Transforming Graduate Education
for Green and Sustainable Future (T-Green)

REPORT

developing outcome based green double/joint degree programmes:

Yerevan State University (YSU)
National Polytechnic University of Armenia (NPUA)
Eurasia International University (EIU)

Country: Lithuania

Mykolas Romeris University

Vilnius
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Aligning programs with OBE principles

Outcome-based education is education in which an emphasis is placed on a clearly articulated idea of what students are expected to know and be able to do, that is, what skills and knowledge they need to have, when they leave the school system. OBE can be called a general methodology, the purpose of which is an attempt to measure educational effectiveness based on results rather than on inputs such as time students spend in class. The student learning outcomes constitute the criteria by which curriculum is developed or redesigned, instructional materials are selected, teaching methods are adopted, and evaluation is conducted. OBE is helpful to encourage the development of teaching and learning practices to attain the established outcomes. This methodology focus on measurement of the knowledge, skills, and capabilities that learners must attain by the end of the course.

Core steps to apply OBE principles for study program development:

1. Highlight institutional mission and vision.
2. Decide on the level(cycle) of the study program and apply the description of learning outcomes for the particular study cycle.
3. Establish program educational objectives
4. Decide in what field the program will be developed and what qualification degree will be awarded.
5. Apply the descriptor of the particular study field to establish learning outcomes for the particular study program.
6. Develop program learning outcomes. Program learning outcomes are measurable statements that relate to knowledge, skills, and capabilities that students achieve after completing a program.
7. Create a Curriculum Map

A curriculum map can be a spreadsheet or table, that include the following features:

- Topics or units: The primary themes or focus areas of the program.
- Learning objectives: particular measurable goals according to each topic and area.
- Instructional methods: teaching methodologies and pedagogies that teachers use within the classroom, helping students attain objectives.

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- Assessments: evaluation techniques and strategies that teachers use to assess student learning and individual progress.
- Timeline: a timeframe for exploring each topic within the program's schedule.

When commenting on the formulations of the expected outcomes of the double degree 2nd cycle study program "Blockchain and digital currencies" it should be noted that the program description indicates two different qualification degrees (***Master of Financial Mathematics*** and ***Master of Information Security)*** that are planned to be awarded upon completion of the study program. It should be noted that the study program is 90 ECTS credits, therefore it will be very difficult to ensure that the study objectives of both fields are adequately achieved.

In the European studies area, learning outcomes are most often classified into 5 groups, which comprehensively characterize what students are expected to know and be able to do in professional and social live. Below is a suggested list of study outcomes for the 2nd cycle study programs eligible for the study outcomes:

1. **Knowledge and its application**

   The newest knowledge in study or activity field based on fundamental or applied scientific research (research parts of art projects) which they are able to use when solving issues in new or unknown environment, performing scientific research or engaging in professional artistic activity, or developing innovation.

2. **Research skills**

   Graduates have the ability to analyze, synthesize and assess research data necessary for studies, scientific (art) and professional activity and innovation development; they have the ability to integrate knowledge, manage complicated situations and make decisions when there is no comprehensive and well-defined information, and assess alternative solutions and possible impact on environment.

3. **Special abilities**

   Graduates have the ability to use available knowledge and prepare new means (technical, methodical, informational and organizational/managerial) based on it necessary for scientific researches, studies, and implementation of cultural and artistic activity or innovation development.

4. **Social abilities**

Graduates have the ability to communicate summarized clear and reasoned information to specialists and other persons and evaluate it critically. They assume responsibility for the quality and assessment of his/her and subordinate employees' activity following the principles of professional ethics and citizenship. They assume responsibility for the improvement of their and subordinate employees' activity.

5. **Personal abilities**

   Graduates have the ability to plan the process of learning in an autonomous manner and choose the direction of improvement in an autonomous manner, and study (learn) in an autonomous manner further. Graduates have the ability to use scientific research (artistic activity) data and has experience in research work and has skills of systemic and strategic thinking necessary for autonomous professional activity and scientific research work (artistic activity). They have the ability to make innovative decisions assessing possible public and ethical outcome of activity. They act perceiving moral responsibility for the impact of their activity and its results on public, economic and cultural development, wellbeing and environment.

