

The Management of Elaborating the Program for University Studies With License Exam for The Economic Engineering Specialization

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Abstract — *Given the current socio-economic context and the needs for long-term development in Romania, The National Strategic Reference Framework has as general objective the employment of educational means with the aim of reducing the economic and social discrepancies between Romania and other countries that are members of the European Union. One territorial and four thematic priorities have been identified. The program for university studies with license exam for the economic engineering specialization, in the electric, the electronic and the energetic field and the domain of Management and Engineering can be associated with the priority axis entitled “Development and More Efficient Use of Human Capital in Romania”. The National Strategic Reference Framework 2007-2013 can establish a connection between the national priorities for development, included in the National Development Plan 2007-20013 and the European priorities – The Community Strategic Guidelines concerning the 2007-2013 Cohesion and the revised Lisbon strategy[7].*

Key words: *Reform; license; quality; human resources; competence*

I. INTRODUCTION

The university study program with license exam has been conceived for the Engineering Sciences field of knowledge, the Engineering and Management field of study and the Economic engineering in the electric, the electronic and the energetic field specialization. This conception is in accordance with the quality requirements for academic education, as well as the legal requirements, the requirements of beneficiaries (students, graduates) and the demands of a permanently changing job market.

While elaborating this program, the principles of construction and development of university curriculum (program of study and education plan) have been taken into consideration.

The university study program with license exam conceived for the Economic engineering in the electric, the electronic and the energetic field specialization is based on:

- our experience in designing curricula in Romania;
- the international acquisitions in the field of curricula development;

- the need for coherent politics concerning the design of curricula at the level of the entire educational system in Romania;

II. PRINCIPLES FOR THE ELABORATION OF THE ACADEMIC PROGRAM WITH LICENSE EXAM FOR ECONOMIC ENGINEERING IN THE ELECTRIC, THE ELECTRONIC AND THE ENERGETIC FIELD

A. Principles for selection and cultural hierarchy[5];[6]

The program aims at the configuration of fields of knowledge and culture, as parts of the academic curricula. In accordance with this principle, the study subjects are grouped in different categories, in accordance with the type of the components that are aimed at and taking into account the share of different knowledge domains in the professional formation of students, as well as the connections between these fields. The fields of study are formed by a number of related study subjects, on the basis of some representation codes and common procedures for research and development.

The field of Engineering and Management is part of a larger group: we can connect it with the Engineering Sciences, since it includes technical subjects in the field of electricity, electronics or energy, but also with the Economic Sciences, since it deals with subjects such as general economy, general management, etc. Thus, the Engineering and Management specialization can be associated with both the Engineering and the Economic Sciences.

The engineering and Management field can be subdivided into several disciplines, which together are referred to as Economic engineering in the electric, economic and the energetic field.

The principle of selection and cultural hierarchy indicates the fact that, for the curricular configuration, a clear delimitation among domains, at different levels of the curricular design, would come into contradiction with the interdisciplinary tendencies on which the current educational epistemology is based on.

For a closer connection with the contemporary tendencies in education and culture, the flexibility in delimitating, grouping and classifying the study domains and disciplines is imperative.

In grouping study subjects, people usually adopt conventional demarcation forms. Consequently, in the

design of the curricula, a configuration within the group is needed, in order to ensure the internal coherence; however, the openness towards external connections is very important, since it ensures a trans-disciplinary communication level, which is considered very important in the contemporary world. The Economic engineering specialization is characterized by a set of components that operate within the specific group of disciplines that ensure the acting of some professional roles.

B. The functionality principle

- aims to connect various study subjects and categories of study subjects to the contemporary tendencies in education and knowledge;
- aims at the configuration of study subjects included in the education plan in accordance with the competences the graduate needs to acquire during the license study program;
- establishes connections between the curricular development and the extension and diversification of the engineering field;
- it answers questions such as "How could the future economist engineer in the electric, electronic and energetic field practice the roles he or she is going to perform?" "How relevant are disciplines that are not strictly connected with the economic engineering field for the future development of the graduate student?"
- the curricular field represents a grouping of disciplines that prove functional in relation with the competences the future graduate student needs.

