

SELF-EVALUATION REPORT OF THE FACULTY OF NATURAL SCIENCES AND MATHEMATICS OF THE UNIVERSITY OF MARIBOR FOR THE 2011-2012 ACADEMIC YEAR

January 2013

The English version gives the table of contents and
translation of Sect. 7 Quality assurance at FNM.

The full report in Slovenian language is available at http://www.fnm.uni-mb.si/images/files/Samoevalvacijsko_porocilo_FNM_UM_za_letu%202011_2012.pdf
Several tables and Figures can be understood even without translation.

Contents:

1 BASIC INFORMATION ON THE FACULTY	NAPAKA! ZAZNAMEK NI DEFINIRAN.
1.1 FACULTY VISION AND MISSION	NAPAKA! ZAZNAMEK NI DEFINIRAN.
2 FACULTY'S POSITION IN ITS ENVIRONMENT	NAPAKA! ZAZNAMEK NI DEFINIRAN.
2.1 COOPERATION AND LINKS WITH IMMEDIATE AND WIDER ENVIRONMENT - RELATED INSTITUTIONS- UNIVERSITIES, INSTITUTES, BUSINESSES, SCHOOLS	NAPAKA! ZAZNAMEK NI DEFINIRAN.
2.2 INTERNATIONAL COLLABORATION.....	NAPAKA! ZAZNAMEK NI DEFINIRAN.
2.3 FNM AND ALUMNI	NAPAKA! ZAZNAMEK NI DEFINIRAN.
2.3.1 <i>Career centre FNM - CC FNM</i>	<i>Napaka! Zaznamek ni definiran.</i>
2.3.2 <i>Life-long learning Centre FNM - LLLC FNM</i>	<i>Napaka! Zaznamek ni definiran.</i>
3 ACTIVITIES OF HIGHER EDUCATION INSTITUTION	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.1 EDUCATIONAL, SCIENTIFIC, RESEARCH AND PROFESSIONAL OBJECTIVES, STRATEGY OF ACTIVITIES AND DEVELOPMENT OF THE FACULTY	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.2 IMPLEMENTATION OF FNM UM ACTION PLAN OF FROM THE 2011 WORK PLAN AND REVIEW OF REALISATION OF THE FNM UM WORK PLAN FOR 2012.....	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.3 ORGANIZATION OF FNM UM.....	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.3.1 <i>Managing bodies of the Faculty for Natural Sciences and Mathematics of the University of Maribor</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.3.2 <i>Dean's office and secretariat of FNM UM</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.3.3 <i>Implementation of educational and research activities at FNM UM</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.4 SCIENTIFIC, RESEARCH AND PROFESSIONAL WORK	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.4.1 <i>Scientific disciplines</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.4.2 <i>Programmes and projects</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.4.3 <i>Publications of scientific and research work</i> ...	<i>Napaka! Zaznamek ni definiran.</i>
3.4.4 <i>Collaboration with other institutions</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.4.5 <i>Participation of researchers and inclusion of scientific research contents into pedagogical process</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.5 ORGANIZATION AND IMPLEMENTATION OF STUDY PROGRAMMES	NAPAKA! ZAZNAMEK NI DEFINIRAN.
3.5.1 <i>Study programmes at FNM</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.5.2 <i>Type and scope of implemented study programmes</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.5.3 <i>Method of study programme implementation</i> ..	<i>Napaka! Zaznamek ni definiran.</i>
3.5.4 <i>Student mobility</i>	<i>Napaka! Zaznamek ni definiran.</i>
3.5.5 <i>Monitoring student study programme advancement</i>	<i>Napaka! Zaznamek ni definiran.</i>
4 HUMAN RESOURCES.....	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.1 STRUCTURE AND NUMBER OF PARTICIPANTS IN STUDY PROGRAMMES CONDUCTING SCIENTIFIC RESEARCH WORK AT FNM UM	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.2 STRUCTURE AND NUMBER OF SUPPORT STAFF (PROFESSIONAL, ADMINISTRATION AND TECHNICAL STAFF) OF FNM UM	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.3 FNM UM SENATE MEMBERSHIP STRUCTURE	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.4 HABILITATION PROCEDURES AT FNM UM.....	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.5 TEACHER MOBILITY	NAPAKA! ZAZNAMEK NI DEFINIRAN.
4.6 EMPLOYEE JOB SATISFACTION	NAPAKA! ZAZNAMEK NI DEFINIRAN.

