Enhancing Quality of Technology-Enhanced Learning at Jordanian Universities, EQTeL

DEV3.2 Development of TEL Platform Report

A Virtual Leaning Environment (VLE) was developed as a platform that hosts and manages the delivery of the proposed e-courses. HU, working closely together with UoJ and PSUT, set the on-line learning strategies to select proper VLE tools for designing and adopting the eLearning courses: English, Renewable Energy and Communication Engineering Lab into VLE.

It was decided to implement Moodle open source platform as the Learning Management System (LMS) in the VLE with its plugins and other software tools to manage e-content, virtual class rooms, assignments, task submissions and grading, quizzes, exams, tasks queue, lab booking, and scheduling online experiments. The team agreed on how to integrate the courses into the VLE and discussions on roles and responsibility were carried out among HU, PSUT and UoJ.

The VLE was then hosted at a special PSUT server dedicated for this purpose. The VLE is accessible via the URL http://eqtel-vle.psut.edu.jo/moodle . The VPN IP Address is 193.188.67.34 and the Server IP Address: 172.31.0.20. The VLE specifications are the following:

- Moodle version 2.8.+
- PHP version 5.4.7
- MySQl version 5.5.27

In addition, four types of accounts were created; administrator, teacher, student and guest. Proper privileges were given to these accounts according to their roles. Suitable educational and teaching material were selected for all courses with large effort spent on integrating the remote lab to this VLE, such that both courses and Communication Engineering Lab are delivered by full interactivity and offering flexibility of content delivery and the opportunity for shared social learning between partner institutions. All materials for the eLearning courses needed to complete the content in a traditional way were prepared and designed by YU, HU and PSUT.

HU, UoJ and PSUT led efforts in the personalization process of VLE and tools were properly selected in order to suite the courses, students and professors. Selection of the learning tools included synchronous and asynchronous modes, project-based learning, cooperation tools, assessment and evaluation, as well as social media tools as complement of the learning process.

The home page of the VLE, shown in Figure 1, gives a description of the project as well as access information.

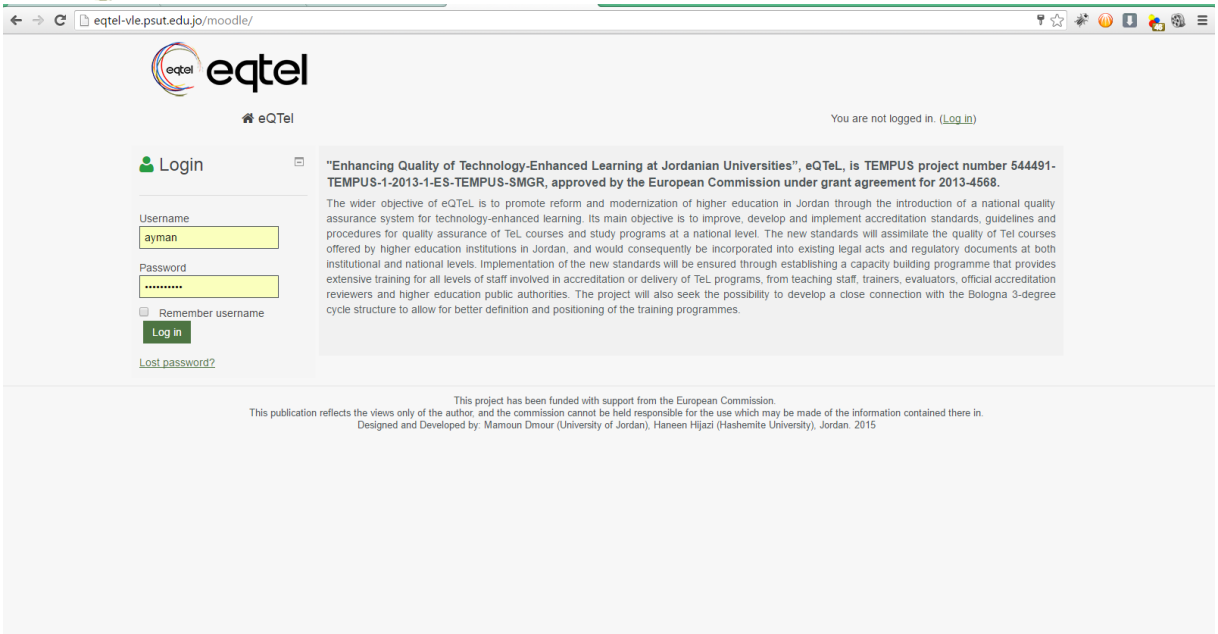


Figure 1: Snapshot of VLE Home Page.

The environment of the VLE and its content including the eLearning courses and Communication Engineering Lab are displayed as shown in Figure 2. Students can access the content of the two e-learning courses; Renewable Energy Systems and English 101, and Communication Engineering Lab by visiting the main title of the content as shown in the Figure 3. Student access depends on the course he/she is enrolled in and the university he/she is a student at.

