



Funded by the  
Erasmus+ Programme  
of the European Union

**DOCMEN**



# Development of two cycle innovative curricula in microelectronic engineering - DOCMEN

North Kazakhstan State University Named After M. Kozybayev

Interim report  
(As of 30/11/2017)

М. Қозыбаев атындағы

Солтүстік Қазақстан мемлекеттік университеті

# 1. OFFICE PROVISION ON SUPPORT AND SERVICES DISTRIBUTION IN MICROELECTRONICS (MICSO)



- The Regulation on the Office for the Support and Dissemination of Services for Microelectronics (MicSO) has been developed and signed.



According to the faculty dean order (No. 33 from 28/02/2017) the Dr. Sci.Tech. Koshekov K.T.. is appointed to be responsible for MicSO work.



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## 2. THE DEVELOPMENT OF ACTIVITY PLAN



Activity plan of measures is worked out on realization of the project on 2016 – 2018 years.



MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN  
NORTH KAZAKHSTAN STATE UNIVERSITY

APPROVED  
Rectector of NSI named after M. Qozymbayev  
M. Qozymbayev  
2016

Plan\*  
of actions "Development of two cycle innovative curricula in microelectronic engineering (DOC MEN)" for 2016 year

No	Activities	Ref No	Term of implementation	Clarification notes
1	Development of the actions plan on the implementation of the research DOC MEN program • definition of faculties and departments – performers; • purpose of sections, responsible for realization; • formation of the research group and definition of the project coordinator from higher education institution.	1.1 - 5.2	18.04.2016	- Define target faculties (institutes), departments/divisions which are interested to participate in the project. - Assign responsible persons for execution of each working package (REF.N1 - REF.N5), if necessary, to create the relevant working groups. - Identify the project coordinator at the University, according to local conditions to organize the project work group (preferably, under participation of university management, target departments/entities, representatives of teachers, students/graduate students)
2	Making a list of valid subjects/courses for analysis and future updates	1.1	29.04.2016	Use valid University courses close to the theme of the project.
3	Development of a catalogue of questions for analysis of existing curricula/disciplines (the questionnaire for the University and a questionnaire for interested non-academic partners)  Develop a schedule to analyze valid disciplines	1.1	17.05.2016	Possible items to prepare a list of questions at the University; the name of discipline, what are the relevant faculties and departments, since which year is discipline taught the number of enrolled students, the balance of practical / theoretical hours and student workload. The existence, year of introduction and "freshness" of technical training tools, computers, software products, educational literature, the use of periodic national, foreign thematic/scientific/technical journals, the availability of trainee position... The practical performance of students in small groups, the number of such works. - Conduct a survey of young professionals / graduates to figure out what competences were especially useful in first time). - Conduct a survey of employers relevant for the graduates of the University to clarify the requirements to competences/ skills of

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### 3. ATTRACTION, DISSEMINATION, SUSTAINABILITY AND USE OF PROJECT RESULTS

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Information on the project was provided:

- at information meeting with students and undergraduates (number of 25 people);
- at a meeting of the Academic council of NKSU named after M. Kozybayev (the protocol No. 6 from 26.02.2016);
- at a meeting of the Academic council of NKSU named after M. Kozybayev (the protocol No. 5 from 02.11.2017);
- at a faculty meeting "Power and Radio Electronics" with the invitation of managers of target departments.



# 4. PROJECT PROMOTION



- The information stand is created.
- The information booklet of the DOCMEN project published with a circulation of 500 copies is developed.
- Information on the project are placed in mass media: the publication of article in the NKSU named after M. Kozymbayev large-circulation student's newspaper "Parasat", No. 2, 7 of April, 2016, No 2,3 of March 2017; the publication of article in the regional newspaper "Northern Kazakhstan", No. 28, 11 of March, 2017. the publication of article in the regional newspaper «Қызылжар нұры». - 2017. – 13 October; the publication of article on a portal Edunews.kz. News of higher school of Kazakhstan. - 2017. - 10 October.
- The update information on the project is posted on the website of NKSU:

<http://www.nkzu.kz/page/view?id=717>.



