



agency for science and higher education

**REPORT
OF THE EXPERT PANEL
ON THE

RE-ACCREDITATION OF
THE FACULTY OF MECHANICAL ENGINEERING AND NAVAL
ARCHITECTURE UNIVERSITY OF ZAGREB**

Date of site visit:

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MAMFORCE



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INTRODUCTION

The Agency for Science and Higher Education (the Agency) is an independent legal entity with public authority, registered in the court register, and a full member of the European Quality Assurance Register for Higher Education (EQAR) and European Association for Quality Assurance in Higher Education (ENQA).

All public and private higher education institutions are subject to re-accreditation, which is conducted in five-year cycles by the Agency, in accordance with the Act on Quality Assurance in Science and Higher Education (Official Gazette 45/09) and subordinate regulations, and by following *Standards and Guidelines for Quality Assurance in the European Higher Education Area* (ESG) and good international practice in quality assurance of higher education and science.

The Agency's Accreditation Council appointed an independent Expert Panel for the evaluation of the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb.

Members of the Expert Panel:

- Prof. Osman Turan, University Strathclyde Glasgow, United Kingdom of Great Britain and Northern Ireland, chair
- Prof. Richard Curran, Delft University of Technology, Kingdom of Netherlands
- Prof. Dora Karagiozova, Institute of Mechanics, Bulgarian Academy of Sciences, Republic of Bulgaria
- Prof. Pierre Ferrant, Ecole Centrale de Nantes, Nantes, French Republic
- Prof. Vladimir Medica, Faculty of Engineering University of Rijeka, Republic of Croatia
- Denis PlavljeniĆ, student, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture University of Split, Republic of Croatia.

During the site visit, the Expert Panel held meetings with the following stakeholders:

- Management
- Self-evaluation Report committee
- Students
- Alumni
- Heads of study programmes
- Vice dean for education
- Vice dean for research
- Full-time teaching staff

- Assistants and junior researchers
- Leaders of research projects
- Representatives of the business sector, potential employers.

The Expert Panel members had a tour of the work facilities, laboratories, library, IT classrooms, student administration office and classrooms, and attended sample lectures, where they held a brief Q&A session with students.

In accordance with the site visit protocol, the Expert Panel examined the available additional documents and study programme descriptions (learning outcomes).

The Expert Panel drafted this Report on the re-accreditation of the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb on the basis of the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb self-evaluation report, other relevant documents and the site visit.

The Report contains the following elements:

- short description of the evaluated higher education institution
- brief analysis of the institutional advantages and disadvantages
- list of institutional good practices
- detailed analysis of each assessment area, recommendations for improvement and quality grade for each assessment area
- detailed analysis of each standard, recommendations for improvement and quality grade for each standard
- appendices (quality assessment summary by each assessment area and standard, and site visit protocol)
- summary.

In the analysis of the documentation, site visit to the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb and writing of the Report, the Expert Panel was supported by:

- mr. sc. Sandra Bezjak, coordinator, the Agency
- Matan Čulo, assistant coordinator, the Agency
- Goran Briški, interpreter at the site visit, the Agency
- Goran Briški, translator of the Report, the Agency.

On the basis of the re-accreditation procedure conducted, and with the prior opinion of the Accreditation Council, the Agency issues a following accreditation recommendation to the Minister for Higher Education and Science:

1. **Issuance of a confirmation on compliance with the requirements** for performing the activities, or parts of the activities
2. **Denial of license** for performing the activities, or parts of the activities
3. **Issuance of a letter of expectation** with the deadline for resolving deficiencies of up to three years. A letter of expectation can include the suspension of student enrolment within a set period.

The accreditation recommendation also includes a quality grade of a higher education institution, and recommendations for quality improvement.

SHORT DESCRIPTION OF THE EVALUATED HIGHER EDUCATION INSTITUTION

NAME OF HIGHER EDUCATION INSTITUTION: Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb

ADDRESS: Ivana Lučića 5, 10 000 Zagreb

DEAN: prof. dr. sc. Zvonimir Guzović

ORGANISATIONAL STRUCTURE:

- The Dean
- The Faculty Council
- The Vice Deans
- The Council of Deans
- Departments (Department of Design, Department of Applied Mechanics, Department of Thermodynamics and Thermal and Process, Department of IC Engines and Transportation Systems, Department of Energy, Power and Environmental, Department of Naval Architecture and Offshore, Department of Industrial Engineering, Department of Quality, Department of Robotics and Production System, Department of Materials, Department of Welded Structures, Department of Technology, Department of Aeronautical Engineering, Department of Fluid Mechanics)
- Boards and Committees
- Faculty Secretary
- Faculty Administrative Services
- Dean's Boards and Committees

STUDY PROGRAMMES:

Undergraduate university study programme

- Mechanical Engineering
- Naval Architecture
- Aeronautical Studies

Graduate university study programme

- Mechanical Engineering
- Naval Architecture
- Aeronautical Studies

Postgraduate (doctoral) study programme

- Mechanical Engineering, Naval Architecture, Aeronautical Engineering and Metallurgical Engineering

Postgraduate specialist university study programme

- Industrial Engineering and Management
- Materials Engineering
- Structural Analysis and Design
- Assembly and Packaging
- Advanced Manufacturing Technologies
- Polymer Engineering
- Offshore Structures
- Product Lifecycle Management

NUMBER OF STUDENTS: 2358 full-time students.

NUMBER OF TEACHERS: 133 professors appointed into scientific-teaching grades, 11 professors appointed into teaching grades, 66 assistants and 33 postdoctoral researchers.

SHORT DESCRIPTION OF THE EVALUATED HIGHER EDUCATION INSTITUTION

The Faculty of Mechanical Engineering and Naval Architecture University of Zagreb is the oldest and the largest faculty in the field of mechanical engineering in the Republic of Croatia. In 1898 the Society of Engineers and Architects launched an initiative to establish a technical college and in 1919 the Royal Technical College was established. In 1926 the Technical College with Departments of Architecture, Civil Engineering, Geodesy, Mechanical Engineering, Naval Architecture, Electrical Engineering, Chemical Engineering and Technology and Mining Engineering became a constituent of the University of Zagreb. In 1956 the Faculty of Mechanical Engineering and Naval Architecture was set up after the division of the Technical Faculty into independent faculties based on specialized areas of activity. In 1967 the Post-Secondary Technical School was merged with the Faculty of Mechanical Engineering and Naval Architecture. The Faculty was offering three courses of study: Mechanical Engineering and Design, Mechanical Engineering and production and Naval Architecture. In 1955 the faculty introduced the course in aeronautical engineering, the first of this kind in Croatia. The Faculty was also the first faculty in Croatia to implement the study programmes according to the criteria of the Bologna process enrolling the first generation of students under the new system in the academic year 2003-2004, two years before any other

higher education institution in Croatia. The last change in the organization of the Faculty took place in 2017 when a new Department of Fluid Mechanics with constituent chairs and six new laboratories were established.

BRIEF ANALYSIS OF THE INSTITUTIONAL ADVANTAGES AND DISADVANTAGES

ADVANTAGES OF THE INSTITUTION

1. Highly qualified and dedicated staff with good command of English
2. High-level motivated students with excellent English language skills
3. Very good teaching and research facilities
4. Advanced accessible information and functional quality assurance system
5. Good recognition from industry and research achievements increasing
6. Well-qualified graduates with very good job opportunities
7. Reorganisation of education scheme (based on current high level of learning outcomes and objective evaluation of student achievements) in progress

DISADVANTAGES OF THE INSTITUTION

1. Excessive teaching load for staff (and unbalanced among staff) – especially for young staff
2. Uncertain Career prospect for Teaching Assistants and lack of recognition for research achievements for staff
3. Student dropout rate (50% and insufficient student progress support) and lack of specific measures to control this and heavy work load for students – especially in 2nd year
4. Low public recognition of achievements and low international visibility together with low mobility of staff
5. Structure of the educational program 7+3 distribution of semesters instead of internationally accepted 6+4
6. Number of Assistants is too high relative to having 40% of staff being temporary employed – the number of assistant, associate and full professors should be increased for quality, stability and sustainability
7. The average age of assistant professors is much too high and links to the previous point

LIST OF INSTITUTIONAL GOOD PRACTICES

EXAMPLES OF GOOD PRACTICE

1. Internal access and availability to QA reports
2. Clearly formulated learning outcomes – program, syllabus and courses; current development of new improved educational program. Also introducing new courses such as Mechatronics to meet industry needs.
3. Academics are always available for advice, support and welfare of students
4. Possibility of having exam results reviewed
5. Open access to laboratories for both teaching and research
6. Good industrial relations
7. Courses and elective selection of courses to support PhD students
8. Excellent foreign language teaching setup.

