# Alignment of Balance between Academic Programme Computational Mechanics and Qualification Frameworks

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General information about the programme

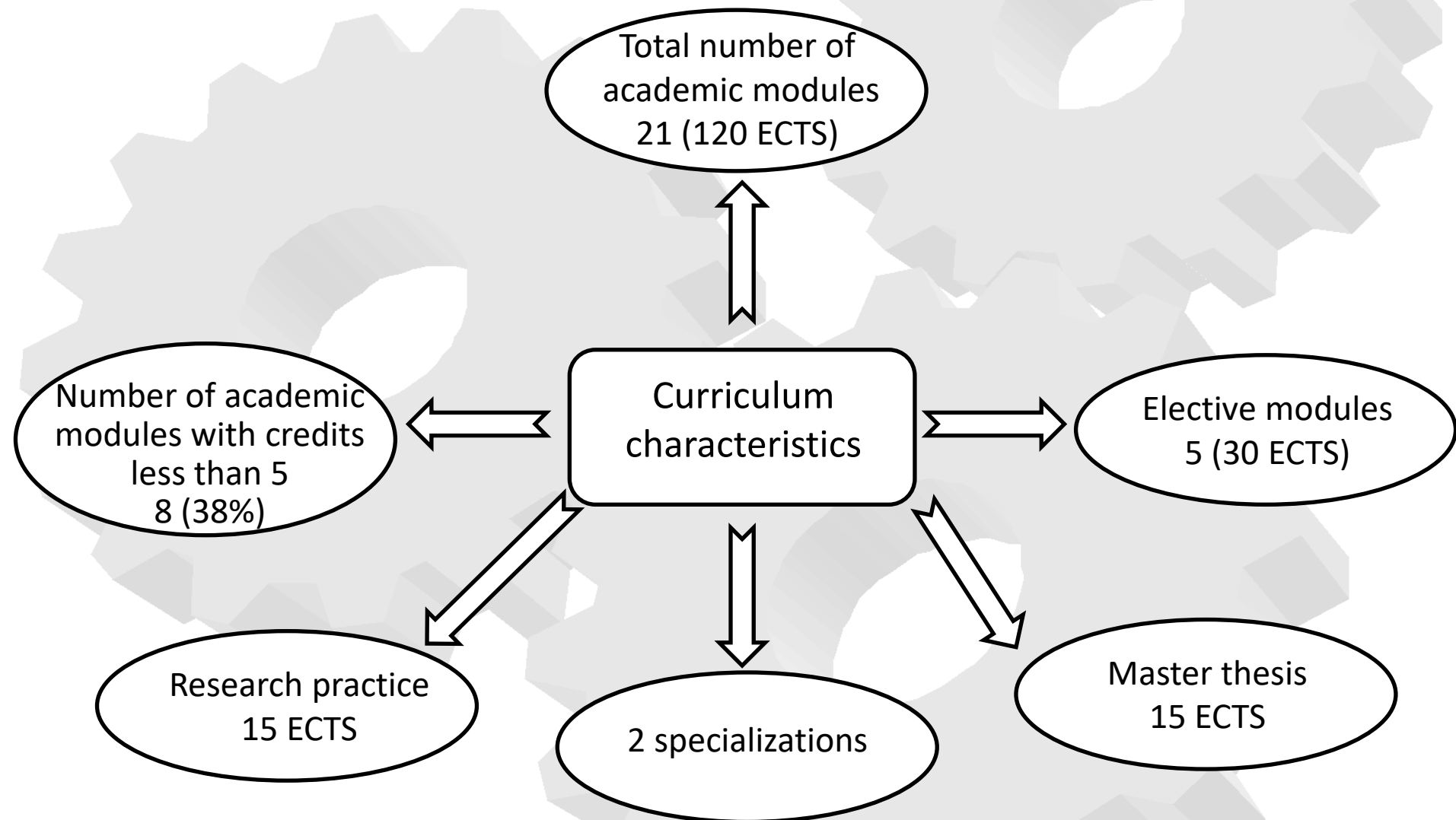| Programme Title	Master/Computational mechanics
Number of Stages	2 year (120 credits)
Framework Level	7 NQF
Area of Specialisation	Computational mechanics
Learning Modes Offered	Full-time
Languages	Ukrainian

