



**RE-ACCREDITATION OF THE JOSIP JURAJ STROSSMAYER  
UNIVERSITY OF OSIJEK FACULTY OF ELECTRICAL  
ENGINEERING**

**Date of the site visit:  
26-27 March 2012**

**August, 2012**

## **COMPOSITION OF THE EXPERT PANEL**

- Prof. Dr. Angelika Bruckner-Foit, Department of Mechanical Engineering, University of Kassel, Germany (Chair)
- Prof. Dr. Ivan Aaen, Computer Science, Aalborg University, Denmark
- Prof. Dr. Dinko Begušić, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split
- Prof. Dr. Mirta Baranović, Faculty of Electrical Engineering and Computing, University of Zagreb
- Nikola Benja, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split, student

Expert panel was supported by:

- Kristina Ferrara, MBA, coordinator, Agency for Science and Higher Education
- Gordana Cukar, interpreter at site visit, Agency for Science and Higher Education

# Contents

<b><u>INTRODUCTION.....</u></b>	<b><u>4</u></b>
SHORT DESCRIPTION OF THE EVALUATED INSTITUTION.....	4
THE WORK OF THE EXPERT PANEL.....	5
<b><u>I. COMMENTS AND RECOMMENDATIONS ON THE CRITERIA FOR THE ASSESSMENT OF QUALITY OF HIGHER EDUCATION INSTITUTIONS WITHIN UNIVERSITIES .....</u></b>	<b><u>7</u></b>
1. INSTITUTIONAL MANAGEMENT AND QUALITY ASSURANCE .....	7
2. STUDY PROGRAMMES .....	8
3. STUDENTS .....	11
4. TEACHERS .....	12
5. RESEARCH AND PROFESSIONAL ACTIVITY .....	12
6. INTERNATIONAL COOPERATION AND MOBILITY .....	13
7. RESOURCES: ADMINISTRATION, SPACE, EQUIPMENT AND FINANCES .....	15
<b><u>II. SUMMARY OF COMMENTS AND RECOMMENDATIONS BASED ON VISIT AND SELF-ASSESSMENT REPORT.....</u></b>	<b><u>17</u></b>

# INTRODUCTION

## *Short description of the evaluated institution*

The Faculty of Electrical Engineering in Osijek (henceforth called Faculty) in its current form was established in 1992 and has been developing its study programmes and its research activities ever since. In the academic year 2004/2005 study programmes' curricula were re-adjusted in accordance with the Bologna Declaration (3 + 2 + 3 model) and were implemented at the Faculty of Electrical Engineering in the academic year 2005/06. The following programmes are available: University Undergraduate (Bachelor) and Graduate (Master) study programmes in Electrical Engineering and Computer Engineering, as well as professional study programmes in the same fields.

Later on postgraduate (doctoral) study programmes in Electrical Engineering were introduced with the areas of specialization in Power Engineering and Communications and Informatics, and postgraduate specialist study programmes in Power Engineering in Market Environment, Advanced Communication Technologies, and Process Computing.

In the last 33 years, the Faculty of Electrical Engineering in Osijek has grown into an institution that now has the total area of approximately 8,500 m<sup>2</sup>, including 12 lecture halls and video conference rooms, 8 computer classrooms and 20 laboratories (mainly computers). There were about 2,000 students enrolled in the academic year 2011/2012, 450 of whom are enrolled every year in the first year of university undergraduate and professional study programmes. In addition, currently more than 100 students are enrolled in the postgraduate study programmes.

Teaching activities are today conducted by 90 full-time employees, 42 of whom are appointed to scientific-teaching and teaching titles, 31 to associate titles, 7 to professional titles, and 10 junior researchers, and in co-operation with part-time teachers from other scientific institutions within the University of Osijek, from Croatia and abroad, as well as from the business sector.

Scientific and teaching activities of the Faculty of Electrical Engineering are organized through 6 Departments: Department of Core Courses, Department of Power Engineering, Department of Electromechanical Engineering, Department of Industrial Plants and Automation, Department of Communications and Department of Computer and Software Engineering, with the total of 11 chairs and 2 accredited laboratories.

