Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND)

Project overview by Jaroslaw Makal, coordinator (BUT)

MC Meetings

- (Kick-Off) Poland, 21-22 of June 2021
- **(Project Management) Serbia, June 2022**
- (Project Management) Bulgaria, Sept 2022
- (Management Committee) Poland, May 2023

Main aims to discuss and elaborate:

- missing data in the annual report;
- current state of ICT_EDUPAND implementation;
- what will be the topic of the next meeting and what we should do by that time

ANNUAL REPORT

for National Agency (PL)

1.06.2021 – 31.05.2022 up to 15 of June for my authorities

Missing data:

- website addresses or links to previously developed materials,

- description of activities (in details) supported by the grant for Project Management and Implementation that have been carried out until now.

This grant is used for:

- *achieving the goals and implementation of the project activities, through financial control of the funds by the project financier and financial manager of the partners universities (?). It consists of control of the activity of the teachers through monthly reports for: the hours worked, days and description of the project activities carried out for the respective period and periodical meetings of team members to discuss progress, difficulties encountered and upcoming tasks.*
- *BUT team also used these funds to organize the Kick-Off Meeting in June 2021.*

AIMS

Improving the PBL-method in 8 courses

From June 2021 to September 2022 – training the teachers;

From September/October 2022 to May/June 2023 – applying in indicated courses

4 intellectual outputs

- IO 1 - Resources for teacher training in PBL teaching and assessment methods suitable for pandemic conditions. June 2021 – May 2022

- IO 2 - Digital resources in educating teachers for acquiring new skills related to problem-based methodology. June 2021 – Nov 2022

- IO 3 – Digital teaching resources in selected areas of ICT applicable for a group of problem-based courses. Aug 2021 – March 2023

- IO 4 – Writing textbooks suitable for distance learning in pandemic conditions. Sept 2021 – March 2023

IO 1 - Resources for teacher training in PBL teaching and assessment methods suitable for pandemic conditions.

Start: **June 2021** End: **May 2022**

Leader: NTNU

Realization of IO1 by number of working days

	working days planned	working days reported
NTNU	103 + 5	64,5
UNI	21 + 1	15
UR	21 + 1	20
BUT	42 + 2	0 + 0

All partners: 50,5%

Outputs of IO1 are needed for realisation of IO2-IO4 !

Planned webinars in M4 (Sept 2021), M6 (Nov 2021), M9 (Feb 2022) and M12 (May 2022) for teaching staffs.

Realized:

9 workshops in October 2021

Do we need more workshops related to IO1 ?

IO 2 - Digital resources in educating teachers for acquiring new skills related to problem-based methodology

Start: **June 2021** End: **Nov 2022**

Leader: BUT

Realization of IO2 by number of working days

	working days planned	working days reported
NTNU	32 + 2	8,375
UNI	21 + 1	12,5
UR	21 + 1	14
BUT	222 + 13	170 + 5

All partners: 69,2%

Training of teachers:

planned: - webinars in M5, M6, M9 and M12 (primarly at NTNU and BUT, but also for UR and UNI),

- workshops (collocated with MC meetings) in M12 and M16.

Realized:
2 workshops in October 2021 (Bialystok, in Polish) +1 in November 2021 (Nis) + 2 webinars in February 2022 (BUT)

We plan to make 2-3 more workshops/webinars related to IO2. What are proposals for the topics?

IO 3 – Digital teaching resources in selected areas of ICT applicable for a group of problem-based courses.

Start: Sept 2021 End: March 2023

Leader: UR

Realization of IO3 by number of working days

	working days planned	working days reported
NTNU	36 + 2	33,875
UNI	222 + 16	97,75 + 8
UR	222 + 16	105 + 4
BUT	151 + 11	30 + 0

All partners: 42,3%

8 undergraduate level courses – modernized and adapted to project-based teaching:

1. Electrical Circuits (Basics of Electrical/Electronic Engineering) – BUT with help of NTNU,
2. Internet of Things (Communication Technologies) – BUT with help of UNI,
3. Advanced Mobile Communication Networks – UR with help of UNI,
4. Digital Transformation and Industry 4.0 - UR,
5. Electrical safety, Power System and Smart Grid - UR,
6. Laboratory Practicum – UNI with help of BUT,
7. Networks and Protocols – UNI with help of UR, and
8. Information Theory - UNI.

a) Introduction-to-lecture movies (**NTNU to share experience**)

b) Multimedia teaching presentations

c) Projects Statements

d) Lab exercises

e) Exam tests (**BUT to share experience**)

Indicators (per course):

Number of prepared video materials - 15

Number of multimedia interactive presentations for teaching - 15

Number of lab exercises - 5

Number of project statements - 8

Number of online tests - 10

IO 4 – Writing textbooks suitable for distance learning in pandemic conditions.

Start: Sept 2021 End: March 2023

Leader: UNI

Realization of IO4 by number of working days

	working days planned	working days reported
NTNU	46 + 2	1,25
UNI	207 + 13	92,5 + 5
UR	207 + 13	96 + 1
BUT	207 + 13	180 + 13

All partners: 54,9%

The multimedia interactive books:

1) Collection of practical problems in Telecommunications Measurements (BUT, UNI, …) English and/or native language (*ready before October 2022*)
2) Collection of practical problems in Electrical Engineering (BUT, NTNU, …) English and/or native language (*ready before October 2022*)
3) Advanced Mobile Communication Networks (UR, UNI, …) to be defined the language (*ready before October 2022*)
4) Collection of representative students' projects in partner labs (UNI, …) English language (*projects realized in summer 2021/2022 and winter semester 2022/2023*)

"Multimedia" – active links to movies, presentations, web resources facilitating self learning.

Planned indicators:

Number of prepared books - 4
Number of students' projects finalized and presented in a book – 16

Number of students' papers presented at students' conferences - 10
Number of presentations of projects results at popular events - 4
Number of TV interviews - 8
Number of newspapers articles - 8

Surveys with partners, participating staffs and students
(who and when elaborate the templates for these surveys?)

Three parts (planned activities):

1. Presentation of Norwegian team experience - done in October 2021.

We need the digital materials: examples of semester plans, video lectures, written learning resources, exercises, project descriptions, personal lab equipment, exams and assessment documents, etc.

Three parts (planned activities) suite …

2. Training the teaching staff (short courses, webinars, consultations, etc.) – Nov 2021 – Feb 2022 (also possible in October 2022).

3. Review and assessment of the concepts and resources elaborated and prepared by teachers to provide the PBL method in practice – May 2022 (???). Who and when ???

What will be the topic of the next meeting and what we should do by that time?

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Lets start the discussion . . .

