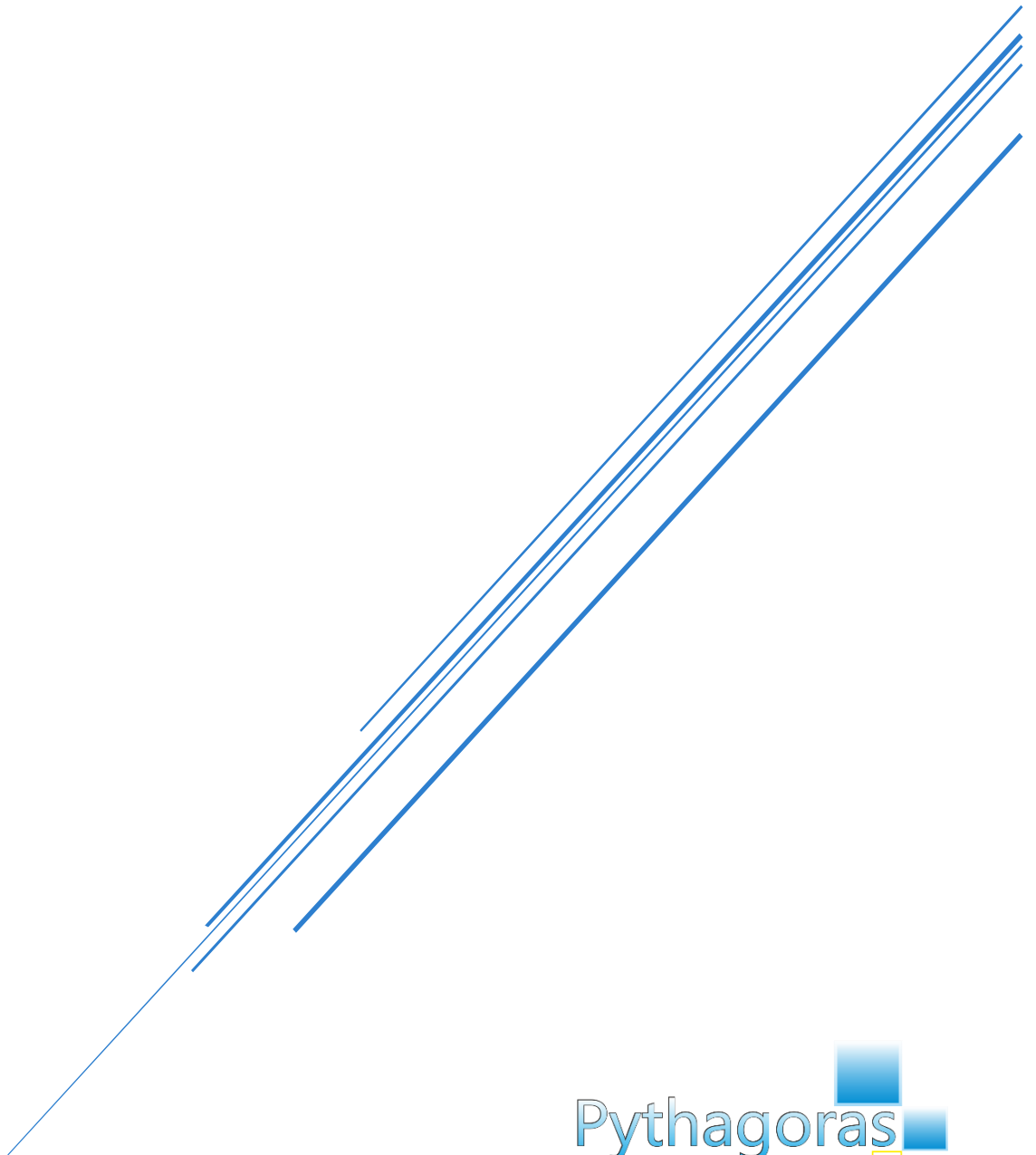


INNOVATIVE STRATEGIES FOR TEACHING AND LEARNING MATHEMATICS

Workshop for teacher trainers





Workshop for teacher trainers – 11th-15th March 2024

INNOVATIVE STRATEGIES FOR TEACHING AND LEARNING MATHEMATICS

University of La Laguna, Tenerife (Spain)

Welcome

Dear colleagues,

On behalf of the Erasmus+ project team, and specifically, we would like to extend a warm welcome to this workshop, where we will come together to explore and share innovative strategies for teaching mathematics in the early years of STEM degrees.

