different methods e. g., lectures and verbal instruction, demonstration, testing, project work so that the students will gain the necessary knowledge of a course, acquire practical skills, will be able to summarize and analyse the results of the studies, and will learn to use acquired knowledge and skills creatively. Unfortunately there was given no clear evidence about the content of different thesis works in 2-nd and 3-rd semesters. The quality of final degree theses presented to the evaluation team was acceptable, but the theses can be divided into two categories. The so called design oriented engineering theses have the content, which was as traditional as possible and they were at the comparable level with other theses from the faculty of Electronics (design of concrete electronics devices or test and measurement procedures oriented to avionics). The rest of the theses were essay type compositions, and therefore difficult to recognise as engineering oriented master level theses. Due to the fact that international cooperation during the development and up-grading of the study program has been on low level (statement bases on data from SAR and on conclusions of onsite discussions with the staff), it could be stated that this study program is more or less the polytechnic level study programme rather than university level master programme. Such an impression is supported by the fact that the international and domestic research activities practiced by the staff are non-existent.

The quality level of the specific study laboratories presented to the evaluation team was partly out-of-the-date and equipped with the old soviet type measurement devices and boards. On base of discussions with students it came out that some these laboratory activities were replaced by the excursions to airport installations.

Strength

- The study programme design meets legal requirements;
- The study subjects and modules are spread evenly.

Weakness

- Self-evaluation report missed the key weakness in the operation of this study programme e.g. quality of facilities, access to up-to-date avionic systems etc.;
- No clear evidence is presented that the programme reflects the latest achievements in science and technologies in avionics;
- Laboratory works are replaced with the excursions to airport installations.

3. Staff

In the study year 2010/11 there was 5 full time and 3 part time teachers active in the master study programme. This results in a ratio of university teachers to students about 0.53, which is an excellent result for possible high quality tuition of the master students. Unfortunately the staff age structure reflects a catastrophic mixture between very experienced teachers and young staff members. The four of five full time teachers are 67 years old or older. On base of discussions with the staff the evaluation team become to be informed that there are only two PhD students available as a substitute for the teaching activities in the near future. So the continues age profile of the teaching staff is missing, and also it turned out that the staff development plan is missing in the department. The qualification of the staff members is well documented, but the required qualification of the professors and other teaching staff members seems to be outdated. The international R&D activities are very weak and the staff international exchange rate is extremely low. The total number of publications is low and these few publications mentioned in CV-s of some of the professors have all domestic character. From the SAR and during the onsite visit no clear explanation was given whether all lecturers have raised their qualifications at least once in a 5-year tenure doing internships of 2 to 6 months at companies or scientific institutions. The actual number of PhD students is low.

Strength

- The number of the teaching staff is proportioned to the present number of students to ensure learning outcomes.

Weakness

- No provision for developing staff competences;
- No evidence for the future human resource planning;
- No significant research activities of the teaching staff;
- No internationalization by the teaching staff and in study programme;
- The actual number of PhD students is low.

4. Facilities and learning resources

During the onsite visit also the specific laboratories for Avionics department and the department's library was presented to the evaluation team. The impression of the evaluation team about the quality level of students teaching in a certain training laboratories became dejected. All the laboratory devices were from the soviet time and strongly out-of-date (like a museum). The only modern device was the flight simulator for small airplanes, but this device does not support directly the MA study programme of Avionics. Strong modernization of the teaching-training environment (student labs) is needed. The premises for specific research activities with high quality equipment were missing fully.

The evaluation team was told that since 2008 a project to modernize the laboratories started but no visible improvement was done with this respect. Also the students informed us that part of avionics studies take place at the premises of the Faculty of Electronics. From the SAR of the study program titled Electronics Engineering (VGTU Electronics Faculty) we recognize that the faculty has enough classrooms, laboratories and other premises available. The classrooms intended for giving lectures are equipped with stationary multimedia equipment. The services of VGTU library, as well as the reading room of the Faculty of Electronics are available for all master students and enough well equipped. Therefore it was difficult to understand the wish to keep the studies inside the environment of the Institute, where the equipment quality level of study laboratories, not speaking about the research facilities, is strongly out-dated.

During the onsite visit the department's library has been visited as well. The library was very small and equipped on average level (no computerized workplaces for students were available, only the quiet reading room for preparation and working through of the books or journals at place). Partly the books were on a high international quality level, but a lot of out-of-date Russian language literature was still available. The list of the scientific journals is deficient. On base of SAR and from the onsite visit we came to the conclusion that from the

important and obligatory high quality scientific journals like IEEE transactions on aerospace and electronics, or AIAA journal, etc., the availability of these journals is extremely accidental (e.g. from the journal IEEE transactions on aerospace and electronics only the following exemplars were available: 2009, Nr. 4, and 2010 Nr. 1).