In order to aligning programs with OBE principles it is necessary to ensure the compatibility of the learning outcomes of the study level, required outcomes of study field and learning outcomes of particular study program

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Integrating sustainability and green principles

The need of "Blockchain and Digital Currencies" Master`s Degree Programme is conditioned by several factors, which we also observe in the latest scientific studies.

According to the World Economic Forum, blockchain can enhance trust in green finance by rendering environmental impact data more transparent and traceable.

The digitalization level has a significant positive promoting effect on the green development of regions and enterprises. The integration and application of Blockchain technologies will effectively promote the determination and effective implementation of green development strategies for the enterprises. When Blockchain technology applied to the production and operation processes of enterprises, it can not only alleviate the financing constraints of enterprises and reduce transaction costs but also enhance the expected benefits of enterprises undertaking environmental protection and other social responsibilities through traceability mechanisms.

Deng et al. explored the impact of blockchain technology maturity on supply chain finance participants, using principal-agent modeling and incentive theory and designing an incentive mechanism between platforms, banks, and central banks, so as to find the optimal incentive contract in the blockchain technology-enabled online supply chain.

Blockchain technology is recognised as a valuable tool for traceable and transparent data, enabling investors to monitor the impact of climate change on green bonds and loans. Green financing aims to amplify financial flows for sustainable development, managing risks and capitalising on opportunities.

Therefore, the study goals of the "Blockchain and Digital Currencies" programme (“to train specialists in blockchain and digital currency technologies for the financial and IT sectors; to prepare graduates for roles as blockchain analysts, digital asset managers, decentralized applications, blockchain, and cybersecurity experts; to equip students with the skills needed to work in fintech, banking, digital asset management, investment, regulatory bodies, and IT companies; to provide expertise in blockchain integration, digital transaction security, and the development of innovative financial solutions through decentralized technologies.”) are actual and meet labour market needs.

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Assessment methods and learning outcomes

One of the main objectives of OBE is to ensure the development of all students. Therefore, implementing different types of assessment techniques helps measure student achievement in terms of learning outcomes. The effective assessment techniques include:

- Individual or group projects: these allow learners to research, plan, and develop projects that showcase their understanding and application of skills.
- Presentations: students present their findings, solutions, and analyses.
- Self-assessment and peer review: learners reflect on what they have learned so far, helping to identify areas of strength and weakness. On the other hand, peer reviews provide a chance to exchange constructive feedback with each other.

Key features of OBE assessment include:

Clear learning outcomes: starts with well-defined and measurable learning outcomes or competencies. These outcomes specify what learners are expected to be able to do, understand, or demonstrate upon completing a course or program.

Assessment of skills and competencies assesses learners' ability to apply knowledge, solve problems, and perform real-world tasks related to the subject matter.

Authentic assessments: assesses how learners demonstrate their skills and competencies in contexts that resemble actual work or practical situations.

Performance criteria: selection of specific performance criteria that define what constitutes successful attainment of the learning outcomes. These criteria help ensure consistency and fairness in assessment.

Feedback and improvement: creates constructive feedback to learners, allowing them to understand their strengths and areas for improvement. Feedback is used to guide further learning and skill development.

Individualization: assessment is tailored to the individual learner's pace and development.

Holistic assessment: assesses learners' abilities across a range of interconnected skills, promoting a more holistic understanding of their capabilities.

Reflective learning: encourages learners to reflect on their own learning and performance. This self-assessment and reflection contribute to a deeper understanding of their strengths and areas for growth.

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Criterion-referenced grading: typically uses criterion-referenced grading, where learners are assessed against specific performance standards rather than being ranked against their peers.

Continuous improvement: supports continuous improvement by encouraging learners to revisit and refine their skills and knowledge over time.

All competences and abilities defined in the learning outcomes shall be formally assessed in the way that ensures that students have developed them. Students shall receive appropriate feedback on completed works. Assessment of completed works and projects shall be based on clear criteria and accompanied by constructive comments.

All student assessments shall be based on clearly defined and previously known criteria. The scope of works intended for assessment as well as methods and criteria for assessment of students' results and achievements shall be clearly defined in the study programme.

