Telecommunications Engineering Department
Yarmouk University
Tempus Project No. 511074

Competition Analysis of Masters Programs in Telecommunications Engineering and Management

Report

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Preface

This report presents the competition analysis for the new Masters programs proposed by the Telecommunication Engineering Department at Yarmouk University. The Competition Analysis is part of the activities of the Tempus project No. 511074 which was awarded to the University in July 2010.

The objective of the Competition Analysis is to understand the competition environment in order to be able to specify the characteristics and attributes of a successful Masters program. The results of this analysis will serve as input to the curriculum development phase of the new programs.

Through the surveys and meetings conducted by the Competition Analysis Work Group in a span of about 6 months, a competition analysis report (this report) was realized. This report highlights the main characteristics of competing programs in Jordan and the region and identifies the characteristics of potential new programs suggested to fill the gaps in the market.

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Executive Summary

It is well known that Telecommunications Engineers may pursue their higher studies either to deepen their knowledge in their field, or to improve there professional, business, and management skills. Consequently, to gain technical knowledge, they will typically choose to obtain a Masters of Science (M.Sc.) degree in telecommunications engineering, whereas they may pursue a Masters of Business Administration (MBA) to increase their management and leadership skills.

This report contains the results of the competition analysis of the Masters programs in areas related to both Wireless Communications and Business Administration offered by a number of universities in Jordan and the Middle East region. This analysis is part of the activities of the Tempus project No. 511074 which was awarded to the Telecommunications Engineering Department at Yarmouk University in July 2010. The project aims at reforming the existing Masters program and introducing two new programs: Telecommunication Management and Telecommunications Technology.

In this analysis, a number of Masters programs in both telecommunications engineering and Business Administration (MBA) were considered in order to study the competitive environment of the proposed programs. Ten M.Sc. Programs offering degrees related to electrical and communications engineering were selected as competing programs to the existing Masters of Science and the proposed Masters of Telecommunications Technology program at a number of Jordanian universities and a number of universities in the region. In addition, six MBA programs were selected as competing programs to the proposed Masters of Telecommunication Management program.

Several criteria were considered to evaluate the competing programs and then used to develop a questionnaire which quantified the competition environment. After those questionnaires were distributed and collected, data were summarized and comparison was made between different programs.

There are two main outcomes of the competition analysis process. Firstly, the main attributes of a successful Masters program in Telecommunications related fields were identified. Secondly, based on the identified completion environment, it was possible to define the structure and characteristics of the new proposed new programs.

Chapter 1
Introduction

The existing Masters program offered by the Telecommunications Engineering Department at Yarmouk University was started in 2004 and offers a Masters of Science (M.Sc.) degree in Wireless Communications. The program admits students who have a B.Sc. degree in Telecommunications Engineering or related disciplines. The program is operated by 17 faculty members most of which are PhD holders and have relevant academic experience.

The curriculum of this program was developed by the Department staff in 2003 and was approved by the Jordan Ministry of Higher Education (MOHE). The curriculum development was based on a survey of similar programs in Jordan, the EU and the USA, and was guided by program specifications mainly prescribed by both Ministry of Higher Education (MOHE) and the Department standards. These standards consist of a detailed list of necessary subjects, course contents and associated contact hours. Hence, the curriculum development process was input driven and the curriculum was based on compulsory core curricula expressed by core subjects, plus a variety of elective subjects that allow enhancement of the outcomes of the program.

One of the main shortcomings of the existing curriculum is that it was completely based on academic opinion and did not consider the needs of the local and regional telecommunications market. Furthermore, the curriculum did not have a periodic and formal procedure for obtaining or processing feedback from the industry and from its graduates. Therefore, it was necessary to reform and update the existing curriculum in accordance with the needs of local industry as well as with the best practices in EU partner universities. The objective of the curriculum reform process is to provide a new program with up-to-date curricula which address the needs of the local market and produce graduates who are competitive and can keep pace with dynamic labor market needs and advances in telecommunication industries.