- 5 STUDENTSNAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.1 STUDENT INCLUSION IN SCIENTIFIC AND RESEARCH ACTIVITIES**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.2 RECOGNITION OF KNOWLEDGE OBTAINED AT OTHER FACULTIES OR ABROAD **NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.3 STUDENT ORGANIZATION AND PARTICIPATION IN THE FACULTY MANAGEMENT BODIES AND IN THE FACULTY QUALITY IMPROVEMENT**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.4 COMPETENCES, TASKS AND DUTIES OF STUDENTS IN THE FACULTY MANAGEMENT BODIES **NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.5 STUDENT INCLUSION IN EVALUATION AND MODERNISATION OF STUDY PROGRAMMES **NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 5.6 STUDENT ACTIVITIES IN THE CAREER CENTER AND SUPPORT TO GRADUATES WITH JOB HUNTING**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6 MATERIAL CONDITIONSNAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.1 FACILITIES**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.2 INFORMATION, COMMUNICATION AND OTHER IMPORTANT RESEARCH EQUIPMENT OF HIGHER VALUE**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.3 LIBRARY ACTIVITIES.....**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.4 FACILITY OWNERSHIP**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.5 CARE FOR STUDENTS WITH SPECIAL NEEDS**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.6 AVAILABLE FUNDS FOR STUDY PROGRAMMES, SCIENTIFIC AND RESEARCH ACTIVITIES AND OTHER SIMILAR ACTIVITIES**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 6.7 PROVISION OF FINANCIAL, MATERIAL AND OTHER RESOURCES **NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 7 QUALITY ASSURANCE AT THE FNMNAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 7.1 QUALITY ASSURANCE OF STUDY PROGRAMMES AND EVALUATION OF TEACHING..... **NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 7.2 ANALYSIS OF ADVANTAGES AND DISADVANTAGES**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- 7.2.1 *Financing and material circumstances - sufficiency and variety of resources***Napaka! Zaznamek ni definiran.**
- 7.2.2 *Human resources***Napaka! Zaznamek ni definiran.**
- 7.2.3 *Study programme implementation***Napaka! Zaznamek ni definiran.**
- 7.2.4 *Scientific research and professional work*.....**Napaka! Zaznamek ni definiran.**
- 7.3 QUALITY ASSESSMENT OF ALL FACULTY ACTIVITIES AND PROPOSED CORRECTIVE MEASURES**NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 1: WORK PLAN FOR 2012 AND ITS REALISATION . NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 2: STUDY PROGRAMMES.....NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 3: SCIENTIFIC AND RESEARCH PUBLICATIONS..... NAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 4: EMPLOYEE JOB SATISFACTION SURVEY- QUESTIONNAIRE AND RESULTSNAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 5: STUDENT SURVEYNAPAKA! ZAZNAMEK NI DEFINIRAN.**
- APPENDIX 6: INDICATORS OF MONITORING FNM UM ENVIRONMENTAL IMPACT UNDER EMAS IN THE ACADEMIC YEAR 2011/12 ... NAPAKA! ZAZNAMEK NI DEFINIRAN.**

**APPENDIX 7: PERFORMANCE INDICATORS OF LIBRARY ACTIVITIES FOR THE
ACADEMIC YEAR 2011/2012NAPAKA! ZAZNAMEK NI DEFINIRAN.**

7 QUALITY ASSURANCE AT THE FNM

7.1 Quality assurance of study programmes and evaluation of teaching

Efforts to provide high quality study programmes are displayed in the following procedures and activities:

- planning of pedagogical work,
- conducting direct pedagogical work in accordance with study programme accreditations, course curricula and timetable,
- a professor appointed by the department to be the head of a study programme is in charge of the programme,
- planning of teachers' work load,
- effort to ensure optimum work load for professors and students,
- preparation and publication of timetables online and on department notice boards,
- separate offices for undergraduate and postgraduate student affairs,
- regular input of timetable changes (changes in office hours and exam dates) and notification of students and professors,
- timely announcement of exam dates and dates for defence of diploma thesis, Master and doctoral dissertations,
- office hours are announced and held on time,
- management of students' personal documents and monitoring of the accomplished duties,
- publication of calls and support to student exchange,
- publication of calls for scholarships and opportunities for financial study support/grants,
- tutorial system is established,
- lectures on popular science and expert topics for students (e.g. Biological evenings),
- FNM Career Centre activities,
- inclusion of students in research projects,
- provision and access to study literature, lecture notes and practical work/exercise instructions,
- updates and changes in study programmes by following the established formal paths,
- student survey to assess professors and appropriate measures (described in more detail below),
- student survey to assess student's actual work load (described in more detail below),
- analysis of students' progress through academic years,
- reliable and predictable functioning of the student affairs office,
- reliable and predictable activities of the Student Affairs Committee and timely processing of student applications,
- special care for and measures to accommodate students with special needs and status,
- personal relations between students and teachers who are available both in person and by e-mail,
- timely processing of teacher-student issues,
- promotion activities and informing the public on study options at the FNM,
- maintaining the contact with our alumni – ALUMNI Club.

Quality of pedagogical work at the UM is measured by means of the "Pedagogical work questionnaire" conducted by the UM IT Centre. The questionnaire is filled in by students upon enrolment in a higher year. The questionnaire is mandatory for students and is anonymous. It comprises annual assessment of university teachers and other staff involved in teaching courses of the current year. The assessment of individual teachers, submitted by the Student Council FNM on the

basis of the results of representative student questionnaires, is taken into account when deciding on habilitation of academic staff. The questionnaire completed by students in 2011/12 and results of the student questionnaire for 2011/12 are presented in Appendix 5. According to the results the average mark for our pedagogical work is 1.39. Since the results were sent by the UM in a pdf file we cannot compare the FNM with other faculties. We are very pleased with this achievement as we have managed to preserve a high quality of our pedagogical work (the average rating is the same as last year when we ranked at the first place among the UM members).

In 2011/12 some aspects of the questionnaire were improved. This year every employee received an “Individual summarised report on pedagogical work”. Total rating and more detailed information on individual questionnaire categories were given. The report also included students’ comments if they were made. The latter provides teaching staff with direct feedback. To ensure transparency also this year the questionnaire ratings are published and accessible online. In our opinion quality assessment of pedagogical process by means of an electronic student questionnaire, which is conducted by the UM IT Centre (as a result we cannot influence the method of conducting the survey or eliminate errors), has improved. Student feedback is of special value to us as this makes it easier for our staff to improve the study process. Unfortunately, certain issues in the questionnaire are still present; they occur most frequently with courses taught by two or more teachers. Such an example is the questionnaire chapter “Assessment”. With many courses the student's final mark is given by the course head, while under the questionnaire chapter “Assessment” all courses teachers are assessed. Thus in spite of the above mentioned improvements certain issues remain to be resolved. Also the “Questionnaire on student’s actual work load” was completed by students. Based on the results of this questionnaire, the Student Council of member faculties monitors the actual student work load in new study programmes, prepares proposals and plans for quality improvement and suggests the changes of study programmes.

7.2 Analysis of advantages and disadvantages

7.2.1 Financing and material circumstances – sufficiency and variety of resources

The financing of the FNM is still inadequate for the natural sciences and mathematics study process. In the recent years the faculty has managed to survive with the help of additional funds obtained by the Ministry of Higher Education, Science and Technology tenders (later Ministry of Education, Culture, Science and Sport) (development tasks, implementation of the Bologna process) and the funds from the development fund of the UM. In 2012, the FNM received additional funds from the development fund of the UM and funds for short-term balancing. Nevertheless, the prospects for the year-end continue to be negative, as this manner of solving financial issues does not represent a systemic solution for the FNM funding.

The faculty’s scientific research and professional activities continue to grow despite extreme pedagogical and administrative work load of its academic staff. In the 2011/2012 academic year, the faculty funds obtained through various programmes and projects amounted to about 32 % of total funds.

Reduced funding at the end of 2011 was a consequence of completion of the European Social Fund project “Development of Science Competences”. The ministry did not publish tenders for research projects in fundamental scientific research, new postdoctoral projects or target research projects for which we planned to prepare proposals.