Figure 1: Brief description of the programme
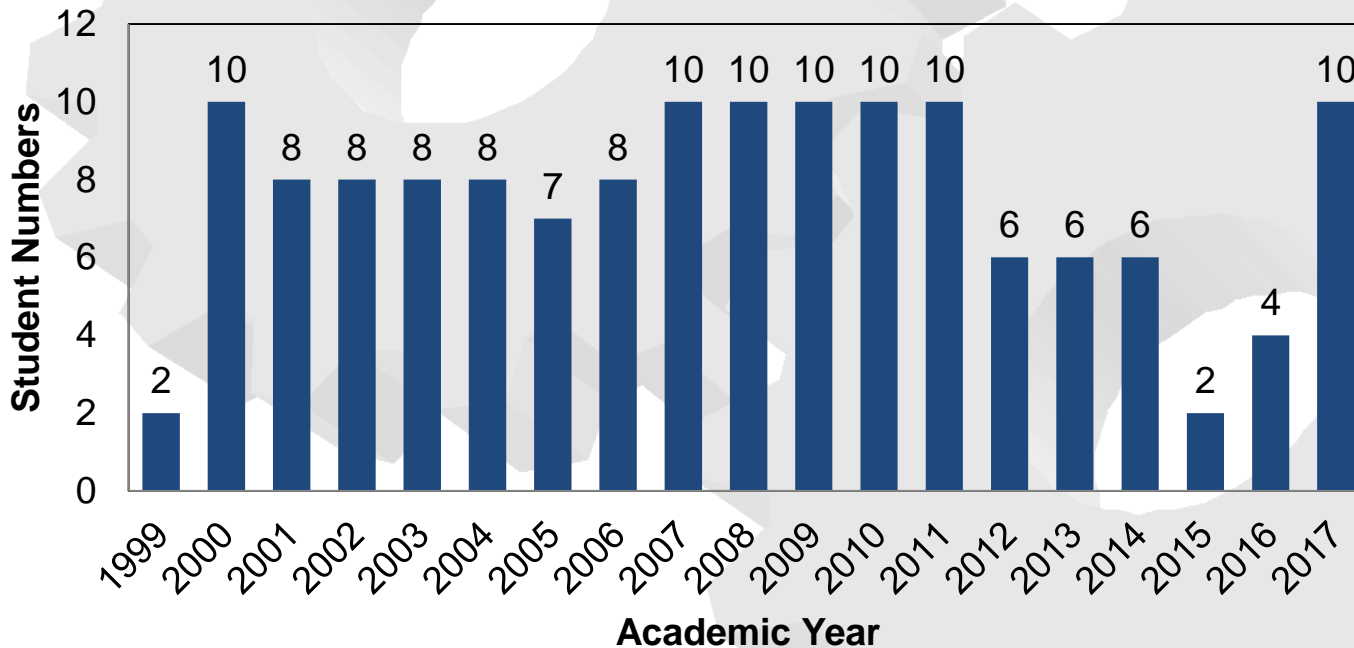
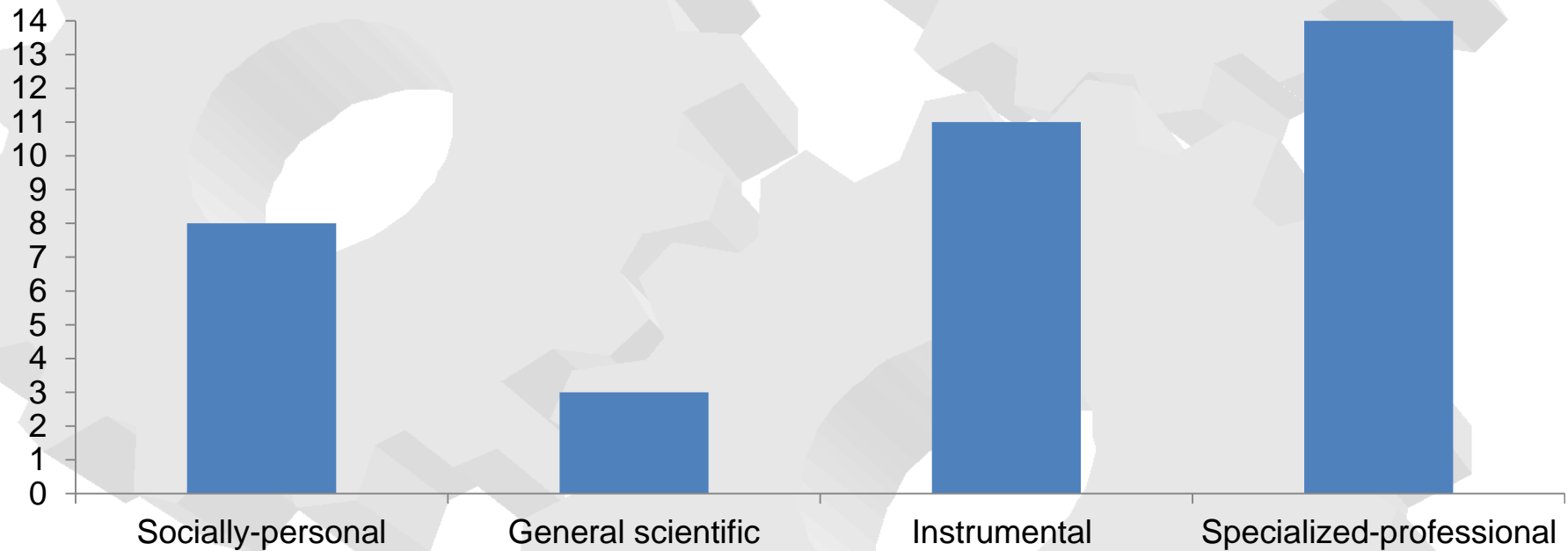