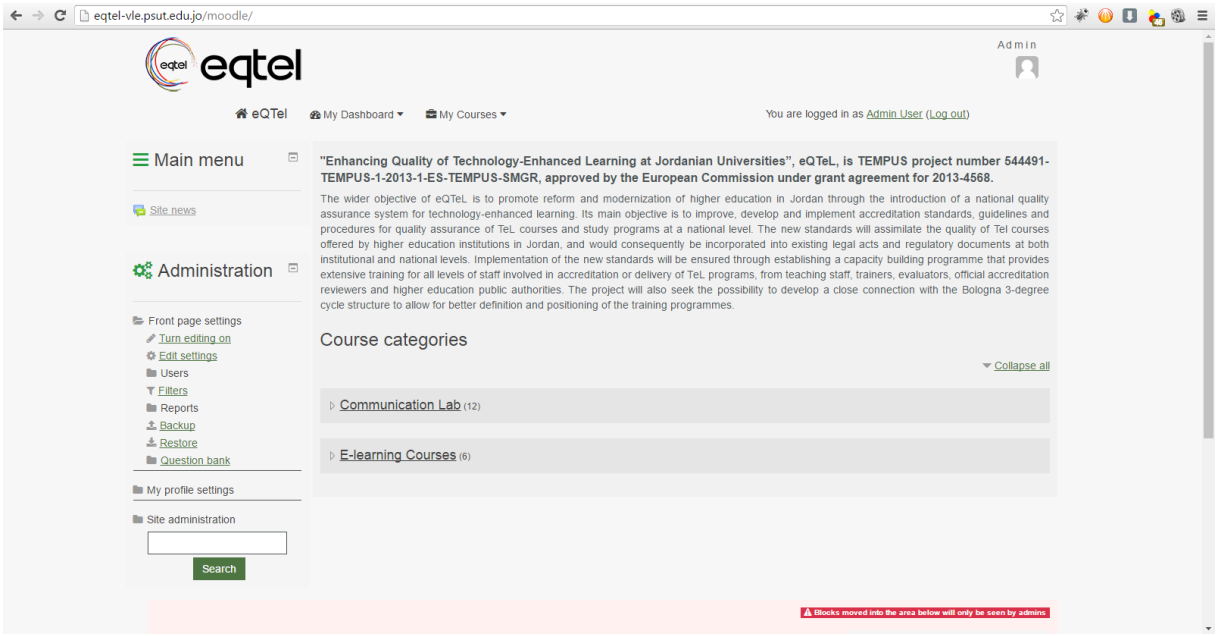


Figure 2: Snapshot of VLE Content.

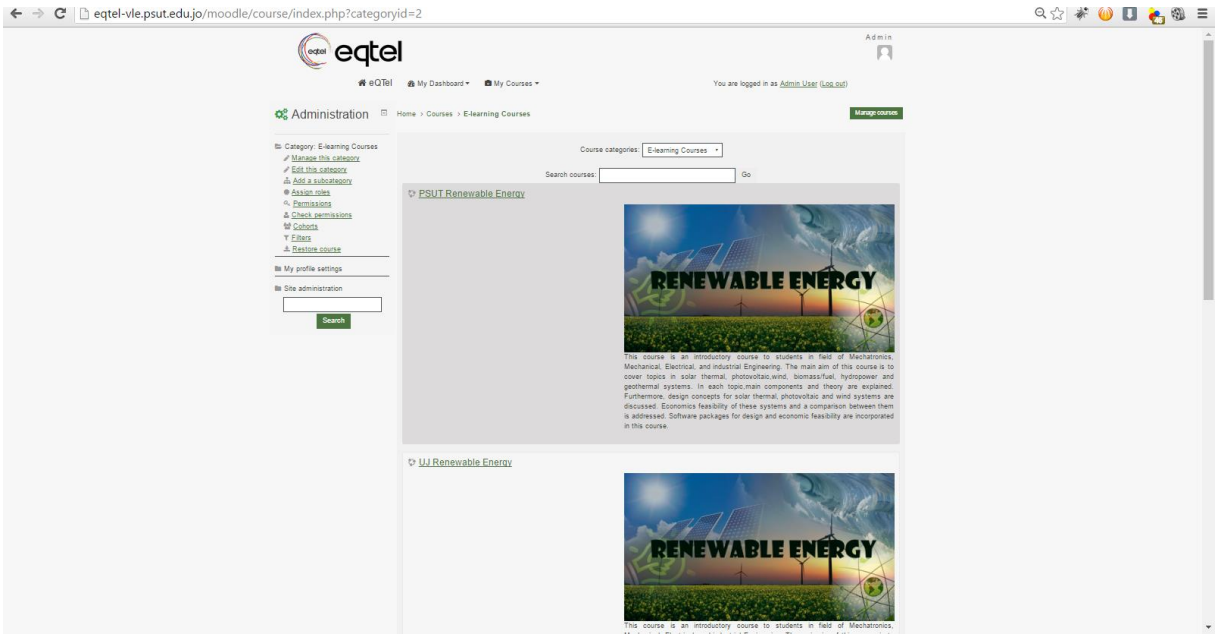


Figure 3: Snapshot of E-Learning Courses Page.

The detailed content of each e-learning course is consequently and student can access topic by topic or chapter by chapter as shown in Figure 4. A description of each topic is given prior to accessing the actual content of each chapter to enable students to familiarize themselves with the scientific subjects.