## ***The work of the Expert Panel***

A panel of experts (henceforth called Panel) appointed by the Agency for Science and Higher Education in Croatia (ASHE, henceforth called Agency) visited the Faculty on March 26, 2012 and March 27, 2012.

During the site visit the Panel made a short tour through the classes, lecture halls, library etc. and held meetings with the following groups:

- Management
- the working group that worked on the Self-evaluation of the Faculty, the Management Representative for Quality Assurance and the Committee for Quality Assurance and Enhancement in Higher Education
- Vice-Dean for Education and the Vice-Dean for Application-Oriented Studies
- Teachers
- Assistants and young researchers
- Students
- Vice-Dean for Science
- Project leaders

The Panel evaluated the Faculty on the basis of the report on self-assessment, and the results of the visit. The evaluation report consists of two parts:

I. Comments and recommendations on the criteria for the assessment of quality of higher education institutions within universities:

The task of the Panel was to decide on grades for all the criteria adopted by the Agency. In some cases, there were no problems, and the Panel felt that there was no need for further investigations. In these cases the Panel adopted the general policy of putting in the grade 4. It has to be kept in mind that a closer investigation could have shifted the grade towards a grade 5 in some cases. Some of the criteria refer both to the formal process and to the results. However, sometimes the process is there, but it is just a formal one with minor impact on the outcomes. Vice versa, the system can be working very well, but the formalities of the process are not clear. In both cases, the Panel agreed on the grade 3 even though the outcomes are certainly more important than the formalities.

No comments are given to fully implemented (grade 5) processes, even though they are obviously the strong points of the Faculty. The Panel is aware of the fact that the general impression on the institution may be less positive than intended because of this non-commenting policy.

II. Summary of comments and recommendations based on visit and self-assessment report: These reflect the general impressions of the Panel and were communicated to the Faculty at the final meeting.

**The Panel is convinced that, due to the complexity of the evaluation procedure, any follow-up actions should be based on the comments and the recommendations given in this report, and not on some average grade.**

# **I. COMMENTS AND RECOMMENDATIONS ON THE CRITERIA FOR THE ASSESSMENT OF QUALITY OF HIGHER EDUCATION INSTITUTIONS WITHIN UNIVERSITIES**

## ***1. Institutional management and quality assurance***

The Faculty relies more on communication and institutional quality assurance systems than on formal procedures. Therefore, the grades on all points referring to formalization of the management and the quality assurance process are not so good. However, they obtain excellent results with very little administrative input. The Panel therefore does not think that there is actually a need for change or formalization, and consequently does not feel that there should be any additional recommendations.

*1.1. The institution conducts systematic strategic planning by which it engages its stakeholders in understanding its current position and in defining its vision, goals and strategy in line with its mission.*

There is no strategic planning on a global scale. However, this may not be the best time to define high-flying strategic goals given the economic crisis. Notwithstanding this lack of formal planning, the Faculty has a very clear understanding of its position in the region and is engaged in active dialogue with its stakeholders. As long as this fundamental understanding prevails, formal plans are not really needed.

*1.2. The institution has developed effective organizational structures and processes and has formalized them in its legal documents.*

The structures and processes are good and even excellent in parts, but there are not so many documents on that. The Panel was only able to understand the processes and their very high quality during the site visit. This is related to the fact mentioned above that the Faculty relies more on communication than on formalities.

*1.3. The institution within a university actively contributes to achieving university goals and has aligned its strategy with the university.*

There seem to be no problems. An indicator may be that the Faculty was able to allocate additional resources from the University.

*1.4. Each study program offered by the institution is aligned with its mission.*

The study programs are very good and correspond to international level.

*1.8. The institution has implemented formal mechanisms for monitoring and improvement of the research quality.*

There is a follow-up on publications and an excellent mentoring program for young researches. The grade given is related to the fact that the average research quality is moderate due to lack of equipment.

*1.9. In line with its mission, the institution has established formal rules for the highest level of ethical behaviour in its teaching and research activity.*

There are no formal rules, but some kind of mutual understanding of what are the dos and the don'ts.

