Enhancing Quality of Technology-Enhanced Learning at Jordanian Universities, EQTeL
DEV3.1 Creation of 3 Pilot Courses

The design of the three pilot e-courses has been completed and the courses are currently being delivered at Yarmouk University, PSUT, Hashemite University and University of Jordan. AHU will deliver the courses in the upcoming semesters.

Renewable Energy (RE) Course

The design of the RE e-course has been completed and delivered for the first time as an online course at the Hashemite University, Yarmouk University and Princess Sumaya University for Technology in the Summer Semester of the academic year 2015/2016.

The course is composed of 8 modules. These modules are:

- Introduction to Renewable Energy
- Photovoltaic Systems
- Hydropower Energy
- Geothermal Energy
- Solar Thermal Energy
- Wind Energy
- Bioenergy
- Energy Economics

Video tutorials were produced to help the students navigate through the eCourse VLE, understand organization of the material, and become familiar with this online course. The "Welcoming Section" is the first field that students should go through. It contains the following:

- Brief description of the course and its objectives
- Teacher's Responsibility while teaching online class
- Student's responsibility while navigating the online course
- <u>Syllabus of the course</u>
- <u>Course and Study Guide</u> which constitutes the backbone of the course. It changes depending on the semester and university at which the course is being offered. It includes:

o Days, dates and week number for the semester the student enrolls in
o University event (Classes begin, exams,)
o Material that students should study during that week
o Dates of weekly quizzes, midterm exam
o Assignments (posting and due dates)
o Date and time for traditional and virtual office hours

The course is organized into topics format. In the main topics (Photovoltaic Systems and wind Energy), topics are divided into sections. The remaining topics (Introduction into RE, Hydropower Energy, Geothermal Energy, Solar Thermal Systems, Bioenergy, and Energy Economics) are presented as one section. Each section of the main topics and the other topics are divided into the following:

- Objectives are stated clearly. These objectives include measurable criteria.
- Outline is described briefly.
- The eContent, that contains the same material in the lecture slides, is augmented with
o several Flash animations that demonstrate the principles of RE sources

o purposefully meaningful images and graphics
o confident and knowledgeable sound narration
o Youtube videos where applicable
o Practice problems with solutions where applicable that allow students practice the skills acquired within a particular topic.
The interactive electronic content can be accessed by clicking on "eContent" link. Textual Concepts explanations.

- Slides: The material of the RE course is posted to students as PDF files.
- Interactive Post-Self-Assessment quizzes with automated feedback are introduced after each module/section in order to test the knowledge acquired by the students. The online assessments are designed in a way that gives the students the chance to re-take the assessments as much as they want. Several types of questions are used in the self-assessment quizzes;
o Multiple-Choice Questions
o True/False Questions
o Workout Questions
o Matching Questions
These quizzes are graded automatically and all grades are archived to allow the tutor track students' progress throughout the course.
- References
In some sections, students may find more items such as
- External links to Youtube Videos that are provided in order to allow the students get deeper understanding about specific topics.
- Self-study reports, articles, related to the subject of these topics.
Formal quizzes and midterm and final exams that assess each of the learning objectives are designed and conducted online. These quizzes and exams are held in a certain computer lab at specific times announced to the students in the Course and Study Guile taking into consideration all authentication measures. Questions can have a variety of styles. The student gets his/her grade upon the completion of the quiz with a feedback about his/her answers.
Online homework assignments are assigned to students. These assignments are managed using Moodle page of the course. The instructor posts the assignment with the due date, and students upload their response (as a word or pdf file) for grading. The instructor grades students' assignment and upload their grades and feedback comments for each student.
Several synchronous and asynchronous communication mechanisms are employed in the courses with emphasize on the synchronous methods. Synchronously, Virtual office hours are conducted periodically in order to help the students, answer their questions and guide them through the learning process. Virtual office hours are held through Instructors' Facebook Page or Virtual Class Room in Moodle. WhatsApp Group for the students administrated by the instructor is another synchronous communication mechanism that some instructors employed.
Pre-assessment and post-assessment surveys are designed and posted to the students in order to get their expectation and feedback about all aspects of the online course (design, delivery, content, management, etc.). These surveys will be used later in continuous improvement of the course and resolve the challenges and issues that students and instructors confront.
A sample of the course design is shown at the link http://eqtel.psut.edu.jo/Pages/AllVedios.aspx

English Course
The design of the three pilot e-courses has been completed and the English skills course is currently being delivered at Yarmouk University with over 180 students' enrollment 2015/2016. Developing the eLearning ENG 101 course at Yarmouk University revolved around building a student centered

classroom. Developing the course consisted of three phases: planning and design, development and implementation, and course delivery and management. The planning and design phase centered around discussing major pedagogical questions in terms of how the online instructional design are different from the face to face classroom and to what extent the current eLearning system at YU can support the implementation of the different teaching methods and instructions. Based on these discussions, the team developed a shared vision of delivery strategies and course instruction (e.g., lecture notes, group discussion, formative assessment, summative assessment, and video demonstration, and course activities).