13 graduates with PhD degree

Figure 2: Number of registered students, 1999-2017

Analysis of the programme structure before participation in the project

Analysis of the programme structure before participation in the project

According to university standard (CTBH3 8.040202003.OKX-2013) the master of academic programme "Compuitional Mechanics" must know, understand and be able to perform 36 programme learning outcomes after successful completion of learning.

Analysis of the programme structure before participation in the project

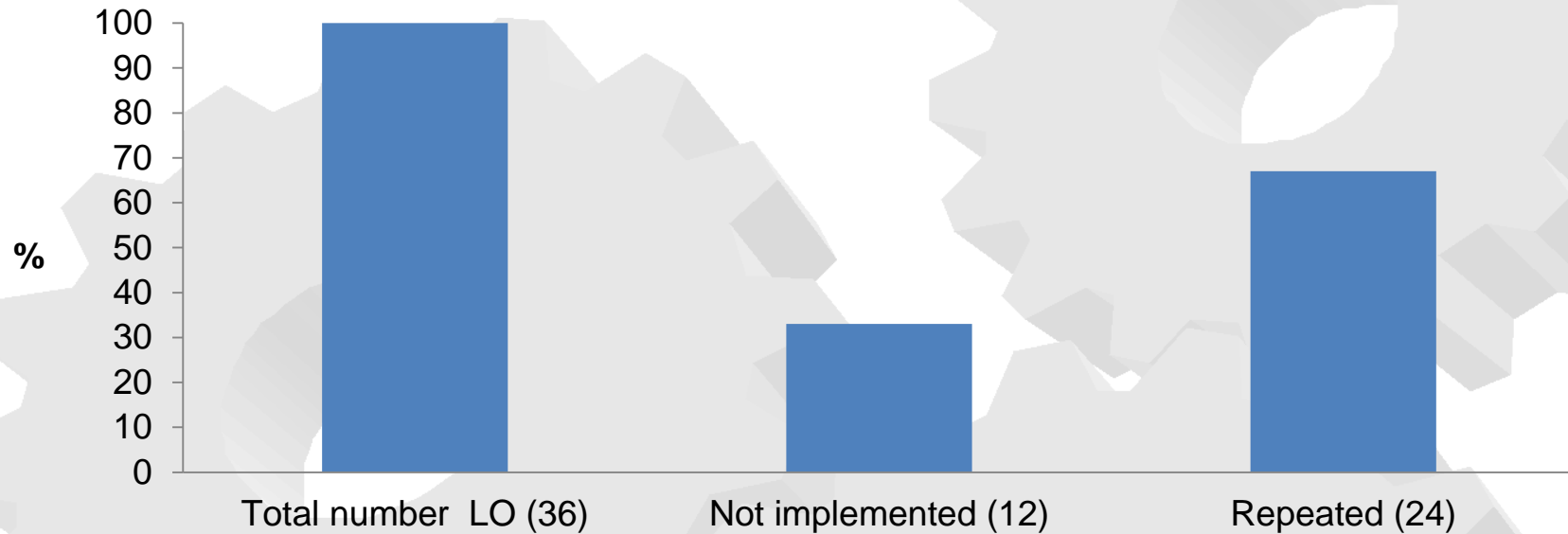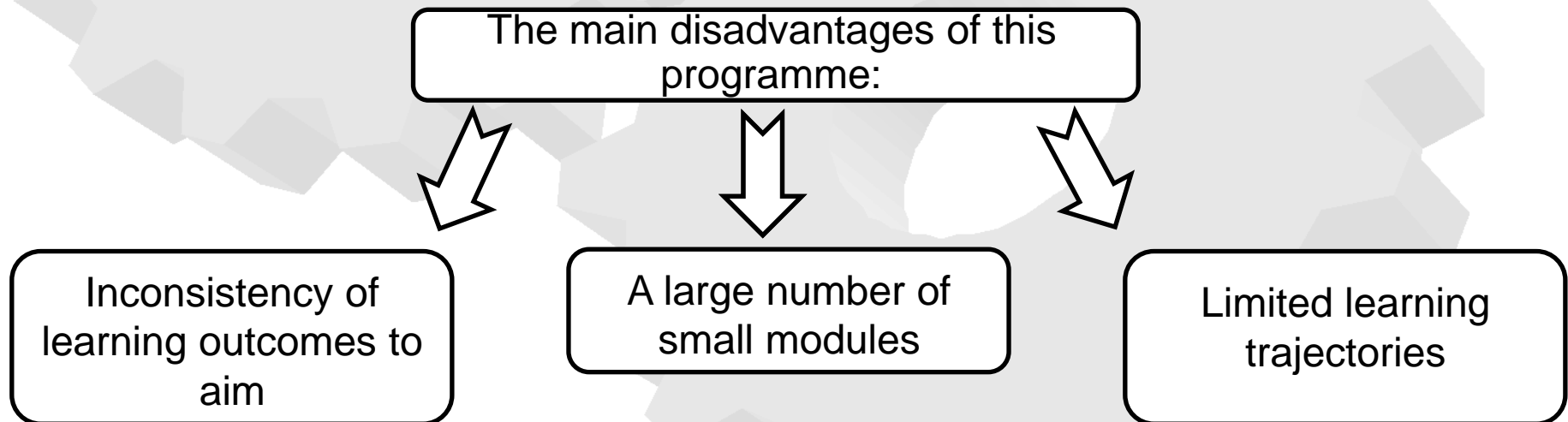Figure 3: Implementation analysis LO (%)

%

Total number LO (36) Not implemented (12) Repeated (24)

The main disadvantages of this programme:

Inconsistency of learning outcomes to aim

A large number of small modules

Limited learning trajectories

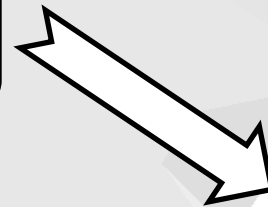# What was done ......