The system of assessment of students' achievements shall be clearly documented and allow higher education institutions to make sure that students graduating from the study programme have achieved a certain level of outcomes defined in the study programme. The system of assessment shall be designed in the way that allows for comprehensible and transparent indication of the level of student's outcomes achieved in the diploma and its supplement issued for the student.

In order to ensure clear links between learning outcomes and the assessment of achievements it is suggested to develop a Descriptor of levels of achieved learning outcomes. Example of a Descriptor of levels of achieved learning outcomes for 2nd cycle study program is presented below;

1. **Excellent achievement level.** Perception of the study field and related practical competences are detailed, exceed the information provided during the studies. In analysing and considering the results of work, original thinking and excellent knowledge of literature and respective activity, research planning and performance are clearly expressed. Knowledge and practical skills are rapidly adapted to new situations in dealing with any unexpected and unclear problems. Calculations, explanations, interpretations and analyses requiring deeper knowledge are performed rapidly, smoothly and precisely. A problem and its solution are viewed critically. New knowledge is acquired in a rapid and assured manner. Graduates have excellent general abilities and the ability to manage the agenda. Graduates having graduated

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from the studies of this level are able to continue studies at the doctoral level. Upon acquisition of professional experience, the graduate becomes an excellent practitioner able to demonstrate good expertise;

2. **Typical achievement level.** Perception of the study field and practical competences are good, however, they are mainly limited to the material provided during studies. The graduate understands what knowledge and competences may be adapted to new situations in their activities, is able to apply problem solution methods fast, acquires knew knowledge easily. Ordinary calculations, explanations, interpretations and analyses are performed precisely. The graduate has good general abilities and the ability to manage the agenda. Upon acquisition of professional experience, the graduate becomes a good practitioner;

3. **Threshold achievement level.** Perception of the study field and practical competences are basic. The graduate understands what general knowledge may be applied in a new situation. Ordinary calculations, explanations, interpretations and analyses of results may be performed, however, assistance and control may be required. Upon acquisition of respective professional experience, the graduate is able to become a good practitioner of a specific area.

Assessment methods are determined separately for each subject, considering the competencies to be developed and the study methods used, as well as the tasks assigned to students. In order to assess how students are able to creatively search for possible solutions and generate original ideas whilst solving various complex situations, the following assessment methods are most commonly used in a study field: concept mapping, research projects, written reports and oral presentations of research project results, reviews of literature sources, and exams.

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Curriculum structure and program alignment

The detailed recommendations for curriculum structure with logical refinements for better alignment with academic and industry needs:

1. Fundamentals of cybersecurity

Recommended changes:

a. Title adjustment: rename to "Development of Cybersecurity" to better reflect the course's focus on the evolution and practical implementation of cybersecurity strategies.
b. Course integration: merge this course with "Database Security" in the 3rd semester to create a more comprehensive and streamlined approach to cybersecurity, covering both network security and data protection.
c. Expanded content: include key aspects such as risk management frameworks (NIST, ISO 27001, DORA), encryption techniques, smart contract security, and emerging cybersecurity threats in decentralized systems.

2. Fundamentals of blockchain

Recommended changes:

a. Title adjustment: rename to "Disruptive Technologies and Blockchain" or "Disruptive Technologies" to provide a broader perspective on emerging innovations that impact industries beyond blockchain.
b. Content enhancements: incorporate additional disruptive technologies such as AI, IoT, and quantum computing, explaining their intersections with blockchain.
c. Practical application: introduce real-world use cases from finance, healthcare, and supply chain to illustrate the impact of blockchain and other emerging technologies.

3. History of cryptocurrencies & crypto law

Recommended changes:

a. Title adjustments: rename "History of Cryptocurrencies" to "Development of the Cryptocurrency Industry" to shift the focus from pure historical evolution to the industry's technological and regulatory advancements.

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b. Rename “Crypto Law” to “LegalTech and Crypto Law” or “Legal Technologies” to broaden the scope beyond cryptocurrencies and include legal innovations like smart contracts and regulatory technology (RegTech).