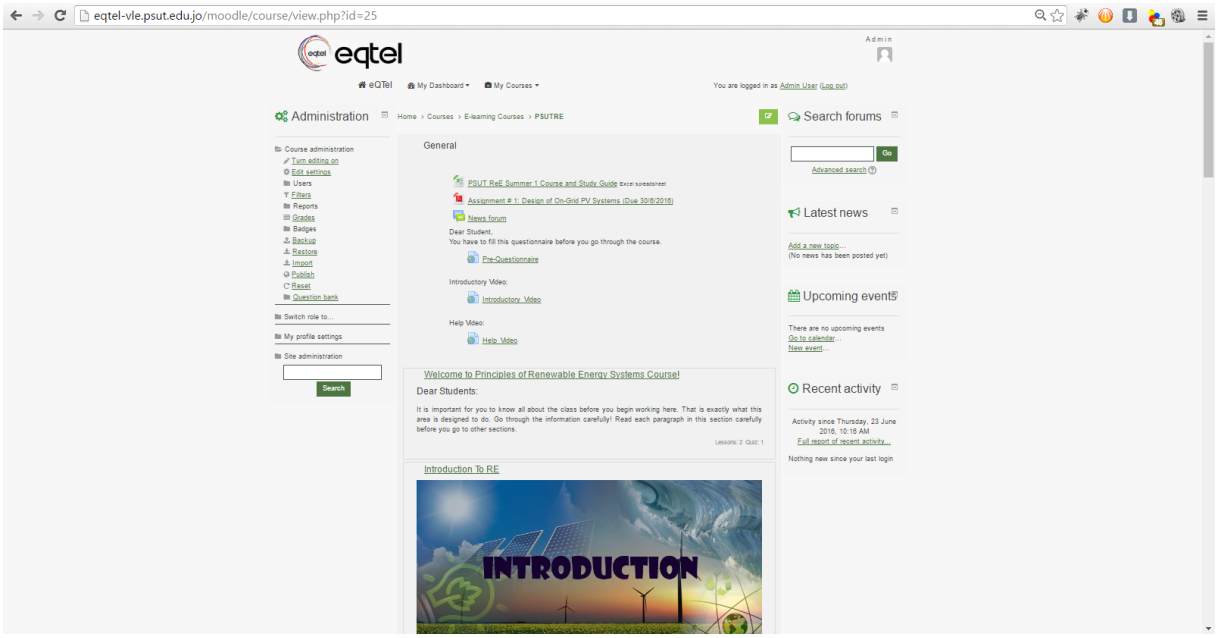


Figure 4: Snapshots of e-learning Course Topics Page.

The first field that students face is the “Welcoming Section”, Figure 5. 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
- Syllabus of the course
- Course and Study Guide, Figure 6, which constitutes the backbone of the course. It changes depends 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, ect)
    - Material that students should study during that week
    - Dates of weekly quizzes, midterm exam
    - Assignments (posting and due dates)
    - Date and time for traditional and virtual office hours

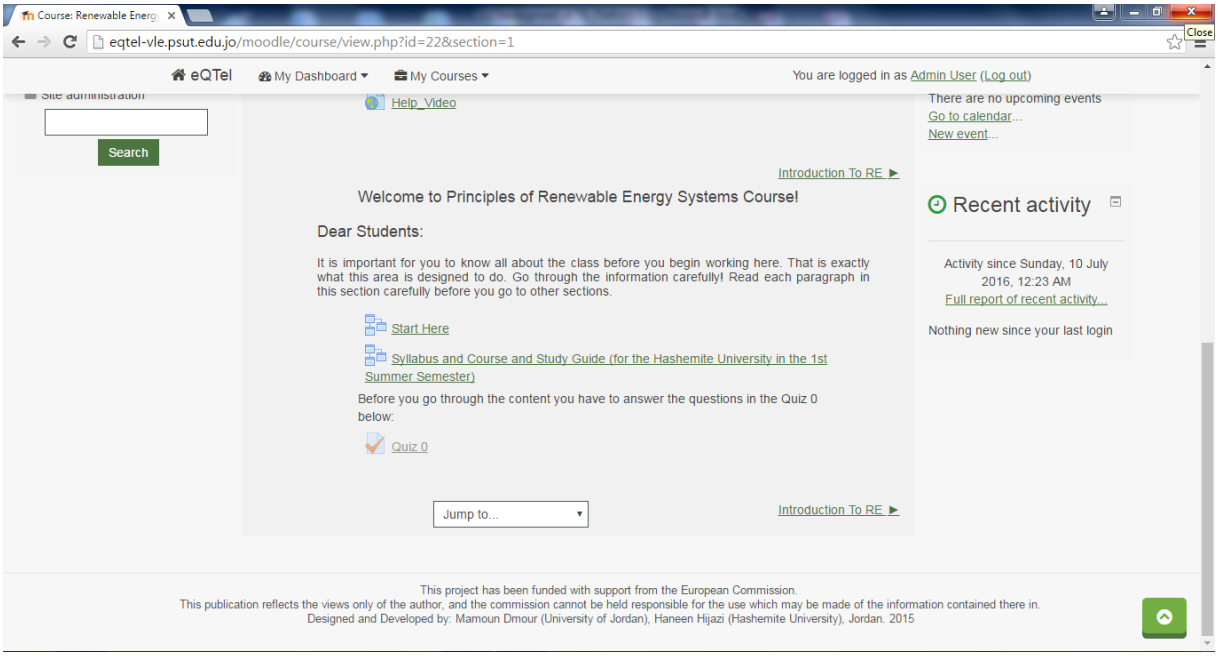
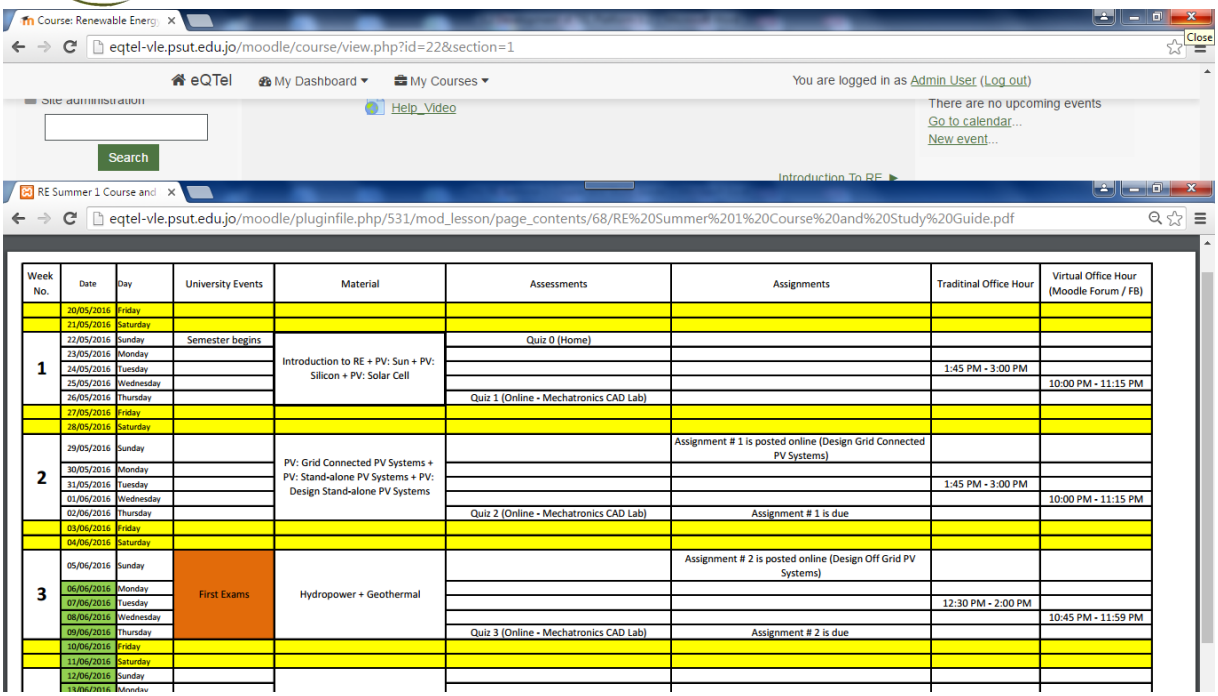