ICT-EDUPAND
NTNUs activities and future plans

2nd project meeting in Niš

Summary of NTNUs work

- Workshop series in October 2021
  - prepared lectures to summarize NTNU´s team experience with problem-based learning
  - organized workshops demonstrating use of some online collaboration tools
  - edited and annotated workshop recordings for easy navigation

- Translated selected materials from problem-based courses (ADE, ESDA 1/2)
  - semester plans, video lectures, compendium
  - exercises, ERT-sessions, design problems
  - exams (written and oral) and assessment documents
  - content and use of personal lab equipment

NTNU– future plans

- Finalize the translation and organization of selected materials (summer 2022)
- Serve as discussion partners/mentors for course development at partner universities (2022/23)
- Contribute to the textbook on practical problems in Electric Enginering (autumn 2022)
- Contribute to local conferences at partner countries
- Organize a multiplier event at NTNU (spring 2022)

Practical information

- ICT-EDUPAND project webpage: https://ictedupand.pb.edu.pl
- Google disk for sharing documents: https://drive.google.com/drive/folders/1UBGy62SrxsCFDRwHHU-vGedXXWQlhfTr?usp=sharing
- Link to overleaf: https://www.overleaf.com/2133657382zgjmrmjgpffq
- Mathematics (TMA4106, spring 22)
  - https://wiki.math.ntnu.no/tma4106/2022v
  - ERT example: https://folk.ntnu.no/mortano/ert/19.pdf

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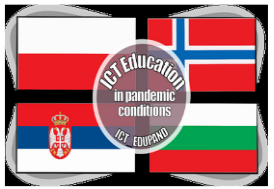
Results/Plans of UR staff concerning IO1-IO4

https://ictedupand.pb.edu.pl

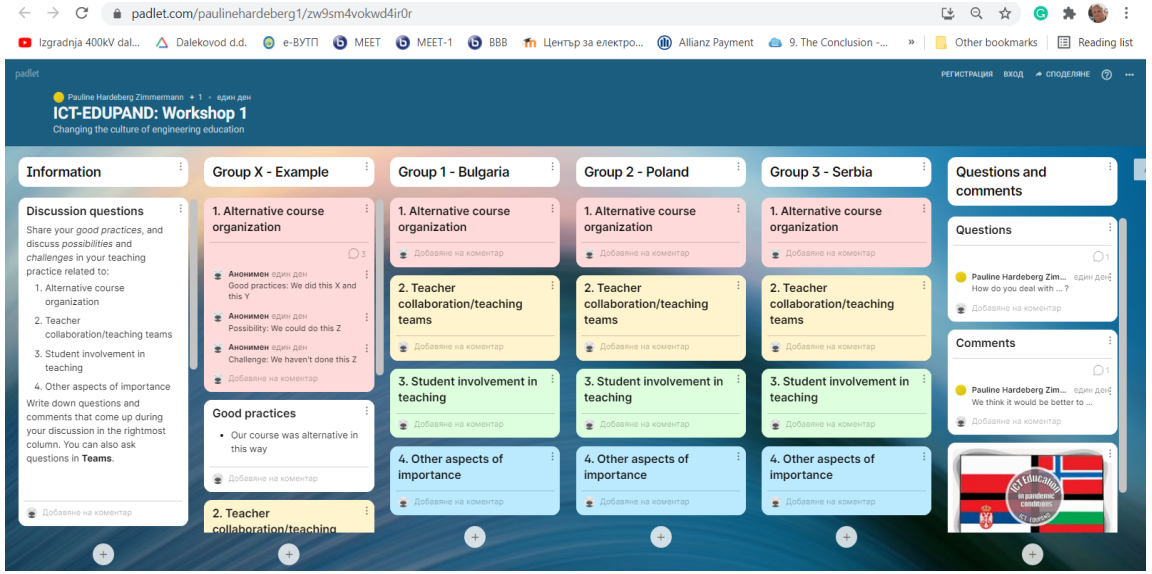


UR team members:

- Teodor Iliev
- Ivaylo Stoyanov
- Yordan Doichnov
- Elena Ivanova
- Ivanka Tsvetkova
- Vencislav Keseev
- Petya Arnaudova
- Iana Kraleva
- Ludmila Dimitrova
- Ivanka Firkova
- Plamenka Varlinkova-Atanasova

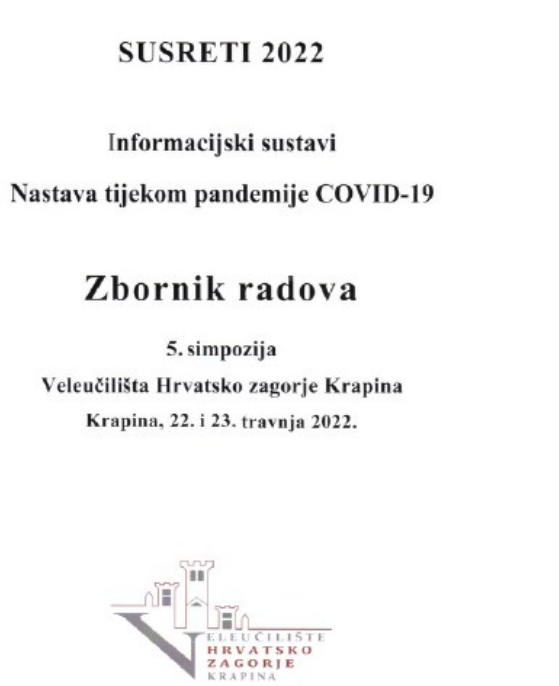
IO 1:

- Analysis of software platforms for e-education
- Improvement of the qualification of teachers from the University of Ruse by participating in a workshops
- Academics from different departments attend to the workshops



IO 1:

- Publication of two conference papers



IO 2:

- Presentation skills for teachers educating engineers
- Analysis of suitable presentation system for education
- Analysis of software platforms for e-education

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How to make a good presentation?

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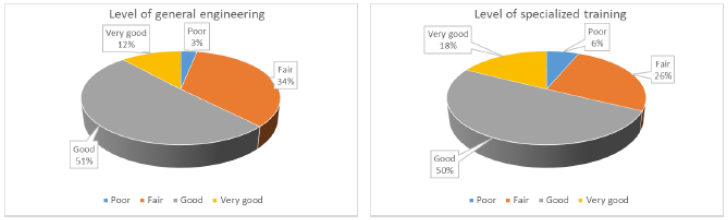
Modern Teaching Methods & Digital Platform for e-Learning

https://ictedupand.pb.edu.pl

IO 3:

- Analysis of the needs for new knowledge and skills of students and teachers (surveys)