In order to achieve this objective, the department sought funding from the EU through the Tempus Program in order to conduct curricular reform and to introduce new study tracks within the existing Masters program at the Department. The Department applied for Tempus funding in March 2010 and was awarded a grant in July 2010 for a project which addresses curricular reform of its Masters program. The project consists of a number of activities with the objective of reforming the existing curriculum and the introduction of new study tracks within the exiting Masters program which address the needs of the local and regional telecommunications market.

The first planned activity within the project was to conduct a review of the existing curriculum by academic as well as non-academic experts from Jordan and the EU in order to point out the weaknesses and strengths of the existing program and produce guidelines on the set of improvements required in the proposed curricula.

The second planned activity is to establish a business case for the requirement and feasibility of the new tracks, and its consistency with the goals of YU. This step corresponds roughly to Workpackage 2 "Competition and Demand Analysis". The work package consists of conducting a competition analysis to compare the proposed program with other existing programs and also a demand analysis of the proposed programs to determine the requirements of the labor market with regard to curriculum development and quality of graduates. The result of this analysis will serve as an input to the curriculum development process.

In this report, the results of the competition analysis are presented. The competition analysis is based on a survey of the competing programs in Jordan and the region. A number of Masters Programs were identified as competing programs based on their inputs, outputs and contents. The competing programs were analyzed using data collected through questionnaires which includes (but not limited to) program contents, teaching methodologies, study models and program structure.

The remainder of this report is organized as follows: Chapter 2 presents the methodology of the curriculum review process. Chapter 3 presents the results of the questionnaires and Chapters 4 presents the characteristics of the proposed programs. Finally, Chapter 5 provides conclusions and remarks.

1.1 The Telecommunications Engineering Department at YU

The Telecommunications Engineering Department at Yarmouk University was established in 1989. Located in the city of Irbid, Jordan, the department plays a vital role in providing the market of local and regional industries with high level engineering graduates. The Department offers both B.Sc. and M.Sc. degrees in Telecommunications Engineering and Wireless Communications Engieering. These programs are operated by 17 faculty members, of whom 90% are PhD holders. The offered programs attract outstanding students from Jordan and neighboring countries with an average class of around 150 per annum. Currently, there are around 850 students (800 at B.Sc. level and 50 at M.Sc. level) of which approximately 10% are from neighboring countries. The number of graduates has exceeded 2000 engineers who enjoy a high employability rate in Jordan and the region. As well as this, the Department has distinguished itself by offering a training program for students that provides them with a "live" experience in leading companies in Jordan and abroad, which provided strong industry ties for the faculty members as well as enhanced employment opportunity for its graduates.

1.2 The Proposed Programs

The Tempus project at the Department is intended to result in the reform of the existing M.Sc. program in Wireless Communications and the development of two new Masters programs, namely:

- a Masters of Engineering in Telecommunications Technology
- a Masters of Engineering in Telecommunication Management.

These new programs were proposed based on an initial study of the market needs in Jordan and on a number of studies conducted in the last few years on the relationship between the market needs and the curriculum development processes of engineering programs. In these studies,it was observed that graduates usually pursue their higher studies by selecting either the technical path to enhance their knowledge in certain engineering topics, or the management and business path to enhance their managerial skills. The new programs are expected to provide students with the skills and knowledge required to be successful in both paths and to provide the market with highly skilled graduates who can take pace with the changing telecommunications market. The new programs are expected to be developed, accreddited and operated throughout the lifetime of the Tempus project at the Department. The proposed programs are expected to provide the Jordanian and regional markets with qualified Telecommunications engineers who are capable of working in the quickly-growing telecommunications market in Jordan and the region. Furthermore, these programs are expected to gain an international recognition by EU professional bodies given that the development of these programs will be done in cooperation with a number of EU educational institutions who are known for their experience in the development of such industry-oriented study programs.