Programme revision
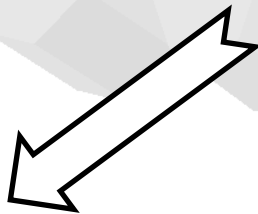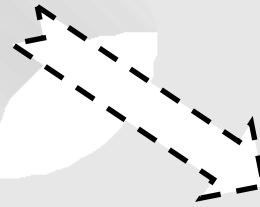
Enlargement of modules

Expansion of opportunity of free choice by students of learning trajectories

Learning outcomes revision

Employers Council creation

Harmonization of the learning outcomes with the needs of the labor market

Adaptation of graduates to the labor market
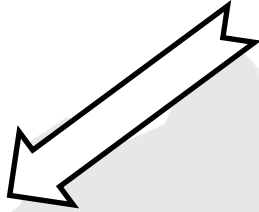
Feedback (Student Survey)

- Is it possible to consult with the teacher during the module?

- How was established the communication and feedback with the teacher during the module?

- Please evaluate the assessment process of your work in module.

- How effective the teacher used the time spent for classes?

- How was organized the work with literature in the study of module?

- Please evaluate the quality of the explanation of the learning material by the teacher.

- Evaluate the usage by the teacher during the learning of technical facilities and active forms of learning

New assessment of students' project

Point	Assessment
5	**Abstract** Includes clear and concise (1 sentence) explanation of each main section of the project
20	**Intro** Begins by discussion of main concepts of the project Includes brief summary of methods and results previously obtained, including main equations
20	**Methods** Demonstrates a solid understanding of project procedure
20	**Results** Overall results of project are summarized in first paragraph of results section
20	**Discussion** Connects evidence collected with the theoretical concepts discussed in project and lectures Extends the results of the project by providing questions and further direction
15	**Writing** Contains accurate spelling grammar and punctuation Language is clear and concise
Total 100	

Aims/goals of the programme

The aim of the Master programme is preparation of specialists with high level skills in computer technologies for advanced engineering problems, applicable in all directions of engineering science and technology, where laws of mechanics are used, in particular in machine building, aerospace industry, heating and atomic power engineering, building and bioengineering.

Basic task of the programme is preparation of students obtaining the following outcomes:

- advanced knowledge on fundamental sciences (mathematics and mechanics) and modern programming languages;
- skills of use of computer technologies of modelling, computer-aided design and optimization;
- experience of practical use of modern computer software packages for calculations of dynamics and strength, thermomechanics, heat-mass exchange and hydraulic gas dynamics, optimization and diagnosing of complex technical systems.
- cooperation with industrial companies at local, regional and national level that provides a close connection with market demands and ensures high employability level of its graduates.

New programme learning outcomes

After successful completion of the programme students will be able to:

PLO 1 Speaking and representation of results their activity by English language with specialized terminology.

PLO 2 Team work with another people for achievement of common aim and jointly responsible for results achievement.

PLO 3 Follow high standards of ethical behavior in professional sphere and arrange work in accordance with demands of life security and labor protection.

PLO 4 Possess analytical and numerical methods of modeling of complex mechanical systems and physical continuum models.

PLO 5 Use experimental methods for research of mechanical systems and aerohydrodynamic processes including use of modern mathematical apparatus, methods of research results processing and computer technologies.