## 5. STATE OF THE ROOMS FOR MicLABs

- For a laboratory creation on microelectronics (MicLab), the laboratory No. 509-A/4k is taken, which is under the authority of "Power and radio electronics" department of engineering faculty. Address: Petropavlovsk, Pushkin St., 86.
- The regulations for the MicLAB laboratory have been developed and approved.



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MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN  
Министерство образования и науки Республики Казахстан  
M. Kozhbayev NORTH KAZAKHSTAN STATE UNIVERSITY  
СЕВЕРНО-КАЗАХСТАНСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ им. Махамата Козыбаева

APPROVE/ТВЕРЖДАЮ

Rector of M. Kozhbayev NKSU

Ректор СКГУ им. М. Козыбаева

S. Omirbayev

03 2017



REGULATION ABOUT SCIENTIFIC AND EDUCATIONAL LABORATORY ON  
MICROELECTRONIC ENGINEERING (MicLab)  
ПОЛОЖЕНИЕ О НАУЧНО-ОБРАЗОВАТЕЛЬНОЙ ЛАБОРАТОРИИ ПО МИКРОЭЛЕКТРОННОЙ  
ИНЖЕНЕРИИ (MicLab)

It is developed within implementation of the European project  
Разработано в рамках реализации Европейского проекта

Development of two cycle innovative curricula  
in microelectronic engineering (DOC MEN)

according to the program of ERASMUS+ Programme  
по программе ERASMUS+

Capacity Building in Higher Education

(agreement no. 2015 - 3124/001-001,  
project reference no. 561627-EPF-1-2015-1-PL-EPFKA2-CBHE-JP,  
project duration: 15/10/2015 - 14/10/2018)

Petropavlovsk 2017

Responsible for MicLab is the  
associate professor Ritter D. V.

## 6. STATE OF THE ROOMS FOR MicLABs

Due to the financial means of the project the laboratory of MicLAB was equipped by a computer technique and educational laboratory options :

- 1) "Industrial sensors of technological information ";
- 2) "Microcontrollers and microprocessor technique",
- 3) "Study of the personal computer - "Clever house",
- 4) "Digital and microprocessor technique".



# DOC MEN



# 7. DOCMEN PROJECT AGREEMENTS



- The Cooperation agreement within DOCMEN Plus project with “Dinamika zhizni” LLP is undersigned specializing in sale and service of medical equipment.
- The Agreement on Cooperation with the Pavlodar State University named after A.Ya. S.Toraigyrova.



СОГЛАШЕНИЕ "DOC MEN - Plus"

№ .....

СОГЛАШЕНИЕ "DOC MEN-Plus" о взаимодействии по распространению и внедрению результатов проекта ERASMUS+DOC MEN «Разработка двух уровней (Бакалавр, магистр) новых учебных курсов/дисциплин в области микроэлектроники»

Стороны Соглашения

Настоящее Соглашение заключено между организациями: участниками консорциума проекта ERASMUS+DOC MEN, именуемыми в дальнейшем "COOCOMEN", с одной стороны и Павлодарский государственный университет имени С.Тораигырова, 140008, г. Павлодар, ул. Ломача, 64

именуемыми в дальнейшем "CoDOC MEN-Plus", при совместном использовании. Стороны целью распространения, внедрения и развития результатов проекта ERASMUS+DOC MEN.

Предмет Соглашения и действия Сторон.

Стороны решают объединить свои усилия с целью внедрения, распространения и развития результатов проекта ERASMUS+DOC MEN и, в частности, в сфере совершенствования подготовки, повышения квалификации высококвалифицированных специалистов и проведения научных исследований.

С этой целью Стороны настоящего Соглашения договорились о следующих действиях.

