

**Welcome!**

**Blended Intensive Program (BIP) with final week in Wroclaw  
“Construction, operation and diagnosis of rail transport equipment”**

Dear student,

We are pleased to confirm your participation in the BIP. It is great to have you on board!

During theoretical and practical classes, students will be introduced to the problems of construction, operation and diagnostics of rail transport means. Issues of safe operation and malfunction diagnosis of transport system components will be presented. Students will be introduced to contemporary testing and diagnostic methods. Students will acquire knowledge in the construction of means of transport, operation and fault diagnosis using dedicated modelling methods and testing tools. The best part is that the week will be held onsite in Wroclaw, so you will get the chance to meet your teachers and team members face-to-face.

Please read the instructions below, for your participation in the BIP. Following the instructions is mandatory for admission to the course!

**ONBOARDING TO OUR ONLINE LEARNING ENVIRONMENT BEGINS NOW:**

A) We are going to use Zoom as our main communication tool. With the Zoom workspace, you can work collaboratively with your fellow students and tutors on tasks given in the program.

B) So, task number 1 is to connect to the “Construction, operation and diagnosis of rail transport equipment” Zoom workspace (you can sign up with your google or any other e-mail account)

C) Complete the challenges you should do prior to the start of the course. You can find these in the Zoom Channel #assignments. This is your mandatory pre-work and counts towards earning your ECTS!

D) For further useful information and announcements, please check all the Zoom channels regularly!

E) Please make sure your university/faculty/school recognizes the 3 ECTS you will earn.

## FURTHER INFORMATION

### **1. PURPOSE AND GOAL**

“Construction, operation and diagnosis of rail transport equipment” program is held in the form of a BIP because we want to give every student the opportunity to gather an experience with other international students.

Virtual mobility is the only way to deal with the uncertainties and restrictions that COVID-19 has imposed on international student exchange and collaborations. During “Construction, operation and diagnosis of rail transport equipment” we will tackle these difficulties with a remote, but intense, online course..

The program offers participants the opportunity to get acquainted with creative methods and techniques for safe operation and malfunction diagnosis of transport system components. Students will be introduced to contemporary testing and diagnostic methods and will acquire knowledge in the construction of means of transport, operation and fault diagnosis using dedicated modelling methods and testing tools.

### **2. PARTICIPANTS**

We believe that a good intercultural mix and a good representation of the world’s ecosystem is key to making meaningful innovation happen. This is why we invite you to our virtual group of 15 participants with different nationalities, educational backgrounds and expertise. The biggest part of this group will be students from partner institutions of the participating universities, complemented with participants from Poland.

### **3. TUTORING AND COACHING**

Tutoring will be held in the evenings at 20:00 pm European Central Time (CET) in order to allow all students online gatherings in time with no other home university obligations. The time slots from During the remaining time slots, you will do self-study or work together with other students in a team. You and your team can then decide for yourselves when you will work on your assignments.

#### **4. Program BIP PWr 24-28.04.2023**

##### **Monday - Day 1 (24.04.2023)**

09:00 - 09:30 Welcome to Wrocław – BIP Opening (class 2.36, building B4)

09:30 - 11:00 Method of reconfiguration of the planned timetable, taking into account the resilience of the rail transport system. (Lec.) (class 2.36, building B4)

11:00 - 11:30 Break

11:30 -13:00 Simulation tools supporting modeling of railway traffic (B8 building)

13:00 - 15:00 Lunch break

15:00 - 16:30 Railway traffic risk analysis based on probabilistic tools (B8 building)

##### **Tuesday - Day 2**

10.00 – 13.00 Visiting Wrocław (meeting point: main entrance to building B4, 5 Łukasiewicza St.)

13.30 – 15.30 Lunch break

15.30 – 18.00 Visiting Wrocław ZOO, (at 15.00 meeting point: main entrance to building B4, 5 Łukasiewicza St.)