ANALYSIS OF EACH ASSESSMENT AREA, RECOMMENDATIONS FOR IMPROVEMENT AND QUALITY GRADE FOR EACH ASSESSMENT AREA

1. Internal quality assurance and the social role of the higher education institution

Analysis

The recording of quality assurance data is very good and also the systems that are in place. The societal role is well understood and is ingrained in the culture of the staff and students at a personal and collective level.

Students in early years (undergraduate) are overloaded with excessive contents and teaching. This naturally leads to very high failure rates in some classes and very high dropout rates without any qualifications. Problem was reported in previous assessment and is well recognised by FMENA but no solid action has been taken to address the unbalanced workload and failure rates.

Recommendations for improvement

- There could be better evidence of reaction and actions relative to the gathered information. For example, the reaction to data collected was not made visible and changes to syllabus and workload at Year 2 etc. is well recognised but still not dealt with.

- The Faculty should not take for granted the extremely high level of passion and commitment of the staff and students and should do more from the top-down to support them better.
- There should be a clear link between the recommendations and conclusions of the previous assessment and this assessment, and associated definitive actions and a plan of action.

Quality grade

High level of quality

II. *Study programmes*

Analysis

The study programmes are of sufficient standard but there was a lack of evidence of institutional effort to formally monitor and ensure that course materials are evaluated against international standards on a detailed content level.

Recommendations for improvement

- There should be a separate assessment for education and research so that education can be assessed separately. There should be peer assessment of courses and a clear link between the course content and the learning outcomes.

Quality grade

Satisfactory level of quality

III. *Teaching process and student support*

Analysis

The teaching processes are very well supported and managed – in the face of extremely HIGH teaching loads due to the understaffing with permanent and young permanent staff in particular.

In general students are satisfied with the teaching and it seems the general educational system in Croatia depends a lot on the dedication, motivation and passion of the students (and similarly for the staff by the way).

Despite the well-praised dedication of teaching staff, the current standards cannot be sustainable unless the staffing strategy at a governmental level is addressed.

Recommendations for improvement

- The teaching staff numbers should be INCREASED so that the staff members can have time and opportunity to push educational excellence rather than just coping with maintaining high quality within the Croatian context.
- With regards to student support, tangible and SMART mechanisms should be put in place and maintained and up-graded.

Quality grade

Satisfactory level of quality

IV. Teaching and institutional capacities

Analysis

The expert panel were very impressed with the quality of teaching and institutional delivery in light of the poor national funding the Faculty receives. Again, it is clear that due to the Government strategy permanent staff levels cannot be increased and the short term fix is to provide over 40% of the academic load with temporary staff who do not seem to have good career progression opportunities. As mentioned this is not seen as a failing of the Faculty but due to the government educational strategy and should be changed if the institutes in Croatia want to be recognized as Institutes at a high International level; rather than leaning too heavily on the staff dedication and passion while under-supporting them and the Faculty.

Recommendations for improvement

- The Faculty needs more staff funding for permanent staff to sustain current levels of high education standards in Croatia and even higher levels of funding to start to compete effectively at high international standards.
- Relying on the extremely high quality of individual staff, faculty and students to deliver the current quality of education standards is unsustainable.

Quality grade

High level of quality

V. Scientific/artistic activity

Analysis

It was clear that there are opportunities for faculty members to compete at an international level but that the support at a government level is very limited. Many groups and individuals push very hard and outperform even despite high teaching loads and limited government financial support.

In terms of government support – it is clear that the quality of individuals and collective effort is superb but without proper government funding and strategy the institutions in Croatia will struggle to break into the top 500 Universities in the world.

The number of PhDs graduating is very low. Relative to international standards, the number of graduates with PhDs from 2014-2017 was 67 for 133 academic established staff; including assistant, associate and full professors (and NOT the additional 66 'assistant staff). That is a productivity of 0.1 PhDs per staff per year. The standards in top Universities are 7-10 times more, i.e. 0.7-1 PhD per staff member per year for a well-established research group!

Recommendations for improvement

- The Faculty needs more staff funding for permanent staff to sustain current levels of very high standing in Croatia and even higher levels of funding to start to compete effectively at high international standards – rather than depending on the extremely high quality of individual staff, faculty and students.

Quality grade

Satisfactory level of quality

DETAILED ANALYSIS OF EACH STANDARD, RECOMMENDATIONS FOR IMPROVEMENT AND QUALITY GRADE FOR EACH STANDARD

I. Internal quality assurance and the social role of the higher education institution

1.1. The higher education institution has established a functional internal quality assurance system.

Analysis

The Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb, Croatia (in further text FMENA) has established a high quality system for Quality assurance policy. The FMENA Quality assurance system is an integral part of the common quality assurance and improvement system of the University of Zagreb. FMENA has been awarded by the officially acknowledged Certificate issued upon completion of the periodic external evaluation of the quality assurance systems, carried out by the Agency for Science and Higher Education (AZVO) in 2015 for the period of five years. It acknowledges that the FMENA Quality assurance system meets the Standards and Guidelines for Quality Assurance Systems in the European Higher Education area and that it is at an advanced stage of development.

The FMENA Quality assurance system (QAS) covers all activities of the Faculty (study programmes, teaching process, student admission and progression, student support, learning resources, research and professional activities, etc.). The system is already implemented and being developed further.

The information about activities, results and documents of the QAS are available on the FMENA website. The fundamental documents of the QAS of the Faculty are:

- Quality Assurance Policy
- Regulations on the Quality Assurance System
- Quality Assurance Manual
- Reports on activities of the Quality Assurance Committee
- Student satisfaction surveys

The Quality Assurance Committee, comprising representatives of teaching, research and professional staff, external stakeholders, students and administrative staff, holds regular meetings and monitors the results. For the evaluation of achieved results of the FMENA Quality assurance system indicators of completed activities are specified. The internal control performs monitoring and analysis of the system efficiency, the quality

of teaching, and the research and professional activities of the Faculty. The regular annual reports on the QAS evaluation are the basis for further activities and improvements of the system. These reports are discussed and adopted by the Faculty Council. The Faculty Council meetings regularly include items related to the field of quality assurance and implementation of the strategy of the Faculty, and if required, topical meetings of the Faculty Council are held. Conclusions are the starting point for planning activities in the next academic year.

The activities of the QAS in all areas are evidenced in annual reports, which are presented at the Faculty Council meetings. The reports include the indicators and the analysis of the teaching activity, research, collaboration with industry, human resources, financial operations, investments and maintenance, and the organization of the Faculty.

The FMENA has developed and published the Strategy on the Development of the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb for the duration between 2014 and 2025 and it is available on the website.

The Strategy comprises four main fields of goals:

- Research and Innovation Strategy of FMENA (Improvement of the research potential of the Faculty, the research influence of the Faculty on the economy and the international research visibility of the Faculty),
- Educational Strategy of FMENA (Continuous review and update of the curricula and continuous improvement of educational methods and technologies),
- Strategy of FMENA on the Relations with Other Stakeholders (Promotion of FMENA at all levels, stimulation of activities of the alumni association AMAC-FSB, and improvement of the cooperation with other stakeholders),
- Organization and Management Strategy of the FMENA (Active development of human resources, continuous improvement of the management system, and rationally and effective management of the workspace and equipment).