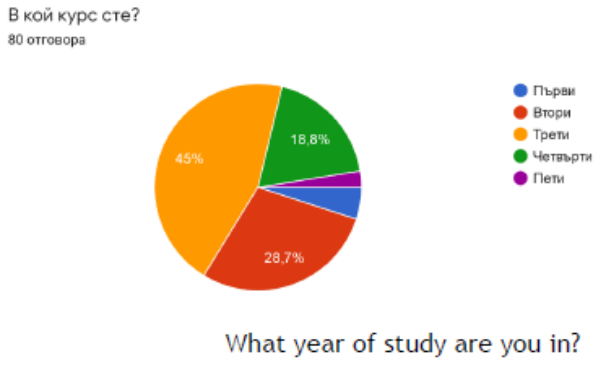


a b

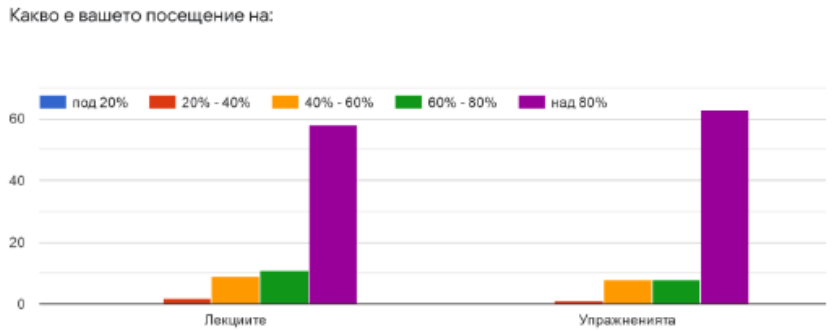
FIG. 1. Level of general engineering (a) and specialized training (b)

The analysis of the obtained results shows that the graduating students have:

- good skills and qualities for teamwork (74%);
- average level of organizational skills (58%);
- relatively good abilities for independent work (47%)..



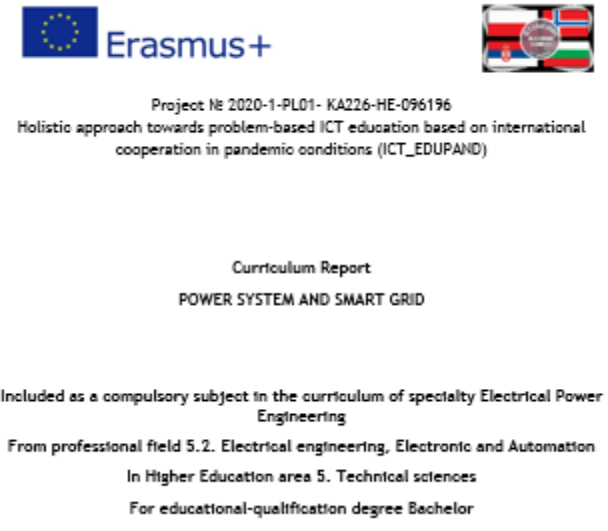
What year of study are you in?



What is your attendance at
Lectures
Exercises
Below 20%
Above 80%

IO 3:

- Consulting curriculums
  1. Advanced Mobile Communication Networks
  2. Electrical Safety
  3. Power systems and smart grid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Curriculum Report

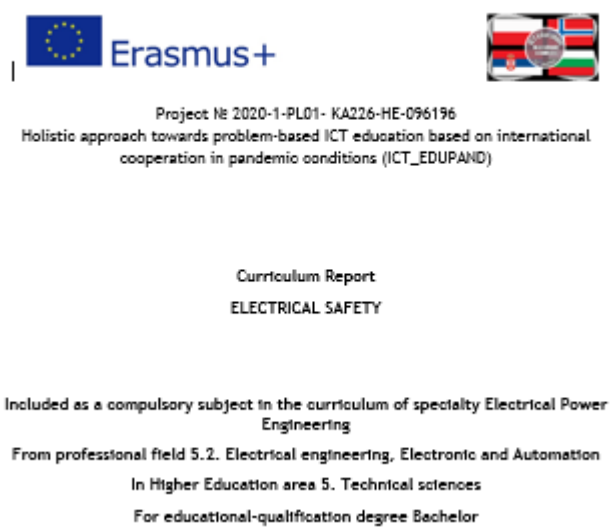
POWER SYSTEM AND SMART GRID

Included as a compulsory subject in the curriculum of specialty Electrical Power Engineering

From professional field 5.2. Electrical engineering, Electronic and Automation

In Higher Education area 5. Technical sciences

For educational-qualification degree Bachelor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Curriculum Report

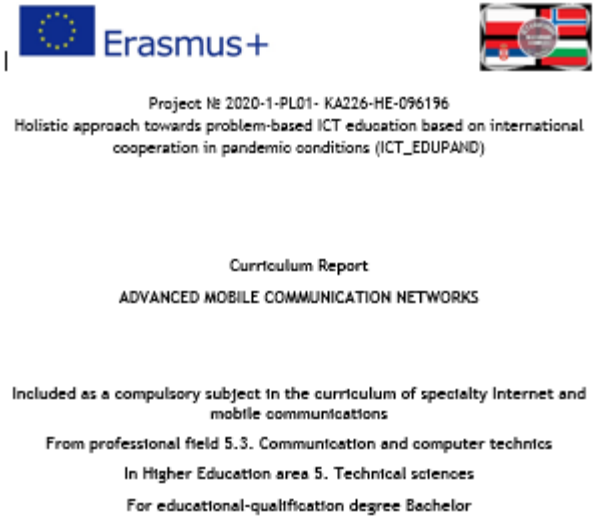
ELECTRICAL SAFETY

Included as a compulsory subject in the curriculum of specialty Electrical Power Engineering

From professional field 5.2. Electrical engineering, Electronic and Automation

In Higher Education area 5. Technical sciences

For educational-qualification degree Bachelor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Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND)

Curriculum Report

ADVANCED MOBILE COMMUNICATION NETWORKS

Included as a compulsory subject in the curriculum of specialty Internet and mobile communications

From professional field 5.3. Communication and computer technics

In Higher Education area 5. Technical sciences

For educational-qualification degree Bachelor

Multimedia interactive presentations :

1. Presentations (incl. questions, polls, quizzes, slides, images, gifs, movies, and etc.)
2. Supporting software programs for PC or smartphone.
3. Publish on the online teaching/e-learning platforms

IO 3:

- Good practices from:
  - Project partners
  - The CEO of the company ELSTART Ltd indicate the necessary knowledge, skills and competencies that graduate engineers must have for more successful and faster professional realization

IO 3:

- Innovation project’s topics:
  - Design of overhead power line HV, MV and LV;
  - Station design and layout of station switchgear;
  - Design of switching and safety devices;
  - Monitoring system for PVS;
  - LV switchgear: functions &selection.LV circuit breaker;
  - Earthing Schemes - TT, TN, IT;
  - Residual Current Devices;
  - Protection against power surges in LV;
  - FSO as a backhaul for the 5G network.

IO 3:

- Advanced mobile communication networks:

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ADVANCED MOBILE COMMUNICATION NETWORKS

Topic 2. Radio Propagation of the signal

TUTOR'S INSTRUCTION

Objective: To determine whet
distribution, how shading and
and to investigate some paran

Tasks:

1. Determine whether th
   distribution.
2. Determine how shadin
   sequence.
3. Investigate some param

1 task:

To perform the first task, th
is associated with a small fragment
obtained under conditions of unifo
measured.