Content enhancements:

a) Provide a structured analysis of cryptocurrency adoption trends, major technological breakthroughs (e.g., Ethereum, DeFi, CBDCs), and regulatory shifts.
b) Discuss the role of LegalTech in automating compliance, contract execution, and fraud detection within digital finance.
c) Compare global regulatory approaches, covering major jurisdictions such as the U.S., EU, China, and Singapore.

4. Database security & Web 3

Recommended changes:

a) Title adjustments: rename “Fundamentals of Web3” to “Web Technologies” to ensure the subject covers a broader range of internet innovations, including decentralized networks, semantic web, and modern web security.
b) Replace “Database Security” with “Privacy and Data Protection” to better align with modern security challenges such as GDPR, zero-knowledge proofs, and decentralized identity (DID).

Content enhancements:

a) Expand on Web 3 concepts, covering decentralized applications (dApps), IPFS, and smart contract-based ecosystems.
b) Introduce key data privacy techniques, including homomorphic encryption, data anonymization, and self-sovereign identity solutions.

5. Scientific seminar

Recommended changes:

a) Title adjustment: rename to “Research Planning and Methods 2” to clearly define its academic focus on research methodology and planning.

Structural enhancements:

a) Provide clear learning objectives, ensuring students develop critical analytical skills in blockchain and fintech research.

b) Integrate case studies from leading research papers and regulatory reports on digital assets and emerging technologies.

c) Encourage student-led discussions on recent advancements in blockchain governance, decentralized finance (DeFi), and tokenomics.

Final recommendations for the curriculum

1. *Improve course cohesion*: merging related subjects (e.g., cybersecurity and database security) will enhance learning continuity and reduce content overlap.
2. *Strengthen industry relevance*: expanding the curriculum to include emerging disruptive technologies, LegalTech, and data privacy trends will better prepare students for evolving market demands.
3. *Emphasize practical applications*: case studies, hands-on projects, and industry collaborations should be integrated into the courses to ensure real-world applicability.
4. *Enhance regulatory and security focus*: given the rapidly changing legal landscape of blockchain and digital currencies, regulatory compliance, data security, and privacy protection should be emphasized in multiple courses.

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Differences between joint and dual degrees programmes

Policy and Frameworks in the EU

The Bologna Process and European Higher Education Area (EHEA) frameworks promote both joint and dual degree programs, emphasizing the importance of mobility, quality assurance, and cross-border recognition. Joint degrees are encouraged for fostering deep institutional collaboration, while dual degrees offer flexibility for students and institutions aiming to maintain distinct academic identities.

Joint Degree Programs - a joint degree program is a single, integrated program collaboratively designed and delivered by two or more universities. Upon completion, the student receives a single degree jointly awarded and signed by all participating institutions. The curriculum is integrated, often requiring students to study at multiple campuses or universities, fostering cross-cultural and interdisciplinary education. Joint programs are characterized by their strong academic alignment and the development of a unified curriculum that meets the academic standards of all institutions involved. These programs are typically supported by frameworks like the Erasmus Mundus initiative, promoting internationalization and cooperation within the European Higher Education Area (EHEA).

Dual Degree Programs - a dual degree program involves a partnership between two universities that allows students to earn separate degrees from each participating institution. Students must fulfill the academic requirements of both programs, often through a coordinated structure that reduces redundancy in coursework. Unlike joint programs, dual degrees result in two distinct diplomas, reflecting each university's curriculum standards and accreditation. Such programs provide broader recognition and flexibility in global academic and professional contexts but require careful navigation of differing academic regulations and systems.

Based on the provided courses specifications, the **"Blockchain and Digital Currencies" program** appears to align more closely with a **dual degree structure**. However, this also causes some ambiguities that prevent it from being accurately identified as a dual degree program.

In general, the differences between a dual degree and a joint degree can be seen in the following aspects:

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Aspect	Joint Degree	Dual Degree
Certification	One diploma jointly signed by partners	Two (or more) diplomas from institutions
Curriculum	Fully integrated	Separate but aligned
Mobility	Typically mandatory	Often flexible
Accreditation	Unified by all institutions involved (there may be differences depending on national regulations)	Independent for each partner
Recognition	Single qualification in multiple countries	Can be multiple qualifications
Focus	Harmonized academic and research goals	Diverse academic perspectives

The dual degree model chosen by universities would require more detailed information to clarify some of the aforementioned aspects.