The main motivation for the Strategy is the fact that FMENA intends to become a leading institution in the fields of mechanical engineering, naval architecture and aeronautical engineering in South-East Europe. Through its research and teaching potentials, the Faculty is keen to assure its key role in the development and progress of an innovative Croatian industry.

The Strategy Committee drafted the Short-term Action Plan adopted by FMENA in 2015. This Action Plan defines activities, responsibilities, indicators and monitoring mechanisms to monitor the implementation of the strategic documents. The Action

Plan was said to have incorporated also all of the recommendations from the previous evaluation in 2012.

Major changes and implementation of goals from the Action plan are expected in 2020. These changes will be in the adaptation of the study programs into the usual Bologna frame of 3+2 years of study instead of the present 3.5+1.5. Next are expectations to diminish and equalize the present high working load of teachers. Other improvements are also expected to be delivered in due course.

Some of the goals are already implemented. One of them is the mentioned QAS. Next to this is the introduction of new doctoral study, the formation of various councils regarding the collaboration with external stakeholders, introduction of transparent information sharing regarding various decisions, planned actions, results etc. More information was included in other topics of this report.

Recommendations for improvement

- FMENA's commitment to develop and provide further help and support to their student population in the strategy document is missing. This should be included in the strategy document
- The recommendations for cooperation in teaching and research with similar institutions at a national level (as for organization of common studies, common applications) and participation in EU and other international research projects etc., can also be added to the Strategy document.
- FMENA management should be encouraged to continue with the implementation of the goals outlined in the Strategy and Action Plan.

Quality grade

High level of quality

1.2. The higher education institution implements recommendations for quality improvement from previous evaluations.

Analysis

The FMENA has developed the Strategy for the period 2014-2025 and it is available on the website. The Strategy Committee drafted the Short-term Action Plan adopted by FMENA in 2015. The Action Plan was said to incorporate also all of the recommendations from the previous evaluation in 2012, together with certain completion terms for their implementation. One important goal of the Action plan is the adaptation of the study programs into the usual Bologna frame of 3+2 years of study instead of present 3.5+1.5.

Recommendations implemented from the previous evaluation and achievements are:

- The Faculty has provided ways for greater involvement of all key stakeholders in its strategic development. Common committees are established with regular meetings and reports to the Faculty Council.
- The Faculty had improved the system of regular feedback in the frame of quality monitoring, especially from the alumni and from employers of graduated students. Alumni club is active and involved in supporting FMENA with its strategies.
- Approach to e-learning. FMENA has its Intranet access for its students for teaching materials and contact with teachers and assistants. Teaching rooms are equipped with appropriate computers and projectors for computer-assisted lectures.
- Improved links with domestic and international industries providing opportunities for student practice. Researchers from the FMENA are involved in projects for domestic industry. Faculty is providing support for the initial part of such projects.
- International mobility of students and teaching staff. Mobility and exchange programs for teachers and students is in place with increasing participation over recent years. However, some aspects, such as the recognition of exams abroad, have to be improved.
- Introduction of some courses in English language and improvement of the resources offered to international students. FMENA is already offering study programs and the main part of the lessons in English language and the majority of teachers is involved.

Recommendations from previous evaluation, not implemented at the time of the visit to FMENA:

- Institutional strategy should be developed to improve the scientific research quality in wider disciplines while a system should be established to encourage academic staff to extend their research capacity.
- External inputs on monitoring and recommending changes to study programmes,
- Cross-checking system with fellow universities in the country and international institutions as well as reviewing by national and international experts in the field.
- Establishment of an advisory committee of international academics, industrial experts and other stakeholders,
- Monitoring and balancing the workload for teaching and research,
- Attracting more regular foreign guest lecturers,
- Exploring the opportunities for cooperation in EU Life Long Learning (LLL) programme.
- Establishment of some laboratories which could be accessible via Internet.

Recommendations for improvement

- The Faculty must find ways to finish the implementation of mentioned action plan goals, together with the cited recommendations from the previous evaluation that are yet to be implemented. A clear timetable should be developed by FMENA to complete the outstanding actions
- The faculty should introduce an institutional system to recognise the foreign grades obtained by the mobility students, who returned from student mobility programmes.

Quality grade

Satisfactory level of quality

1.3. The higher education institution supports academic integrity and freedom, prevents all types of unethical behaviour, intolerance and discrimination.

Analysis

The FMENA has a well-organised system to support academic integrity and freedom. The Faculty Ethic Committee has been established to deal with cases when the adopted Code of Ethics has been violated. An ombudsman at the University level is engaged with issues related to staff and students' disciplinary regulations. A Disciplinary Committee has been also established to deal with cheating in exams and plagiarism. However the possible cases of violation of the academic ethics in the students' theses have not been considered so far due to the absence of appropriate software.

Recommendations for improvement

- The Faculty should adopt and use a system for checking for plagiarism in all students' theses as soon as this system is available at the University.

Quality grade

Satisfactory level of quality

1.4. The higher education institution ensures the availability of information on important aspects of its activities (teaching, scientific/artistic and social

Analysis

Sufficient information related to the admission criteria, study programs, courses' contents, research projects, students' life, etc. is available through the well-organised website of the FMENA.

Information on the organized workshops, summer schools, seminars and other forms of further education organized by the faculty is also available from the website. The faculty is organizing “open doors” events to promote various important activities.

Many other examples of good practice are given in the self-evaluation report and the panel highly appreciates the well-established system to inform students, academics and all interested parties in all aspects of the Faculty actions including the teaching process and feedback from the learning outcome, students support, research activities, students’ life, etc.

Recommendations for improvement

None

Quality grade

High level of quality

1.5. The higher education institution understands and encourages the development of its social role.

Analysis

The FMENA is putting significant effort to increase their social role in Croatia by contributing to the economy through developing strong collaboration with the industry and enhancing the innovation capabilities of the participating companies. The Faculty is contributing to the further education of professionals by organizing events targeted to the enhancement of their special skills. The six accredited standard and calibration laboratories at the Faculty build up the reputation of the FMENA as a competitive institution in Croatia and abroad. Faculty professors, being certified expert witnesses, also serve the local community by providing the court with expertise when requested.

There is a definite evidence of engagement and responsiveness to industry/economic needs – but not sustainability/environmental impact.

There is definite contribution to the academic profession and development. Accountability could be developed and measured better.

There is a strong and loyal empathy with the social role, from staff and students, but this could be more strongly expressed and explicitly (standardised) in the strategy document.

Recommendations for improvement

- This was not well set out in the documentation and little evidence was provided in the report but it is clear that this is a developing theme to be standardised in some way and promoted, and the staff treated it to a large extent as assumed – they are strongly motivated but should stipulate their collective (Faculty/Dept) and individual (Chair/Individual) vision more clearly.

Quality grade

High level of quality

II. Study programmes

2.1. The general objectives of all study programmes are in line with the mission and strategic goals of the higher education institution and the needs of the society.

Analysis

Overall, the general objectives of the study programmes in FMENA are in line with the goals of Higher Education. It is ambitious, aimed at training top quality engineers in accordance with industry needs by taking into account internationalisation. Resources in terms of labs, well-equipped classes are at a very good standard, as with the quality of teachers. However, ECTS workload of the students planned within the study programme and the actual workload that students have do not match with the common workload observed in other European institutions. During the visit the panel felt that, a 4-4.5 year degree course was squeezed into 3.5 years. This results in extremely overloaded students who do not have enough time for industrial practice and personal development. However, most of all, more than half of the students do not finish the second year. This in practice becomes 'survival of the fittest' approach, as only small number of students finishes the graduate master degree while the remaining students fail to obtain any undergraduate degree. This contradicts the Bologna accord as it clearly tries to provide a distinction between undergraduate and postgraduate degrees so that students with different abilities can exit the university with different degrees and skills.

