

UKRAINE



National University
"Zaporizhzhia Polytechnic"

INTERNATIONAL WEEK

Lectures, Roundtables, Seminars, Workshops

16-20 NOVEMBER 2020



120 YEARS
OF POLYTECHNIC
EDUCATION



Co-funded by the
Erasmus+ Programme
of the European Union



National University "Zaporizhzhia Polytechnic"

Program of the International Days

18-20 November 2020

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Dear Students,

Dear Colleagues,

Dear Esteemed Partners and Guests,

We are honoured to welcome you at our activities devoted to the anniversary of *120 years of National University "Zaporizhzhia Polytechnic" and in general Polytechnic Education in Zaporizhzhia Region.*

Considering the current situation COVID-19 when some countries are completely locked down we are happy to invite you for a series of online lectures which are given by scientists, researchers and teachers from different European countries.

Over the years our university became active in international knowledge exchange in different fields of studies such as Material Sciences, Automotive industry, Energy Sciences, Electronics, Informational Technology and others. Over the last 10 years our network has been rapidly growing through participation in a variety of European projects starting from Tempus projects in 2010 PRactice Oriented Master Programmes inENGINEERING [PROMENG], 2012 Industrial Cooperation and Creative Engineering Education based on Remote Engineering and Virtual Instrumentation ICO-op and 2013 Development of Embedded System Courses with implementation of Innovative Virtual approaches for Integration of Research, Education and Production in UA, GE, AM [Desire]. It was successfully continued by Erasmus+ CBHE projects Internet of Things: Emerging Curriculum for Industry and Human Applications [Aliot] and Innovative Multidisciplinary Curriculum in Artificial Implants for Bio-Engineering BSc/MSc Degrees [Bioart], the DAAD project Virtual Master Cooperation Data Science [ViMaCs].

Students of NU "Zaporizhzhia Polytechnic" have possibility to participate in Erasmus+ KA107 program and study one semester in the partner universities AP Antwerpwn, Carinthia University of Applied Sciences, KU Leuven, FH Dortmund, Technical University Ilmenau, ISEP University of Porto, Universidad Politécnica de Madrid, Tomas More University College, Transilvania University of Braşov. And one of the strategic goals of National University "Zaporizhzhia Polytechnic" is to support and increase our international polytechnic community.

We are really grateful for all our partners from Austria, Belgium, Germany, Israel, Poland, Portugal, Spain who find their time to share their knowledge with our students. And we really hope that our students will get opportunity from that.

Rector,

Sergiy Byelikov



Agenda of the International Days

18.11.2020

10:00 Opening Session

Registration link: <https://docs.google.com/forms/d/e/1FAIpQLSdydXmJLl0DuEgZDvpFgs-7UJHP7niB59khagOJ9eGDK3mKsg/viewform>

Welcome speech of Prof. Sergey BYELIKOV, Rector of National University "Zaporizhzhia Polytechnic" *Presentation of the University History - Dedicated to the 120th Anniversary of the University*

Pericles MITKAS, BSUN President

Presentation of the MOTOR SICH Company from Zaporizhzhia

10:30 – 13:30 *International Conference on: "Perspectives in Industry Digitalization and Advanced Manufacturing in the Black Sea Region"* (additional program <https://docs.google.com/forms/d/e/1FAIpQLSdydXmJLl0DuEgZDvpFgs-7UJHP7niB59khagOJ9eGDK3mKsg/viewform>)

ID Session

Registration link: <https://forms.gle/xmVdVeSqB2mqYf3d6>

11-30-12-00	Dr. Prof. Galyna Tabunshchyk Presentation of the Erasmus+ Project Cross-domain competences for healthy and safe work in the 21st century / WORK4CE
	Presentation of the international partners
12:00-13:30	Dr. ing. Peter Arras (KU Leuven, Belgium), Energy demand in modern Vehicle Propulsion systems <i>Content of the seminar:</i> The world of personal transportation globally is facing a lot of challenges. Then number of personal cars worldwide is growing at high speed putting a lot of stress on the necessary resources: steel and metals for making the car, fossil fuels to drive the cars. In this lecture we take a look at the energy demand in a car to drive it. With these numbers and looking at different energy sources it is clear that disruptive changes are necessary to allow for personal transport in the future. We will see how new legislation and standards force automobile builders to explore pathways to more fuel economic drive trains and alternative propulsion solutions