- CoDOC MEN:
  - В) поделит CoDOC MEN-Plus информацией о проекте, в том числе:
    - актуальный календарный план активности проекта
    - разработанные по проекту технические и учебные материалы
    - на основе веб-портала проекта <http://www.docmen-project.pl>
- Каждая из сторон CoDOC MEN-Plus:
  - а) организует обучение полученных материалов и разработает план их адаптации и применения в учебном процессе и иные для повышения квалификации профессиональных работников и обучение других заинтересованных групп
  - б) разрабатывает план участия в активности

Cooperation Agreement "DOC MEN - Plus"

№ .....

Cooperation Agreement "DOC MEN - Plus"

Dissemination and implementation of the outcomes of ERASMUS+ project DOC MEN "Development of two cycle innovative curricula in microelectronic engineering"

Parties to the agreement

This is an cooperation agreement among the consortium members of ERASMUS+DOC MEN, hereinafter referred to as "CoDOC MEN-Plus", joint referred as PARTIES

Subject of the agreement

The PARTIES will join their efforts aiming implementation, dissemination and developing of the results of ERASMUS+DOC MEN, particularly in the field of improvement of training high qualified specialists as well as in research activities. For this purpose the PARTIES agree on the following activities:

- CoDOC MEN:
  - a) Will share with CoDOC MEN-Plus information about the above project as the up-to-date timetable of Project activities and teaching/training aids developed during the Project
  - b) Will develop on the base of project portal <http://www.docmen-project.pl>
  - c) a sub domain called "DOC MEN-Plus".
- Every member of CoDOC MEN-Plus:
  - a) Will study the information defined, develop a plan to adopt and implement it at teaching/curriculum to improve training of graduated professional staff
  - b) Will develop a plan for participating at DOC MEN activities, at action on implementation and dissemination of project results (self-reliant actions, if possible joint actions with CoDOC MEN), may participate at

СОГЛАШЕНИЕ "DOC MEN - Plus" Cooperation Agreement "DOC MEN - Plus"

№ .....

6.5. Попоручению участников консорциума проекта ERASMUS+DOC MEN, с одной стороны "COOCOMEN" и Павлодарский государственный университет имени С.Тораигырова, 140008, г. Павлодар, ул. Ломача, 64, с другой стороны, именуемыми в дальнейшем "CoDOC MEN-Plus", при совместном использовании. Стороны целью распространения, внедрения и развития результатов проекта ERASMUS+DOC MEN.

Предмет Соглашения и действия Сторон.

Стороны решают объединить свои усилия с целью внедрения, распространения и развития результатов проекта ERASMUS+DOC MEN и, в частности, в сфере совершенствования подготовки, повышения квалификации высококвалифицированных специалистов и проведения научных исследований.

С этой целью Стороны настоящего Соглашения договорились о следующих действиях.

- CoDOC MEN:
  - В) поделит CoDOC MEN-Plus информацией о проекте, в том числе:
    - актуальный календарный план активности проекта
    - разработанные по проекту технические и учебные материалы
    - на основе веб-портала проекта <http://www.docmen-project.pl>
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  - б) разрабатывает план участия в активности

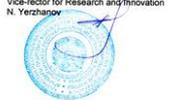
ИСТИ И РЕКВИЗИТЫ СТОРОН  
Essential elements of the PARTIES

"CoDOC MEN-Plus":

S. Toraigirov Pavlodar state university,  
140008, Pavlodar city, Iomov st. 64, Kazakhstan

2017

Vice-rector for Research and Innovation  
N. Yerzhanov



## 8. PUBLISHING THEIR OWN EDUCATIONAL AND METHODICAL MANUALS



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- A monograph "Identification Measurements in Oil and Gas Industry ", of 150 pages are developing to be published now.
- Methodical manuals are planned to develop for the laboratory practical works on the new equipment of MicLAB laboratory, in particular on the microcontroller and microprocessor equipment, industrial sensors.