Figure 5: Welcoming Section at the beginning of course webpage



Week No.	Date	Day	University Events	Material	Assessments	Assignments	Traditinal Office Hour	Virtual Office Hour (Moodle Forum / FB)
	20/05/2016	Friday						
	21/05/2016	Saturday						
1	22/05/2016	Sunday	Semester begins	Introduction to RE + PV: Sun + PV: Silicon + PV: Solar Cell	Quiz 0 (Home)			
	23/05/2016	Monday						
	24/05/2016	Tuesday					1:45 PM - 3:00 PM	
	25/05/2016	Wednesday						10:00 PM - 11:15 PM
	26/05/2016	Thursday			Quiz 1 (Online - Mechatronics CAD Lab)			
	27/05/2016	Friday						
	28/05/2016	Saturday						
2	29/05/2016	Sunday		PV: Grid Connected PV Systems + PV: Stand-alone PV Systems + PV: Design Stand-alone PV Systems		Assignment # 1 is posted online (Design Grid Connected PV Systems)		
	30/05/2016	Monday						
	31/05/2016	Tuesday					1:45 PM - 3:00 PM	
	01/06/2016	Wednesday						10:00 PM - 11:15 PM
	02/06/2016	Thursday			Quiz 2 (Online - Mechatronics CAD Lab)	Assignment # 1 is due		
	03/06/2016	Friday						
	04/06/2016	Saturday						
3	05/06/2016	Sunday	First Exams	Hydropower + Geothermal		Assignment # 2 is posted online (Design Off Grid PV Systems)		
	06/06/2016	Monday						
	07/06/2016	Tuesday					12:30 PM - 2:00 PM	
	08/06/2016	Wednesday						10:45 PM - 11:59 PM
	09/06/2016	Thursday			Quiz 3 (Online - Mechatronics CAD Lab)	Assignment # 2 is due		
	10/06/2016	Friday						
	11/06/2016	Saturday						
	12/06/2016	Sunday						

Figure 6: Course and Study Guide (for the Summer Semester at the Hashemite University)

On Moodle VLE, the courses were organized into topics format. In some large important topics (such as Photovoltaic Systems and wind Energy in RE course)**, topics a**re 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

- Objectives
- Outlines
- eContent
- Slides
- Self- Assessment quiz
- References

In some sections, students may find more items such as

- External links to YouTube videos
- Self-study reports, articles, etc., related to the subject of these topics.

Figure 7 shows the above items for a sample topic (Geothermal Energy Chapter).