Funds obtained from the market represent the smallest share of our financing. It is very difficult to secure additional funds with commercial activities as we are active in the area of basic sciences, natural sciences and mathematics. Typically, our knowledge and skills enable application in other areas which are based on fundamental natural sciences and mathematics, therefore we mostly depend on the funds normally subsidised through tenders published by the Ministry of Education, Culture, Science and Sport. However, this year such tenders were not published. Furthermore, we are not able to secure commercial funding for the teacher training courses. In spite of announced reduction of the European funds we remain hopeful that in 2013 at least some of our proposals will be successful thanks to a large number of planned partnerships in the European projects.

Lack of funding is evident in all the faculty work areas. Due to excessive work load of our employees, insufficient maintenance funding and minimum funds allocated for material expenses to enable the study process (below the level required for smooth conduct of our study process) the faculty recorded a loss at the 2011 year-end, as projected in the financial plan. This is also evident from the analysis of the employee job satisfaction survey. Majority of our employees rated their work equipment as unsatisfactory. The employed researchers are more satisfied as they can finance their equipment with project funds.

Lack of funds means that the FNM academic staff has to take on new duties and additional work, which results in even higher work load and less intensive scientific and research work. In the academic year 2011/12, study programmes at level 2 were introduced. Overburdened teachers are not happy with their salaries, but their dissatisfaction is mostly related to the inappropriate remuneration system throughout the higher education system in Slovenia.

7.2.2 Human resources

Teaching staff

30 per cent of 57 permanently or part-time employed university teachers at the FNM UM hold the position of a full professor. This is an indication of a high quality of study programmes and research work, yet at the same time it represents a substantial financial burden for the faculty. It should also be noted that the number of students per university teacher and assistant at the FNM is by 25 to 50 % higher than at other UM faculties active in the field of natural or technical sciences. A high share of full professors therefore does not indicate an inappropriate position structure (by academic titles), but is rather an indicator of high quality of our employees and at the same time a need to hire younger members of staff.

Despite the study process optimisation (reduced number of contact hours), in the 2011/2012 academic year the pedagogical work load of employees remained too high. Also our young researchers are included in the faculty’s study process.

Academic staff and associates carry out both the undergraduate and postgraduate study process, and professional advancement training. The FNM UM staff structure does not allow fully independent execution of our programmes; as a result we rely on contractual employees of other faculties of the

University of Maribor, and to some extent also on the University of Ljubljana staff as well as on individuals from the business environment. In the 2011/12 academic year the number of contractual staff conducting study programmes almost equalled the number of permanent employees. Participation of staff from other institutions enriches the study programmes, and at the same time it increases the possibility of student participation in the work of different institutions already during the study process. In the case of contractually employed assistants this represents yet another burden for the laboratory staff.

Administration

Lack of staff and work overload issues are present also in the FNM UM support services/administration. A 20 % share of financing for the employees of Miklošič Library FPNM is covered by the FNM. The library employees would like their positions to be harmonised with the UM job system - a title of Independent professional collaborator 7/II. The outdated IT equipment is seen as a serious hindrance for their work. As a solution they propose the library activities to be partially financed from project funds. The FNM Career Centre requires additional staff in order to increase the student responsiveness.

7.2.3 Study programme implementation

All changes of study programmes were accredited in 2011. The changes refer to reduction of contact hours; thus at present the total number of contact hours for study programmes at level one and two amounts to maximum 3100. In the academic year 2011/2012 also the double-major educational study programmes at level 2 “Educational Chemistry” and additional qualification course for teaching natural sciences in years 6 and 7 of primary schools were accredited. Next accreditation of the Physics study programmes at level 1 and 2 is due in the academic year 2012/2013, and in the coming years the renewal of accreditation of all other study programmes will follow.