19.00 - 21.00 – Dinner Spiz Restaurant (Town Hall Square 2, Wrocław)

##### **Wednesday - Day 3**

9.30 – 11.00 Experimental-numerical approach in fatigue lifetime assessment (class 316, building B1)

11.00 – 11.30 Break

11.30 – 13.00 Fatigue lifetime prediction of railway metallic components (Lec.) (class to be announced later)

13.00 – 15.00 Lunch break

15.00 – 16.30 Case study analysis: fatigue failures and improvements (laboratory 111, building B1)

##### **Thursday - Day 4**

9.30 – 11.00. Pneumatic and hydraulic systems in railway applications (Horn and Whistle Control System, Electro-Pneumatic Pressure Regulator, Pantograph Control Systems, Internal Door Systems) (laboratory L8-1/L8-2, building B5)

11.00 – 11.30 Break

11.30 – 13.00 Vibroacoustic signals in the hydraulic systems of transport vehicles. (Lec.) (class 4, building B5)

13.00 – 15.00 Lunch break

15.00 – 16.30 Vibroacoustic diagnostics in railway pneumatic systems (laboratory L8-1/L8-2, building B5)

## **Friday - Day 5 (28.04.2023)**

9.30 – 10.00 Wrap - up

10.00 – 12.00 Student Presentations (15 minutes per team) (class 117, building B1)

12.00 – 13.00 Closing ceremony (class 117, building B1)

13.00 – 15.00 Lunch break

### Attention:

1. Participants' lunches start at 1.45 p.m. Venue: SKS PWr, building C-18, 10 Wrońskiego St.

2. Contact persons:

Michał Stosiak, 307 cabinet, building B5, [michal.stosiak@pwr.edu.pl](mailto:michal.stosiak@pwr.edu.pl), +48 713204599

Mateusz Zając, 11 cabinet, building B8, [mateusz.zajac@pwr.edu.pl](mailto:mateusz.zajac@pwr.edu.pl), +48713202004

## **5. TIMETABLE – ONLINE**

02.05.2023 - 06.05.2023 (on-line)

2.05.2023 (Tuesday)

1. Introduction to the issues of the virtual component.
2. The importance of diagnostics in railway traffic safety.

3.05.2023 (Wednesday)

Information redundancy in the context of railway traffic safety.

4.05.2023 (Thursday)

Diagnostic technologies in railway traffic

5.05.2023 (Friday)

Reliability of railway structures

6.05.2023 (Saturday)

Summary of project assignment

## **6. CERTIFICATE**

Upon successful submission of the required post-course work, participants will receive a certificate.

This certificate states the grade you have received in the „Construction, operation and diagnosis of rail transport equipment” course.

## **7. TEACHING METHODS**

Students will participate in online and onsite lectures, which will be provided by carefully selected lecturers from international partnering institutions. In addition, creative and contemporary teaching and learning methods, such as problem-based learning, gamification, teamwork and project tasks, will be applied to establish a collaborative work environment and to enable students to learn from both lecturers and each other.

## **8. LEARNING OUTCOMES**

During the training, students will have the opportunity to learn practical skills that can be applied in a future career related to railway infrastructure. The training will include both theoretical classes and practical workshops that will allow students to gain practical experience. Students will also be able to learn about the latest technologies and trends related to railway infrastructure, which may be helpful in their future work. All this will make students better able to understand and control the process of building, operating and diagnosing railway infrastructure devices.

## **9. DESCRIPTION**

The training for students will consist of various topics related to replacement, operation and diagnosis of railway infrastructure devices. Below are some topics that can be an example of such training:

- Basics of the construction of railway tracks and infrastructure elements - discussion of various types of tracks, sleepers, turnouts and other elements of railway infrastructure.
- Rail Track Diagnostics and Maintenance - Methods of rail track diagnosis and maintenance, such as ultrasonic testing, tension testing, and track monitoring systems.
- Electrical actuators - a list of various electrical devices, including signaling devices, track quality systems and others.
- Safety on the tracks - discussion of the rules of safety on the railway tracks, including the rules of working on the tracks, immediate procedures and others.
- Rail Traffic Control Systems - an overview of various rail traffic control systems, such as track block systems, traffic light systems, and more.
- Railway shunting devices - discussion of various shunting devices, such as shunting locomotives, rail crossings and others.
- Diagnostics and maintenance of electrical devices - methods of diagnosing and operating optical devices, such as systems for monitoring devices and optical devices.

- These and many other topics can be helpful in the training "Construction, operation and diagnostics of railway transport infrastructure devices" for students

#### **10. VIRTUAL COMPONENT**

The online part of the proposed program will include a combination of lectures, case study analyses, individual and team work assignments. Participation in all scheduled appointments will be obligatory, as well as working on all assigned tasks. Students will form international teams, preferably composed from different study profiles and fields working towards an innovative and sustainable digital solution of a real case problem. All virtual classes and homework will prepare the student teams for the final physical week, in which they will get acquainted with a real-life organization, its problems and challenges, that they will try to find and propose a solution for. The virtual classes will be supported by an online training platform as well as through an online collaboration tool Zoom for easy online communication between team members, all students and teachers.