The development and implementation phase consisted of the following steps: 1) Identify textbooks and start gathering content materials for the course, 2) identifying learning outcomes, 3) mapping out the relationship between content units and assessment, in this part we selected which assessment methods are appropriate for learning outcomes. We agreed to use multiple assessments methods to provide students with ample opportunities to demonstrate learning; for example, we used pre-quizzes that assess the students before they read the chapter and start the activities in the unit. 4) Identifying supplemental materials like you tube, educational videos, online –lectures materials that can support students if they needed additional help during the course, 5) after preparing the teaching materials, the technical experts transferred all content materials into the eLearning system and set up course components into course site.

The course delivery and management phase consisted of the following steps: 1) providing two orientations for the students, one for the three online sections and another one for each online class by itself. In both orientations, the technical team explained how to use the E-learning and how to navigate the different tools in the Moodle. The course teachers explained the course objectives, course completion requirements, expectations of students' participation, and instructor's contact information and office hours, 2) providing video tutorials as students logged in to the course to help them navigate through the e-learning and understand the structure course, 3) providing "Welcoming Section" prior to start the course which   contains the following: brief description of the course and its objectives, teacher's Responsibility while teaching online class, student's responsibility while navigating the online course, syllabus of the course, and course study guide which constitutes the backbone of the course. It changes depending on the semester and university at which the course is being offered. It includes days, dates and week number for the semester the student enrolls in, university event (classes begin, exams, material that students should study during that week, dates of weekly quizzes, midterm exam, and assignments (posting and due dates).

In addition to that, the course is composed of seven units. Each unit is divided into three basic sections: Grammar, Reading and Vocabulary. The grammar sections start with brain storming exercises followed by explanation of the grammar points in the unit.The second section is the reading section. In this part students read a text on a topic familiar to them dealing with issues related to their daily life, cultural issues, or major trending topics on the media. Try to read the text and make sure you comprehend what you read. Section three is the Vocabulary section. The vocabulary items presented in this section are words that students came across in the previous two sections. The vocabulary section not only teaches you words and their meanings but also strategies to figure out the meaning of words and how to use them in various contexts.

Each section contains the objectives and learning outcomes, the pre- required materials that students have to do before they start the section, the assigned readings and activities for the that section, and the post assessment materials, and post-self-assessment quizzes with automated feedback are introduced after each module/section in order to test the knowledge acquired by the students. Each section also contains supportive materials/ tutorials that provide additional explanations for the students. The online assessments are designed in a way that gives the students the chance to re-take the assessments as much as they want. Several types of questions are used in the self-assessment quizzes; multiple-

choice questions and true/false questions. These quizzes are graded automatically and all grades are archived to allow the tutor track students' progress throughout the course.

Formal quizzes and midterm and final exams that assess each of the learning objectives are designed and conducted online. These quizzes and exams are held in a certain computer lab at specific times announced to the students in the Course and Study Guile taking into consideration all authentication measures. Questions can have a variety of styles. The student gets his/her grade upon the completion of the quiz with a feedback about his/her answers.

Online homework assignments are assigned to students. These assignments are managed using Moodle page of the course. The instructor posts the assignment with the due date, and students upload their response (as a word or pdf file) for grading. The instructor grades students' assignment and upload their grades and feedback comments for each student.

A sample of the course design is shown at the link www.youtube.com/watch?v=8M7gj3bVxBw

Communication Engineering Remote Lab

The design of the communication engineering remote lab eCourse has been completed and delivered for the first time as an online course at the Princess Sumaya University for Technology in the Summer Semester of the academic year 2015/2016. The course is composed of 12 modules. These modules are:

- General Introduction
- Sampling and Nyquist in PCM
- PCM Encoding
- PCM Decoding
- Time Division Multiplexing (TDM)
- Line coding and bit-clock regeneration
- Fiber Optic Transmission
- PCM-TDM 'T1' implementation
- Optical digital filtering, splitting and combining
- Fiber optic bi-directional communication
- Wave Division Multiplexing (WDM)
- Optical losses

Video tutorials were produced to help the students navigate through the eCourse VLE, understand organization of the material, and become familiar with this online course. The "General Introduction" is the first field that students should go through. It contains the brief description of the NI ELVIS II and remote lab. The other modules contain brief description of the experiment and the experiment link, while the student click on it; the student must book a session to do the experiment as shown below:

When the session time starts, a new login window will appear to connect to the database as shown below.