Although, FMENA designed its undergraduate and postgraduate degrees in accordance with the Bologna process, almost nobody graduated within 3.5 years with an undergraduate degree. This was cited to be due to a lack of demand by the industry for 3 year undergraduate degrees but rather a high demand for highly skilled graduates with 3+2 Master degree.

Recommendations for improvement

- It is recommended that study programme is revised urgently to reduce the workload of students to be in line with similar programmes in other EU universities. Contents, difficulty and workloads of modules should be designed to reflect undergraduate and Master degrees.
- Representatives from each course should visit sister departments in a number of European countries to exchange practices in designing courses and modules.
- Furthermore, there should be a time allocated for industrial placements during the summer, as suggested by the industry representative, as the currently available 6

weeks summer break is not enough for achieving the aims of gaining practical experience.

Quality grade

Satisfactory level of quality

2.2. The intended learning outcomes at the level of study programmes delivered by the higher education institution are aligned with the level and profile of qualifications gained.

Analysis

Learning outcomes are well aligned with the qualifications gained at FMENA. There is a well-structured and documented education programme supported by the rules and regulations. It is evident that there is a strong and good interaction with students, industry stakeholders and professional associations as their feedback is taken into account designing the modules. Student employment after graduating with a Master degree is really good and the quality of the students in terms of competence, knowledge and confidence is evident, reflecting the high quality alignment.

Although, a 3.5 years undergraduate degree programme is available almost nobody had graduated with undergraduate degree. Everybody, who managed to complete 3.5 undergraduate degree had continued their studies with master degree. This may be due to the unbalanced module contents and difficulty in undergraduate degrees.

Recommendations for improvement

- Module contents, load and difficulty for undergraduate degree programmes should be balanced.
- Suggestions from industry stakeholders on increasing the practical aspects of the course may be good to consider during the redesigning the course for 6+4 system.

Quality grade

High level of quality

2.3. The higher education institution provides evidence of the achievement of intended learning outcomes of the study programmes it delivers.

Analysis

FMENA has a very robust, and well-structured process for different forms of examinations and feedback mechanisms and they are well documented. The marking system is consistent and transparent, and it is evident that student can receive feedback on the outcome of their assessment.

There is a strong engagement with students, industrial stakeholders and alumni and this provides a very good platform for receiving feedback. The process for making changes to courses or revising the documents is well regulated and documented with clear line of responsibilities, which are well exercised and documented.

Recommendations for improvement

- The only suggestion is to have a quality assurance document showing the statistics of exam results for each module such as average pass rate of the module, deviation, percentage of failed students, name of the second marker, etc.

Quality grade

High level of quality

2.4. The HEI uses feedback from students, employers, professional organisations and alumni in the procedures of planning, proposing and approving new programmes, and revising or closing the existing programmes.

Analysis

Strong interaction with industrial stakeholders is clearly demonstrated while the commitment and involvement of the alumni and industrial advisory board are evident, for very positive indications of a healthy and well working system. There are different committees in FMENA dealing with the feedback and changes to study programme and curriculum.

However, meetings with external stakeholders are taking place more often through the form of unofficial and individual interactions between academic and external stakeholders.

Furthermore, evidence was not provided how similar study programmes at foreign universities are studied, compared to FMENA programmes and documented.

It was also not clear how employment statistics of graduates are gathered and utilised to gauge the industry demand for graduates.

Recommendations for improvement

- The good work done by FMENA could be improved by organising the external stakeholder engagement in a more formalised manner supported by documentation of the feedback and suggestions.
- Comparison of FMENA study programmes with other sister faculties/departments at foreign universities should be done in a more structured manner and documented with the outcomes and resulting actions taken by FMENA.
- It is recommended that FMENA (or the University) establishes an alumni office to organise more formal engagement with graduates and this will help achieving better alumni network with healthier employment records.

Quality grade

Satisfactory level of quality

2.5. The higher education institution ensures that ECTS allocation is adequate.

Analysis

The FMENA has developed a rational procedure to assess the alignment of the students' workload with the ECTS credits. All information related to the ECTS credits is available via the Faculty website.

Surveys to monitor the students' opinion have been carried out and regulations for an alignment revision based on the feedback from the students and professors were defined. Based on the long-term survey, the ECTS credits allocated to some courses have been recently adjusted to improve their alignment with the actual student workload.

Nevertheless, the regulations given by Zagreb University and currently used by the Faculty still lead to underestimation of the average actual workload of the students related to some courses.

Recommendations for improvement

- The FMENA should seek a possibility to further reduce the students' workload in order to bring it to the level commonly accepted by the European universities.

Quality grade

Satisfactory level of quality

2.6. Student practice is an integral part of study programmes (where applicable).

Analysis

The students' industry practice in the FMENA is an integral part of study programmes and it is well organised outside the Faculty. The Faculty has a strong and sustainable relationship with the industry so that the students have choices depending on their interests and current place-availability in the companies. A well-documented procedure for application accessible via the faculty website is available. A procedure for the assessment of the achievement of intended practice-related learning outcomes is established and the rule for the allocated ECTS credits is prescribed.

Recommendations for improvement

- The Faculty could seek possibilities to increase the industry practice duration, as suggested by the industry stakeholders, if the students' workload allows. It is advisable to ensure a systematic collection and analysis of feedback from the students on the quality of the practice.

Quality grade

High level of quality

2.7. Lifelong learning programmes delivered by the higher education institution are aligned with the strategic goals and the mission of the higher education institution, and social needs.

Analysis

The FMENA has carried out various activities (seminars, summer schools and conferences) targeting the enhancement of the specific skills of professional engineers. However there is no evidence that lifelong learning programmes supplied with the corresponding syllabi and regulations have been carried out systematically and on a regular basis.

Furthermore, self-evaluation report provided list of Life Learning programmes only in Mechanical engineering and it is not clear whether Naval Architecture and Aerospace engineering delivered such LLP programmes.

Therefore the quality of the learning process is difficult to assess. The alignment of the lifelong learning activities with the mission and strategic goals of the Faculty is not transparent.

Recommendations for improvement

- Based on the needs of the labour market the Faculty should establish lifelong learning programmes in consultation with industrial stakeholders and delivered systematically and on a regular basis, supplied with the corresponding syllabi and regulations.
- The Faculty should seek a collaboration with all interested parties to attract a wide audience in all areas that FMENA has expertise. LLP in Naval Architecture and Aerospace Engineering should also be offered and delivered.
- A system for monitoring the interest and satisfaction of the participants in the LL programs should be implemented

Quality grade

Minimum level of quality

III. Teaching process and student support

3.1. Admission criteria or criteria for the continuation of studies are in line with the requirements of the study programme, clearly defined, published and consistently applied.

Analysis

FMENA has clear criteria for admission and continuation of studies which are in line with the requirement of the study programme. The criteria, updated on a yearly basis, are clearly defined and publicly available on the web pages of the Faculty.

Decision-making procedures regarding the admission criteria are defined by the high school GPA and state matura exams.

Procedures for the recognition of higher education qualifications, periods of study and prior learning in the case of continuation of studies is defined by institution rules and accordingly examples of recognition were accordingly submitted.

Analysis of student performance on the study programme, depending on the admission criteria is stated in the analytical part of the self-evaluation report. Regarding the changes to the admission criteria, the quotas for undergraduate studies of mechanical engineering have increased from 348 to 405.

Number of students who continued studies from other HEI's is low; the main obstacle being the 7+3 semester study programmes while the majority of other HEI's uses a 6+4 semester system. FMENA deals with this problem by making students from other institutions take the difference exams in the 7th semester so they can enrol into the 8th semester in time. While taking the supplementary exams the students do not have student rights. FMENA provided evidence that it has been working on the implementation of the 6+4 semester system.

Recommendations for improvement

- Analysis of feedback from students who have transferred from other HEI's with regard to their experience with the recognition of higher education qualifications, periods of study and prior learning.

Quality grade

High level of quality

3.2. The higher education institution gathers and analyses information on student progress and uses it to ensure the continuity and completion of study.

Analysis

HEI collects and analyses data on student pass rates. The data is given in Dean's yearly reports.