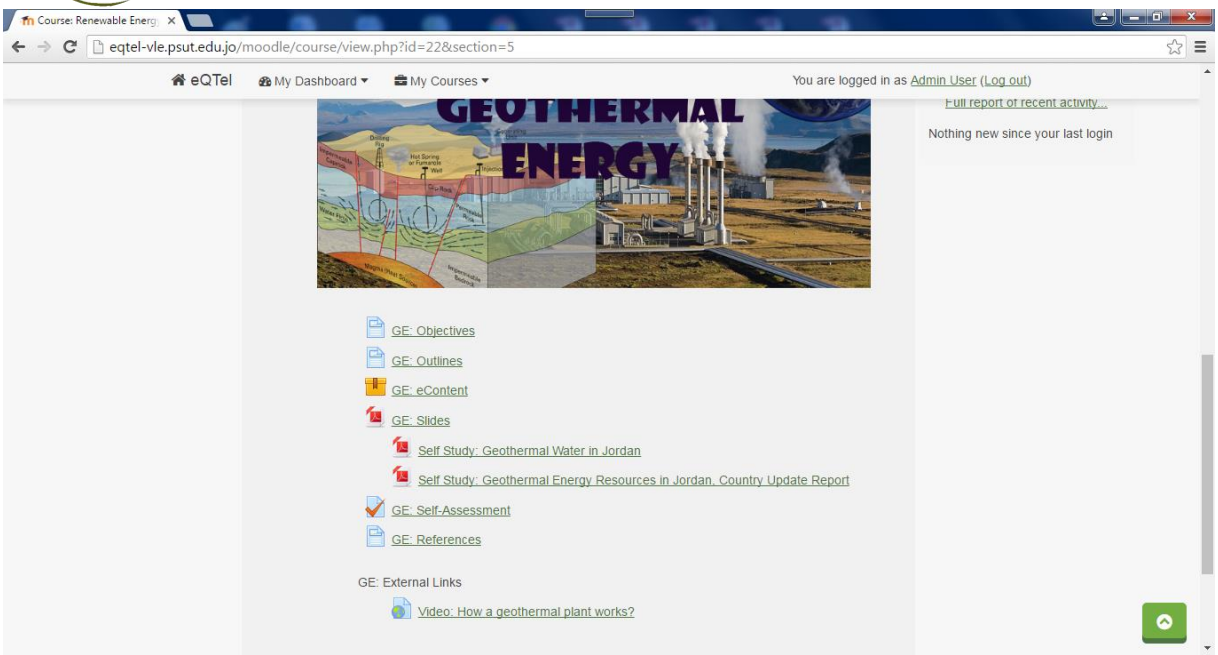


Figure 7: Items for a sample topic (Geothermal Energy Chapter).

The content of courses; RE and English 101, and Communication Engineering Lab can be viewed by clicking on the "Slides" link. Power point slides and/or PDF files as shown in the sample in Figure 8 are then appeared for students.

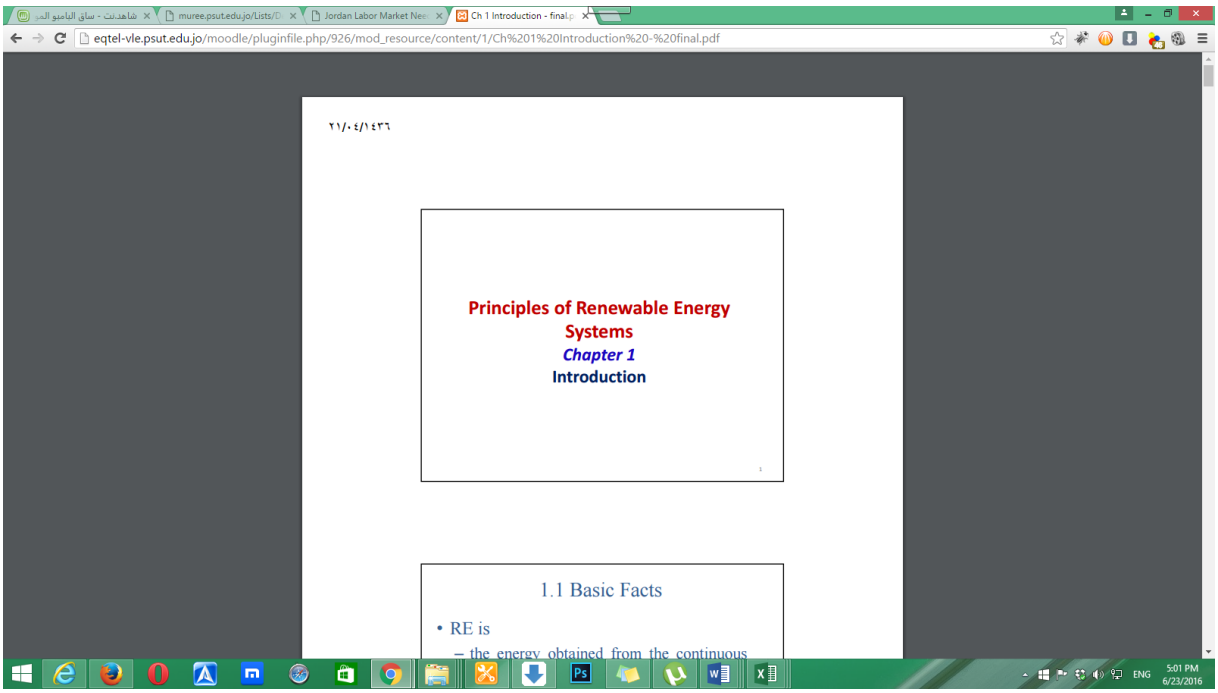


Figure 8: Snapshot of content of RE course slides posted for students as PDF file

The interactive electronic content can be accessed by clicking on “eContent” link. The eContent material was designed using a variety of tools such as:

- Power Point: for material organization.
- Natural Reader and Sony Sound forge: for sound recording and editing.
- Adobe Photoshop and Snagit: for image editing.
- Adobe Flash: for creating animations.
- Lectora Publisher: as eLearning content authoring tool.

The e-Content was published into SCORM package format with a maximum upload size of 80 MB. Each SCORM package may represent a section or a topic and includes combinations of the following learning items:

- Textual Concepts explanations.
- Purposefully meaningful images and graphics.
- Confident and knowledgeable sound narration.
- Reasonable several Flash animations that demonstrate the concepts.
- Reasonable videos.
- Practice problems with solutions that allow the students to practice the skills acquired within that particular topic. Solutions were provided so that students can check their work. Moreover, feedback on how the answers were calculated was introduced.

The student can navigate the eContent easily using previous and next buttons and a table of content designed as a menu on the left to help the student access a specific lesson quickly easily. Figure 9 represent a screenshot for an eContent lesson.