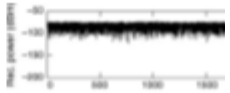

Fig. 1 Information fr

One option to record the me
as shown in Fig. 1. This can be reco
In other cases, the measured sequ
digital converter, which must be
series are set with their phase and

The series11.mat file consists of a matrix with two columns, the first being the time axis in seconds and the second column the power in dBm.

Draw the Rayleigh density function (Rayleigh pdf), which is shown in Fig. 2. By integrating this function, the cumulative distribution function (CDF) can be obtained as:

CDF(R) = Prob(r<R) (1)

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ADVANCED MOBILE COMMUNICATION NETWORKS

Topic 3. Basic properties of multipath wireless channels

Theory for self-preparation

Theory for self-preparation

1. J. D. Parsons, "The Mobile Radio Propagation Channel", 2nd edition, John Wiley & Sons, Ltd, Chichester, UK, 2000.
2. J. H. Whitteker, "Fresnel-Kirchhoff theory applied to terrain diffraction problems", Radio Sci., 25(5), pp. 837-851, 1990.
3. J. Amutha, J. Nagar, and S. Sharma, "A distributed border surveillance (dbs) system for rectangular and circular region of interest with wireless sensor networks in shadowed environments", Wireless Personal Communications, 117 (3), pp. 2135-2155, 2021.
4. S. Singh, S. L. Sunkara, I. Güvenç, A. Bhuyan, H. Dai, and M. L. Sichitiu, "Spectrum reuse among aerial and ground users in mmWave cellular networks in urban settings", in 2020 IEEE 17th Annual Consumer Communications & Networking Conference (CCNC), IEEE, pp. 1-6, 2020.
5. L. Ahumada, E. Carreno, A. Angles, D. Schkolnik, "Shadowing correlation: empirical results for mm-wave wireless links in urban street canyons", IEEE Antennas and Wireless Propagation Letters, 17 (4), pp. 543-546, 2018.
6. https://www.mathworks.com/matlabcentral/fileexchange/2225-basic-diffraction-models?s_tid=srchtitle_knife%20edge%20model%20_1
7. https://www.mathworks.com/help/antenna/ref/propagationmodel.html

IO 3:

- Advanced mobile communication networks:

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ADVANCED MOBILE COMMUNICATION NETWORKS

Topic 5. Cellular architectures

Exercise

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Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND)

ADVANCED MOBILE COMMUNICATION NETWORKS

Topic 2. Radio Propagation of the signal

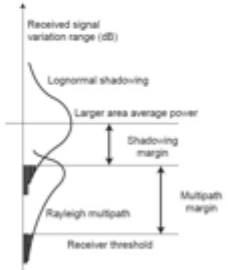
Protocol

Objective: to investigate the coverage and impact of ir

Tasks:

1. Generate realistic series with road losses and sha
2. Generate partially cross-correlated shaded series.
3. Examine the coverage over an area.
4. Investigate the effects of multiple noise sources.

You will study the shading that causes signal delays and var exercises, you will first synthesize the signal series. In this cas drawn as a function of the distance traveled.
Assume that fast variations have been filtered out and only variations remain. When comparing series produced in this way for execution or in a scenario with limited noise or interference, changes are taken into account, using already changed thresh variations. This is illustrated in Fig. 1.



Фиг. 1 Fast and slow variations, and the corresponding threshold

The Hatta model is a version of the Okumura model developed for use in computerized coverage forecasting tools. Hatta obtained mathematical expressions by adapting the empirical curves provided by Okumura. Expressions for calculating road loss, L (dB) (between isotropic antennas) for urban, suburban and rural environments are presented.

Objective: To determine whether the pre-simulated sequence has a Rayleig distribution, how shading and multiplicity affect the pre-simulated sequenc and to investigate some parameters of the complex envelope sequence.

Tasks:

1. Determine whether the pre-simulated sequence has a Rayleig distribution.
2. Determine how shading and multipath affect the pre-simulate sequence.
3. Investigate some parameters of the complex envelope sequence.

1 task:

To perform the first task, the file *series11.mat* is used, which is shown in Fig. 1.

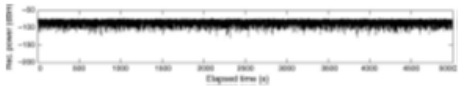


Fig. 1 Information from series11.mat used in the first project

One option to record the measured sequences is in units of dB or dBm (dB to 1 mW as shown in Fig. 1.

Draw the Rayleigh density function (Rayleigh pdf), which is shown in Fig. 2. I integrating this function, the cumulative distribution function (CDF) can be obtained as

$$CDF(R) = Prob(r \le R) \quad (1)$$

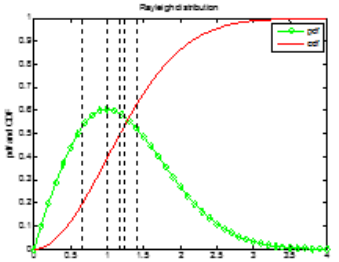


Fig. 2 Function for probability density and cumulative distribution for Relight

IO 3:

Data Transmission

The VLC : Visible Light Communication

Published by Sami BENRAHMA and Alexis MARIE
sami10benrahma@gmail.com
alexismarie2@live.fr

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ECE

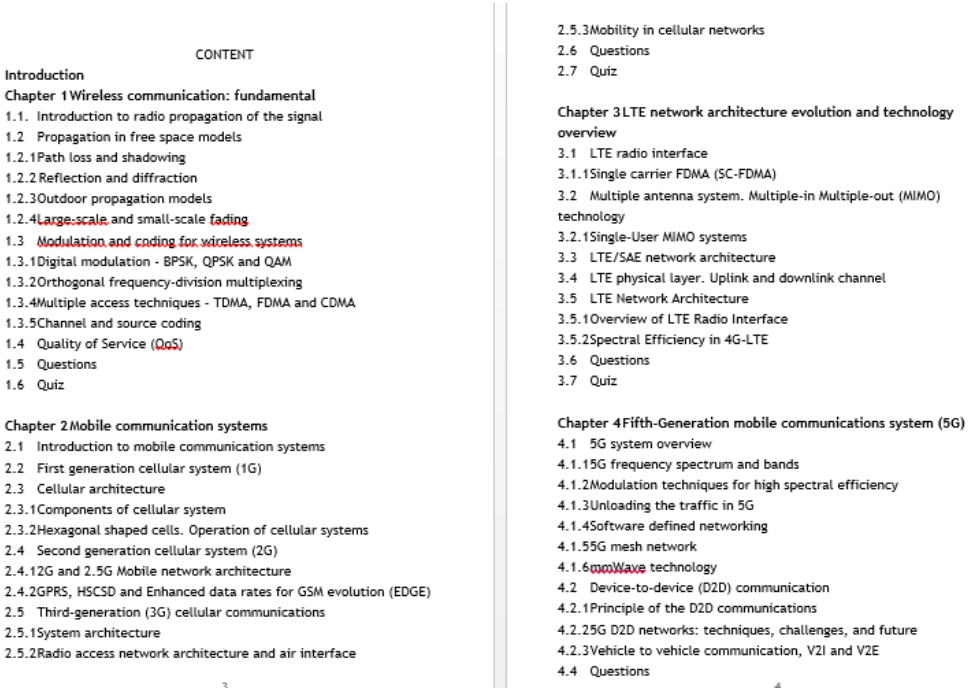
SUMMARY

IO 4:

- Textbook Advanced Mobile communication networks
  - Cover page

IO 4:

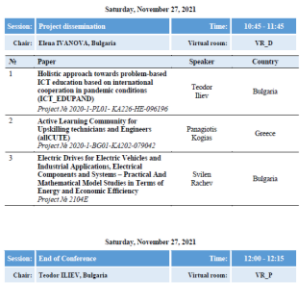
- Textbook Advanced Mobile communication networks
  - Chapter: Fifth-Generation mobile communications system (5G)
  - Chapter: Requirements and key trends of the future mobile networks



CONTENT

Promotion actions:

- Information on UR website, news websites, newspapers.
- Attendance to the conference, session: Project dissemination



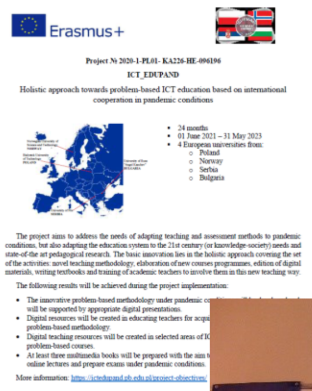
Saturday, November 27, 2021

Session:	Project dissemination	Time:	10:45 - 11:45
Chair:	Elena IVANOVA, Bulgaria	Virtual room:	VR_D

№	Paper	Speaker	Country
1	**Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND)** *Project № 2020-1-PL01- KA226-HE-096196*	Teodor Iliev	Bulgaria
2	**Active Learning Community for Upskilling technicians and Engineers (allCUTE)** *Project № 2020-1-BG01-KA202-079042*	Panagiotis Kogias	Greece
3	**Electric Drives for Electric Vehicles and Industrial Applications, Electrical Components and Systems – Practical And Mathematical Model Studies in Terms of Energy and Economic Efficiency** *Project № 2104E*	Svilen Rachev	Bulgaria

Saturday, November 27, 2021

Session:	End of Conference	Time:	12:00 - 12:15
Chair:	Teodor ILIEV, Bulgaria	Virtual room:	VR_P



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Project № 2020-1-PL01- KA226-HE-096196

ICT_EDUPAND

Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions

- 24 months
- 01 June 2021 – 31 May 2023
- 4 European universities from:
  - Poland
  - Norway
  - Serbia
  - Bulgaria

The project aims to address the needs of adapting teaching and assessment methods to pandemic conditions, but also adapting the education system to the 21st century (or knowledge-society) needs and state-of-the art pedagogical research. The basic innovation lies in the holistic approach covering the set of the activities: novel teaching methodology, elaboration of new courses programmes, edition of digital materials, writing textbooks and training of academic teachers to involve them in this new teaching way.

The following results will be achieved during the project implementation:

- The innovative problem-based methodology under pandemic co[...] will be supported by appropriate digital presentations.
- Digital resources will be created in educating teachers for acqui[...] problem-based methodology.
- Digital teaching resources will be created in selected areas of IC[...] problem-based courses.
- At least three multimedia books will be prepared with the aim t[...] online lectures and prepare exams under pandemic conditions.

More information: https://ictedupand.pb.edu.pl/project-objectives/

8 СТУДЕНТСКА ИСКРА ФЕВРУАРИ 2022

Иновативни прояви и проекти

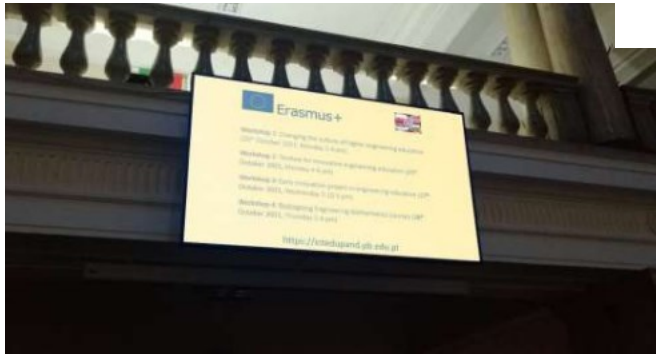
Обучение по социално предприемачество

Семинар по програма „Интелигентно животновъдство“

Проект ASEAN FACTORI 4.0

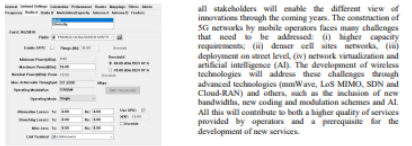
Проект ICT_EDUPAND 2020-1-PL01-KA226-HE-096196

Споразумение за сътрудничество с АЕЦ „Козлодуй“



Dissemination:

- Participation in conferences Mipro‘2021, Mipro‘2022, CIEES‘2021, Susreti‘2022



Data Traffic Models for Broadband Backbone in 5G Networks

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***Abstract* - Broadband backbone for the 5-th generation networks is essential for QoS to the end customer. It must be fulfilled in any conditions. The Quality of Service (QoS), that must be observed in this type of network is the probability of blocking, less than 10^{-6}. Considering the ultra-high speed, it is not allowed any technical problem. The construction of the traceroute and the selection of devices, must take into account many different parameters, such as reliability, price, terrain, climatic features, region and loads. MINI-LINK 6352 is one of the devices, which supports those conditions. Traffic models, queue and the parameters of equipment is presented in the paper, as a part of broadband network traceroute in the North Bulgaria.**

Keywords – Quality of Service, manW, mWave, R4N

I. INTRODUCTION

Today, we all depend on the quality of service and quality of excellence, the speed of our access to the global Internet world. Almost all of the learners and the students need constant connections with their teachers and advisors, the big part of the business already works distantly from home, the players and work clouds, the smart buildings, the e-health critical applications. And the last but not least, the Industry automation 4.0 is already entering more and more industrial units. The quality of service has to be fulfilled to the end customer, regardless of its type.

The quality of service of the backbone structures that must be achieved during transmission is less then 10^{-12}. The delay and blocking on the backbone network is unacceptable, in the conditions that are working today [1].

The traffic queues for less delay variation are sensitive to the traffic of the TCP/IP. Those protocols have a congestion avoidance mechanism that is based on buffer utilization. A high link utilization must be provided, high TCP goodput, queues configured to handle this type of traffic needs to be in the area of hundreds of milliseconds at the smallest congestion point, equivalent to the network end-to-end Round-Trip time [2].