Correlation between the quality of enrolled students based on admission criteria and their performance after the first year of study is presented in the analytical part of the self-evaluation report. Although there is an improvement of enrolled students in some study programmes, the average quality over the past 3 years is the same.

Completion rates vary depending on the study programme and level of studies. In comparison with European higher education institutions completion rates in undergraduate level are low. However, at national level, when comparing with other higher education institutions with similar undergraduate study programmes the completion rate is similar. This may possibly need to be addressed nationally as the problem is a not unique to FMENA

As far as Master programmes are concerned, almost all (95%+) students who enrol to postgraduate studies finish successfully.

There is no obvious improvement in completion rates over the last 3 years.

Recommendations for improvement

- There could be better evidence of reaction and actions relevant to the gathered information. For example, the reaction to data collected was not made visible and changes to the syllabus and workload at year 2 etc is well recognised but still not dealt with.
- There should be clear link between the recommendations and conclusions of the previous assessment and this assessment, and associated definitive actions and a plan of action.
- There should be a traceable and explicit system for collecting student feedback on the degree programmes as well as the individual courses each year, and evidence, which shows feedback is subsequently being assessed, recognized and resolved. In addition, an effective teaching staff-student counselling system with 6 monthly meetings could be organised for each study year.
- FMENA is encouraged to define and implement measures to increase pass and completion rates.

Quality grade

Minimum level of quality

3.3. The higher education institution ensures student-centred learning.

Analysis

The higher education institute delivers various modes of programme delivery such as classical learning, hybrid learning, e-learning courses, etc. E-learning courses are well developed and include literature in the English language. The modes of programme delivery are in accordance with the intended learning outcomes. Research-based learning is encouraged by letting students co-author scientific papers as 15% of the students co-authored the published papers. Not enough evidential information is provided on encouraging interactive learning and creative thinking. Students are generally very satisfied with the faculty, teaching staff and the amount of knowledge they receive.

Teaching methods are adapted to suit also the needs of students with certain circumstances and disabilities. Help is provided to female students that gave birth in period of studies. Direct enrolment is ensured to children of soldiers who lost their lives in the war.

There is no policy for students of lower economic status, students belonging to the Roma minority and students whose parents have lower educational qualifications. During the visit to the faculty the committee gathered sufficient evidence on the commitment of teachers and their contribution to the motivation of students. The consensus opinion of the committee is that the staff and the teachers show the highest level of commitment and passion. There is a possibility that less committed staff do exist on the faculty but were not present during the faculty visits. There are no formal documents regarding the encouragement of student progress.

FMENA provided evidence of evaluating different modes of programme delivery. Evidence of adapting different modes following the trends in industry was also provided. Supporting evidence to this was the closing of certain subjects and introduction of new ones to follow industry trends, e.g. mechatronics. Also, evidence of reallocating ECTS credits in certain subjects was provided. FMENA tries to ensure the usage of state-of-art technologies to modernise teaching. The Faculty equipment, including some world-class facilities, is available to students via laboratory practice included in study programmes.

There are no official ways to encourage autonomy and responsibility of students. Encouragement depends on the teachers and their will to support that.

It was not clear how student-centred learning is supported in the first 2 years of the degree programme where there is a significantly high number of students in classes.

Recommendations for improvement

- FMENA is encouraged to maintain and further improve the number of student co-authored papers.
- FMENA is recommended to introduce a formal 'Personal Development Plan' to encourage students to become more independent and autonomous.
- FMENA is encouraged to develop and implement the institutional support to student-centred learning and to accept it as part of the development strategy goals.

Quality grade

Satisfactory level of quality

3.4. The higher education institution ensures adequate student support

Analysis

FMENA provides students with guidance on studying at FMENA by allocating a mentor to every student on the 1st year. The role of the mentor is to introduce the student to the faculty and explain any doubts and questions the student may have about studying. Career opportunities are available to students and are also marketed yearly on career day.

FMENA provided evidence of support to student mobility, of adequate library and administration services, and to support students with disabilities. Procedures for student career guidance, psychological and legal counselling are established on university level.

Faculty provided sufficient evidence on the number, qualification structure and availability of library and administrative staff. This evidence also included information on training and professional development of the staff.

Student support is not tailored to address all of the student population. No special support is provided for students belonging to the Roma minority, students whose parent have lower educational qualifications and students of lower economic status.

During the meeting with the students the committee concluded that students are well informed about the available support services. The faculty does not get feedback from

the university regarding the number of students that sought career guidance, psychological or legal counselling.

FMENA supports student associations and organizations. Student associations have teachers as mentors. Students also expressed high levels of satisfaction with the availability of teaching and administrative staff.

Recommendations for improvement

- Support policy for students belonging to the Roma minority, students whose parents have lower educational qualifications and students of lower economic status shall be implemented.
- FMENA is encouraged to recognize the student activity on Faculty supported student projects, which should be accepted and approved as part of their study obligations in FMENA.
- Encourage them to establish their own career centre and provide better career guidance.

Quality grade

High level of quality

3.5. The higher education institution ensures support to students from vulnerable and under-represented groups.

Analysis

FMENA provides the support to pregnant and parenting students, to students with disabilities and learning difficulties and to students being children of Croatian soldiers from the Homeland War. This kind of help is institutionalized by FMENA regulations. Students and FMENA personnel are very sensitive to their colleagues in need and offer their help voluntarily. Help to the handicapped students is provided for better access to faculty spaces, study rooms and other services.

No evidence of specific support to under-represented groups was presented.

Recommendations for improvement

- FMENA is encouraged to continue to provide and improve the support to all their students in need.

- Although there are very rare cases of under-represented group members involved in engineering studies, the Faculty is encouraged to include institutional support also to these students.

Quality grade

Satisfactory level of quality

3.6. The higher education institution allows students to gain international experience.

Analysis

Considering the educational level and language skills of students, FMENA should offer them opportunities for an international experience. However, the number of students in outgoing mobility remains limited at the moment. The 3.5+1.5 courses is part of the problem.

Recommendations for improvement

- The committee recommends to promote more actively the mobility schemes towards students, informing them on the benefit of an international experience on their employability.
- The future reorganization of study programmes could be an opportunity to offer longer summer breaks suitable to internships in foreign companies or universities.
- FMENA has to address the problem of recognizing the students achievements gained during the mobility programs.

Quality grade

Satisfactory level of quality

3.7. The higher education institution ensures adequate study conditions for foreign students.

Analysis

The committee observes that satisfactory study conditions are offered to foreign students. Especially, an increasing number of lectures are given in English. Information on the academic courses is available in English on the website, still through intermediate pages in Croatian. The committee emphasizes that self-funded foreign

PhD students could be a source of additional research workforce in a context with limited local resources.

Recommendations for improvement

- FMENA is encouraged to strengthen the promotion of its programs at the international level, e.g. towards Asian countries (China, India...). The English version of website and of other information resources is to be completed
- FMENA should introduce full English accredited degree programme to attract more international students and to gain international recognition.
- FMENA should gather more detailed data on incoming students including their experience and feedback.

Quality grade

High level of quality

3.8. The higher education institution ensures an objective and consistent evaluation and assessment of student achievements.

Analysis

FMENA is committed to providing an objective assessment of learning outcomes. The conditions of evaluation are clear and accessible online through the information system. Teachers are encouraged to improve their assessment procedures through internal meeting seminars. Possible contests from students are appropriately addressed. Examination procedures are adapted for students with disabilities.

Recommendations for improvement

- The student feedback on the objectivity of grading procedures could be better monitored.
- FMENA is encouraged to analyse high drop-out rates and to implement results in the action plan to reach better study results.

Quality grade

High level of quality

3.9. The higher education institution guarantees the issuance of Diploma Supplements and adequate qualification information.

Analysis

Several Diploma Supplements were presented to the committee during the site visit. Together with the global quality of the information system of the HEI, this is a good indication that the issuance of Diploma Supplements and qualification information is properly managed by the HEI. The strong feeling of engagement and professionalism given by the Vice Dean for Education during the various discussions with the committee is an additional confirmation of the adequate treatment of this issue by the FMENA.