13:30 - 15:00	<p>Dr. Prof. Carsten Wolff (FH Dortmund, Germany). Projectized innovation processes and entrepreneurship - case studies</p> <p><i>Goals of the seminar:</i> Understand the impact of the projectized and digital world. Be able to apply tools from project management and digitalisation to an innovation process which is intended to lead to a startup. Understand the impact on the skillset of an entrepreneur.</p> <p><i>Content of the seminar:</i> Innovations and entrepreneurship are projectized and digital. Organizational patterns are becoming agile and cooperation is becoming virtual. Understanding this development is very important for the definition of the organizational DNA of a startup. Entrepreneurs need to familiarize themselves with the recent trends in project management in the digital world. The speaker will go with the audience through some case studies from the industry-university-cluster ruhrvalley..</p>
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19.11.2020 ID Sessions

Session 1

10:00-11:30	<p>Albert Treytl (Danube University, Austria). Embedded intelligence</p> <p><i>Goal:</i> Understanding of concept of integrated sensor systems or What is required that a sensor can be fully operational in a system</p> <p><i>Content of the seminar:</i> Today a mobile phone contains at least 10 sensors, a car more than 100 and a factory 1000 of sensors. With IoT applications sensors will even become more wide spread and in particular embedded in many devices or deployed stand alone. To make use of these sensor values being important drives of digitalization a sensor becomes a system integrated towards systems of systems. Such integrated sensor systems must combine core sensing, processing electronics and software as well as communication to provide reliable sensor values to various applications.</p>
14:30- 17:00	<p>Dr. Prof. David Luengo (Universidad Politecnica de Madrid, Spain) ECG-based biometrics recognition</p> <p><i>Goal:</i> Introducing the concept of biometric recognition; providing an overview of the main biometric traits with their advantages and drawbacks; describing three different ECG-based biometric systems (from an electrical engineering perspective)</p> <p><i>Content of the seminar:</i> Biometric recognition deals with the identification/authentication of users from some set of unique biological characteristics. The electrocardiogram (ECG), routinely used in medical applications, has been explored as a promising biometric trait during the last two decades. In this seminar, we will provide an overview of the existing biometric systems, the contexts where they may be applied, their advantages and drawbacks. Then, we will focus on ECG-based biometry, describing some of the most interesting systems proposed. We will focus on signal processing and machine learning algorithms used for noise/outlier removal, fiducial point extraction, dimensionality reduction and classification.</p>



17:00-18:30	<p>Dr. Prof. Peter Schulz. (HAW Hamburg, Germany). Timed State Machines for FPGAs in VHDL – Introduction</p> <p>Goal: Get an insight into FPGA-technology and how to implement finite state machines (FSM) using VHDL. Understand the principles of timed state machines and their implementation.</p> <p>Content of the seminar: Very brief refresher course on the basics of state machines and FPGAs. Recapitulation on FSM coding styles in VHDL. Concept of Timed State Machines.</p>
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Session 2