Most of the referenced texts are written in Lithuanian and also all presented lecture notes were in Lithuanian.

Strength

- Almost all specific courses in study programme Avionics have adequate and accessible domestic textbooks or instructions.

Weakness

- Laboratory equipment is completely outdated;
- The list of the scientific journals is deficient, and the availability of these journals is extremely accidental;
- Arrangements for students' practices are conservative, and should be organised better;
- The permanent access to the computer work-stations is under-developed; and therefore should be improved and provided for all students;
- Self-evaluation report misses the key weakness in the operation of this study programme e.g. quality of facilities, access to up-to-date avionic systems etc.

5. Study process and student assessment

The master student admission is done by the University Admission Committee. Applicants with the highest scores are enrolled for the planned number of places. From the SAR the number of take-in students for the study programme Avionics over two last years has been relatively low (2009/2010 9 students, and 2010/2011 8 students). In the same time the success rate has significantly been improved during the last few years. The master program is full-time studies (2 years lasting). However, the majority of master students are full-time working at companies to support themselves. According to the teaching staff and the students, the lectures are held in the evenings, that working students could attend the lectures. In such case, the working students have to manage the extreme workload per week. As the result, the working students does not devote sufficient amount of time for studies. The solution could be to extend the master program

for the full-time working students to 3 years. There is adequate information about the study programme *Avionics* available e.g. on the web site of VGTU, at the University admission commission. VGTU regularly organizes open-door days, involving the head of department. During these meetings the students can find out their concerns regarding study programme, modules and study processes.

The social side of the studies looks like as:

- Social grant encompasses 3 BSI (basic social benefits) (1 BSI = 130 Lt). This scholarship is allocated for the students who are from poor families or live alone and are entitled to the financial social support.
- Incentive memorial scholarships are awarded for good study results
- One-time scholarships are awarded for the active cultural, sports and other social activities for the interests of the university and faculty. The maximum size of the one-time scholarships is 3 to BSI.

The assessment of students' knowledge is in agreement with the official legislation. The assessment formula is provided in each module. Students who did not accomplish the term paper or project are not allowed to enter for examination. After the examination students have an opportunity to get acquainted with their assessment sheets, teacher's remarks and the assessment. This provides conditions and opportunities for the unbiased assessment of students' knowledge. Examination results are published in the University information system "Medeinė". The lack of laboratories and up-to-date laboratory equipment cannot ensure the development of practical skills. The students and alumni informed that they do not do the laboratory works. The excursions to the airport cannot replace the practical work for engineering students.

The general requirements for the Master's thesis and the approval commission are in agreement with the official legal requirements. The students oblige to publish their research results in scientific journal and present in students' scientific conference organized by VGTU before they are defending the master thesis. The thesis must be based on independent analytical or applied research, knowledge application or developed as a project, revealing competencies that correspond with the programme aims. The defense commission of final thesis is conservative and may lack the benchmarking ability due to non-existing mobility of teaching staff. The results of final work defence are discussed with the committee chairmen in the department meetings. After such discussions the learning outcomes of separate study subjects are reviewed with the external experts. However, due to the poor participation in the research of

teaching staff the students have low motivation to choose the PhD studies after graduation. At the time of the visit there were 2 PhD students at the Institute of Avionics.

The career days are organized by VGTU with a purpose to attract international and domestic companies to cooperate with students, to advise them, to introduce students to career opportunities in their companies. A separate unit – VGTU career direction, has a goal to establish the cooperation between university and business, government agencies, consultations regarding participation in programme, professional training, retraining and graduate employment. The employers are satisfied with the competence of graduated students. The employers outlined good theoretical understanding in the field of avionics of graduated students. However, the employers agree that graduated students' lack of practical skills.

All the previously named activities show the good quality of the university generally. On base of onsite meetings with the staff and leadership of the department they recognise the availability of such services from the university side and they affirmed the participation in one or other way in all events organised or governed by the University for the study process or assessment procedure.

The internalization of the program is out of scope. The Institute offers the Socrates/Erasmus exchange program with the University of Zilina and the Technical University of Brno. However, no students have used this opportunity. The reasons are (1) the low motivation of students to gain more practice abroad, (2) not sufficient knowledge of foreign language, and (3) students are working part or full time jobs during their MA study period. The MA students expressed the small interest to the participation in the exchange programs. The teaching staff and program administration do not tend to encourage students for mobility programs.