Microwave links operate with large fade margins and forward error correction resulting in low residual BER level, typically 10^{-12}, the quality of service for those part of the network must be fulfilled. In the paper is cited the classification mechanism, the work of the chosen devices.

The last part of the paper presents some pictures of the real installation and the needed parameters of the installed devices MINI-LINK 6352 in North Bulgaria, a part of renewing and preparing the network for the next generation networks for the one of the biggest mobile providers in the country [3, 4].

II. QUALITY OF SERVICE

Quality of Service (QoS) is a set of mechanisms that makes it possible to prioritize the frames depending on traffic type, and to make sure that the capacity is sufficient to guarantee the network free of congestion. QoS is an alternative to overprovisioning the network. A network is logically separated in an operator domain and one or more customer domains. The priority of a frame in an end-to-end connection can be different in different parts of the network. Customers set the priority to use in their domains, and the operator sets the priority to use in the operator domain [2, 4].

Figure 1 shows an overview of the QoS mechanisms that the packet radio supports. It is shown the ingression of the frames to classification part, choosing the priority by the operator with mapping tables, the possible dropping of some frames till the end of the cycle in the shaping buffer [2].

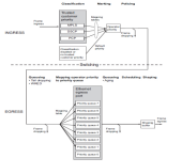

Figure 1. QoS mechanisms supporting by packet radio

all stakeholders will enable the different view of innovations through the coming years. The construction of 5G networks by mobile operators faces many challenges that need to be addressed: (i) higher capacity requirements; (ii) denser cell sites networks, (iii) deployment on street level, (iv) network virtualization and artificial intelligence (AI). The development of wireless technologies will address these challenges through advanced technologies (mmWave, LoS MIMO, SDN and Cloud-RAN) and others, such as the inclusion of new bandwidths, new coding and modulation schemes and AI. All this will contribute to both a higher quality of services provided by operators and a prerequisite for the development of new services.

ACKNOWLEDGMENT

This work is also partially supported by the EC Project 2020-1-PL01-KA226-HE-096196, project title: "Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions".

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SUSRETI 2022

Informacijski sustavi

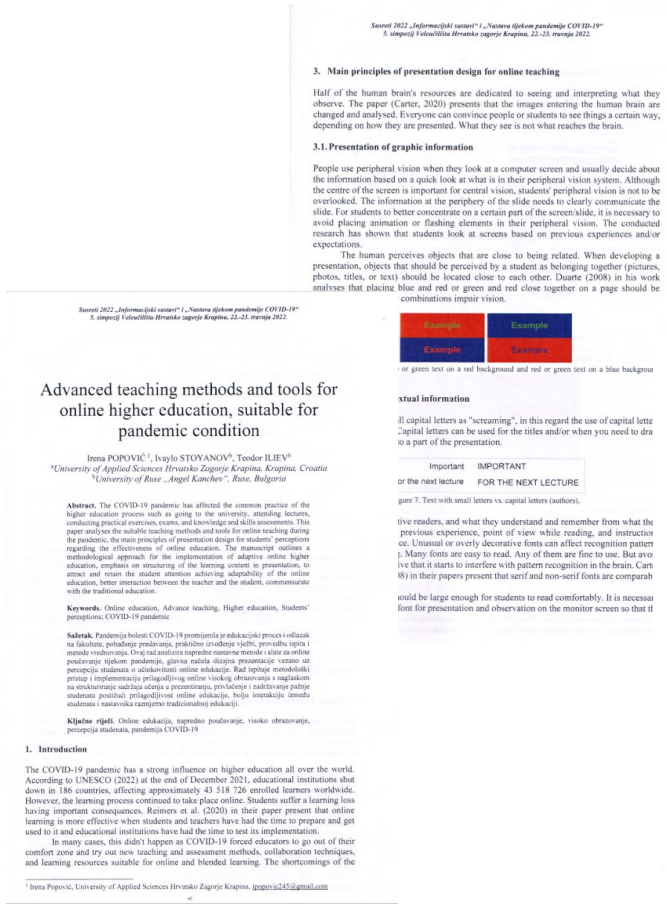
Nastava tijekom pandemije COVID-19

Zbornik radova

5. simpozija

Veleučilišta Hrvatsko zagorje Krapina

Krapina, 22. i 23. travnja 2022.



Advanced teaching methods and tools for online higher education, suitable for pandemic condition

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[b]University of Ruse „Angel Kanchev", Ruse, Bulgaria

Abstract. The COVID-19 pandemic has affected the common practice of the higher education process such as going to the university, attending lectures, conducting practical exercises, exams, and knowledge and skills assessments. This paper analyses the suitable teaching methods and tools for online teaching during the pandemic, the main principles of presentation design for students' perceptions regarding the effectiveness of online education. The manuscript outlines a methodological approach for the implementation of adaptive online higher education, emphasis on structuring of the learning content in presentation, to attract and retain the student attention achieving adaptability of the online education, better interaction between the teacher and the student, commensurate with the traditional education.

Keywords. Online education, Advance teaching, Higher education, Students' perceptions; COVID-19 pandemic

Sažetak. Pandemija bolesti COVID-19 promijenila je edukacijski proces i oblazak na fakultete, pohađanje predavanja, praktično izvođenje vježbi, provedbu ispita i metode vrednovanja. Ovaj rad analizira napredne nastavne metode i alate za online poučavanje tijekom pandemije, glavna načela dizajna prezentacije vezano uz percepciju studenata o učinkovitosti online edukacije. Rad ispituje metodološki pristup i implementaciju prilagodljivog online visokog obrazovanja s naglaskom na strukturiranju sadržaja učenja u prezentiranju, privlačenje i zadržavanje pažnje studenata postižući prilagodljivost online edukacije, bolju interakciju između studenata i nastavnika razmjerno tradicionalnoj edukaciji.

Ključne riječi. Online edukacija, napredno poučavanje, visoko obrazovanje, percepcija studenata, pandemija COVID-19

1. Introduction

The COVID-19 pandemic has a strong influence on higher education all over the world. According to UNESCO (2022) at the end of December 2021, educational institutions shut down in 186 countries, affecting approximately 43 518 726 enrolled learners worldwide. However, the learning process continued to take place online. Students suffer a learning loss having important consequences. Reimers et al. (2020) in their paper present that online learning is more effective when students and teachers have had the time to prepare and get used to it and educational institutions have had the time to test its implementation.