PLO 6 Based on her/his knowledge to choose rational solutions to solve problems of mechanics, apply modern mathematical tools and computer technologies solutions for the tasks, analyze results and determine the limits of their competence.
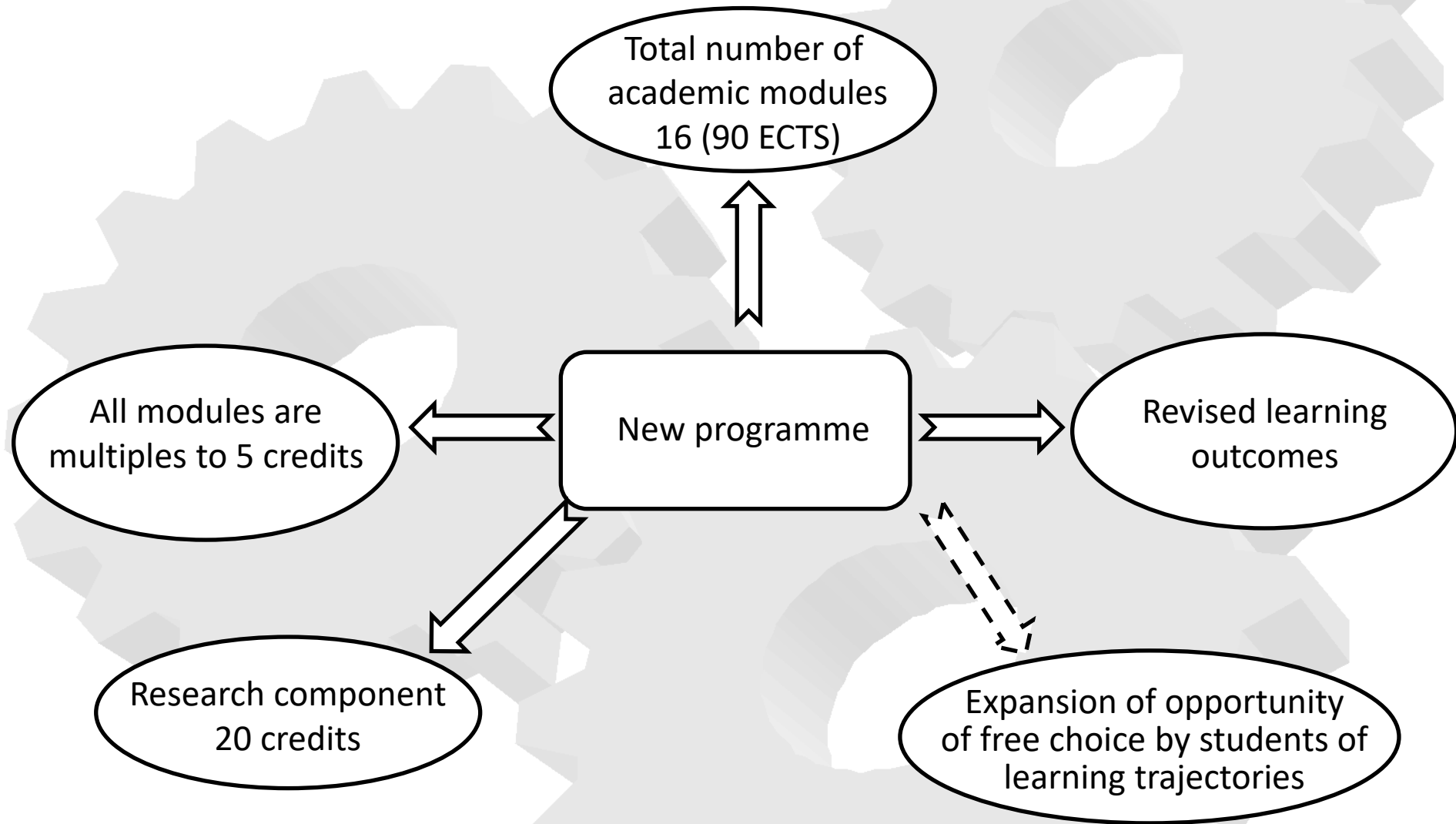
PLO 7 Conduct scientific and applied research using practice/applied methods and methodologies in professional spheres and managing scientific and technical documentation in accordance with the highest industry, scientific and international standards.

PLO 8 Use methods of technical diagnostics and forecasting of reliability of mechanical systems.

PLO 9 Design new software on the basis of developed reliable mathematical models and calculation methods for elements of studied model.

PLO 10 Use her/his knowledge and skills on computational mechanics in real situation.