*1.10. The staff and the students are acquainted with the rules for ethical behaviour.*

Some months ago a data leak occurred concerning the students' e-mail addresses which were misused for private purposes. The Panel is not convinced that all members of the Faculty are really aware of the seriousness of this incident. However, they have taken some measures against data leaks in the meantime.

## ***2. Study programmes***

The quality assurance system related to study programmes is fully implemented as an adaptive control system. Efforts on improving the teaching quality and the pass rate are outstanding. The Panel was very impressed by the dedication of the institution towards attaining the highest standards in the study programmes.

*2.2. The enrolment quotas are in line with the institutional resources for quality teaching and the analysis of pass rate.*



The Faculty has a problem with their resources for teaching in Physics and in Mathematics. They are aware of that and stressed this point in their Self-Assessment Report. The problem came about because most of the teachers in that area left for another Faculty closer related to their research interests. The Panel agrees with the analysis of the Faculty and strongly supports the request for an increase of teaching capacity in Physics and Mathematics. There is also still a problem with the number of teaching assistants, because some of the groups are still too big in spite of tremendous efforts by the Faculty.

***Recommendation: Additional teaching resources in Physics and Mathematics should be given to the Faculty. No new study programmes should be approved before this problem is solved. In addition, the University should support the Faculty by increasing the number of teaching assistants.***

*2.5. Allocation of ECTS reflects the realistic estimate of the student workload.*

A more detailed analysis of the workload is under way, but is not yet available. However, the current allocation looks reasonable.

*2.6. The content and quality of each study programme conforms to internationally recognized standards, ensuring the international recognition of its qualification.*

The study programmes meet the international standards and were designed along the lines given by international standards. However, there is an urgent need for additional lab exercises beyond simulation.

***Recommendation: The Faculty is not able to improve their labs using their own resources, and additional means are needed. The Faculty should be asked to draw up a list specifying their most urgent needs in this area.***

*2.7. Teachers select teaching strategies that are appropriate to the nature of the material being learned, responsive to various student learning styles and encouraging students to be autonomous, responsible learners.*

The quality of communication between teachers and students is very good. Some individual approaches are formalized, e.g. within the framework of the final paper and the master thesis. The only obstacle in this area is the group size in exercises.

***Recommendation: Allocate more openings for teaching assistants to the Faculty.***

2.8. Programme faculty made available appropriate amount of supplemental resources, including electronic databases and other sources, which aid knowledge acquisition.

There is an excellent activity concerning the use of Moodle in the teaching process. However, the access to international databases needed for research is not always available. The supplemental material in the library is poor.

***Recommendation: The Faculty should re-direct all funds for the library towards an e-library. This library should give access to all books in Croatian and also to English textbooks, if available. The access to international databases such as Web of Science and Scopus has to be improved. This will also have an impact on the quality of research.***

2.9. As appropriate to learning outcomes, students have opportunities to reinforce and apply their learning in the context of practical applications, such as through internships, business partnerships, community service, or similar arrangements.

The Faculty makes great efforts to arrange for these in cooperation with industry. However, their possibilities are limited given the economic situation in the area. They are currently discussing a new model where the final paper in the Bachelor programme is replaced by a prolonged internship (only for students who continue to graduate level). The Panel is thoroughly convinced that this is a valuable approach worth pursuing on a national level, as internships of several months cannot be incorporated into the Bologna framework in a 3+2+3 model. Moreover, an internship with duration above three months could be used for increasing students' mobility as they could apply for internship at an international level. For example, there is a booming market on internships in engineering in Germany, and companies normally support their interns.

***Recommendation: Establish pilot projects pursuing the idea that the final paper in the B.Sc. programmes can be replaced by a prolonged internship at the Faculty and other participating faculties of engineering. Those who want to participate should be allowed having changes above the 20% level in their study programmes in order to accommodate the internship. Evaluate the impact on student mobility after three years following the project implementation.***

### **3. Students**

The Faculty has a very respectable pass rate (65% in Electrical Engineering) which puts them in the top ranks in that area. Class attendance is also very good (about 2/3 of students attend 100% of classes). The students have ample opportunities to give their feedback on teaching. The Panel got the impression that there is a constant dialogue going on between teachers and students resulting in a very good academic climate.