In many cases, this didn't happen as COVID-19 forced educators to go out of their comfort zone and try out new teaching and assessment methods, collaboration techniques, and learning resources suitable for online and blended learning. The shortcomings of the

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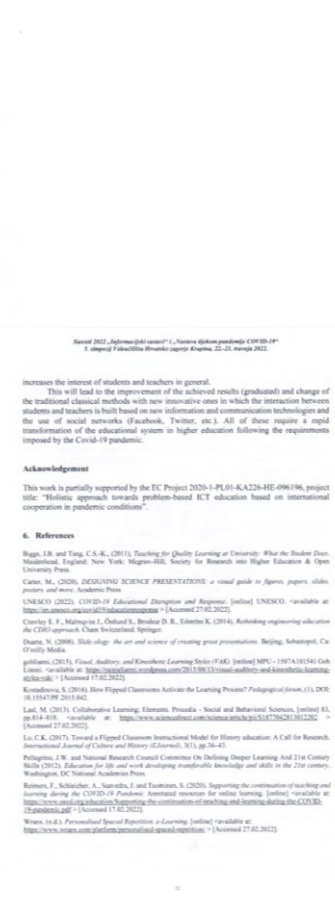

Management:

- Monthly meetings, financial control

Erasmus+

MEETING REPORT

Today, 17 September 2021 at the University of Ruse "Angel Kanchev" was conducted a working meeting by Project № 2020-1-PL01- KA226-HE-096196: Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND). All members of the working team were present.

Agenda

1. Discussion about IO4 - content and cover page of the textbook
2. Discussion about IO3 - curriculums
3. Current tasks

The meeting was opened by the Project coordinator for the University of Ruse "A Kanchev" Assoc. Prof. Teodor Iliev.

Item 1. Assoc. Prof. Yordan Doychinov presented the draft project of the cover p of the textbook Advanced Mobile Communication Networks.

Item 2. Assist. Prof. Ivaylo Stoyanov introduced the required materials documentation for the subjects Electrical Safety, Power Systems and Smart Grid Advanced Mobile Communication Networks.

Item 3. The next working meeting was scheduled for 01 October 2021.

The agenda being exhausted, the meeting was adjourned.

Assoc. Prof. Ivaylo STOYANOV
Secretary of the meeting

Assoc. Prof. Teodor ILIEV
Project coordinator for the University of Ruse

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Project: Holistic approach towards problem-based ICT education based on international cooperation in pandemic
Project Acronym: ICT_EDUPAND
Project №: 2020-1-PL01- KA226-HE-096196
Event Name: Working meeting
Place: University of Ruse "Angel Kanchev", Bulgaria
Data: 17.09.2021

List of Participants

№	Full Name	Position	Institution	e-mail
1.	Teodos Iliev	Assoc. Prof.	UR	tiliev@uni-ruse.bg
2.	Ivaylo Stoyanov	Assoc. Prof.	UR	stoyanov@uni-ruse.bg
3.	Yordan Doychinov	Assoc. Prof.	UR	doichinov@uni-ruse.bg
4.	Elena Ivanova	Assist. Prof.	University of Ruse	eivanova@uni-ruse.bg
5.				
6.				

1

РУСЕНСКИ УНИВЕРСИТЕТ „АНГЕЛ КЪНЧЕВ"
75 години с лице към знанието, младостта и бъдещето

7004 Русе, ул. „Студентска"8
www.uni-ruse.bg; secretary@uni-ruse.bg; тел.: 082/888 211; факс: 082/845 708

ЗАПОВЕД

№ 2045 от 19.11.2020

На основание договор за финансиране на проект с номер 2020-1-PL01- KA226-HE-096196 и наименование „Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions", акроним ICT_EDUPAND по програма Еразъм+ КА2 на Европейския съюз и доклад от ръководителя на проекта от Русенски университет доц. д-р инж. Теодор Божидаров Илиев,

СФОРМИРАМ:

състава на работния екип по проекта както следва:

1. доц. д-р инж. Теодор Божидаров Илиев, ФЕЕА
2. доц. д-р инж. Ивайло Стефанов Стоянов, ФЕЕА
3. доц. д-р диз. Йордан Иванов Дойчинов, АИФ
4. гл. ас. д-р Елена Пламенова Иванова, ФЕЕА
5. Яна Кралева Пантелеева, Финансово-счетоводен отдел
6. Людмила Иванова Димитрова, Отдел Човешки ресурси
7. Иванка Христова Фиркова, Финансово-счетоводен отдел
8. Петя Генчева Аранаудова, ФЕЕА

Участниците в работния екип извършват дейности от категориите Manager, Teacher, Researcher, Youth worker, Technician и Administrative staff, съобразно длъжностите и категориите персонал по програма Еразъм+ на Европейския съюз. Текущото разпределение и координиране на задачите между членовете на екипа се осъществява от неговия Ръководител.

Посочените лица да отчитат положения труд и извършената работа по проекта извън обичайните си трудови задължения по основния си трудов договор с Русенски университет като за целта се сключат граждански договори за допълнителна работа при спазване на законовите изисквания за максимално седмично работно време и часово натоварване.

Срокът за изпълнение на проектните дейности, съгласно сключения Договор е от 01.06.2021 г. до 31.05.2023 г. (24 месеца).

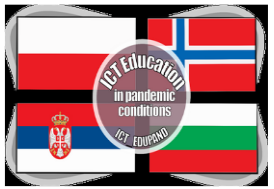
Контрол по изпълнение на заповедта да осъществява ръководителят на екипа доц. Теодор Илиев.

При възникване на проблеми, възпрепятстващи напредъка по изпълнение на проекта, да бъда уведомяван незабавно.

Заповедта да се доведе до знанието на лицата за сведение и изпълнение.

CERTIFIED TRUE COPY OF AN ORIGINAL DOCUMENT
SIGNED
DATE 02.10.2021

Ректор:
/Акад. проф. дтн Христо Белоев, DHC mult./

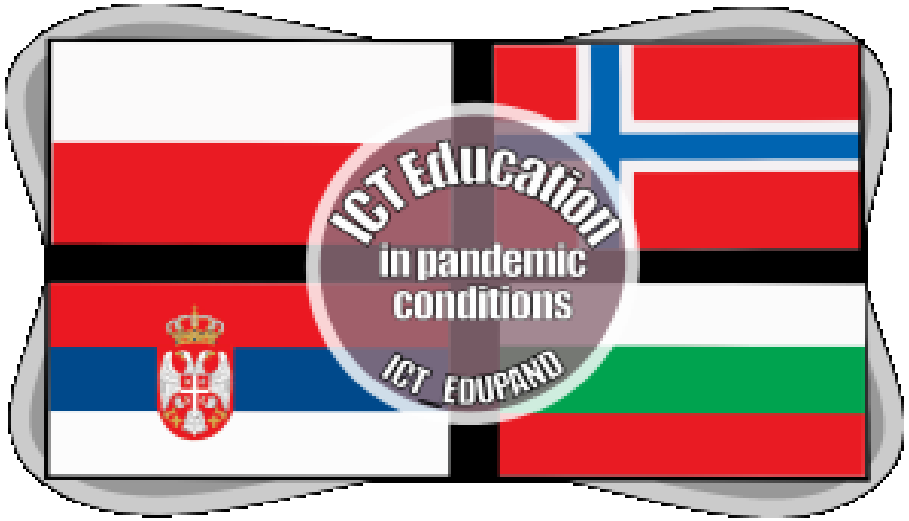


Thank you for your attention!