Based on the statistic data presented in Appendix 2 regarding individual study programmes at level 1 it is possible to conclude the following:

- The numbers of students enrolled in the Bologna study programme Biology is highly satisfactory. The number of study places available was reduced in the academic year 2011/12; however, considering a large interest for the study of biology the quota could have remained 45 as all the places, including additional 8, were filled. We have observed that among the enrolled students there is an increasing share of grammar school students who successfully completed their matura exam.
- We are also very pleased with the number of enrolled students in the Bologna study programme Ecology with nature conservation, as every year since the introduction of the programme all study places have been filled or we have accepted even more students than the initial quota. Similar to biology there is a lot of interest for the study of Ecology with nature conservation and the quota of study places could have remained 45 as in the preceding years. Also this study programme has a very good student structure – majority of enrolled students have completed grammar school. Advancement to the next level is still high,
- Although the number of enrolled students in the study programme Physics in the academic year 2011/2012 grew, it remains small. In the last two years a half of the quota remained vacant. Almost all students have completed high school with the general matura exam and have high average grades.
- We can be pleased with the number of students enrolled in the Bologna study programme Mathematics. About 40 students are still enrolled every year, but a slight downward trend has

been noticeable since the academic year 2009/10. Just over half of the enrolled students are grammar school students. Advancement to the second year is relatively good, but from the second to the third year it is very high. The reason for a relatively high number of first year drop-outs is the demanding nature of the study and different levels of student knowledge obtained previously. As a result the number of students in the second year correlates very closely to the number of students who enrolled in the programme with the first application.

As evident from Appendix 2, since 2008/09 when the previous study programmes were abolished, the number of enrolled students in the educational study programmes dropped significantly. The decrease is particularly noticeable in physics and technical science; these areas have the highest deficit also at the national level. Unfortunately, lack of interest in educational study programmes is present also at level 2 of Bologna system.

Presumably, the factors contributing to the lower number of enrolled students are the following:

- abolishment of state scholarships for teacher education programmes,
- trainee programmes for graduates in pedagogical study programmes are limited and on a voluntary basis,
- lack of teacher employment at primary and secondary schools in Slovenia,
- the respect for the teaching profession is lower,
- low recognition of educational study programmes within the Faculty of Natural Sciences and Mathematics,
- low recognition of educational study programmes carrying the name “Educational ...”
- smaller generations.

According to Appendix 2, the year 4 of the non-Bologna university study programmes were taught for the last time in the academic year 2011/12 and at the same time these programmes finished. Students and the remaining final year students in these programmes will have to produce a seminar and diploma thesis to complete their study. It is necessary to point at the mentorship-related duties of the teaching staff. This means that our professors will continue to mentor these students, but this will not be evident from their pedagogical annual plan; nevertheless, it will represent a work load for them as apart from these students the teachers will mentor the Bologna students at level 2.

In the academic year 2011/2012 three new study programmes at level 2 were offered for the first time (Mathematics, Educational Mathematics, Biology and Ecology with Nature Conservation). The summary of the statistical data presented in Appendix 2 for individual study programmes of level 2 is the following:

- The number of students enrolled in Biology and Ecology with Nature Conservation and Mathematics, the study programmes taught for the first time, is satisfactory. Vacant study places in the first year are a result of many students deciding to take a year to complete their studies at the Bologna level 1. Next year a more numerous enrolment is expected in both study fields.
- The number of students enrolled in the study programmes “Educational Mathematics”, “Educational Design”, “Physics” and “Educational Physics” is and remains very low; in the academic year 2011/12 there were no candidates for “Educational Physics”.

Advantages that are detected in the course of study programmes:

- the work of the academic staff is assessed by students as very good – as evident from Appendix 5,
- developed formal tools and tested methods used to plan and execute pedagogical tasks: direct pedagogical work (lectures, tutorials, lab work, field work), timetables, exam dates, office hours, practical pedagogical training, diploma theses and processing student applications,
- majority of single major study programmes are recognisable and well received,
- developed formal tools and tested methods used to update and modify study programmes,
- a high level of inter-personal relationships, both among employees as well as between our employees and students,
- ability to perform the set tasks together,
- a high interest in study programmes that focus on nature.

Although in the recent years natural sciences and technical studies are gradually gaining popularity, the crisis is still evident in the number of students enrolled in the first year of educational natural sciences and technical study programmes. The available places are normally not filled entirely. Therefore the number of places available in the academic year 2012/13 has been reduced for certain programmes.

Our approach to promotion and recruiting students has been very systematic. As the study at our faculty is known as demanding, it is important that we try to attract as many students with good academic skills as possible.