Consequently, the educational plan includes the following:

- *central curricular areas*, which correspond to the procedural dominants of the specific way of thinking. These procedural dominants are reflected into the following fundamental subjects: Mathematical analysis, Linear algebra, Analytical and differential geometry, Physics, General chemistry, Operating computers, Technical drawing, Special mathematics, Programming and programming languages, Computer assisted graphics, General economy I, Numerical methods for engineers, Professional communication, General economy II;
- *specific curricular areas*, that correspond to the field of engineering and management and reflect the specific way of thinking. In order to become functional, the curricular areas reflect the recent development tendencies of the field and the useful elements for the social and the professional inclusion of economist-engineers in the electric, electronic and energetic field. The specialized study subjects are the following: Business law, Electric installations, Strategic marketing, Financial and economic analysis, International commercial law, Practice, Projecting industrial electric systems, Advanced production systems, Human resources management, Quality management, Economic and commercial contracts (optional), Economic

legislation (optional), Financial management (optional), International economic relations (optional), Quality engineering (facultative), The management of product development, Project management, Organizational behavior, Energy sources (optional), Industrial energy (optional), Microwave technologies (optional), Industrial management (optional), Practical activities aimed at the elaboration of the graduation project;

- *interference curricular areas*, aimed at opening the student's way of thinking towards other transfer areas: Elements of mechanic engineering, Technological procedures and methods, Electrotechnics I, Electric and electronic measurements I, Analog and digital electronics I, General elements of law, electric mechanisms, Electric technologies, Analog and digital electronics II, Accounting, Finances and credit, Labor law, Practice I, Electric and electronic measurements II (optional); Translators and sensors (optional), Electric equipments, Reliability, The Basics of assisted projecting; The basics of marketing, General management, Negotiation techniques, Static converters (optional), Systems of electrical tripping, Systems with microprocessors, Electrotechnic materials, Inventics and industrial property (optional);

- *curricular areas of functional culture*, which supplement the specialized formation of economic engineering in the electric, electronic and the energetic field and ensure the functionality of socio-professional integration, both on the job market and for the continuation of academic studies. The complementary disciplines are: English I, Sports I, English II, Sports II, History of science and civilization (optional), Multimedia and Internet techniques (optional); English III, Sports III, Philosophy (facultative), English IV, Sports IV, Sociology (facultative), English V (facultative), English VI (facultative)

- The typology of curricular areas and the relationships between them set out the generative framework of the Educational plan.

C. The coherence principle

- refers to the degree of horizontal and vertical integration of curricular areas and within the same areas, of the study subjects.

This principle involves two correlation levels:

1) At the plan level, we aim at the vertical correlation of study subjects, with the view of forming the competences that are specific to the economic engineering domain, and at the horizontal coherence, with the view of avoiding overlapping and/or contradiction among related disciplines;

2) At the level of study programs we aim at

- the correlation (both vertical and horizontal) of study subjects from the specialized curricular area, so that the specific competences for each subject should be in

harmony with all the others, for the formation of the specialized competences;

- ensuring the complementary character with regards to the contribution of study subjects to the formation of competences aimed by the economic engineering specialization for the electric, electronic and the energetic field. The unspecified disciplines of this specialization are configured in accordance with the socio-professional needs, characteristic of this specialization. For example, the important element in the foreign language curricula is the functional component of the specific language.

D. The “equality of chances” principle

This principle aims at the formation of a system of equivalent conditions referring to the access, the development and the acknowledgement of studies, as well as the socio-professional orientation for all students/candidates for higher education. The putting into practice of this principle results in:

- the implementation of regulations that guarantee the equality of access opportunities; in other words, each person benefits from the same minimal conditions for admission to the Program of academic studies with license exam for the Engineering Sciences field of knowledge, the Engineering and Management field of study and the Economic engineering in the electric, the electronic and the energetic field specialization.