Recommendations for improvement

None

Quality grade

High level of quality

3.10. The higher education institution is responsible for the employability of graduates.

Analysis

FMENA provides a high level of education to students, with clear learning outcomes recognized by industrial stakeholders. FMENA is willing to adapt its educational offer to fit the evolution of industry needs, see e.g. the recent introduction of mechatronics. The employability of students seems to be high, although the information is not fully monitored.

Recommendations for improvement

- FMENA is encouraged to improve the collection and analysis of data related to the employment of former students, possibly through stronger links with the activity of the alumni association, perhaps with an alumni office.
- FMENA should establish a better system to provide better career guidance

Quality grade

High level of quality

IV. Teaching and institutional capacities

4.1. The Higher education institution ensures adequate teaching capacities.

Analysis

The self-evaluation document provided clearly indicates very high teaching load in all levels of teaching staff. Some professors carry teaching load of more than 300% of normal teaching loads. Furthermore, there is a substantial educational load (consulting, periodical exams etc.), which is not directly recognized as teaching load due to being from assistants. The committee is of the opinion that, based on the allowed teaching load, the FMENA is lacking about 30 lecturers. High teaching load results in problems of not having sufficient time for research, especially for assistant staff.

The ratio of student numbers to teacher numbers is 16.38 for FMENA. 83% of teachers (from assistant professors to full professors) are fully employed at FMENA but assistant contracts are temporary. Changes in educational plans are in progress, including also the changes in total teaching load.

Recommendations for improvement

- Possibility of FMENA to employ additional lecturers is limited due to present limits imposed by the Ministry of science, education and sport of the Republic of Croatia.
- In any case the teaching load has to be set within allowable limits, close to the proposed normal load for the lecturers. This will help in providing the more time for scientific research.
- The FMENA can find ways to recognize additional teaching load, especially for assistant's staff.

Quality grade

Satisfactory level of quality

4.2. The higher education institution has an objective, transparent and excellence-based procedure of teacher recruitment.

Analysis

The teacher recruitment process from Assistant Professor to Associate Professor (and then Full Professor) is well managed, transparent and sound. The Human Resource Committee sounds well formulated and very complete. However, the move from

Teaching Assistant to Assistant Professor sounds like a lottery; the move after 5yrs (or 3yrs) for an Assistant Professor to Associate Professor sounds guaranteed; and the move to Full Professor requires the exit of an existing faculty member. This is all highly questionable.

Recommendations for improvement

- It is recognised that there are stifling constraints on the Faculty (given legislation and funding issue etc) but objectively there needs to be a fundamental change in the career progression expectations.
- Interviews with the staff during the selection and appointment of academics should definitely be included!
- The progression of teaching assistants to Assistant Professor is hampered by funding and not at all well-structured in terms of providing positions for the best candidates. This is a consequence of the lack of a consistent and visionary view from the government funding restrictions; effectively losing brilliant dedicated young potential staff because there is no structural mechanism for ensuring their continuing career progression from teaching assistant to full academic staff. A progression of 15-30% after a 10 yr financial and PhD training commitment is not good.
- If teaching assistants are so heavily loaded with teaching, supervision, consultation, marking, organisation, research assistance, etc. - they are being stifled and this is not letting the best staff/researchers etc. also to shine, especially given such dedication and loyalty that was obviously evident.

Quality grade

High level of quality

4.3. Teacher advancement and re-appointment is based on objective and transparent procedures.

Analysis

Internal procedures are excellent.

With reference to the reservations set out in 4.2, it is clear that everything is being done at a high level to ensure teacher advancement; but the Faculty is struggling to offer reasonable advancement and reappointment opportunities. An obvious

consequence of this will be that the best students and staff will be pushed (against their will) to leaving!

Staff are being punished by teaching load and are increasingly being asked to strive towards research excellence (publication levels, funding, etc.).

Recommendations for improvement

- The internal process could be improved with candidate interviews, with a member from another Faculty involved, but the critical issue is the environment you have to operate within. This requires critical government change, or Zagreb University will fall out of the top 1000 academic institutes in the world.

Quality grade

High level of quality

4.4. The higher education institution provides support to teachers in their professional development.

Analysis

There is a certain amount of teacher training workshops available and also English language help. Teaching loads are very high but the teaching web-based facilities (Atlantis, and various software) are advanced and very well organised. Mobility is encouraged, including sabbaticals and international visits. All educational aspects are very well supported and encouraged by the Vice Dean for Education. Teaching Assistants provide almost all of their time to educational support, including supervision, marking and consultations etc. but this is not formally recognized.

Recommendations for improvement

- Teacher training courses could be increased and formal certified training made mandatory for all staff, including Teaching Assistants (whose educational load should be formally recognized and not just assumed at the current 150 hrs).
- Sabbaticals should be further encouraged and supported. Peer review of teaching should be introduced. The educational review of the program must be done and the teaching load dealt with as soon as possible.

Quality grade

Satisfactory level of quality

4.5. The space, equipment and the entire infrastructure (laboratories, IT services, work facilities etc.) are appropriate for the delivery of study programmes, ensuring the achievement of the intended learning outcomes and the implementation of scientific/artistic activity.

Analysis

The total space of FMENA is 33.962 m², divided in two separate buildings, located at a distance of 200 m between them. The FMENA has sufficient well equipped lessons rooms for performing the education. There are 69 lecture halls with a total space of 4930 m² with 2388 seats. Most of spaces have Internet access and equipment for computer-assisted education. FMENA has 51 laboratories (total area of 7.022 m²), all with the possibility of access for students and researchers.

The FMENA has 6 nationally accredited laboratories holding Croatian national standards, having special spaces for development of further standards. There are no specifically pure research laboratories with closed access. The FMENA as an educational institution promotes access to all laboratories, especially to students in their education and research. The FMENA has 261 offices for teaching staff. All offices are equipped with computers and have Internet access. All spaces have appropriate IT equipment. The FMENA has its own IT services centre, serving all education and scientific research needs.

Recommendations for improvement

- There are no specific recommendations for necessary infrastructure.
- Funds have to be provided for further completion of some laboratories, which are not completed at the moment, especially the Hydrodynamic laboratory, which is essential for Naval Architecture education.

Quality grade

High level of quality

4.6. The library and library equipment, including the access to additional resources, ensure the availability of literature and other resources necessary for a high-quality study, research and teaching.

Analysis

Excellent library facility is very well managed with work spaces for students and very dedicated staff!

Library equipment and availability of literature is quite good and adapted to the educational and scientific research purposes. The library has sufficient samples of compulsory titles are at the disposal of students. Sufficient space is provided for students' needs. Students are using the library spaces also for performing part of their obligations in their free time.

Recommendations for improvement

- There are no specific recommendations for library as it is functioning properly.
- Financial support for acquiring access to new databases or titles will be of mutual interest.

Quality grade

High level of quality

4.7. The higher education institution rationally manages its financial resources.

Analysis

The budget levels are significant and very well and effectively managed. However, it was calculated that 30 new teaching staff should be added, although the funding is not there and recruitment currently depends on staff retiring. Current levels of funding are not sufficient and even paying current electricity and heating costs etc. is a challenge.

Recommendations for improvement

- The Government needs to increase the teaching budget to maintain the high quality of teaching and reduce the excessive teaching load – especially if the strategy to increase research standards is to be realised!

Quality grade

High level of quality

V. Scientific/artistic activity

5.1. Teachers and associates employed at the higher education institution are committed to the achievement of high quality and quantity of scientific research.

Analysis

FMENA teachers and associates, despite very high teaching load, have been producing high quality publications in high impact journals while securing research and knowledge exchange funding from international and national sources. Outputs documented in the self-evaluation report reflect their commitment to carrying out high quality research and generating outputs in different platforms, i.e., journals, international conferences and symposia.