University of Ruse
"Angel Kanchev"

Address: Studentska 7, 7017 Ruse, Bulgaria
E-mail: tiliev@uni-ruse.bg
Web: www.uni-ruse.bg

Project reference: **2020-1-PL01-KA226-HE-096196**
ICT_EDUPAND Kick off meeting 2021 (Poland)



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Holistic approach towards problem-based ICT education based on international cooperation in pandemic conditions (ICT_EDUPAND)

Project Meeting, 13-14 June, 2022, Niš

2020-1-PL01-KA226-096196

KA2 – Cooperation for innovation and the enchange of good practices

KA226 – Partnerships for Digital Education Readiness

4 intellectual outputs

- IO 1 - Resources for teacher training in problem-based teaching and assessment methods suitable for pandemic conditions.
- IO 2 - Digital resources in educating teachers for acquiring new skills related to problem-based methodology.
- IO 3 – Digital teaching resources in selected areas of ICT applicable for a group of problem-based courses.
- **IO 4 – Writing textbooks suitable for distance learning in pandemic conditions.**

IO 4 – Writing textbooks suitable for distance learning in pandemic conditions.

Start: 1.9/2021 End: 31.3/2023 (=19 months)

Leader: UNI (UR actually according to Table)

710 working days for this activity.
The percentage of engagement of partners: UNI (31 %), BUT (31 %), UR (31 %), and NTNU (7 %).

UNI: 207 teachers days (15318 EUR) + 13 technician days (715 EUR) = 220 days (16033 EUR)
BUT: 207 teachers days (15318 EUR) + 13 technicians days (715 EUD) = 220 days (16033 EUR)
UR: 207 teachers days (15318 EUR) + 13 technician days (715 EUR) = 220 days (16033 EUR)
NTNU: 48 teachers days (11568 EUR) + 2 technicians days (380 EUR) = 50 days (11948 EUR)

OUTPUT: Textbooks suitable for distance learning in pandemic conditions

Local impact for **each university will be publishing the textbook in native language for a course that did not have one previously.**
Within the network, the **joint textbooks will bring together partners on collaborating towards a common goal, and result in textbooks that are compatible with universities in multiple countries.**

Regarding the collection of students' projects, it is expected that its use will help teachers in spending less time reviewing and correcting students' reports. At the same time, students are expected to benefit via **improved writing skills, and be better prepared for engineering/scientific work.**

The multimedia interactive books:

1) Collection of practical problems in Telecommunications Measurements (UNI, BUT …) English and/or native language
2) Collection of practical problems in Electrical Engineering (BUT, NTNU, …) English and/or native language
3) Advanced Mobile Communication Networks (UR, UNI, …) To be defined the language
4) Collection of representative students' projects in partner labs (UNI, …) Probably English

"Multimedia" – active links to movies, presentations, web resources facilitating self learning.

To be checked the form of edition and language!

Indicators:

Number of prepared books (4)
Number of students' projects finalized and presented in a book (16)

Number of students' papers presented at students' conferences (10)

- **IO 3 – Digital teaching resources in selected areas of ICT applicable for a group of problem-based courses.**

Networks and Protocols

- Introduction. History of telecommunication networks. Types of networks. The layered architecture. Functions and data link layer protocols and network layer. Examples of multiple access applications in LAN and MAN networks. Routing in telecommunication networks. TCP and IP protocols. Industrial networks. CAN protocol.
- Textbooks/References
  - T. Saadawi, M. Ammar, A. El Hakeem, Fundamentals of Telecommunication Networks, John Wiley&Sons, NY , 1994
  - D. Bertsekas, R. Gallager, Data Networks, Prentice Hall, 1992, second edition, chapter 4
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Information Theory and Applications

- Overview of the system for the transmission and information recording. Discrete memoryless and memory information sources. Continuous source. Entropy of the information source. Basics of compression. Compression Algorithms - Chenon-Fano Process, Huffman's Code, Lempel-Zive Code. Channels for information transmission. Transformation. Channel capacity. Arimoto-Blahut algorithm. error correction coding. Linear block codes. Cyclic codes. Cyclic Redundancy Check (CRC). Convolutional codes. Viterb's algorithm. Software implementation of encoding and decoding of block and convolution codes. Estimation of code gain using Monte Carlo simulations. Principles of iterative decoding. Record information on hard disk and flash memory. Data storage centers. Introduction to cryptology. Examples of interdisciplinary application of Information Theory.
- Textbooks/References
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Laboratory Practice 1

- Application of measuring instruments and devices in the Laboratory for Telecommunication Systems. Oscilloscope, power source, signal generator, network analyzer and spectrum analyzer. Connecting devices and instruments. Devices protection from static charge and external influences. Probes, attenuators, DC component removal, power supplyblocks and networks. Counters and frequency meters. A/D and D/A converters. EVM measurement (Error Vector Magnitude). Generators of the pseudo-random string of bits. Analysis of eye diagram, jitter and error probability. Acquisition, processing and visualization of laboratory results. Presentation of results. Writing Lab Reports. Basics of literature referencing, characteristics of student works and elements of student seminar report. Poster and oral presentation of student projects. Ethics in engineering and scientific work.
- Textbooks/References
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Number of students’ papers presented at students’ conferences (10)
Number of presentations of projects results at popular events (4)
Number of TV interviews (8)
Number of newspapers articles (8)

The following items will be also important in measuring the quality:
Poll with partners
Poll with participating staff
Poll with students

Industrial partners to do following:

1) **A short movie about required skills of engineers employed by them**
2) Opinion on our novel methodology and courses organizations during project duration every fourth mounts
3) **Participation in multiplier events and webinars**

Some partners from Serbia, Poland and Bulgaria were mentioned in application. I am not sure if Jaroslaw and Teodor confirmed their participation, but we should include some of them, **just officially**!

MC Meetings

- Poland, 6/2021 (575 EUR per participant)
- Serbia, 6/2022 (575 EUR per particpant, 760 EUR per NTNU participant)
- Bulgaria, 12/2022 (575 EUR per particpant, 760 EUR per NTNU participant)
- Poland, 5/2023 (575 EUR per participant)

- 2 participants per institution

Multiplier Events:

1) BUT, 5/2023, Workshop on project-based teaching, Participants: students, teachers, industrial partners, secondary school teachers and pupils. Partcipants from Poland (30) and from foreign universities (10). 5000 EUR
2) UR, 4/2023, Workshop on project-based teaching, Participants: students, teachers, industrial partners, secondary school teachers and pupils. Participants form Bulgaria (30). 3000 EUR
3) UNI, 4/2023, Workshop on project-based teaching, Participants: students, teachers, industrial partners, secondary school teachers and pupils. Participants form Serbia (30). 3000 EUR
4) NTNU, 4/2023, Workshop on project-based teaching and assessment process, Participants: students, teachers, industrial partners, secondary school teachers and pupils. Partcipants from Norway (30). 3000 EUR 4/2023