The FNM Pedagogical Centre (PC FNM) is actively involved in promotion as it represents the “gateway” to high schools. The PC FNM members are constantly in contact with teachers and management of the high schools where our students of educational programmes gain their practical work experience. Various intensive preparation activities are carried out, such as presentations at high schools, different activities prepared by the FNM departments for high school students and the Open door week, which was in 2011/2012 held for the fourth time, traditionally in the last week of January. During the FNM Open door week the faculty hosts a series of interesting presentations, workshops and activities which are supported by promotion, especially aimed at media. In January 2012 about 500 primary and high school students took part in workshops held during the Open door week. For 7 years the Faculty of Natural Sciences and Mathematics has actively participated in the Researchers' night. By presenting their work to the public, the researchers of all our departments promote the study programmes of our faculty.

In the academic year 2011/12 active promotion was carried out also by using social media networks.

At the same time the long-term strategy focusing on promotion of the faculty and its programmes is being implemented. Two questionnaires have been developed to assess the interest of high school students, and based on the outcomes an annual promotion strategy is prepared. We hope that the long-term systematic work and raising awareness among high school students will lead to an increase in willingness to study natural sciences, mathematics and technical science.

As evident from table 7-1, the number of enrolled students in educational study programmes in recent years has continued to fall dramatically. The decrease is particularly noticeable in physics, technical and computer science; these areas have the highest deficit also at the national level.

Table 7-1: Information on the number of students enrolled in the Bologna programmes in the academic years 2009/10, 2010/11, 2011/12 and in the old university educational programmes in the academic year 2008/09

University programmes	2008/09	Bologna programmes	2009/10	2010/11	2011/12
Biology and ...	35	Educational biology	21	31	23
Physics and ...	11	Educational Physics	4	4	5
Chemistry and ...	25	Educational chemistry	14	18	19
Mathematics and ...	24	Educational mathematics	20	18	20
Computer Science and ...	18	Educational Computer Science	9	14	7
Production and technical education and ...	18	Educational technique	11	5	7

A measure introduced last year in order to improve the recognition of our educational study programmes with "Educational" in their name is preparation of a new study programme which will join 12 existing study programmes into a unified Masters study programme called "Subject teacher". This new study programme will improve electiveness and enable triple major study process. Accreditation of the new study programme is planned for the academic year 2012/13.

As evident from table P-1.3 (International activities and participation in European projects) and List 5, in the academic year 2011/2012 the FNM hosted visitors from partner universities; in the given period there were not many exchanges. The number of foreign doctoral students of Physics has grown. The biggest obstacle in developing the incoming student mobility is the teaching language at the FNM – for all the courses at level 1 this is Slovene. As a result guest students from abroad require many individual hours with teaching staff, which is additional burden for all involved. This makes the FNM less attractive as a student exchange destination; on the other hand, with more numerous student exchange the scientific, research and professional work of participating lecturers suffers. At this point it should be mentioned that the faculty's website has been translated into English to support our international co-operation.

7.2.4 Scientific research and professional work

In the area of scientific research work the best results have been achieved by the Institute of Physics. It is followed by the Institute of Mathematics and Computer Science, Institute of Biology, Ecology and Nature Conservation and by the Institute of Modern Technologies. The situation in research field at the two latter institutes is somewhat worrying, particularly in light of the fact that all four institutes have a similar number of researchers and volume of funds allocated for scientific research work. Although the Institute of Mathematics and Computer Science has a slightly bigger number of registered researchers, it has not managed to transform that into a noticeable progress in scientific

research work. It is also interesting to convert the above indicators into the productivity/person ratio. This again results in a practically identical situation.

A comparison with researchers who work for other Slovenian institutions shows that the number of comparable / competitive researchers at the FNM UM is high and that the faculty has a major potential to win both national and international research projects. It is the task of these individuals to apply more actively for various calls and also in this way improve the faculty's financial situation, especially the segment tied to participation in and financing of our scientific research work.

The statistical analysis of data for Slovenia is most useful in order to improve the indicators of efficiency of our scientific research work. Illustration 7-1 shows that the number of pure citations is closely connected with the number of publications. As seen from Illustration 7-2 most frequently cited researchers are not necessarily those who publish only in journals with a high impact factor. This is the case of an optimum ratio between the number of publications and their quality, and it seems that excessive efforts to publish in the most prestigious journals do not lead to the desired results. At this point it is necessary to emphasise that these results have been obtained on the basis of 40-year-long scientific research work of all Slovenian researchers, therefore a possibility of them being subject to any significant statistical errors (arising from either an inadequate or non-representative sample) is highly unlikely. Illustration 7-3 merges the information shown in Illustrations 7-1 and 7-2 and confirms that an optimum proportion of articles is published in acclaimed, but not necessarily most prestigious journals. Therefore the Quality Committee proposes that scientific research at the FNM UM develops in accordance with these findings.