There is a good measurable system to assess the quality of impact and mechanisms/measures to encourage academics to publish high quality papers in high impact journals, as well as presenting in international conferences. FMENA academics have also been organising conferences regularly and involved in the conference committees.

Since 2015, outputs of the academics are required to be recorded and stored in CROSB online system, and this is a very good step. Furthermore, FMENA, using SCOPUS database, studies the impact of the publications. These are very good evidences reflecting FMENA's commitment to research activities in a structured and measurable manner.

Such data is utilised for the appointment and promotion of academic staff according to the clearly outlined criteria. This is very encouraging as it will motivate the academics to achieve the requirements, as they are officially recognised in FMENA's annual reports as well as providing awards.

New Postgraduate Doctorate Study programme in the field of mechanical engineering, naval architecture, aeronautical engineering and metallurgy demonstrate a good structure and opportunity for academics to enhance their research career.

However, there is no clear evidence of strategy for supporting young academics to give them the opportunity to progress and excel in their research activities. Very high load for teaching is a significant barrier, particularly for young academics as they try to perform their research outside working hours as indicated during the visit.

It is not clear and not evidenced how senior academics support younger academics. Furthermore, international visits by FMENA academics is low and needs to be increased to enhance FMENA's international visibility, collaboration and position.

Recommendations for improvement

- There should be a priority mechanism for young academics to obtain research grants to establish internationally recognised research career development.
- A reward mechanism for young academics for high quality quartile 1 publications.
- There should be alternative PhD funding mechanisms to increase the number of PhD students and completed PhDs.
- Well established senior staff should support younger academics to build international links and international research opportunities.
- Teaching load should be decreased significantly to achieve the university strategy to be an internationally recognised research university in south-east Med.
- Opportunities should be created for academic staff to take sabbatical leave in order to establish international research network from foreign universities.

Quality grade

High level of quality

5.2. The higher education institution provides evidence for the social relevance of its scientific / artistic / professional research and transfer of knowledge.

Analysis

There are strong links with the industry both in terms of research collaboration (e.g. with PhDs and research proposal support) and education (e.g. introduction of the new Mechatronics course). There is a very strong culture of educating bright young and motivated students for the future of the country. The international focus is strong and well recognised.

Recommendations for improvement

- The Committee for the Promotion of Industry-University Collaboration could be held more often with industrial people and further collaboration schemes identified – as the current effort is very good.
- Internationalisation should continue to be encouraged as this is again very good societal practise for awareness of international standards.

Quality grade

Satisfactory level of quality

5.3. Scientific/artistic and professional achievements of the higher education institution are recognized in the regional, national and international context.

Analysis

Regional and national recognitions of scientific and professional achievements of this FMENA are very high. Researchers from this FMENA have been awarded with 2 university, 6 national and 11 international awards for their scientific achievements.

The number of published relevant scientific papers is increasing continuously through the last 5 year period, with a total period increase of 20%. The number of annually published papers cited in WoS or CC is 0.93 per employed scientist holding a PhD degree. The present scientific potential is certainly higher. In the last 5 year period the FMENA researchers have been involved in 35 international, 10 bilateral and 16 domestically funded scientific research projects.

Regardless it has not been specifically mentioned in the FMENA Self-evaluation Report, the FMENA researchers have been also involved in professional research projects for partners in industry. A large part of the income from these projects was invested in new laboratory equipment.

Recommendations for improvement

- Increase of the collaborative scientific research with other foreign universities and research institutions in order to increase and access the internationally recognized scientific impact.
- Conduct strategic guidelines in improving and increasing the scientific research output.
- Introduction of stimulating the system for scientists to increase the number of highest grade scientific papers

Quality grade

Satisfactory level of quality

5.4. The scientific / artistic activity of the higher education institution is both sustainable and developmental.

Analysis

The research development strategy is aligned with the vision of the Faculty development. Research projects are carried out in emerging and strategic areas reflecting also industry needs. The available technical resources present a solid base for the further development of the research activities while the Faculty is putting continuous efforts to innovate the experimental facilities.

The faculty has developed a system of rewarding the scientific achievements of the researchers but currently it does not lead to a strong motivation and satisfaction. Although new parameters of evaluation of the scientific research work have been adopted in 2015, the new system has not been yet introduced.

The number of PhD students in the system and PhD completion rates are extremely low compared to other foreign universities. PhD students are an essential part of high quality research outputs. Unfortunately, PhD funding mechanisms in Croatia appears to be a barrier to increasing PhD student numbers. The current number of 0.1PhD degree per academic for per year is very low and this begs a new strategy at national level.

Currently the time and efforts for research work are not appropriately quantified as a part of the employees' workload, which takes into account only the hours in contact with students. This conclusion applies to all researchers but it has particularly strong consequences for young researchers, thus holding back their career development due to the high teaching load. In a longer term, the current human resource management could lead to a generation gap and would eventually disrupt sustained development.

Recommendations for improvement

- The Faculty should develop a strategy for a better human resource management in order to ensure the possibility of faster career development of the young researchers.
- A national strategy should be established to increase the admitted PhD student numbers and completed PhD numbers in order to enhance the research visibility of FMENA at international level.

Quality grade

Satisfactory level of quality

5.5. Scientific/artistic and professional activities and achievements of the higher education institution improve the teaching process.

Analysis

The quality of the research, strongly linked to industry needs, is a source of inspiration for improving the teaching programmes. The recent introduction of the Mechatronics cursus is a good indication of the situation. On the other hand, as already mentioned in other sections of this report, there is a lack of recognition of time spent on research work in the researchers' global task allocation. The committee considers that this situation, combined with the very heavy teaching load, is not favourable to a fast transfer of new knowledge arising from research, to teaching programs.

Recommendations for improvement

The committee suggests to FMENA to reduce the teaching load of younger researchers and to promote the development of elective, high level courses focusing on frontier research topics covered by Faculty's researchers

Quality grade

Satisfactory level of quality

APPENDICES

1. Quality grade by assessment criteria

<i>Quality grade by assessment area</i>				
<i>Assessment area</i>	Unsatisfactory level of quality	Minimum level of quality	Satisfactory level of quality	High level of quality
<i>I. Internal quality assurance and the social role of the higher education institution</i>				X
<i>II. Study programmes</i>			X	
<i>III. Teaching process and student support</i>			X	
<i>IV. Teaching and institutional capacities</i>				X
<i>V. Scientific/artistic activity</i>			X	

<i>Quality grade by standard</i>				
<i>I. Internal quality assurance and the social role of the higher education institution</i>	<i>Unsatisfactory level of quality</i>	<i>Minimum level of quality</i>	<i>Satisfactory level of quality</i>	<i>High level of quality</i>
1.1. The higher education institution has established a functional internal quality assurance system.				X
1.2. The higher education institution implements recommendations for quality improvement from previous evaluations.			X	
1.3. The higher education institution supports academic integrity and freedom, prevents all types of unethical behaviour, intolerance and discrimination.			X	
1.4. The higher education institution ensures the availability of information on important aspects of its activities (teaching, scientific/artistic and social).				X
1.5. The higher education institution understands and encourages the development of its social role.				X

<i>Quality grade by standard</i>				
<i>II. Study programmes</i>	<i>Unsatisfactory level of quality</i>	<i>Minimum level of quality</i>	<i>Satisfactory level of quality</i>	<i>High level of quality</i>
2.1. The general objectives of all study programmes are in line with the mission and strategic goals of the higher education institution and the needs of the society.			X	
2.2. The intended learning outcomes at the level of study programmes delivered by the higher education institution are aligned with the level and profile of qualifications gained.				X
2.3. The higher education institution provides evidence of the achievement of intended learning outcomes of the study programmes it delivers.				X
2.4. The HEI uses feedback from students, employers, professional organisations and alumni in the procedures of planning, proposing and approving new programmes, and revising or closing the existing programmes.			X	
2.5. The higher education institution ensures that ECTS allocation is adequate.			X	
2.6. Student practice is an integral part of study programmes (where applicable).				X
2.7. Lifelong learning programmes delivered by the higher education institution are aligned with the strategic goals and the mission of the higher education institution, and social needs.		X		