*3.3. The competences of applicants upon admission are aligned with the demands and expectations in the future career of the graduates.*

The very low drop-out rate and the fact that the unemployment rate of the graduates is very low indicate that the Faculty fulfils this criterion.

*3.4. The institution supports students in their extracurricular activities.*

There is something going on, but the strong points of the Faculty lie in a different field.

*3.6. The institution cares for and raises the level of student standard.*

The students complained about shutting down a student restaurant in the Faculty building. The problem is that students cannot go to the Student Centre on some days because of a tight schedule.

***Recommendation: Check whether the existing services can be extended to solve the problem with the student restaurant.***

*3.7. The institution supports the work of the Student Council.*

There are no problems in this area; the level of communication between teachers and students is very good.

*3.11. The institution ensures that students have appropriate opportunities to participate in its decision-making processes and in the resolution of matters affecting their experience.*

See 3.7.

## **4. Teachers**

The Panel gained the impression that teachers at the Faculty are highly motivated. The Faculty takes care that there are no excessive overloads. They have a qualification and mentoring programme for young teachers.

*4.1. Number and qualifications of the teachers are in line with strategic goals of the institution and adequately cover core disciplines.*

The comparatively low grade refers again to the problem in Physics and Mathematics as explained in 2.2.

*4.3. - 4.6. The institution demonstrates the employment of sufficient numbers of full-time teachers at a study programme to ensure the quality and continuity of teaching and learning. The institution takes into account the number of full-time teachers, maintaining the optimal ratio between students and full-time teachers. The institution has well-developed policies for teaching staff that ensure their development as needed to advance the institution's mission. The institution developed and accepted clear procedures for teachers' advancement. Such procedures are implemented in a fair manner, with the possibility of appealing advancement decisions.*

If there are any restrictions, they can be traced back to the lack of funds.

## **5. Research and professional activity**

The Panel met with a group of project leaders and young researchers during the site visit. Both groups are highly motivated and well capable of doing qualified research. This applies both to basic research and to applied (professional) research in cooperation with industry. There was great concern about the future policy of the Ministry of Science, Education and Sports concerning research funds.

*5.1. The institution has established a strategic programme of scientific research the implementation of which is monitored, evaluated and reviewed via defined success indicators.*

There are some good ideas, but not focused programmes. However, this is urgently needed, if the Faculty wants to succeed on a European level.

***Recommendation: The Faculty should identify overlapping competences and interests between its research groups with the aim of finding out where they could cooperate. They should also identify their strong points and their weak points. Based on this analysis, they should agree on a shortlist of key research areas. They should then increase their efforts in allocating funds for research activities in these areas.***

5.2. *In planning and implementing its research agenda, the institution clearly envisions and provides for cooperation with other scientific organizations and industry both within and outside Croatia.*

Cooperation outside the Faculty exists only on an individual level.

***Recommendation: The Faculty should pursue this subject after having fulfilled the recommendation given in 5.1. This is urgently needed for acquiring international funding.***

5.3.-5.8. *At all levels of the institution, research is acknowledged as a contributing element of its overall activity as may be evidenced by intellectual contribution to the institution and its reputation. The institution continuously supports its young researches. The institution has developed and implemented a policy of promoting research excellence. The institution has developed and implemented a policy of encouraging academic publishing. The institution keeps track of multiple evidences of scientific productivity, such as Croatian and international publications, citations, patents, and other. In line with its mission, the institution supports professional activities and services, ensures conditions for knowledge and technology transfer and monitors their evidence.*

All the required activities are done. However, the Panel is aware that there is a need to strengthen research activities on all levels, and can therefore not give excellent grades on all points. However, the Panel appreciates the efforts and the progress made since the last accreditation.

## ***6. International cooperation and mobility***

The panel is convinced that mobility is a key issue for all universities in Croatia, in particular for a comparatively small institution as the Faculty located in an area with economic problems. At present, the main point is outgoing mobility for students with the purpose of getting additional

qualifications for the job market and for researchers with the purpose of networking. The Panel members think that ingoing mobility on a student level is less important for Croatian institutions, even though it is on the agenda of the Bologna process, as this only becomes an issue if there are more jobs than applicants in a given field (e.g. Engineering in Germany).