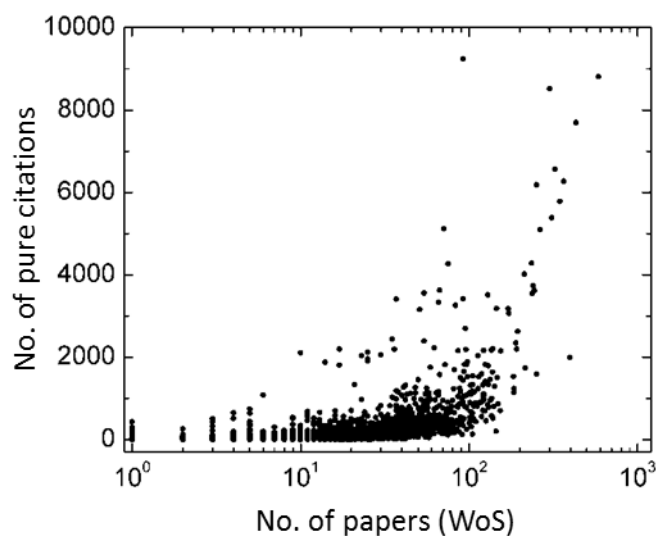


Figure 7-1: Each circle is one Slovenian researcher, whose articles indexed in WoS are shown horizontally and their total number of pure citations is shown vertically. The trend indicates that the most frequently cited Slovenian researchers are those who have had most publications.

Regardless of guidelines for the future, scientific research at the FNM is already well developed. The comparison between last and this year shows an evident increase mainly in the area of application projects and co-operation with businesses. The number of Slovenian research projects and EU projects remains unchanged. It would be advisable to increase the funds from the international environment (ERC and other EU mechanisms); however, as competition in Europe is very strong, this remains our

challenge for the future. As a new faculty we have not fully implemented precise mechanisms for monitoring these activities; nevertheless, in this field we use the ARRS criteria which are very detailed and will in the foreseeable future become valid for all of Slovenia.

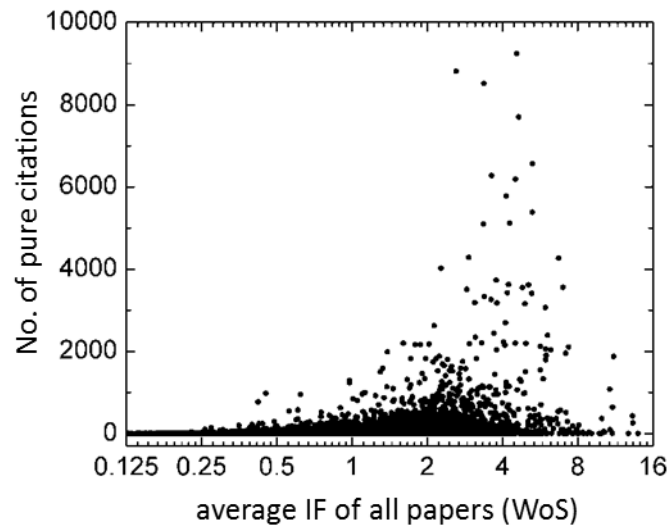


Figure 7-2: Each circle is one Slovenian researcher, whose average Impact Factor of all articles indexed in WoS is shown horizontally and their total number of pure citations is shown vertically. The most frequently cited Slovenian researchers have had more publications in journals with medium (seen globally) impact factors (top between 4 and 6, majority between 2 and 4). There is no evidence of intensive focus on journals with extremely high impact factors leading to either high citations or to other impressive indicators of scientific and research performance/success (h-index and similar.)