- the existence of some compulsory components that might ensure the validation and acknowledgement of the diploma; in other words, irrespective of the location where the activities of the program of academic studies with license exam for the Economic engineering in the electric, the electronic and the energetic field take place, students receive the same type of diploma;

- the indemnification of a set of central subjects that might represent the operating basis for the formation of necessary competences for the Economic engineering in the electric, the electronic and the energetic field specialization; more precisely, the bachelor of science diploma in Economic engineering in the electric, the electronic and the energetic field specialization guarantees the command over a common set of concepts and specific procedures;

- ensuring an offer of educational services that concern the career counseling at the institutional level; -

- the Program guarantees the mechanism of quality learning and teaching and allows each student to benefit from it and develop. This mechanism implies: first, the evaluation of the knowledge level of first year students and the redirection of the ones who obtain extreme results (either positive, or negative) towards recovery or excellence programs; The system is then periodically put in to practice, in order to be adjusted as necessary.

- The additional act to the diploma should highlight the remarkable performances at different disciplines (the completion of research projects and their publication,

presentations during international meetings, participation to different competitions, etc.)

E. The flexibility and the individual formation routes principle

This principle can be put into practice in the context of university autonomy and individual formation routes for students. The putting into practice of this principle leads to:

- assuming the decision for the educational plan at the level of the Faculty of Electric Engineering and Information Technology/University of Oradea, taking into account the human and the material resources that can be used in accordance with the medium and long-term institutional strategy;

- creating mechanisms that might ensure the choice, by each student in particular, or different formation routes, which are nevertheless equivalent, as well as the formation of competences aimed at by the Economic engineering in the electric, the electronic and the energetic field specialization.

- the structuring of the educational plan relates to two components: compulsory and optional;

- the consideration of a segment of facultative disciplines, which are relevant for the permanent educational process. The facultative disciplines bring an additional number of credits, besides the total of credits that are necessary for the validation of the specialization. Such disciplines are: English V, VII, Philosophy, Sociology, etc.

This principle can be put into practice if it is based on one of the following two mechanisms of flexibility: the optional and the modular character.

A. The optional character:

- allows the flexibility of the academic offer, through the addition, to the common set of disciplines, of some alternative courses. It refers to the existence of a curricular offer that includes study subjects/sets of study subjects that can be chosen by students in certain circumstances.

- The optional disciplines or optional sets of disciplines need fulfill the following conditions:

- be coherent in relation to the competences aimed at by the Economic engineering in the electric, the electronic and the energetic field specialization.

- be in conformity with the possible directions for continuation of studies or the socio-professional integration.

B. Modularity:

- is regarded as a construct of learning contents, on the basis of some independent study units (modules). Modularity is not applied in this program for university studies with license exam.

F. The “connection to the social world” principle

This principle implies the existence of a curriculum that might ensure the optimal socio-professional integration, in accordance with positive ethic and aesthetic values.

The putting into practice of this principle contributes to:

- the configuration of the curricula in relation to the demands of the job market. In other words:
- the background knowledge includes basic elements of the Engineering Sciences field of knowledge, the Engineering and Management field of study and the Economic engineering in the electric, the electronic and the energetic field specialization.
- The focalization of disciplines that lead to the configuration of contents at the level of university cycle with license exam has been achieved. Such focalization represents a specific epistemological anchor, fixed on a common conceptual fundament.
- The correlation of the Economic engineering in the electric, the electronic and the energetic field specialization with the work market and the set of competences that the student acquires during the period of higher education studies.
- The design of the curricula took into consideration the trans-disciplinary perspective, which is necessary for exercising a socio-professional role in the contemporary world. Methodologically, this involves the exceeding of standard examples and applications of a discipline through reporting teaching to the real context.