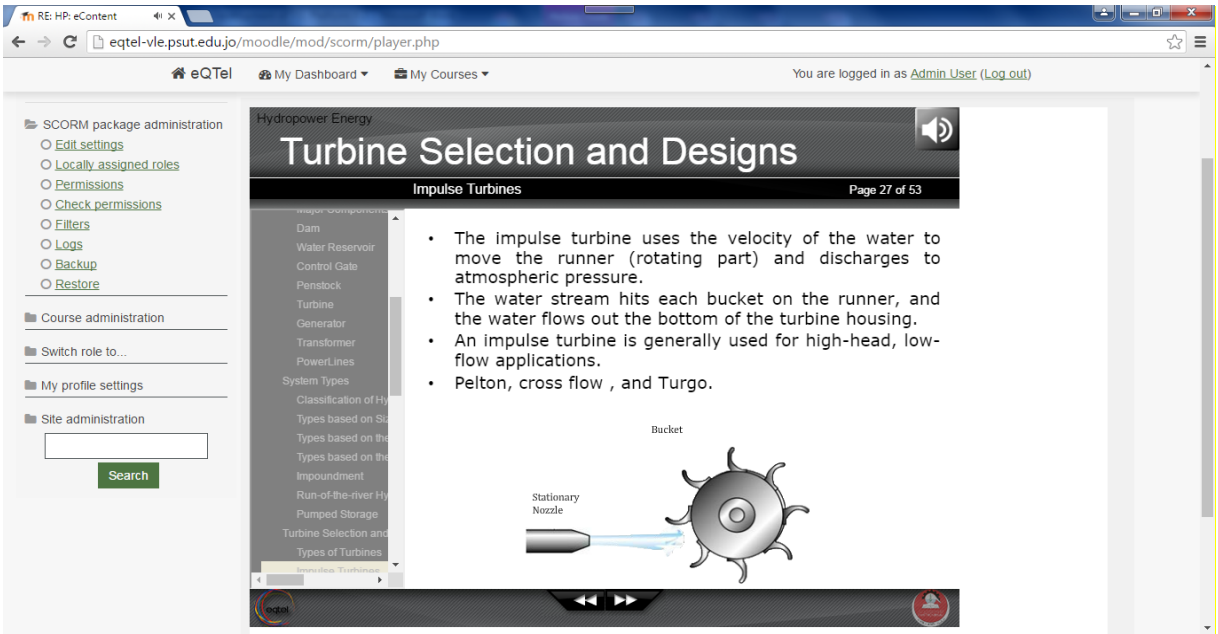


Figure 9: Sample of eContent showing the listed of issues covered in that section/chapter

All quizzes (self-assessment and official) and exams (midterm and final) are held using Moodle taking into consideration all authentication measures. Questions can have a variety of styles. Figure 10 shows

a sample of one of the quizzes. The student gets his/her grade upon the completion of the quiz with a feedback about correct answers, Figure 11.

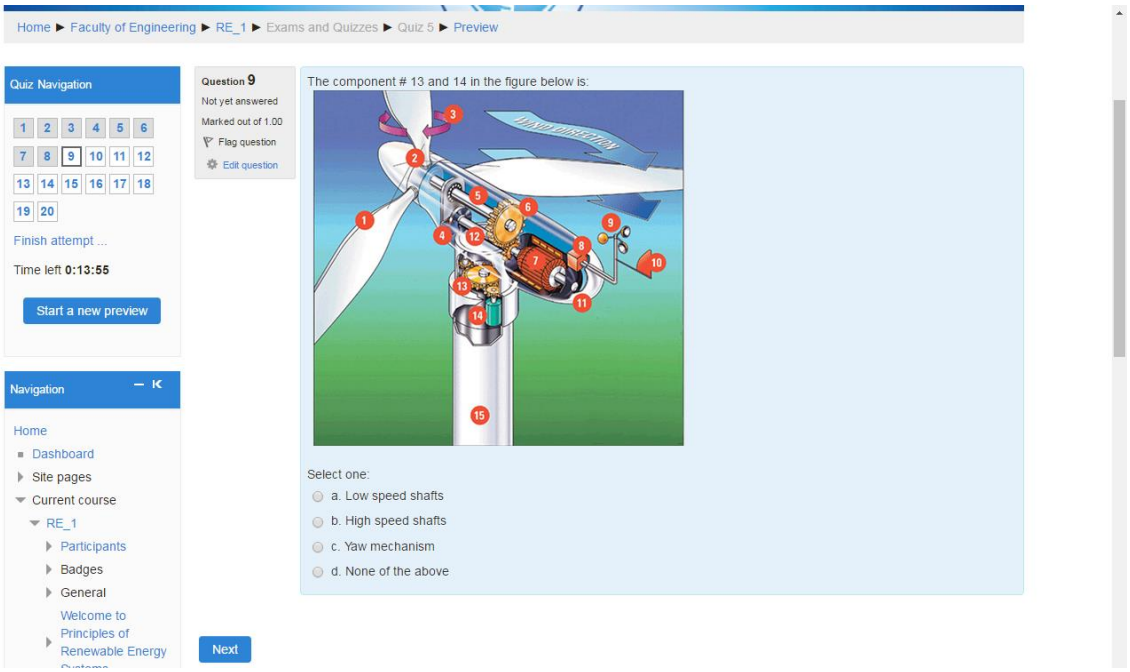


Figure 10: A sample of one of online quizzes.