*6.1.-6.3. The institution facilitates and promotes mobility of students from other higher institutions. In keeping with the international context of study programs, students have opportunities to complete some portion of their program abroad. The institution encourages international cooperation and mobility of its teachers and analyses implementation of their experience in its activities.*

The Faculty is aware of the importance of mobility and makes an effort to promote it, but the results are still disappointing. There is not much they can do about it in the current economic situation, as very often mobility is put on hold due to lack of funds. However, as recommended in 2.9., internships outside Croatia can be arranged more easily, and the issue should be pursued. Another possibility are joint master theses at other academic institutions or in industry abroad. Very often, it is much easier for the students to get support for these project-based stays abroad than for studying at another university.

***Recommendation: The Faculty should start the pilot project on internship as mentioned in 2.9. Additionally they should try to establish a network for exchange on the basis of the master thesis with financial support by the receiving institution. In this context, receiving institutions are academic institutions in other countries as well as companies.***

*6.5. The institution has ensured conditions for attracting students from abroad.*

There are some lectures in English, but not enough for a fulltime study programme for foreign students. However, as stated in the introductory paragraph, the members of the Panel think that ingoing mobility is not a key issue for Croatian institutions in the current economic situation.

*6.4., 6.6., 6.7. The institution is involved in international associations of similar institutions and actively contributes to joint goals. The institution has developed cooperation in the EU Lifelong Learning Programme. The institution has developed other forms of inter-institutional cooperation through European projects, bilateral agreements, joint programs, etc.*

The Faculty has some activities (e.g. IEEE membership), but their engagement is limited. They take part in ERASMUS, and have several bilateral agreements for cooperation.

***Recommendation: The Faculty should pursue existing activities, but should focus on outgoing mobility of researchers and students.***

## ***7. Resources: administration, space, equipment and finances***

The problem of the Faculty is the quality of their equipment. It is not possible to educate engineers for the modern world with theoretical presentations and outdated computers.

***Recommendation: The Panel strongly encourages the Ministry for Science, Education and Sports to increase their investments in equipment for technical faculties. This is especially true for Osijek where thriving technical faculties could contribute significantly to the development of the region.***

*7.1. The institution provides appropriate resources for all enrolled students sufficient to support their effective learning. These resources include classrooms, laboratories and equipment, library resources, computers, individual and group study spaces, and others in keeping with the institution's multiple learning modalities.*

In general, classrooms are in good conditions (grade 4). There exist a fair number of spaces for group and individual study (grade 3). Quite a large number of computers are totally outdated (grade 2), and the library is in very poor condition (grade 1), as it contains an insufficient number of modern textbooks and monographs.

The Panel appreciates the efforts of the Faculty (e.g. TEMPUS project), but they will not reach anything comparable to international standards without outside help.

***Recommendation: The Faculty should set up a priority list of the equipment most urgently needed. They have to allocate this equipment to teaching units (modules) in their study programme. Equipment with multipurpose use should get higher priority. The Panel is convinced that they can do that without additional external regulations given the excellent communications structures in the Faculty. To optimize resources needed in computer labs the Panel suggest to consider the possibility of using software available under free academic licencing policy, that enable students to use it on their own computers at home.***

7.2. *The institution has fully developed rules which regulate the development of the non-teaching staff and provide training opportunities in line with the mission of the institution.*

There are some efforts going on.

7.3.-7.4. *In keeping with its research agenda, the institution ensures that laboratory equipment and usage protocols comply with recognized international standards. The institution provides the equipment and technical support for its use to ensure that all aspects of the organization can make the most of current and varied technologies.*

The little equipment they have is used properly. The problem is the availability of equipment - see recommendation at the beginning of this section.

***Recommendation: The Ministry for Science, Education and Sports should provide some funds such that the Faculty can apply for project related equipment.***

7.5. *The institution collects, analyses, and uses information relevant to improvement of its activities.*

The Faculty fulfils this requirement.