The paradigmatic organization of the curriculum has been achieved through:

- the valorization of the perennial elements of the engineering and management domain in new configurations, in consonance with the current socio-professional demands;
- the updating of the curricula by introducing new disciplines on the basis of the socio-professional feedback.

From the methodological point of view:

- the application of strategies for evaluation and self-evaluation.

The following curricular areas can be identified for this program: Communication, The information and communication technology and the Value management.

III. THE FUNCTIONAL APPROACH TO LEARNING AND LEARNING OBJECTIVES

The functional approach to learning and learning objectives is a consequence of putting into practice the above-mentioned principles:

- the reorganization of course contents from descriptive to procedural and contextual. The reorganization of the study subject in terms of procedural and contextual bases demands answering questions such as: Which are the major concepts of the discipline? Which are the study subject's specific procedures that can be developed starting from the operation of these concepts? Are these procedures useful for the formation of the competences that are being aimed at? Are these

procedures useful for the formation of competences aimed at by the Economic engineering in the electric, the electronic and the energetic field specialization? In what contexts? What connections can be established among concepts, procedures and problem-contexts/situations? Do these lead to the development of competences that are being aimed at by the Economic engineering in the electric, the electronic and the energetic field specialization?

- In teaching, the accent falls upon the demonstration and the application of expert procedures (the expert is considered a professional in a certain domain).

- The diversification of the cognitive experience of students through the metacognitive and the experimental approach;

- Developing a new professor-student relationship.

Premises:

- Both student and professor are considered partners in the building of knowledge: the student is involved in a process of active learning, which gives the professor the opportunity to leave the framework that produces knowledge-product and dedicate himself or herself to the process-knowledge.

- Both reconstruct the perspective over the engineering and management field: it is obvious that, if a process of learning is taking place, the students' thinking frameworks change and the understanding of the study domain becomes deeper; the professor contributes to the reconfiguration of the discipline during the process of teaching.

- Both student and professor are aware of and apply evaluation criteria for acquisitions. The program of university studies with license exam needs to ensure the quality of the didactic process, avoiding the traditional mode of evaluation, where the professor was regarded as single authority. Both professors and students understand the criteria that ensure a transparent evaluation and offer the possibility to obtain a useful feedback in the process of knowledge.

The professor that participates to the Program of university studies with license exam has new roles:

- The professor as facilitator of learning, who projects and organizes new learning opportunities, adequate for the disciplines that are being introduced and the group of students; thus the routine of the standard example is avoided.

- The professor as adviser, who guides students in the process of knowledge by a motivating combination of cognition and affinity;

- The professor as educator, who allows students to make cognitive experiments; this role demands the thorough study of the engineering and management domain, by reallocation of some cognitive experiences to students-partners in the building of knowledge. A process of learning through applicable projects is suggested, which has a real formative potential.

The curricula of university study program with license exam, conceived for the Engineering Sciences field of knowledge, the Engineering and Management field of

study and the Economic engineering in the electric, the electronic and the energetic field specialization is a modern one, adequate to a knowledge-based society, and is characterized by:

- The placing of learning-as-process at the center of the didactic approach. In other words, the accent falls upon what the student learns, rather than on what the teacher presents.
- The direction of the learning process towards the formation of competences necessary for the socio-professional insertion of graduates from the Economic engineering in the electric, the electronic and the energetic field specialization.
- The flexibility of the learning offer.
- The introduction of new ways of content selection and organization, in conformity with the principle "less is better than much and worthless".
- The individualization of the university processes, which should be motivating for students and oriented towards innovation and personal fulfillment.
- The focusing, on the part of the educator, upon the specific forms of behavior as organizer and mediator of learning-research-didactic transfer activities.
- Obtaining a pragmatic balance between a characteristically academic culture and a functional culture, adapted to the aims of the Economic engineering in the electric, the electronic and the energetic field specialization.