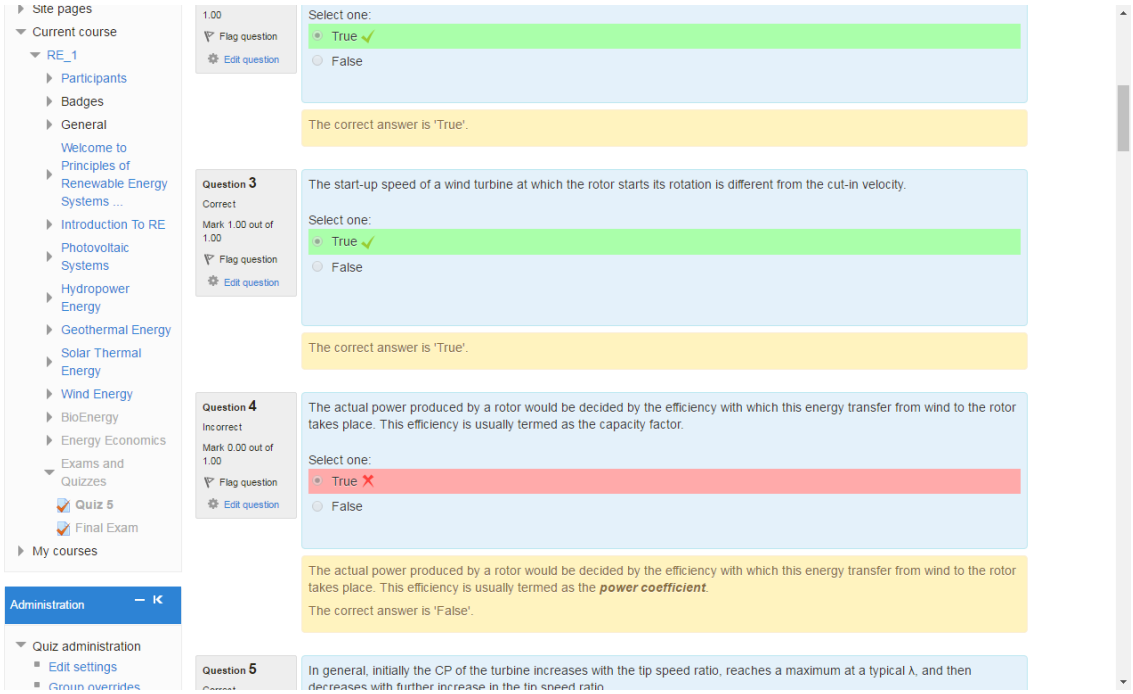


Figure 11: Feedback students obtain after submitting their quiz for grading

In addition, assignments are managed using Moodle page of the course. The instructor posts the assignment with the due date, Figure 12, and students upload their response (as a word of pdf file) for grading. The instructor grades students' assignment and upload their grades and feedback comments for each student, Figures 13 and 14.