10:30 - 11:00	<p>Dr. Prof. Nava Shaked (HIT, Israel) Speech processing for Intelligent systems</p> <p>Content of the seminar: A growing area of artificial intelligence is the processing of voice and speech. In recent years it is also an essential component in human machine interface as part of applications, IoT products, wearables and robots. A new field called conversational interaction is growing and requires knowledge of voice-activated software. The seminar offers an understanding of how human speech can be processed by computers. The students will be familiarized with modern tools, research and development and innovative technologies that used in the field of speech and voice intelligent processing nowadays. The areas we introduce are: Speech recognition, Speech Synthesis, Speech Biometrics, Emotion detection, Speech Analytics, Language Identification , Conversational Interaction</p>
11:30- 12:30	<p>Dr. Prof. Gustavo Alves (ISEP, Portugal) OpenLabs in Higher Education</p> <p>Content of the seminar: Recent confinement measures, taken in the scope of the COVID-19 pandemic, led to an unprecedented transformation in Higher Education. Almost all classes moved from traditional face2face classrooms to virtual classrooms, supported by videoconference platforms like Zoom Colibri, CISCO Webex, or Microsoft Teams, among others. Institutions of Higher Education already faced a previous (and similar) transformation when moving many educational contents and activities to online platforms like Moodle, or Blackboard, among other Learning Management Systems. The last frontier seems to be moving online the many labs that are used in Higher Education, particularly in STEM areas. This lecture will present the case of opening instructional labs in Higher Education Institutions, by making them remotely accessible through the Internet.</p>



20.11.2020

Session 1

10:00- 11:30	<p>Dr., Prof. Karsten Henke (TU Ilmenau, Germany) Interactive Content Objects as GOLDi-Lab Services</p> <p><i>Content of the seminar:</i> Interactive content objects (ICOs) are immersive digital tools (e.g., simulations or real interactive experiments) that students can use to generate responses, analyse data, etc. and allows learners to explore the learned content with given or own created examples. Within the framework of our GOLDi remote lab, we offer the students such ICOs as new services, which are used for the digital support of learning processes in computer science. We realized a collection of such interactive tools as new services of our lab to teach from the systematic approach up to methods of designing digital systems. They are intended to show in particular the connections between different methodical approaches of design procedures and provide students a tool to design virtual and remote-controlled laboratory experiments. On the other hand, they allow individual practice-oriented learning through flexible access to experiments at different locations and times. In our online demonstration, we want to present some of these new ICO services and show how to use them to provide a deeper understanding of interrelationships between different theoretical approaches - from very simple basics to complex digital control designs.</p>
12:00-13:30	<p>Dirk Van Merode(AP Antwerpen, Belgium). FPGAs for Space Application</p> <p><i>Content of the seminar:</i> With an CAGR of >10% de FPGA market is booming. Actual hardware designers are always needed, with knowledge of FPGAs and VHDL, but due to higher levels of abstraction you can also start building systems with HLS (high level synthesis) and Phyton. This is why non-traditional hardware companies, like Fintech companies (like Leeman Brothers & Goldman Sachs) are more and more using FPGAs for their business process, because of the better performance/watt and the low latency of hardware in comparison to software (even compared to GPUs).</p> <p>In aerospace the re-configurability features of FPGAs are the main driver for implementation: Late bugs can be fixed without disassembling the component, offering a huge reduction in the schedule and cost of the development and test of units, especially for flight ones</p> <ul style="list-style-type: none"> · In case of fight anomaly, re-programmability can help to solve issue · It can also be used to change functions during flight to serve different purposes. For example, to update to new standards, to adapt some functions after having better flight knowledge or also to fix problems after launch · It could be used as well to have the same hardware performing different functions in different stages of the mission.
14:00 - 15:30	<p>Dr. Prof. Peter Schulz (HAW Hamburg, Germany) Timed State Machines for FPGAs in VHDL – UART example</p> <p>Goal: Learn how to implement a UART-receiver using VHDL.</p> <p><i>Content of the seminar:</i> Very brief refresher course on the basics of UARTs. Design cycle starting with block diagram. Timed State Machine implementation approach using VHDL. Performance of Simulation and Synthesis.</p>



