

EXPERT CONCLUSION

(based on the review of the Educational and Professional Program)

Tribological Materials Science – Master’s Level
Khmelnitskyi National University, Ukraine

1. Overview of the Program and Its Purpose

The Educational and Professional Program (EPP) “Tribological Materials Science” is designed to train highly qualified professionals capable of solving complex engineering and scientific problems related to surface engineering, friction processes, and advanced materials. The program corresponds to the **second cycle of higher education (EQF Level 7)** and is aligned with the **Bologna Process** principles and the **European Standards and Guidelines for Quality Assurance (ESG)**.

The intended learning outcomes and competencies are clearly articulated and appropriate for the Master's level. The program also reflects the current trends in tribological research and industry needs, particularly in the context of sustainability and high-performance materials.

2. Curriculum Design and Labor Market Alignment

The structure and content of the program are coherent and aligned with the **National Qualifications Framework of Ukraine**. It includes:

- 90 ECTS credits
- 66 ECTS credits of mandatory components
- 24 ECTS credits of elective components
- A clearly defined qualification work (Master’s thesis)

The program content is highly relevant to the **engineering labor market**, particularly for positions such as:

- Materials engineer
- Surface engineer
- Tribology specialist
- Research engineer in high-performance coatings

Stakeholders such as industrial partners and employers are involved in program development, which demonstrates labor market alignment.

3. Learning Outcomes and Competency Profile

The learning outcomes are comprehensive and in line with the **Dublin Descriptors**. Graduates are expected to:

- Apply theoretical and practical knowledge to tribological systems
- Conduct independent research
- Use high-energy treatment and diagnostic methods
- Implement sustainable engineering practices

The program uniquely emphasizes **tribological testing, high-energy surface strengthening, and restorative technologies**, setting it apart from standard materials science curricula.

4. Teaching and Learning Strategy

Teaching is based on **student-centered, problem-based, and research-led** approaches. Educational activities include:

- Traditional and multimedia lectures
- Laboratory work with modern equipment
- Independent and guided research
- Internships and pre-thesis practice

Assessment is conducted via continuous and final evaluation, including **oral, written, and project-based formats**. The methodology follows international good practice and ensures transparency.

5. Staffing and Infrastructure

The program is supported by **qualified academic staff**, including **Doctors and Candidates of Technical Sciences** with industrial experience. Infrastructure includes:

- Tribological testing laboratories
- Surface treatment technologies (plasma, laser, etc.)
- Licensed software for modeling and simulation
- Access to national and international scientific resources

6. Internal Quality Assurance

The program is implemented within the **institutional quality assurance system**, which complies with ESG and the **Law of Ukraine on Higher Education**. Key components include:

- Periodic program review and updates
- Feedback collection from students and employers
- Academic integrity policy and anti-plagiarism systems
- Professional development of teaching staff

7. International Perspective and Opportunities

From an international perspective, the program demonstrates strong **academic quality and technical relevance**. However, to enhance its visibility and competitiveness globally, the following areas could be improved:

- Greater integration of **English-taught components**
- Active participation in **international mobility programs** (e.g., Erasmus+)
- More **international co-supervision** of thesis projects
- Outreach to potential **foreign students and partners**

8. Final Remarks and Recommendations

Strengths:

- Specialized focus on a critical and emerging engineering field
- Clear learning outcomes and professional orientation
- Strong facilities and qualified teaching staff
- Integration of advanced technologies in surface engineering

Recommendations:

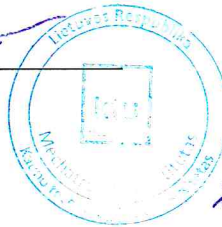
- Expand international mobility and dual degree opportunities
- Foster international research collaborations
- Strengthen ties with enterprises through joint research and internships
- Enhance online presence and promotional materials for foreign audiences

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