IV. THE COMPETENCES OF THE SPECIALIZATION

The competences of the specialization are structured sets of knowledge and abilities that the graduate student acquires while learning in the context of the Economic engineering in the electric, the electronic and the energetic field specialization. These competences and abilities are:

- 1) The identification of basic components of the Engineering and Management field of study and the Economic engineering in the electric, the electronic and the energetic field specialization. The ability to understand, explain, gather information, establish facts and reach valid conclusions. The capacity to interpret a large variety of technical instructions and work with a series of abstract and concrete variables.
- 2) Operating with the entities of the Economic engineering in the electric, the electronic and the energetic field specialization. The ability to work efficiently using numeric, financial and statistic data (analysis, synthesis, organization, presentation).
- 3) Analyzing problems. The detailed analysis of problematic situations, their correct identification the search, identification and selection of pertinent information in choosing the solutions to possible causes that generate problems.

4) The ability to gather important information through verbal communication.

5) The capacity to initiate actions that involve a certain degree of risk, with the aim of obtaining benefits or advantages. The risk level should be understood and analyzed and the assuming of that risk needs to be conscious and rational.

6) Constant preoccupation with all the aspects of a problem, irrespective how unimportant these might appear.

7) The understanding of personal needs and motivations.

8) The ability to express oneself clearly in writing, in a correct form.

9) Understanding the need to maintain control over processes, people and tasks and identifying the most efficient way to solve problems.

10) The ability to get beyond traditional thinking patterns and identify creative and innovative solutions.

11) The capacity to understand the impact and the implications of personal decisions and actions for different levels of an organization.

12) The capacity to understand the essence of the business environment and its close relation with the level of profitability and development at the organizational level.

13) The ability to set out an efficient action course for oneself and for the others, with the aim of reaching a goal.

14) The capacity to exceed the customers' expectations, demonstrating a total commitment to the identification and the obtaining of solutions at high standards, in order to anticipate the customers' needs.

15) The participation as full member to the actions of a team and contribute actively to the team-work, without occupying the leading position.

CONCLUSIONS

- the general coordination of report elaboration
- coordinating the receipt of course schedules, list of published papers, proofs for the employment of the teaching staff, Member functions plan of departments to which the persons teaching subjects included in the program belong, the laboratory presentation sheets;
- collaboration with other departments in order to obtain useful information;

- processing the plan for education and the member functions plans for this program;
 - the strategic plan of our department;
 - the operational plan of our department;
 - the didactic positions included in the program (number, position , etc.).
 - information regarding the students attending this specialization;
 - peer assessment;
 - evaluation of teaching staff by students;
 - evaluation of the teaching staff by the university management;
 - completing the Appendices to the Report;
- creating the links for the self-evaluation report.
- requesting, receiving and verifying the course schedules, CVs, lists of published papers, proofs for the employment of the teaching staff , Member functions plan of the Mathematics, Physics and Sports departments, the laboratory presentation sheets;
 - requesting, receiving and verifying the course schedules, CVs, lists of published papers, proofs for the employment of the teaching staff , Member functions plan of the DESU department, the laboratory presentation sheets;
- Scheduling the research and the synthesis of the scientific research activities (table presenting the scientific activity of the teaching staff from DESU department).
- requesting, receiving and verifying the course schedules, CVs, lists of published papers, proofs for the employment of the teaching staff , Member functions plan of the Electronics and Automatics departments, the laboratory presentation sheets;

- requesting, receiving and verifying the course schedules, CVs, lists of published papers, proofs for the employment of the teaching staff , Member functions plan of the EMUEE department, the laboratory presentation sheets;
- making photos of the faculty premises and laboratories and the inclusion of these photos into the report.
- word-processing the department's self-evaluation report, using the model available at www.uoradea.ro, link quality – self-evaluation – self-evaluation report for the accreditation of programs for university studies with license exam – model [1]; [2]; [3].

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