The new programme structure

Total number of academic modules 16 (90 ECTS)

All modules are multiples to 5 credits

New programme

Revised learning outcomes

Research component 20 credits

Expansion of opportunity of free choice by students of learning trajectories

INDICATORS

INDICATOR	PROGRESS
The academic programmes are properly titled and lead to awards at the appropriate level, consistent with European and national frameworks for higher education qualifications, and the Dublin Descriptors for Masters' awards.	The title of the program has been changed in accordance with similar programs of the leading universities of the world. The new title of the program "Computer Engineering in Mechanics".
The academic programmes are informed by and consistent with professional/industry standards/requirements, where appropriate.	Continuous monitoring and revision of learning outcomes accordance with labor market needs. Works employers' council. The policies and schedule of its work are approved. Academic programs are signed by the employers' council.
The aims of the programmes are appropriate for the student intake, and can be realised through students' attainment of the programme/module learning outcomes.	Aim and objectives formatted according to learning outcomes. The collected and generalized information on the results of the students' scientific work: the number of scientific publications, the number of prize places in the competition of student research works, information on the number of students working on the scientific themes of the department.

INDICATORS

INDICATOR	PROGRESS
All learning outcomes at module level are at the appropriate level, and are assessed through fair, valid and reliable student assignments/tests.	Student tasks assessment is changed. The amount of classroom work is reduced to 16 hours a week. The number of lecture hours has been reduced and the number of hours for practical work has been increased. Lectures 30%. Practical work 70%.
Throughout their course of study, students are able to monitor their academic progress and development, and receive advice on how they can improve and enhance their work.	At the institution level, student surveys were developed for each module, a personal cabinet of students and teachers was developed for feedback between them.
The teaching and learning activities employed within the modules are informed by reflection on professional practices, and designed to enable students to develop the knowledge, skills, abilities and professional competencies that will enable them to achieve the modules' learning outcomes.	Concluded cooperation agreements with leading companies of the region in the field of students learning. Collected and generalized information on the best graduates of the academic programme and their place of employment.

INDICATORS

INDICATOR	PROGRESS
The structure of the programme ensures the progression of students' learning, and provides appropriate opportunities for student choice	Expansion of opportunity of free choice by students of learning trajectories.
The credits ratings (national and ECTS) for modules are properly aligned with the designated student workloads for the modules.	Concluded agreements with universities in Europe on double diplomas and academic mobility.
Students are provided with clear and current information about the learning opportunities and support available to them.	The development of the handbook ends. Estimated date of publication - the end of October 2017.
The design, delivery and monitoring of the academic programmes is 'student centred', engaging students collectively and individually as partners in the development, assurance and enhancement of their educational experiences (e.g., through effective representation of the student voice, discussions about opportunities for course enhancement, involvement in quality assurance processes, and the monitoring and evaluation of student experiences).	At the university level, the process of involving students in the viewing of academic programs is being developed. June 2018.

Thanks to the participation in the project, the following results were obtained

The number of modules reduced from 21 to 16 due to their enlargement. All modules are multiples of 5 credits. The number of PLOs reduced from 36 to 10.

Programme aims and learning outcomes were revised, their alignment ensured.

According to the recommendations of the employers' council and graduates, the components related to engineering and IT skills are added. Change of the AP title at Bsc level.

Number of lectures reduced and number of practical classes increased upon recommendations of the employers' council and graduates. This allowed students to gain more practical skills.

Benchmarking with universities worldwide. Provisions for academic mobility and double-degree agreements.

Launch of tracking graduates and creation of the programme alumni union. Decision and preparations for delivery of the programme in English.

General information about the programme

Best graduates

Ievgenii Altynsev

Oleksandr Maksymenko

Olexandr Udyansky

Ruslan Shulga

Oleg Nesterov, Jana Odyncova, Ruslan Moroz

Olexandr Shelegeda   *web-studio «ArtyCreate» (Praha)*

General information about the programme

Best graduates

Sergiy Tkachenko

Viktoria Nikitina

Andriy Lutenko

Alyona Khalizeva

Bohdan Nishta

Politechnika Wroclawska

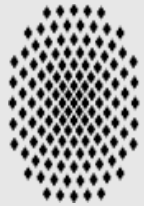Viacheslav Sukhanov

Olexandr Zajcev

General information about the programme

Computational Mechanics programme in the world universities…