## 9. ADDITIONAL WORK ON THE PROJECT DOCMEN



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According to DOCMEN project subject-matter two scientists from the leading European higher education institutions were invited for students' and undergraduates' lecturing using funds of NKSU named after M.Kozybayev:

- Videkov V. Hr., Technical university of Sofia (Bulgaria), subject "Technologies of Superficial Installation";
- Tolstoguzov A. B., the Center of physical and technological researches at New university of Lisbon (Portugal), the subject "Micro and Nanomaterials and Modern Technologies in Radio Electronics and Instrument Making".

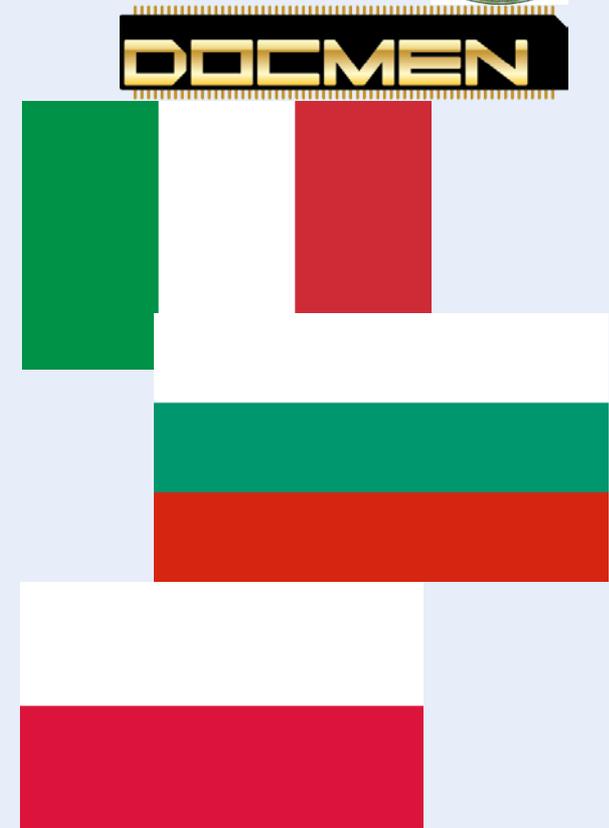


## 10. INTERNSHIPS IN EUROPEAN UNIVERSITIES



According to the approved criteria for teachers casting for the training at the European universities (Protocol No. 6, of 17.03.2017 of meetings of the working group on DOCMEN project) we recommend to direct:

- Technical University Sofia, 19.06.17-30.06.17 – Koshekov K. T., Savostin A. A., Ritter D. V.;
- Politechnic di Torino - 3.07.17-18.07.17 - Koshekov K. T., Savostin A. A., Ritter D. V.
- Cracow University of Technology – 25-29.09.17 – Shevchuk E., Chugunova A.



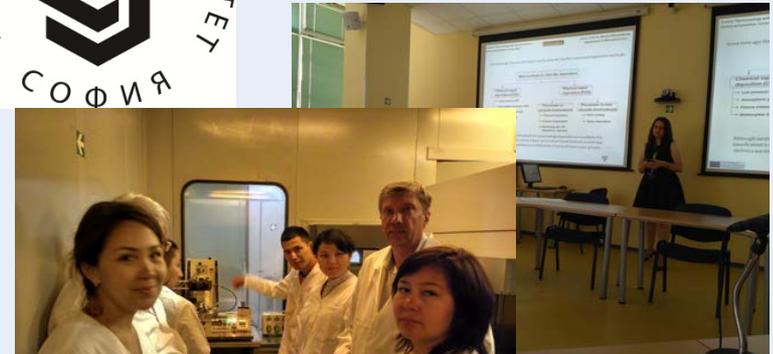
# 11. INTERNSHIPS IN EUROPEAN UNIVERSITIES



## Training at Technical University of Sofia

(19.06.2017 – 30.06.2017)

- Lecture on Nanocoatings and nanostructures.
- Lecture on Computer Added Design in Microelectronics.
- lecture and laboratory in the clean rooms of AMG Technology.
- Laboratory training in the Thin Films Deposition Lab and in the Photolithography and Galvanic Lab.