Session 2

10:00-11:00	<p>Dr. Kinga Korniejeko CUT (Poland) Additive Manufacturing of Geopolymers Composites</p> <p><i>Content of the seminar:</i> 3D printing is disruptive technology for the construction industry. It is the most viable option of widespread use in automated construction processes in the near future. 3D printing technology has many advantages, such as saving of resources, energy efficiency and friendliness towards environment. Contemporary, the main challenge is connected with innovative materials which are a good combination of all essential material properties.</p> <p>Additive manufacturing of geopolymer composites brings a lot of advantages, for instance low labor costs, less waste, and high efficiency. Currently, only few prototype applications for this technology have been developed. However, 3D printed geopolymers are a promising way to develop the materials for effective application in manufacturing on the larger scale, geopolymer composites still require development and optimization. The lecture presents the new, innovative material for 3D printing technology - geopolymer composites, benefits and challenges connected with their use and their applications in construction industry, including case study of the EU project in this area.</p>
11:30 - 12:30	<p>Amir Eliezer (SCE, Israel) Corrosion Management for advanced materials applications</p> <p><i>Content of the seminar:</i></p> <p>One of the major considerations today is to define the design and engineering requirements in parallel with the inspection/maintenance and repair costs. Corrosion Management should include corrosion engineering and corrosion control efforts comprised of policies, processes and procedures that address corrosion across the complete lifecycle of the asset, from design to decommissioning. A Corrosion management program must include an accepted philosophy within the organization and ingrained into the that corporate culture. An effective corrosion control program requires a relatively small investment compared to the potential return on that investment.</p> <p>This presentation will also discuss, materials selections and corrosion prevention systems such as coatings. The presented applications will focus on the importance of applied corrosion methods for automotive, marine and biomaterials applications. Corrosion results show a relationship between the need of suitable manufacturing process, design, materials and surface protection to its corrosion behaviour. Therefore, the concept of corrosion management in the field of materials engineering applications will be presented.</p>
13:00-14:30	<p>Dr. Lynn Houthuys (TMMA, Belgium) Multi-Model Machine Learning</p> <p><i>Content of the seminar:</i> Machine learning is no longer a purely theoretical concept, as it is already frequently applied in real-life applications like face detection, text analysis and medical diagnosis. However often the data is heterogeneous, e.g. there can be multiple related tasks, different representations of the data, multiple labels to be predicted, and so on. In these situations, multiple models have to be combined in smart ways, which is described through the field of multi-modal learning. In this seminar we will cover some of the different variations of multi-modal machine learning and go into some recent advances in the field.</p>

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About the Lecturers

<p>Dr. Prof. Gustavo Alves</p>	<p>Gustavo R. Alves graduated in 1991 and obtained an MSc and a PhD in Computers and Electrical Engineering in 1995 and 1999, respectively, from the University of Porto, Portugal. He is with the Polytechnic of Porto - School of Engineering, since 1994. He was involved in 19 national and international R&D projects and has authored or co-authored +250 publications, including book chapters, and conference and journal papers with a referee process. His research interests include engineering education and remote labs.</p> <p>Dr. Alves currently serves as Head of the Innovation Centre for Engineering and Industrial Technology, an R&D unit supported by the Portuguese Agency for Science & Technology. He also serves as Associated Editor for the IEEE Transactions on Learning Technologies and the IEEE Journal of Latin-American Learning Technologies</p>
<p>Dr. ing. Peter Arras</p>	<p>Dr ing Peter Arras, prof h.c. got his engineering degree in 1985 as engineer in electro-mechanics, automation in Belgium. In 2014 he finished his Phd in material sciences teaching in UKF (University of Constantine the Philosopher) in Nitra, Slovak Republic. In 2016, he was promoted as honorary professor in ZNTU/NU-ZP.</p> <p>He is program director for the degree studies of the Msc in engineering technology in electro-mechanics at KU Leuven in the faculty of engineering technology.</p> <p>He is senior lecturer at KU Leuven, Belgium, in bachelor and master degree courses: design methods, strength of materials, numerical methods for design (FEA, CAE), vehicle propulsion systems.</p> <p>Dr. Ing. Peter Arras is in charge of international relations for the department of engineering technology at campus De Nayer of KU Leuven. He is in charge of the follow up of student and teacher mobility. In this ability he welcomed over 25 students and staff of NU-ZP at KU Leuven for study semesters and staff guest lecturing.</p> <p>For the faculty of engineering technology he is responsible for maintaining and organizing partnerships/agreements for Erasmus and outside Europe. He is member of departmental and faculty boards on international relations.</p> <p>During different projects and in bilateral cooperation Dr Arras was numerous times guest lecturer in different universities in Ukraine, including NUZP, LPNU, NTUU-KPI and Charkiv KAI..</p> <p>He is involved as contact person and coordinator in different European projects over the last 15 years in which collaboration with Ukraine – and ZNTU/NUZP in particular is present.</p> <p>(Work4ce: Cross-domain competences for healthy and safe work in the 21st century- UA-AZ) (coordinated by NUZP, KU Leuven is a partner) (2020-2023)</p> <p>(PRODIT: Projects for the Digital Transformation) (partner)</p>