Our goal:

The goal of this workshop is to promote a mathematics education that is connected to the real world, facilitating understanding and not just knowledge of mathematical processes. To do this, we will focus on three key areas:

1. Mathematics connected to the real world:

- We will use the Sustainable Development Goals (SDGs) as a framework to contextualize mathematics and show its relevance in everyday life.
- We will promote mini-pbl (project-based learning), where students address real and relevant problems for their environment.

2. Incorporation of ICT tools:

- We will explore different digital tools that can be used to facilitate the teaching and learning of mathematics.
- We will show how ICT can help students visualize mathematical concepts, work collaboratively, and develop critical thinking skills.

3. Innovative teaching strategies:

- We will implement strategies such as Scrum to promote active participation and teamwork in the classroom.
- We will address different self-assessment proposals that allow students to take control of their own learning.
- We will share experiences and good practices to address the diversity of the student body, including students at risk or with difficulties in mathematics.

We hope that this workshop will be an enriching learning space for everyone, where we can share ideas, experiences and good practices.

Workshop program

	MONDAY 11th	TUESDAY 12th	WEDNESDAY 13th	THURSDAY 14th	FRIDAY 15th
Institution	ULL	IPP + STU	HMU	KAU + SBU	AAU
09:00 – 11:00	Mini-PBL, ICT & SDG (I)	Edu_Scrum method (I) IPP	Applying Scrum in mathematics (I)	STACK (I) SBU / KAU	Gamification (I)
11:00 – 11:30	Coffee-Break	Coffee-Break	Coffee-Break	Coffee-Break	Coffee-Break
11:30 – 13:00	Mini-PBL, ICT & SDG (II)	Edu_Scrum method (II) STU	Applying Scrum in mathematics (II)	STACK (II) SBU/ KAU	Gamification (II)
15:00 – 16:30	-	-	Project Meeting	Workshop assessment	Visit to Garachico
20:00	-	-	Dinner “La Hierbita”	-	Dinner “Patio Canario”

How to arrive

There is a bus station on one side of the principal building of the university. In this place there is also a tram stop called “intercambiador” in Spanish.

There is only one line from Santa Cruz (main city) to La Laguna, so it is very easy to arrive in the main building of the university.



Wifi-Access

The University of La Laguna offers an internet Access service through the EDUROAM network. However, users can also Access the institution’s own Wi-Fi network called ULL-Conecta, for which they have the following information:

Username: mathschool@eventos.ull.es

Password: **CVLNE52o**

Meals

Coffee-Breaks:

ULL will afford the coffee-breaks that will be from 11:00 to 11:30. It will contain:

- Coffee and Infusions with Milk
- Juices
- Cakes and Biscuits
- Sweet potato Doughnuts
- Various Fruits

Lunch

This will take place in held at the facilities of the ULL Faculty of Mathematics, which is 10-minutes walk from the meeting room. This lunch will consist of the same menú as offered to the students. We have reserved some tables for the workshop participants

Monday	Tuesday	Wednesday	Thursday	Friday
Spinach soup Cuban rice (vegan) Hamburger and sauce Beans	Pinto beans Pork chops with mojo (no mojo if celiac) Spinach cannelloni Mixed salad	Vegan Lentils Grilled chicken breast Pork loins with mushrooms Pasta salad Soy meatballs (vegan)	Vegetable soup Meatballs and sauce Yellow rice Cabbage salad Vegan spring rolls	Pumpkin soup Grilled Fish (celiac) Sausages and sauce Chickpeas salad Soy hamburger (vegan) Vegan — Rice Celiac — No pasta