## 12. INTERNSHIPS IN EUROPEAN UNIVERSITIES



### Training at Politecnico di Torino (01.07.2017 – 21.07.2017)



POLITECNICO  
DI TORINO

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- BIO/CMOS interfaces and co-design.
- Building tomorrow society: NanoElectronics & Photonics.
- Building tomorrow society: IoT applications and data management.



## 13. INTERNSHIPS IN EUROPEAN UNIVERSITIES



### Training at Cracow University of Technology (25.09.2017 – 29.09.2017)

- Microelectronic technologies for alternative sources of energy
- Project management (business planning, funding, marketing, performance)
- ECAD for Microsystems:  
ELECTRONIC DESIGN  
AUTOMATION COURSE
- Soft Skills for Engineers.



## 14. TARGET FACULTIES AND DEPARTMENTS FOR THE IMPLEMENTATION OF THE PROJECT ARE DEFINED



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### 1) **Engineering faculty:**

- «Power and radio electronics», the head of the department - Koshekov K.T.;



### 2) **Faculty of information technologies:**

- «Information systems», the head of the department - Shevchuk E.V.;
- «Physics», the head of the department - Chugunova A.A.

## 15. SPECIALTIES FOR IMPLEMENTATION OF THE PROJECT



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N	Specialties	Department	Coordinators
1	Radio-engineering, electronics and telecommunication	Power and radio electronics	Associate professor Ritter D. V.
2	Power engineering	Power and radio electronics	Doctoral candidate, senior teacher Kashevkin A.A.
3	Instrument making engineering	Power and radio electronics	Associate professor Savostin A.A.
4	Physics	Physics	Associate professor Useinov B. M.
5	Information systems	Information Systems	Doctoral candidate, senior teacher Astapenko N.V.

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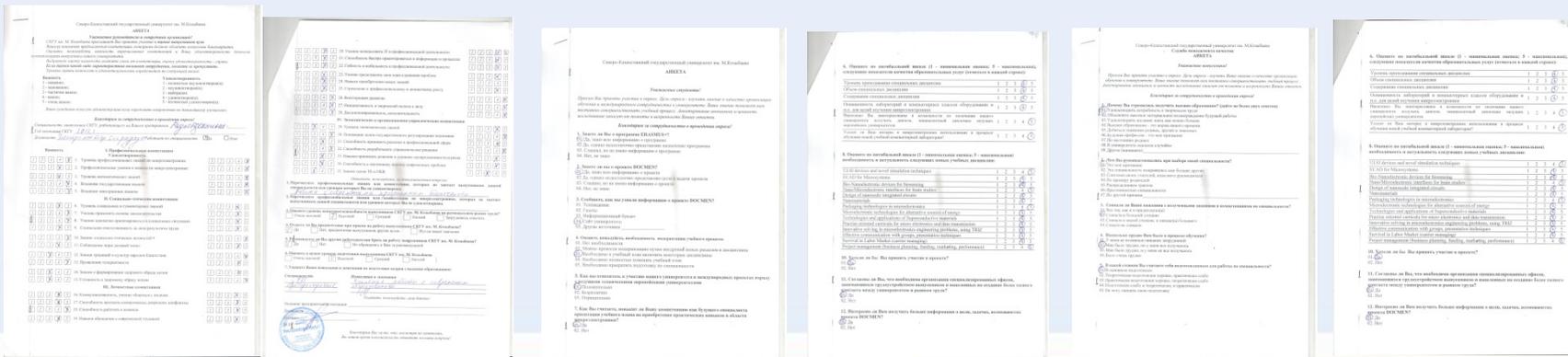


# 17. ANALYSIS OF THE QUESTIONNAIRES



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- The results of the carried-out questioning show that from the graduates' professional qualities the quality of the received education, practical experience, skills, ability to completion and use of the knowledge, especially in the fields of microelectronics is especially appreciated.
- To provide graduates' high competitiveness in a labor market and their successful professional activity, it is necessary to impart to students operational skills with the modern microcontrollers and microprocessors and also with the modern systems of computer-aided and open design of different devices.



