

## **Undergraduate & Master Projects**

### **Introduction**

The Ministry of Industry, the Association of Lebanese Industrialists, the Lebanese National Council for Scientific Research, and Banque du Liban are proud to launch the annual Conference and Exhibition of Lebanese Industrial Research Achievements (LIRA). All universities are encouraged to participate in this showcase of innovation, which aims to instill the importance of creativity and technological development with high quality applied research in young generations of engineers and scientists.

Engineering and Sciences Faculties are invited to select the best of engineering final year projects, and sciences masters' projects, which reflect a strong potential for industrial application. The Faculty adopted projects compete in an open forum and are evaluated by a specialized jury during the LIRA Exhibition, based on the enclosed criteria. The top three projects of each category, listed below, are awarded cash prizes, and an additional prize is awarded to the supervising professor of the best project in each category:

- Mechanical and Mechatronics
- Electrical and Electronics Engineering and Sciences
- Civil Engineering
- Information and Communication Technology
- Chemical and Pharmaceutical Industries
- Agro-Food Industry
- Packing and Packaging
- Materials and Nanotechnology
- Other Industry Related Applications

## Eligibility

To be eligible for consideration in this category, faculty selected projects must be:

- Submitted through the online application portal prior to the deadline
- Prepared by students, on their final year of an accredited engineering program, or, on a master's degree of a sciences program
- Strongly leading to industrial development
- Supported by a functional prototype

## Evaluation Process

Project applications should include all the necessary documents, as submissions should reflect on two main parts:

- **Technical Description:** Clear description of the problem and methodology with relevant bibliographical research, and detailed technical solution with results.
- **Business Perspective:** Clear description of business planning with regards to marketing, feasibility, and commercial competitiveness.

The following criteria are detailed in the remaining part of the document in order to provide a precise description of what is expected for the evaluation process.

Applicants are encouraged to carefully read this description before producing the project document. A project is graded based on the achievements as follows:

- I. Creativity and Innovation (20%)
- II. Technical Solution (40%)
  - A. Research & Design Quality (15%)
  - B. Finishing and Presentation (15%)
  - C. Multidisciplinary Content (10%)
- III. Business Development Potential (40%)
  - A. Market Research & Analysis (10%)
  - B. Added Value to the Lebanese Industry (10%)
  - C. Manufacturing Plans (10%)
  - D. Financial Feasibility (10%)

## Assessment Criteria

### I. Creativity and Innovation (20%)

There is a strong need in Lebanon to promote the development of new industrial activities that can capitalize on the existing human resources. The inclusion of this element is to encourage directing our human resources towards products that have not yet been produced in Lebanon or in export markets. Innovation does not need to be complicated or difficult. The applicant(s) should clearly identify all innovations introduced, as compared to similar products in the market or to other similar projects.

### II. Technical Solution (40%)

#### A) Research & Design Quality (15%)

In today's market, it is imperative to include quality as a parameter in any project evaluation. While there are many definitions for quality, in engineering projects quality deployment requires the investigation, implementation and documentation of specific techniques and steps. A quality project deploys these techniques while executing the engineering design process steps, in order to consistently deliver declared specifications. Quality of the research and design outcome may be defined in terms of functional performance and fitness-for-use requirements as applied to the design and prototype:

**1- Design Planning:** The following steps must be documented:

- Research and evaluation of market needs
- Derivation of measurable engineering project characteristics
- Development of alternative design solutions
- Selection of a best proposed design
- Evaluation (iterations when needed) of the design
- Prototyping and assessment (iterations when needed)
- Following engineering standards and applying engineering best practices (when appropriate)

**2- Reliability:** Reliability is the probability that an item will perform a required function following declared specifications under design stated conditions, for a stated period of time.

**3- Maintainability:** Maintainability refers to the ease with which preventive, predictive, and corrective maintenance on a product can be achieved; more formally maintainability is defined as the ability of an item under stated conditions can be retained in, or restored to, within a given period of time.

**4- Product Safety:** Safety should be designed into the product to a degree consistent with objectives' requirements. Hazards associated with each product (and its components and units) are to be identified, eliminated, or controlled to an acceptable level. Control is to be established over hazards that cannot be eliminated, so as to protect personnel, equipment, and property.

## **B) Finishing and Presentation (15%)**

Product design and finishing are an important prerequisite for any successful innovation, so projects are expected to present a complete product prototype that provides customer satisfaction. A prototype is the first completed unit, tested and found to be fully operational. Prototyping is a science; it is recommended that the applicants get familiar and apply when possible professional prototyping techniques and material. Ideally, prototype units are built using the manufacturing procedures and equipment planned for full-scale production. However, in some cases, that is not possible and the applicant(s) can build the prototype using: finished materials, printed circuit boards, proper housing elements, acceptable labeling, metal and/or plastic molding...etc. A professionally presented functional prototype of the highest finishing standards is to be sought after.

## **C) Multidisciplinary Content (10%)**

In today's knowledge based economy, a high degree of competitiveness can be achieved by successful integration of multiple specializations, yielding in a production of more complex products achieving higher added value. Thus, there is a need to train engineers and scientists for multidisciplinary environments, and to encourage applicants and universities to develop multidisciplinary teams and projects. The inclusion of this parameter aims at promoting multidisciplinary thinking, as applicants are expected to indicate the multitude of disciplines and specialization areas used in the project.

# **III. Business Development Potential (40%)**

## **A) Market Research (10%)**

The evaluation of the marketability should be based upon the following:

- Assessment of proper identification of the market/client needs; Identification of a target market should be clearly defined and justified.
- Assessment of relevance of identified need; i.e. how urgent and how much the client is willing to pay; the relevance of the need to the market being served means a

proper definition of the market size and of potential client, as well as how much the market can pay for the need and how much it can absorb so as to make the operation economically feasible.

- Assessment of the ability of the proposed project to meet the need. It stresses whether the proposed concept is able to meet the need. Since no requirement is stipulated to address the other aspects of the marketing mix (namely promotion/communication, and distribution), they would not be included in the evaluation of the marketability of the proposal.

## **B) Added Value (10%)**

What really determines how well a product is received by a market is the relative value that the product delivers. By looking at value, applicant(s) can compare between different offerings. Value is the benefits derived from a product (tangible and intangible) given the cost one pays as compared to competitors (others serving the same need and the same market segment as defined by the researcher). The applicant(s) must estimate the value-added of the product, by calculating the expenses incurred and proposing a "Tag Price" for the finished product. The academic need to include this factor resides in the necessity of creating a strong awareness among applicants and industrialists of the need to measure and continuously work on improving this critical factor.

## **C) Manufacturing (10%)**

Many of the excellent lab prototypes never make it to the manufacturing stage because the applicant(s) did not take into consideration the manufacturability of the product. Many good designs cannot be easily manufactured and may have to be radically modified to accommodate the needs of mass production processes and/or to reduce the cost of such processes, in order to improve the competitiveness of the product. Applicants are expected to describe the various steps needed to develop the prototype through design for manufacturing.

## **D) Financial Feasibility (10%)**

Project application documents should include a detailed study of the associated costing, through a cash flow projection highlighting the following:

- An estimate of the capital investment
- A detailed breakdown of the manufacturing costs
- An estimate of growing return on capital invested with time.