(It might vary if considered)

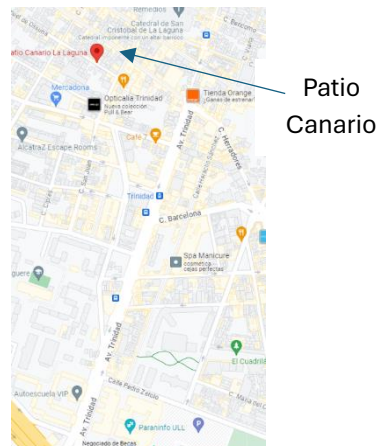
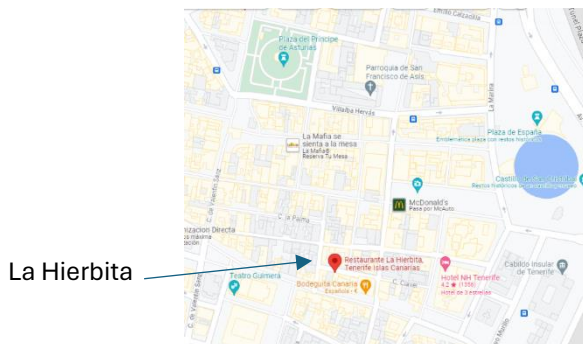
Dinners

Wednesday, 13th in Santa Cruz de Tenerife in a restaurant called “La hierbita”.

Address: C/ Clavel, 19. Tram stop: “Teatro Guimerá”.

Friday, 15th in La Laguna, in a restaurant called “Patio Canario”.

Address: C/ Manuel de Ossuna, 8. (City center, near the cathedral).



Social activity

Friday 15th, 15:00 – 19:00 (approx).

Visit to Garachico.

Garachico, a stately town in Tenerife, boasts a rich history. After its commercial peak in the 15th and 16th centuries, the volcanic eruption of 1706 transformed it. The town reinvented itself with agriculture and then with tourism, which today highlights it for its architecture, volcanic landscapes, and gastronomy.

Its historic center, declared a Site of Cultural Interest, with the Church of Santa Ana and the Palace of the Counts of La Gomera, invites you to travel back in time. The Roques de Garachico and the Caletón are examples of its natural beauty.

Its gastronomy, with fresh products and traditional recipes, conquers palates. Garachico is a unique destination that invites you to discover the essence of Tenerife.



MONDAY, 11th March

TITLE:

Mini-PBL, ICT & SDG

Authors:

Rodrigo Trujillo, Diana Sosa-Martín, Israel García-Alonso

Abstract:

Empowering STEM Education through Project-Based Learning: A Workshop for University Educators

This workshop introduces university educators to the power of Project-Based Learning (Mini-PBL) in Mathematics. Utilizing the innovative mini-PBL model developed within the Erasmus+ Pythagoras project, participants will actively engage in crafting effective PBL experiences for their students.

The workshop focuses on two distinct project themes:

- **Project 1: Bridging the Gap - ODEs from Real-World Data (Advanced courses):** This project tackles the integration of real-world data into Mathematics education. Participants will explore the Ordinary Differential Equations (ODEs) based on experimental data, through Mini-PBL strategies that bridge the gap between theory and application.
- **Project 2: Demystifying the Fundamentals (High School/1st Year Undergraduate):** This project delves into core mathematical concepts like real numbers, the real line, intervals, and linear relationships. Through a PBL approach, participants will design engaging activities that solidify student understanding of these critical foundations.

By the end of the workshop, participants will gain the necessary tools and resources to implement the mini-PBL model in their own Mathematic courses, fostering a more active and engaging learning environment for their students.

TUESDAY, 12th March

TITLE: Eduscrum in Action: A PBL journey towards sustainable solutions - Part I
Authors: Lurdes Babo (IPP) and Jorge Mendonça (IPP)
Abstract: Eduscrum is a Scrum-based framework used to drive innovation in education. The aim of this session is to share experiences and illustrate how to incorporate Eduscrum into teaching using real-world situations through examples used in Maths classes at IPP (Part I) and STU (Part II).