	<p>(BIOART: Innovative Multi-disciplinary Curriculum in Artificial Implants for Bio-Engineering BSc/MSc Degrees – UA -IL) (partner) (2018-2021)</p> <p>(MMATENG: Modernization of two cycles (MA, BA) of competence-based curricula in Material Engineering according to the best experience of Bologna Process – RU-UA - IL) at KU Leuven (grant holder).(2013-2017)</p> <p>(PROMENG: Practice oriented Master Programmes in Engineering in RU, UA and UZ) (partner)</p> <p>(CRIST: Curriculum Reform in Space Technology – RU- UA- KZ) (partner)</p>
<p>Dr. Prof. Amir Eliezer</p>	<p>Prof. Amir Eliezer has studied BSc ,MSc, PhD in Materials Engineering (Summa Cum Laude) and an additional M.B.A.</p> <p>He has received several awards and recognitions including the H.H. Uhlig 2013 award. He is a full Academic staff Member of two faculties Mechanical and Civil Engineering at SCE – Shamoon College of Engineering, Israel. He has published more than 200 scientific publications. He is active in the medical-corrosion field with industries. Currently he is Chair of NACE European Area and has also served as the President of the WCO –World Corrosion Organization.</p>
<p>Dr., Prof. Karsten Henke (TU Ilmenau, Germany)</p>	<p>Dr. Henke is currently a member of the scientific staff at the Department of Integrated Communication Systems. He has significant experience and expertise in distance learning development as well as web-based educational and training systems (esp. remote labs, interactive learning objects), methods and tools for the design and verification of embedded control systems for many years. He has a 25 years' experience in teaching at a university and is supervisor of master and PhD students. Since 1990, Dr. Henke teaches at the University of Cooperative Education Gera (an educational institution for dual education) as well as at the Carinthia University of Applied Sciences in Villach, Austria (specialized on distance education). These activities distinguish him as an expert in course material and curriculum development. Furthermore, he was coordinator of one European TEMPUS project, and he participates in projects funded by the European Union and has therefore experiences in management and coordination of national and international projects. He is member of the Executive Committee of the Global Online Lab Consortium (GOLC) and editorial board member of the "International Journal of Advanced Technology for Learning" and the "International Journal of Online Engineering".</p> <p>On May 29th, 2018, Dr.-Ing. Karsten Henke was awarded the title of "Honorary Professor" by the Academic Council of Zaporozhye National Technical University (ZNTU, Ukraine).</p>