After logging into the second window, the experiment page appears explaining how to proceed with the steps.

About the Experiment

First, read how to perform the experiment. You will be following the procedure as below:

install the **run time engine** (only once) program to operate each VI.

2. Activate the function generator, scope, DSA, by pressing the start from the tool bar, and then pres the in each.
3. Adjust the function generator using its soft controls for an output with the following specification

| Wave Form Shape	Sinusoidal
Frequency	2 KHz
Amplitude	4 V_{p-p}

4. Adjust the scope as follows:

	Channel 0	Channel 1
Volts/Div	1 V	1 V
DC offset	0 V	0 V
Time/Div	200 μ sec	200 μ sec

5. Set the values for the DSA as follows:

| Input Settings	Source Channel to Channel 1
FFT Settings	Frequency span to 45,000
	Resolution to 400
	Windows to 7 term B-Harris
Trigger Settings	Edge
Frequency Display	Units to dB
	Mode to RMS
	Scale to Auto
	Voltage Range to ±10 V
Averaging	Mode to RMS

Variety of scopes will appear according to the experiment such as function generator, Digital Signal Analyzer (DSA), Multimeter, and oscilloscope.
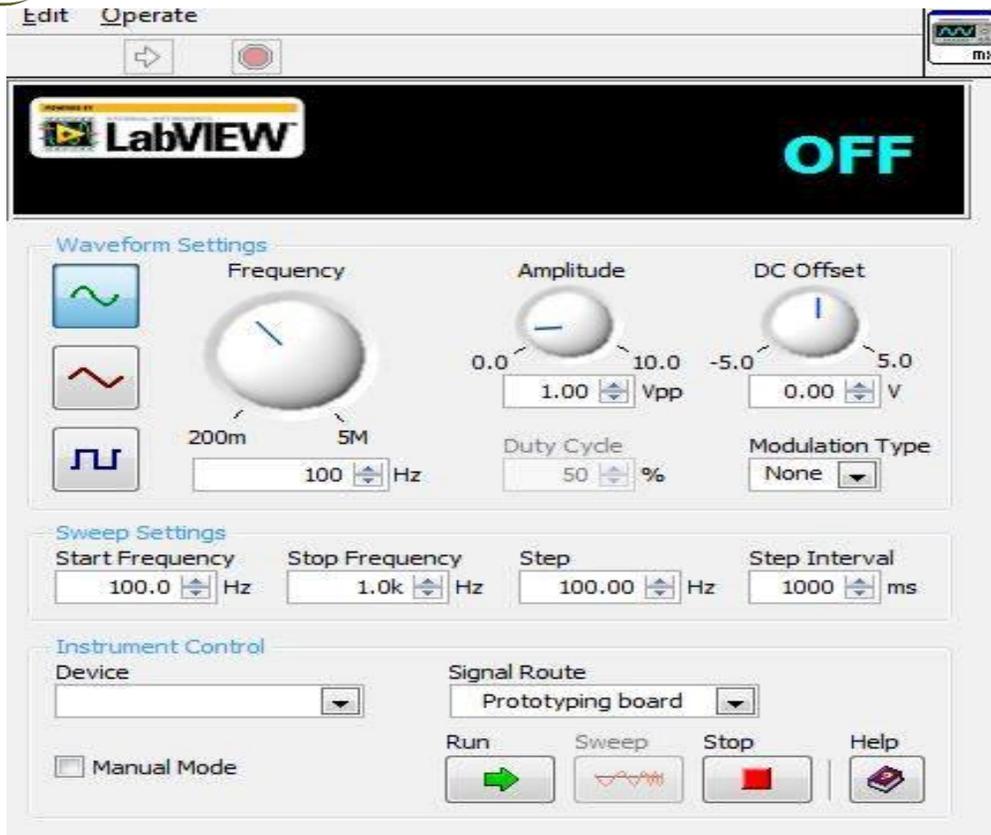
Function Generator.
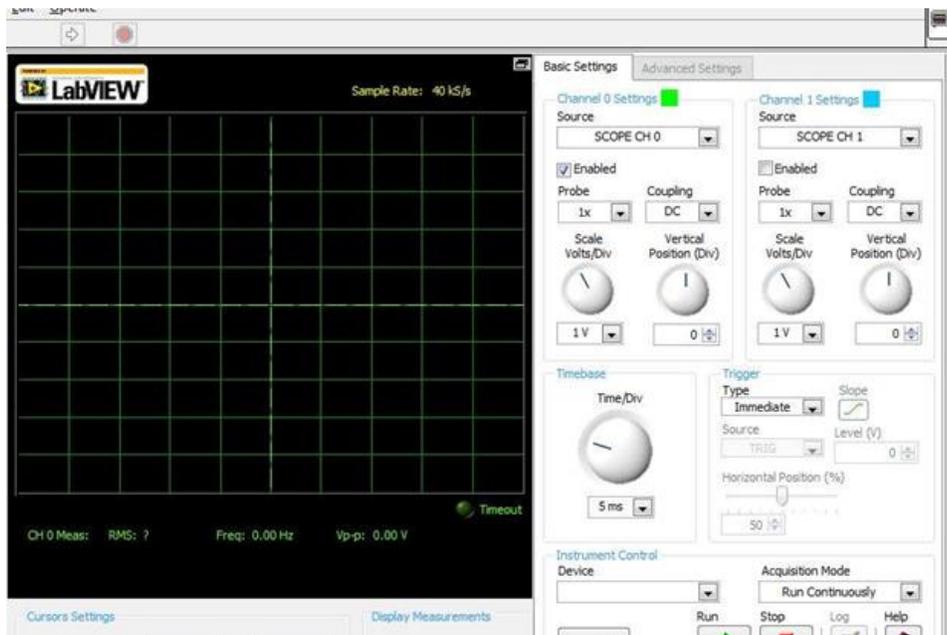
Oscilloscope.
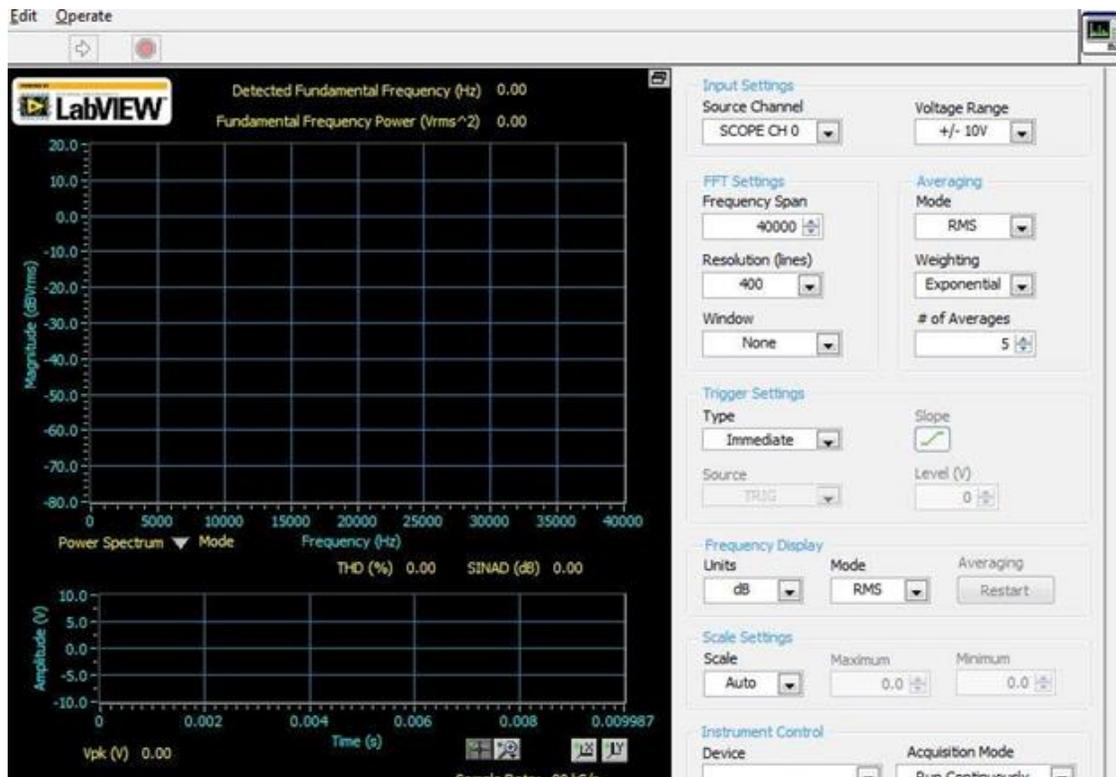
Digital Signal Analyzer (DSA).

When done filling the blanks, proceed with submit to find a survey about the overall satisfactory on the whole project.