This section outlines the essential characteristics of each of the proposed programs which were developed through the various project activities such as the curriculum review, awareness visits of the Department academic staff and the various meetings with representatives of local industry and with academic staff of EU partner institutions. Although the details of these programs will be developed through the curriculum development phase of the project, the developed description of these programs is used to set the stage to develop a detailed structure and contents of each program.

A. Masters of Engineering in Telecommunications Management

To be successful in the business environment, it is important that engineers have good managerial, personal, and analytical skills, as well as the ability to be good decision makers. The objective of the Telecommunication Management program is to prepare students to be managers in telecommunication business environments.

This program will provide students with knowledge in both telecommunications engineering and business administration disciplines, which are needed to progress in the telecom business industry. This program will target engineers working in the telecom industry, as well as fresh graduates who seek to improve their management and technical skills. The telecommunications management program will give students a broad educational background and skills that will allow them to be creative, entrepreneurial leaders and to move among telecom careers and disciplines.

Through a number of meetings with representatives of the local telecommunications industry and data collected during the curriculum review phase of the project, it was possible to outline the main attributes required of such a program. Suggested topics relating to telecommunications engineering and management include the following:

Technical	**Management**
Digital Broadcasting	Project Management
Wireless Communications	Total Quality Management
Communications systems	Accounting, Economics, Finance
Telecommunication Network Management	Entrepreneurship
Next Generation Networks	Business Technology Strategy
	Marketing and Financial Management
	Organizational Behavior
	Regulations and policies of Telecom services
	Management of network services
	Planning and Optimization
	Service flow/logic

As the program would be intended to focus, not only on theoretical knowledge, but also on business administration skills, this program would have a significant overlap with MBA programs which attract telecommunications engineers who wish to enhance their managerial skills. This means that this program will compete with MBA programs and hence, it is important to study the competition environment for such a program.

B. Masters of Science in Wireless Communications Engineering

The objectives of this program are to provide students with sufficient background and research abilities to pursue education beyond Masters level. This program already exists at the Department and will be reformed through the activities of the Tempus project. The topics offered by this program include; mobile communications, digital communications, wireless networks, antennas and propagation, digital signal processing, communication networks, microwave engineering and probability & stochastic processes.

A number of similar programs exist in Jordan and the region. The objective of the curriculum reform process in this case is to redesign the curriculum of this program in order to offer an internationally recognized award and to provide students with the research skills and knowledge required for a successful career in academia from now onwards. Hence, it is also important to study the competitive environment for this program in order to identify the main attributes needed for distinguishing this program from other programs offered by other universities in Jordan and the region.

C. Masters of Engineering in Telecommunications Technology

The objective of this program is to provide students with the technical and professional skills needed for work successfully in the technical side of the telecommunications business, including the technical knowledge on latest telecommunications technology, as well as relevant legacy technology. Courses offered by this program should focus on practical aspects of telecommunications technology and not on engineering science. The following are suggested list of topics which will be considered in the curriculum development stage of this program:

- Mobile Communications Technology
- Wireless Network Technology
- Microwave and RF technology
- Antenna technology
- Entrepreneurship
- Digital broadcasting
- Business technology strategy
- Planning and optimization
- Project management
- Regulations and policies of telecom services

1.3 The Competition Analysis

The main objective of the Tempus project is to modernize the existing Masters of Science program in Wireless Communications at the department and to introduce new tracks that provide strong linkage to local and regional industries and contribute to providing international recognition for our programs in the area of Wireless Communications.

The project consists of a number of activities, which will be conducted over a period of 3 years and range from review of the existing curricula to the establishment of new programs and building capacity at the Department. The project consists of 28 deliverables grouped under a number of work packages as shown in Table 1.1.

Table 1.3 : Tempus project work packages and deliverables.