Dr. Kinga Korniejenko	Kinga Korniejenko is a researcher at the Cracow University of Technology, Faculty of Material Engineering and Physics, Institute of Material Engineering. She received her first PhD from Management and second from Material Engineering – geopolymer composites. She cooperates as an expert for the project: ‘Urban infra revolution - circular economy materials and novel method development to produce recyclable and functional urban construction products’, Lappeenranta, Finland. Her research interests includes: innovation management, environmental aspects and materials engineering - composite materials; in particular fly ash based geopolymer composites reinforced by short fibers as well as 3D printing for concrete and geopolymers. She has experience in coordinating of national and international projects as well as she is an expert in EU programmes, including H2020.
Dr. Lynn Houthuys	Dr. Lynn Houthuys obtained a Master’s degree in Engineering Computer Science and in Artificial Intelligence, both at KU Leuven in Belgium. In 2018 she received a PhD degree in Engineering Science with the thesis titled ‘Coupled Data-Driven models’, also at the KU Leuven. During her doctoral education Lynn served as a teaching assistant for several courses involving neural networks and support vector machines, included in the master programs. She is currently working as a research engineer at Thomas More Mechelen-Antwerp University of Applied Sciences, where she is furthermore responsible for the international activities. Lynn’s scientific interests include machine learning, multi-modal learning, kernel methods and deep learning.
Dr. Prof. David Luengo	Dr. Luengo is Associate Prof. at Universidad Politécnica de Madrid (Spain). His research interests are in the areas of statistical signal processing and machine learning with applications in biomedical engineering. He has been a visiting scholar in several universities, co-authored 1 book ("Independent Random Sampling Methods", Springer, 2018), 3 book chapters, 32 articles in international journals, 58 international conference papers, and he is member of the IEEE Machine Learning for Signal Processing Technical Committee. Since Oct. 2017 he is the coordinator of the BIOART ("Innovative Multidisciplinary Curriculum in Artificial Implants for Bio-Engineering BSc/MSc Degrees") European project.

**Dirk Van Merode**

Ing. Dirk Van Merode MSc finished his engineering studies in Electronics in 2002. His first educational experience was in secondary education, to earn his pedagogy degree. Dirk later moved to Lessius University College, currently renamed Thomas More University College, in 2007, to take up a teaching and research assignment. Since 2018 Dirk works as a lecturer and research engineer at AP University College in Antwerp. His field of expertise is in Internet-of-Things, digital systems design, printed circuit board design and production, embedded systems and audio-video production. Research topics are mainly in European projects, both on curriculum development and student and staff mobility with countries outside the EU. Dirk also did research in space applications and satellite development. He was partner and coordinator of numerous international projects. He was guest professor and advisor in numerous European, Asian and African universities.

Dirk is currently coordinator of an Erasmus+ KA2 Capacity Building for Higher Education project, named ACTEA: Applied Curricula in Technology for East Africa. The ACTEA project aims to fulfil the specific needs in engineering, provide better skills matching with the local labour market, deliver course material in 2 specializations, Computer Aided Manufacturing Technology and Electrical Engineering & Automation and, establish technologic laboratories, with virtual and remote accessibility, establish learning tools, give academic staff and students additional training on technology and in developing technologic course material according to EU standards.

Dirk is also partner in in Erasmus+ KA2 SPACECOM: New study program in space systems and communications engineering

Dr. Prof. Nava Shaked

Dr. Nava Shaked is the head of Multidisciplinary Studies in HIT - Holon Institute of Technology - and an Adjunct professor at the PhD program at CUNY GC, Computational Linguistics Department. The Multidisciplinary Studies department leverages the cooperation between HIT's different faculties and departments in a unique way to promote synergism between Engineering, Sciences & Design.

Web site: https://www.hit.ac.il/en/faculty_staff/Nava_Shaked

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Dr. Prof. Peter Schulz	Peter Schulz studied electrical engineering at the University of Dortmund. He received his doctorate from the University of the Federal Armed Forces in Hamburg. In industry he worked in the areas of microprocessors, communication systems and drone control. From 2004 to 2020 he was professor for microprocessor technology and fundamentals of digital and electrical engineering at the Dortmund University of Applied Sciences. Since the beginning of 2020 he is a Professor for Digital Electronic Systems at the HAW Hamburg.
Dr. Prof. Carsten Wolff	Carsten Wolff is a full professor for computer science at Dortmund University of Applied Sciences and Arts since 2007. He studied electrical engineering and economics at Paderborn University and did a PhD in electrical engineering at the Heinz Nixdorf Institute. In his industrial career, Dr. Wolff was in the semiconductor industry (Infineon AG). He is a founding member and director of the research institute IDiAL and the spokesman of the industry-university-cluster ruhrvalley. Furthermore, he is the co-founder of two technology companies. One of his research interests is the development of processes, methodology and tools for the management of digital transformation.

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