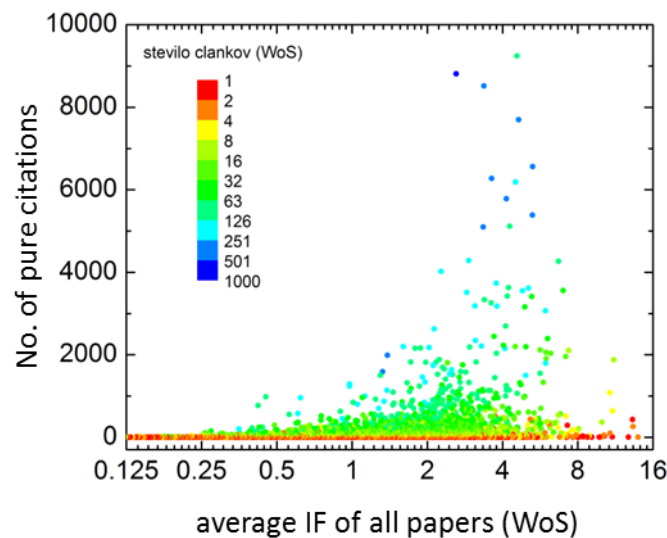


Figure 7-3: Same as Figure 7-2 with the only difference of the colour code that additionally illustrates total number of papers by individual researchers who are indexed in WoS (information under Figure 7-1).

We plan more intensive inclusion of scientific research work in the pedagogical process; this has been possible since 2012 as the former lengthy accreditation procedures of changes through National agency of quality assurance in higher education (NAKVIS) are no longer required.

Additionally, we plan more intensive student participation in research work: we intend to achieve that by building a career path that will help students involved in (target) application projects to find possibilities of using acquired knowledge while including them in research activities in concrete issues. Thus student motivation to learn will improve, applicability of our skills will be promoted and transfer of knowledge onto the economy will be improved.

In the following years it is necessary to ensure “stimulative” research environment which will enable not only pedagogical work of all employees, but also conditions for quality research work. One of the key activities in this area should be easing the burden of individual members of pedagogical staff, which can only be achieved with additional employment, but most of all through suitable optimisation of pedagogical activities implementation. Compared with last year we have had a remarkable success in this segment, which is evident in the growing number of publications and improved indicators of scientific research performance at least of certain institutes that are active in the frame of the FNM UM.

7.3 Quality assessment of all faculty activities and proposed corrective measures

In quality assessment of the FNM UM activities there are two types of factors: those that can be influenced by us, employees, and those that we cannot influence directly.

Scientific research and professional as well as pedagogical activities are the key factors that can be directly influenced by the FNM UM employees. The information included in this report speaks of the excellence achieved in all of the above mentioned areas.

In spite of constant efforts of the faculty management to secure sufficient funds, the financing of the Faculty of Natural Sciences and Mathematics of the UM in the academic year 2011/12 was yet again inadequate for the studies of natural sciences and mathematics, and as a consequence its existence has been threatened. On top of that, due to the economic crisis austerity measures have been adopted by the Ministry of Education, Science and Sports which will undoubtedly lead to lower quality.

Based on the information compiled and presented in this report, the following measures for improvement have been proposed by the Quality Assessment Committee of the FNM UM:

- by transforming the educational study programmes into a more recognisable “Subject teacher” programme increase the number of students enrolled in educational study programmes to such a degree that there will be enough graduates to replace retiring teachers every year,
- procedures and strategies for continuous improvement of quality of pedagogical work should be adopted formally by the faculty (determine quality criteria for the pedagogical work of academic staff; fully analyse students’ academic results and adopt suitable measures for improvement; a plan to reduce work overload of some professors etc.),
- promote life-long learning,
- continue upgrading targeted promotion of less popular study programmes,

- within the Career centre tools for monitoring competences of our graduates and their careers should be developed; also knowledge of and ties with the key partners should be improved,
- retain quality scientific and research activities as a guarantee for improving the UM performance and its Shanghai ranking; intensify participation in international projects as partners in fundamental disciplines and as partners or leaders of life-long learning programmes,
- reduce or eliminate employee dissatisfaction in the areas that proved to be problematic in the employee survey (inappropriate work conditions, low salaries),
- encourage collaboration with economic partners (e.g. in applied mathematics, ecology, medical physics),
- continue intensive promotion activities by using methods popular with the young; raise awareness and recognition of study programmes as well as of the faculty,
- introduce annual interviews of the faculty management with employees,
- the University of Maribor management should provide for adequate funding of the faculty.