WP No.	WP Type	Del No.	Deliverable Title
WP.1	Development	1	Review of Existing Curriculum
WP.2	Development	2	Competition Analysis
WP.2	Development	3	Demand Analysis
WP.2	Development	4	Local Market Needs
WP.3	Development	5	Visits of Jordanian Partner Academic staff to EU
WP.3	Development	6	EU Educational System Seminar
WP.4	Development	7	Professional Development of Local Academic Staff
WP.4	Development	8	Fully Prepared Curriculum Drafts
WP.4	Development	9	Fully Prepared Course Material
WP.4	Development	10	Curriculum Drafts Finalized
WP.5	Development	11	Student Selection Criteria Implemented
WP.5	Development	12	Student Evaluation Process Implemented
WP.5	Development	13	Courses Taught by Local Staff
WP.6	Quality plan	14	Quality Control Plan
WP.6	Quality plan	15	Information System for QC of Curriculum
WP.6	Quality plan	16	Progress Reports
WP.6	Quality plan	17	Budget Review
WP.7	Management	18	Memorandum of Understanding
WP.7	Management	19	Coordination Meeting
WP.7	Management	20	An Electronic Database
WP.8	Dissemination	21	An Informative Web site
WP.8	Dissemination	22	New Program Features Disseminated
WP.8	Dissemination	23	Students Recruitment
WP.9	Exploitation	24	Curriculum Approval and Accreditation
WP.9	Exploitation	25	Collaboration with Local Telecom Industry
WP.9	Exploitation	26	A network of Collaboration with EU institutions
WP.9	Exploitation	27	Quality Control Unit
WP.9	Exploitation	28	Lab Equipment

The Competition Analysis is part of Work Package 2 (WP2) on Competition and Demand Analysis. This work package consists of three deliverables, which are:

- Deliverable 2 - Competition Analysis

- Deliverable 3 - Demand Analysis
- Deliverable 4 - Workshop on Market Needs.

The following are the descriptions of the Work Package and the Deliverable 2 as stated in the project proposal:

Description of work package

"Conduct a competition analysis to compare the proposed program with other existing programs. This Includes collection of information about existing similar M.Sc. programs in Jordan including their program objectives, outcomes, teaching material, teaching methodologies, ability for credit transfer, target audience and employability of graduates. This analysis will serve as input to the design of the program curriculum and program structure.
Perform a demand and statistical analysis of the proposed program by forming joint committees with local industries to determine the requirements of the labor market with regard to curriculum development and quality of graduates.
A workshop will be held with participation from major telecommunication companies in Jordan in order to collect data on the needs of these companies with regard to telecommunications engineers and professionals.
The result of this analysis will serve as an input to the curriculum development process. YU, HU and GJU will be responsible of organizing the workshops and collection of the data and the EU partners will provide consultation on the methodology of analyzing the market demand."

Description of Deliverable 2

"A competition analysis report which consists of a comparison between the proposed program and other existing programs in Jordan. A survey about existing similar M.Sc. programs with regard to program objectives, outcomes, teaching material, teaching methodologies, ability of transfer of credits, target audience and employability of graduates. This report will serve as input to the curriculum development process"

The objectives of the Competition Analysis can be summarized as follows:

1. To reform and modernize the existing Masters program in Wireless Telecommunications including curricula, teaching methodologies, quality control, and to establish new up-to-date tracks in related areas.
2. To provide Masters programs related to Telecommunications Engineering at the highest international standards.
3. To understand the strengths and weaknesses of similar programs offered by other competing universities locally and in the region.
4. To compare the proposed program with other existing Masters programs in Wireless Telecommunications and MBA programs.
5. To enhance student learning outcomes and skills to meet local market needs and international best practices through the building of technical capacity at YU and local partner institutions.
6. To help local project partners establish and implement their Masters of Science programs in telecommunications engineering at their own institutions.

The Competition Analysis is expected to result in the following outcomes:

1. Better understanding of the competition environment

2. A basis for the curriculum development of three Masters program tracks: Wireless Communications, Wireless Networking Technology, and Telecommunications Network Management.
3. A study program structure that can help students in developing intellectual skills such as critical thinking, ability to solve problems, quantitative and qualitative skills.
4. Suggested contents, objectives, outcomes, number of credit hours, and other attributes for the proposed Masters degrees.