7.6. *Size, usability and availability of the library as well as the level of equipment ensure adequate student supports in their learning and research.*

The present library contains only few modern textbooks. However, most students in Engineering rely much more on web-based information than on books. Moreover, technical progress is fast and the funds necessary to keep up with all developments are really high. This is a problem which is also well-known in other countries, and the general tendency is to switch entirely to web-based libraries.

***Recommendation: Replace the library by a nationwide e-library.***

7.7. *As an aspect of its regular planning cycle, the institution ensures that it has maintained an appropriate ratio of teaching and non-teaching staff.*

The ratio is appropriate.

7.8. *Financial stability of the institution is harmonized with its mission and enables students to*



*graduate from their programmes. Sources of finance are transparent and all conditions related to financing are transparent and do not limit institutional autonomy when making decisions about teaching and research.*

The sources of finances are transparent, and they use their funds extremely well. However, the decision making process has limitations because the funds are very limited. There was some concern about the follow-up program in project funding by the Ministry of Science, Education and Sports, because the current program is about to end.

*7.9. Institution's own funds are used to improve the quality of teaching and scientific activity in line with the mission and other formal documents.*

See 7.8.

## **II. SUMMARY OF COMMENTS AND RECOMMENDATIONS BASED ON VISIT AND SELF-ASSESSMENT REPORT**

- **Institutional Management and Quality Assurance, Study Programmes, Students**

The Panel was impressed by the amount of work the Faculty has invested into its study programmes. All study programmes are well-organized and provide a level of education which is well up to international standards. They have analysed all details - from pass rate to final paper - and have achieved excellent results. Their approach to quality assurance in teaching is outstanding, as this is not a mere formal one, but one which does meet students' needs. Moreover, they include the stakeholders in defining their outcomes, and make efforts to help their graduates in mastering the transition between the academic world and the job market. Their high level of teaching standards also extends to continuing education (accredited programs).

- **Teachers**

The Faculty also takes care of their teachers and provides a framework within which they can get qualifications for high quality teaching and research. The general level of communication among teachers is excellent and provides an atmosphere for self-improvement and optimization.

This is especially true for the teaching assistants and young researchers. The workload is distributed evenly, and the vast majority of teaching is done by fulltime teachers.

There is a problem in the core disciplines (Mathematics and in particular Physics) which they cannot solve by their own, but need outside help, e.g. from the management of the University. The Panel feels that this kind of problem is bound to occur in any non-integrated institution and suggests that the University of Osijek should make sure that resources are not transferred from one Faculty to another on the basis of individual decisions.

- **Resources: Administration, Space, Equipment and Finances**

The buildings of the Faculty are in fair or good condition, the majority of the computers is rather old, and there is very little usable equipment in the labs. This is one of the most serious problems of the Faculty. The Panel is thoroughly convinced that additional funds are needed, and that the Faculty will put them to good use. Details are outlined in the recommendations given above.

The Panel is aware that the economic situation in Croatia is difficult and that there are no free funds available. However, it has to be kept in mind that the general economic situation in the Osijek region is difficult and needs to be improved. There are many examples available (e.g. Kassel in Germany) where a thriving technical faculty made a significant and valuable contribution to the economic recovery of a region. The human resources of the Faculty are there and can be put in good use for this purpose, but they need some baseline where they can start from.

- **Research**

The Faculty encourages their researchers and gives them all the support they can. However, they will only be able to survive on a European level, if they have a more focused midterm research strategy. They should engage in some planning along the lines stated in the recommendations above. They should also strengthen their efforts in technology transfer and encourage their young researchers to plan their careers outside the academic world and move towards entrepreneurship. The Panel is convinced that mobility of the researchers plays a key role in this area, and urges the Faculty to look for new ways for increasing outward mobility and internationalization.

## **Conclusion**

The Panel is convinced that the Faculty is on a good way and will achieve its goals in the future. We appreciate their tremendous efforts for improving their study programs and teaching, and hope that the re-accreditation procedure will strengthen their striving for improving their academic community and the region of Osijek.