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## 18. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Bachelor degree. Radio Engineering, Electronics and Telecommunication</b>		
1. Digital devices and microprocessors (4 ECTS).	Petrov P. A., Depart. PRE, ETF	December, 2017.
2. Computer-aided engineering systems (3 ECTS).	Ritter D. V., Depart. PRE, ETF	December, 2017.
3. Circuitry of analog devices (5 ECTS).	Savostin A. A., Depart. PRE, ETF	December, 2017.
4. Systems of data collection and processing (3 ECTS).	Savostin A. A., Depart. PRE, ETF	December, 2017.

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## 20. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Bachelor degree. Instrument Making Engineering.</b>		
1. Bases of nanotechnologies - BD of EC - 1 course (2 credits, 3 ECTS).	Latypov S. I., depart. PRE, ETF	December, 2017
2. Integral and microprocessor circuit engineering (5 ECTS).	Savostin A. A., depart. PRE, ETF	December, 2017
3. Electrotechnical materials science (3 ECTS).	Kashevkin A. A., depart. PRE, ETF	December, 2017
4. Analog and digital electronic devices (5 ECTS).	Savostin A. A., depart. PRE, ETF	December, 2017

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## 21. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Bachelor degree. Physics</b>		
1. Bases of automatic equipment and computer facilities - PD of EC - the 4th course (3 credits, 5 ECTS).	Useinov B. M., department of Physics, FIT	December, 2017
2. Radio electronics elements in elective courses of physics (5 ECTS).	Useinov B. M., department of Physics, FIT	December, 2017

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## 23. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Magistracy. Radio Engineering, Electronics and Telecommunication</b>		
1. Systems of artificial intelligence (4 ECTS).	Koshekov K. T., department PRE, ETF	December, 2017
2. Modeling of systems (6 ECTS).	Koshekov K. T., department PRE, ETF	December, 2017

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## 24. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Magistracy. Power Engineering</b>		
Systems of artificial intelligence (3 ECTS).	Koshekov K. T., department PRE, ETF	December, 2017

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## 25. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Magistracy. Instrument Making Engineering</b>		
1. The intelligent measuring equipment (5 ECTS).	Koshekov K. T., department PRE, ETF	December, 2017
2. Robotic systems (3 ECTS).	Koshekov K. T., department PRE, ETF	December, 2017

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## 26. DISCIPLINES IMPROVEMENT OF SPECIALTIES



**DOC MEN**

Modernised Curricula/module inclusive ECTS related	Name of responsible teacher, department, faculty	Deadline or planned deadline to accreditation on the university level
<b>Magistracy. Physics</b>		
1. Introduction to materials science (3 ECTS).	Useinov B. M., department of Physics, FIT	December, 2017

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## 27. ACCREDITATION OF NEW ACADEMIC DISCIPLINES



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- Modular educational programs developed at the leading departments are considered in the University Academic committee and approved by Head of the Department of the academic questions.
- Working programs of disciplines (syllabuses) undergo the similar authorization procedure. Pilot teaching is planned to start in 2017-2018 academic year.

## 28. COMMUNICATION BETWEEN CONSORTIUM ORGANIZATIONS



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At the project implementation all current questions on the project promotion were resolved quickly by e-mail, 6 videoconferences with the coordinator and participants of DOCMEN consortium are held. Communication is run at the high level.



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**Thank you for attention!**



**М. Қозыбаев атындағы** 

**Солтүстік Қазақстан мемлекеттік университеті**