For conclusions, the students are very dedicated to the field of studies driven by the passion for the airplanes. The students are motivated to study the program and agree that program gives the advantages if compare to other EE study programs in Lithuania. However, the alumni agreed, that study program should decrease the work-practice period (5 years), which is necessary to get the certificate for individual work in Avionics industry, as they are specialized in the field of Avionics. However, the study program is very specific and isolated in the context of Lithuania; nevertheless the benchmarking of the program learning outcomes in international level does not exist.

Strength

- There are dedicated students (in a spite of the limitations due to budget the staff is able to create motivated students), and the alumni and the employers seem to be satisfied with study program;
- The assessment system of students' performance adequate and publicly available;
- Professional activities of the majority of graduates meet the programme providers' expectations;

Weakness

- Although the students have opportunities to participate in student mobility programme (e.g. ERASMUS), little use is made of these opportunities;
- Although VGTU ensures an adequate level of academic and social support the number of students has notably decreased in the past few years.

6. Programme management

The Study Committee is responsible for the structure of the programme and its conformity to the 2nd study cycle programme requirements. The study programme “Avionics” was administrated until 2010 by the Programme Committee of four members J. Stankūnas (Director of Antanas Gustaitis Aviation Institute), D. Rudinskas (AGAI Deputy Director for study issues), K. Maceika (Head of the Department of Aviation Technologies), and Algimantas Jakučionis (Head of the Department of Avionics). Algimantas Jakučionis is the factual coordinator of the programme.

The learning outcomes of a study programme were reviewed and updated in 2008 and 2011. In 2009 after the enactment of the new list of “Study areas, fields and qualifications” for higher education the suggestion of the previous assessment expert group to assign this study programme to the field of *aviation technologies* was realized in 2010: “Avionics” study programme was assigned to the area of *technological sciences, field of Aeronautical engineering, branch of avionics and electrical engineering* and since 2011 the graduates of this programme will receive a *Master degree in Aeronautical engineering*.

During the discussions with the leadership of the department no clear picture was proposed about the responsibility of study committee and about the roles of teaching staff in questions of

solving the improvements of the study programme. On base of discussions with the students we recognised that for the students it is not clear how their opinion enters this process. From the other hand on base of SAR the issues of studies and the study program “Avionics” are discussed and handled by the Department of Avionics. The condition of the study program is being discussed by the AGAI authorities and representatives of the students. Unfortunately the students with whom we have spoken again were weakly informed about this mechanism too. So, we observed confusing and contradictory situation in study program management, which made difficult to understand properly the program management issues by the evaluation team.

Strength

- Information and data on the implementation of the program seems to be regularly collected and discussed.

Weakness

- Responsibilities for decisions and monitoring of the implementation of the programme are un-clearly allocated;
- Confusing and contradictory situation in study program management was observed (the information presented in SAR did not tie in with the oral information gathered by evaluation team at onsite visit), and therefore it made difficult to understand properly the program management issues by the evaluation team.

The overall major strengths and weaknesses on the study program Avionics are:

Strength

- In the frames of given budget limitations the teaching staff has been able to create motivated students;
- The alumni and the employers seem to be satisfied with the study programme.

Weakness

- Programme aims partly do not coincide with the study outcome and the present study programme is rather a conceptual overview of electronic systems associated with the aircraft industry;
- Self-evaluation report misses the key weakness in the operation of this study programme e.g. quality of facilities, access to up-to-date avionic systems etc.;
- Laboratory equipment are completely outdated, and the laboratory works are partly replaced by excursions to airport installations;

- No evidence for the future human resource planning and staff competences development activities was given;
- The research activities and the number of international contacts of the staff members, both supporting the quality of the study program is weakly developed.

III. RECOMMENDATIONS

An option to be considered by the university is that the MA programme is better positioned in the faculty of electronics to give a clear strategic future and for it to be resourced at an appropriate level (to align it with the avionics specialization in the BA study programme in that faculty). In order to facilitate this process it might be suggested to integrate the study programme into the faculty of Electronics.

IV. GENERAL ASSESSMENT

The study programme *Avionics* (state code – 621H43002, 62401T208) is given **negative** evaluation.

Study programme assessment in points by fields of assessment.

No.	Evaluation Area	Evaluation Area in Points*
1.	Programme aims and learning outcomes	1
2.	Curriculum design	2
3.	Staff	1
4.	Material resources	1
5.	Study process and assessment (student admission, study process student support, achievement assessment)	2
6.	Programme management (programme administration, internal quality assurance)	1
	Total:	8

*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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