TITLE: Eduscrum in Action: A PBL journey towards sustainable solutions - Part II
Authors: Daniela Velichová, Jana Gabková
Abstract: We will present materials prepared for introduction of edu-Scrum method as it was implemented at the STU in Bratislava, Faculty of Mechanical Engineering, in the basic courses of Mathematics I (Linear Algebra, Differential and Integral Calculus) and Mathematics II (Differential Equations, Vector Calculus, Coordinate Geometry in 3-D Space, Multivariable Calculus) for the bachelor study programmes. Workshop participants will be informed on how this method was introduced and evaluated, while students' feedback and results will be presented with teacher's comments from the point of didactical issues. Finally, participants will try to work on the prepared sprints in small teams, as it was done in the real classes, in order to receive personal experience with the method from the students' point of view. The choice of problems and level of difficulty of their solutions together with expected learning outcomes and impact on students' achievements will be analysed and discussed at the end of workshop. The discussion will continue in the afternoon

WEDNESDAY, 13th March

TITLE:

How to Apply Scrum in Mathematics: Two case studies in setting up events and new projects.

Authors:

Kostas Petridis

Abstract:

In this workshop, we will discuss the fundamentals of SCRUM: roles, collaboration, and quality assurance of the outcomes. Two case scenarios will be distributed to two groups of participants to apply it and report their results.

THURSDAY, 14th March**TITLE:**

Innovating methods for teaching and learning: constructing and implementing examples in a computer assessment system (STACK)

Authors:

Nicolae Constantinescu, Augusta Ratiu, Oana Ticleanu and Mirela Vinerean Bernhoff

Abstract:

In the workshop we will present examples from the third intellectual output of the Pythagoras - Erasmus+ partnership project for cooperation in higher education. An important aim of this part of the project is to combine the two types of digital technology - the digital mathematical system (DMS) GeoGebra and the computer-aided assessment (CAA) system STACK- to provide automated formative feedback. The purpose is to increase students' engagement and conceptual understanding in mathematics. The work is inspired by similar pedagogical methods focusing on automatic assessment of higher-order mathematical skills (e.g. Sangwin, 2003, and Brunström et al., 2022). Moreover, during the workshop the participants will work in groups proposing own examples with feedback. All examples are going to be discussed and implemented in STACK (if possible).

References

1. Brunström, M., Fahlgren, M., Vinerean, M. & Wondmagegne, Y. (2022). Designing for a combined use of a dynamic mathematics software environment and a computer-aided assessment system. In Hodgen, J., Geraniou, E., Bolondi, G. & Ferretti, F. (Eds.). Proceedings of the Twelfth Congress of the European Society for Research in Mathematics Education CERME12 (pp. 3764-3771). Free University of Bozen-Bolzano and ERME.
2. Sangwin, C. (2003). New opportunities for encouraging higher level mathematical learning by creative use of emerging computer aided assessment. *International Journal of Mathematical Education in Science and Technology*, 34(6), 813–829.

FRIDAY, 15th March

TITLE:

From theory to praxis: Gamification in university math-related education

Authors: Georgios Triantafyllidis

Abstract:

This interactive workshop aims to bridge the gap between theoretical frameworks and practical applications of gamification in university math-related education. Following the PYTHAGORAS learning framework for gamification, we will explore the growing body of research on gamification's impact on student motivation and engagement with the subject, as well as the relevant psychological theories. Participants will also gain hands-on experience by designing and applying gamified elements, to real-world university content.

The workshop will equip educators with the knowledge and skills to:

- Understand the core principles of gamification and their relevance to university mathematics learning.
- Identify key motivational factors and how to leverage them through gamified elements.
- Design and implement engaging gamified learning experiences appropriate for diverse learning styles and course content.
- Critically evaluate the effectiveness of gamification and adapt strategies for continuous improvement.

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The Erasmus+ project team
March, 2024