Diplomas and qualifications awarded:

The program likely awards separate diplomas from partner institutions (YSU, NPUA, EIU). However, given that more than two universities are involved, it remains unclear what qualification and at which institution it will be awarded. The information provided mentions that two qualifications will be awarded: Master of Financial Mathematics and Master of Information Security. Clear identification of what qualification and at which institution it will be awarded is required.

Curriculum:

The curriculum of the program is presented as one common agreement between all three partners (Annex 1). This would be a more appropriate solution for joint degree programmes. Also, taking into account the fact that different qualifications will be awarded, the suitability of one programme raises many doubts. As mentioned, dual degree programmes would allow for the award of different qualifications, but this should be reflected in the curriculum of the study programmes.

Mobility:

There is no clear scheme for student mobility. Dual degree programs, as a rule, stipulate the role of each institution in implementing agreements on such programs and define where the student will have to study each semester. Considering that different higher education institutions carry out separate accreditation of their study programs, they usually have different requirements for implementing the study process. In dual degree programs, it is

necessary to foresee in advance how universities will coordinate study processes with each other. Students must be clear about such aspects as: admission procedures, which universities will conduct which semester, defending the master's thesis at different universities, etc.

Considering that (YSU, NPUA, EIU) dual degree programs are implemented as different programs at different universities, they have different curricula, different qualification degrees may be awarded, and their implementation is regulated by different requirements for study fields (if the study programs are from different study fields).

Dual degree programs are founded on key principles that reflect the EU's commitment to creating a cohesive and competitive European Higher Education Area (EHEA). Among these principles, mutual recognition of study results, and the transferability of academic credits play pivotal roles. Universities are tasked with ensuring that students can seamlessly navigate between partner institutions, combining the strengths of different educational systems to gain comprehensive and diverse expertise.

All three universities must have clearly regulated and defined conditions (at the national level, and if there are no such legal acts in the country, then the universities must define these issues in a mutually signed agreement on the implementation of the dual degree) regarding the recognition of credits from other higher education institutions.

This document must clearly provide for key aspects such as:

Evaluation of learning outcomes - when a student requests credit transfer, the receiving institution evaluates the compatibility of the completed course with its own curriculum. This process involves:

- **Submission of documentation:** the student provides official transcripts, course syllabi, and descriptions of completed course.
- **Assessment by academic experts:** faculty members or program coordinators review the provided documentation to determine whether the content, scope, and learning outcomes align with the institution's requirements.
- **Credit allocation:** credits are assigned if the evaluated courses meet at least two-thirds of the content and objectives of the corresponding courses at the host institution.

Formalization of credit transfer - once the credits are deemed equivalent, the transfer is formalized through the institution's administrative process:

- **Academic credit transfer card:** institutions may issue a formal document, such as an Academic Credit Transfer Card, detailing the credited courses, the number of recognized credits, and their alignment with the institution's curriculum.
- **Registration in the student record:** the recognized credits are entered into the student's academic record, often with a notation of the source institution.

At this stage, it is common for institutions to impose a limit on the maximum number of credits that can be transferred, typically no more than 75% of the total program credits.

Support for students - to assist students throughout the process, institutions provide dedicated support services, including:

- **Academic advisors:** faculty or administrative staff help students navigate the credit transfer process, explain requirements, and offer guidance on additional documentation.
- **Language support:** for international credit transfers, institutions may require official translations of transcripts and other documents.
- **Appeals mechanism:** in cases where credit transfer requests are denied, students can appeal the decision through a formal process.

Integration into the host institution - after the credit transfer is complete, the student integrates into the host institution's academic system. This step involves:

- **Academic planning:** advisors work with the student to design a study plan that incorporates the recognized credits and outlines the remaining coursework needed for graduation.
- **Cultural and academic orientation:** for international students, orientation programs help them adapt to the new academic environment and cultural context.

As one example, we attach Mykolas Romeris University (Lithuania) "Procedure for the recognition of credits at Mykolas Romeris University" – Annex 2.