<i>Quality grade by standard</i>				
<i>III. Teaching process and student support</i>	<i>Unsatisfactory level of quality</i>	<i>Minimum level of quality</i>	<i>Satisfactory level of quality</i>	<i>High level of quality</i>
3.1. Admission criteria or criteria for the continuation of studies are in line with the requirements of the study programme, clearly defined, published and consistently applied.				X
3.2. The higher education institution gathers and analyses information on student progress and uses it to ensure the continuity and completion of study.		X		
3.3. The higher education institution ensures student-centred learning.			X	
3.4. The higher education institution ensures adequate student support.				X
3.5. The higher education institution ensures support to students from vulnerable and under-represented groups.			X	
3.6. The higher education institution allows students to gain international experience.			X	
3.7. The higher education institution ensures adequate study conditions for foreign students.				X
3.8. The higher education institution ensures an objective and consistent evaluation and assessment of student achievements.				X
3.9. The higher education institution guarantees the issuance of Diploma Supplements and adequate qualification information.				X
3.10. The higher education institution is responsible for the employability of graduates.				X

<i>Quality grade by standard</i>				
<i>IV. Teaching and institutional capacities</i>	<i>Unsatisfactory level of quality</i>	<i>Minimum level of quality</i>	<i>Satisfactory level of quality</i>	<i>High level of quality</i>
4.1. The higher education institution ensures adequate teaching capacities.			X	
4.2. The higher education institution has an objective, transparent and excellence-based procedure of teacher recruitment.				X
4.3. Teacher advancement and re-appointment is based on objective and transparent procedures.				X
4.4. The higher education institution provides support to teachers in their professional development.			X	
4.5. The space, equipment and the entire infrastructure (laboratories, IT services, work facilities etc.) are appropriate for the delivery of study programmes, ensuring the achievement of the intended learning outcomes and the implementation of scientific/artistic activity.				X
4.6. The library and library equipment, including the access to additional resources, ensure the availability of literature and other resources necessary for a high-quality study, research and teaching.				X
4.7. The higher education institution rationally manages its financial resources.				X

<i>Quality grade by standard</i>				
<i>V. Scientific/artistic activity</i>	<i>Unsatisfactory level of quality</i>	<i>Minimum level of quality</i>	<i>Satisfactory level of quality</i>	<i>High level of quality</i>
5.1. Teachers and associates employed at the higher education institution are committed to the achievement of high quality and quantity of scientific research.				X
5.2. The higher education institution provides evidence for the social relevance of its scientific / artistic / professional research and transfer of knowledge.			X	
5.3. Scientific/artistic and professional achievements of the higher education institution are recognized in the regional, national and international context.			X	
5.4. The scientific / artistic activity of the higher education institution is both sustainable and developmental.			X	
5.5. Scientific/artistic and professional activities and achievements of the higher education institution improve the teaching process.			X	

2. Site visit protocol

Monday, 8th January 2018

14:00 – 14:30 Training for the expert panel members – short presentation of ASHE, introduction to the higher education system in Croatia

14:30 – 15:00 Training for the expert panel members – introduction to the re-accreditation procedure, standards for the evaluation of quality and writing the final report

15:00 – 15:15 Break

15:15 – 19:00 Preparation of the expert panel members for the site visit (working on the Self-evaluation)

Tuesday, 9th January 2018

8:45 – 9:00 Coffee with the Management - informal

9:00 – 10:00 Meeting with the dean, vice deans and secretary (*no presentations*)

10:00 – 10:15 *Internal meeting of the panel members*

10:15 – 11:00 Meeting with the working group that compiled the Self-Evaluation

11:00 – 12:00 *Internal meeting of the panel members (Document analysis)*

12:00 – 13:00 Meeting with the students (open meeting)

13:00 – 14:30 *Working lunch*

14:30 – 15:15 Meeting with the *Alumni*

15:15 – 16:00 Meeting with external stakeholders -representatives of professional organisations, business sector/industry sector, professional experts, non-governmental organisations, external lecturers

16:00 - 17:00 Organisation of additional meeting on potential open questions if it is needed

17:30 – 20:00 Joint meeting of the expert panel members – reflection on the day and preparation for the second day of the site visit

Wednesday, 10th January 2018

9:00 – 9:45 Meeting with the vice dean for teaching

9:45 – 11:45 *Internal meeting of the panel members (Document analysis)*

11:45 – 12:30 Meeting with the heads of study programmes

12:30 – 13:15 Meeting with full-time employed teachers (open meeting)

13:15 – 14:45 *Working lunch*

14:45-16:15 Tour of the Faculty (library, student services, international office, IT services, classrooms) and participation in teaching classes

16:15 – 17:00 Organisation of additional meeting on potential open questions if it is needed

17:30 – 20:00 Joint meeting of the expert panel members – reflection on the day and preparation for the second day of the site visit

Thursday, 11th January 2018

9:00 – 9:45 Meeting with the vice dean for research

9:45 – 10:45 *Internal meeting of the panel members (Document analysis)*

10:45 – 11:30 Meeting with the heads of research projects

11:30 – 11:45 *Internal meeting of the panel members*

11:45 – 12:30 Meeting with teaching assistants

12:30 – 14:00 *Working lunch*

14:00–14:45 Organisation of additional meeting on potential open questions if it is needed

14:45 – 15:30 *Internal meeting of the panel members*

15:30 – 15:45 Exit meeting with the dean, vice deans and secretary

16:30 – 20:00 Joint meeting of the expert panel members - Drafting the final report and working on the document Standards for the evaluation of quality

Friday, 12th January 2018

9:30 Joint meeting of the expert panel members - Drafting the final report and working on the document Standards for the evaluation of quality

SUMMARY

The International Expert Panel visited FMENA of the University of Zagreb between 8 and 12 January 2018 with an aim of assessing the institution in accordance with the Accreditation Council criteria.

The panel studied the self-evaluation report submitted by FMENA, examined the data and evidence available in the form of hard copy of sample exam papers, theses, student data, procedures, topic syllabus and learning outcomes etc., interviewed FMENA management board, head of departments, programme leaders, teachers, research assistants, students. The Panel also visited a number of laboratories, teaching classes and the library.

Based on the evidence, The Expert Panel is pleased to recommend that FMENA complies with the requirements for performing activities in accordance with the criteria set by Accreditation Council. The summary of the assessment outcomes in each group of criteria can be listed as

	CRITERIA	Outcome
CRITERIA I	Internal quality assurance and the social role of the higher education institution	High Level of Quality
CRITERIA II	Study programmes	Satisfactory Level of Quality
CRITERIA III	Teaching process and student support	Satisfactory Level of Quality
CRITERIA IV	Teaching and institutional capacities	High Level of Quality
CRITERIA V	Scientific/artistic activity	Satisfactory Level of Quality

The Expert Panel provided analysis and recommendations under each criterion which should be studied and taken into account by FMENA in order to achieve FMENA's strategic aim and objectives to work towards 2025. Some of the key observations and recommendations can be summarised as:

- The expert Panel is pleased to confirm that FMENA has established a high quality system for Quality assurance policy.
- The expert panel was very impressed with the quality of teaching and institutional delivery in light of the poor national funding the Faculty receives.
- The quality and dedication of teachers should be recognised as FMENA's biggest asset.
- Teaching workload of teachers is very high and this point requires urgent attention in terms of reducing the teaching load and balancing equally among all teaching staff. This should be dealt with not only at faculty level but also at national level as the root of the problem comes from the current national policies and strategies.
- Dropout rate within undergraduate programmes is unacceptable at any international standard. The Expert Panel was very surprised that this issue was not addressed and recommend the FMENA management board to address this issue urgently.
- Teaching programmes should be converted from a 7+3 to a 6+4 semester programme with appropriate student loading in line with international norms and

practices. This includes readjusting of ECT by studying other European institutions' norms and practices.