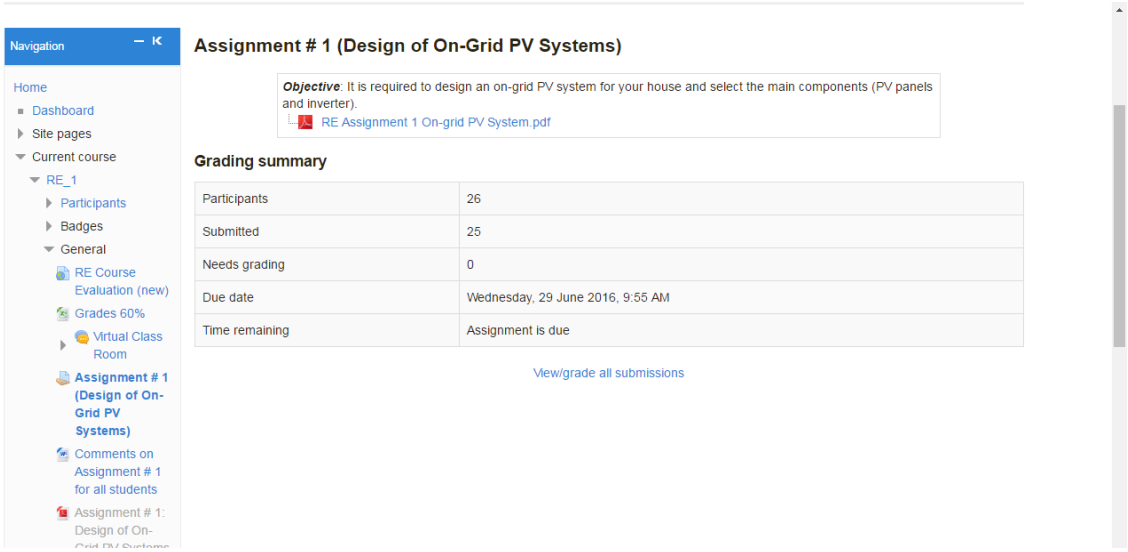


Figure 12: Posting assignment and due date

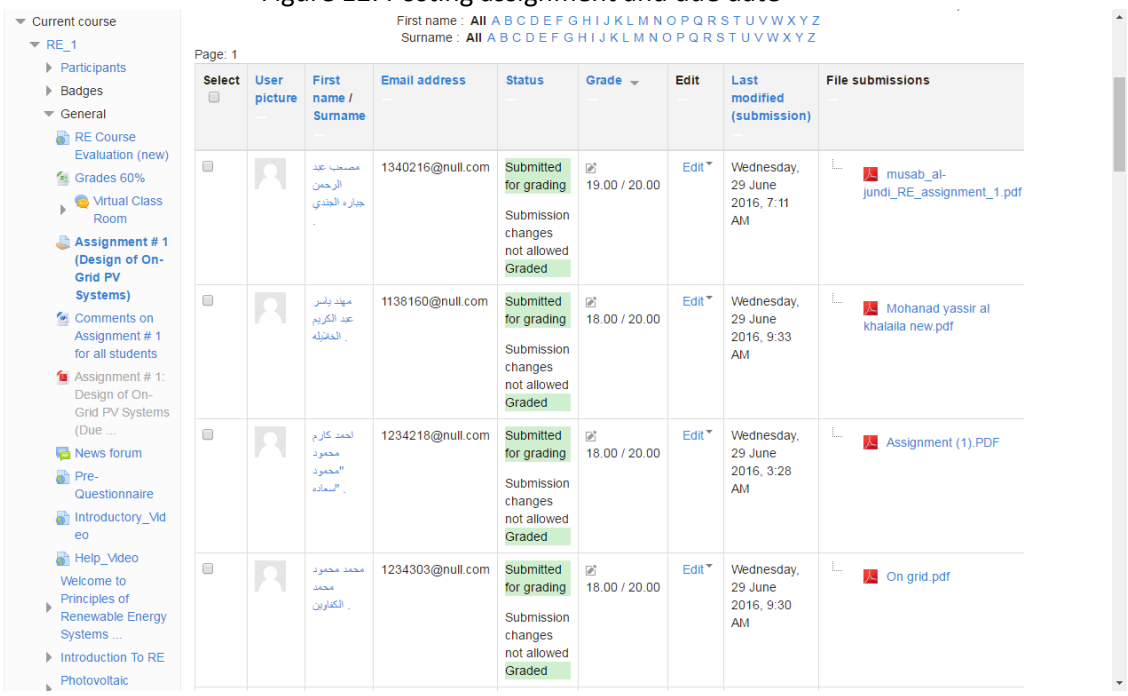
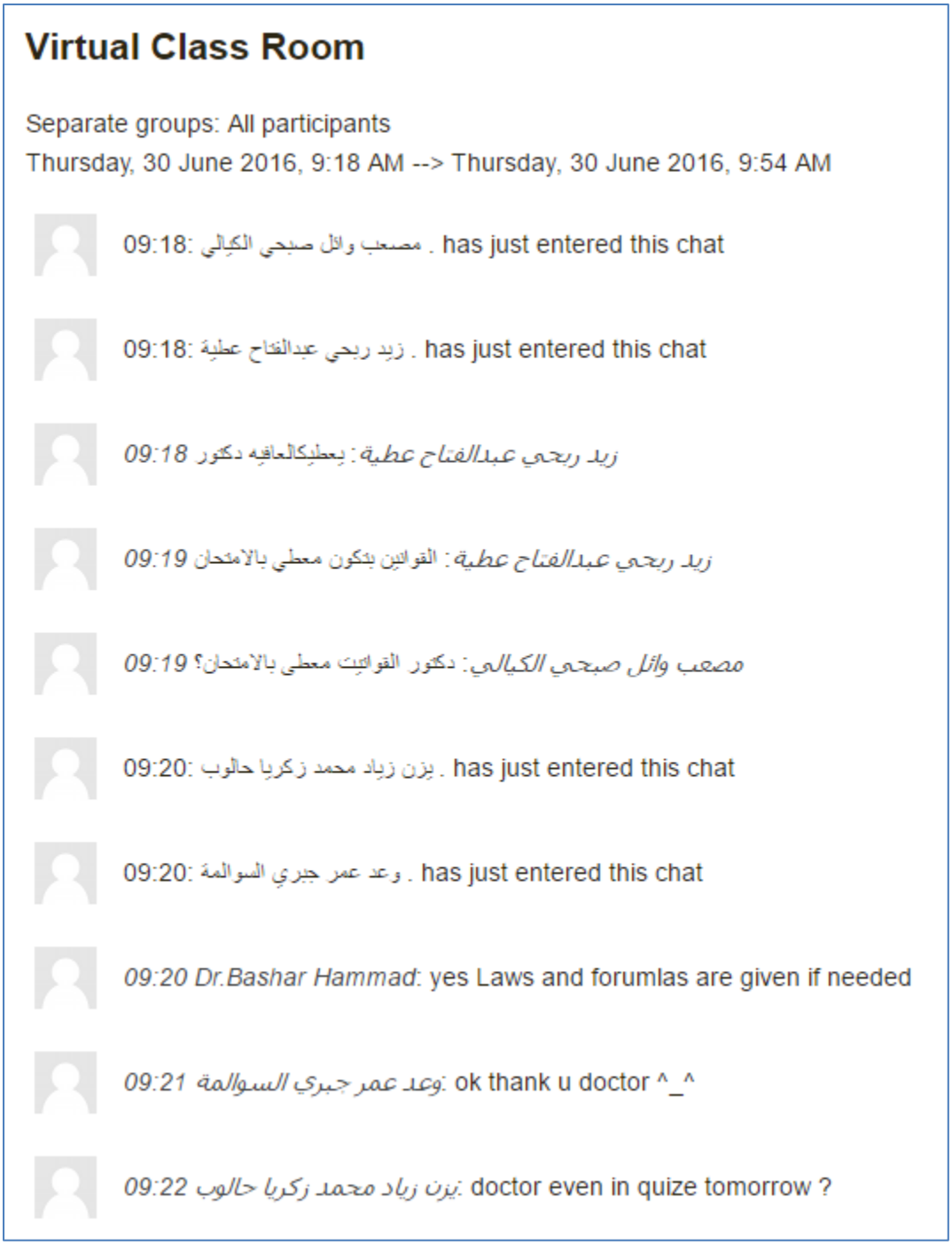


Figure 13: Assignment record for all students

Submission status	Submitted for grading
	This assignment is not accepting submissions
Grading status	Graded
Due date	Wednesday, 29 June 2016, 9:55 AM
Time remaining	Assignment was submitted 3 hours 47 mins early
Editing status	Student cannot edit this submission
Last modified	Wednesday, 29 June 2016, 6:07 AM
File submissions	saif mousa .pdf
Submission comments	Comments (1) Dr.Bashar Hammad . - Sat, 9 Jul 2016, 3:13 AM Student's Number:1234265 Dear Saif Major Comments: - Selection of PV modules should be from data sheet posted on Moodle (not the same as slides). - Highest and lowest operating modules temperatures are not suitable for Jordan. - Inverter selection is not clear. What the model is and how you got inverter specifications. - Number of modules per string in your analysis is between 7 & 10, but you then used the number from the slides!!!! - Maximum MPP tracking voltage = 420 V but in the specifications it is 470 V. Which one is the correct number? - Number of modules per string is not correct. Minor Comments: - Cover sheet is not proper Thanks ++++++++++++++++++++++++++++++

Figure 13: Record for a student showing feedback on his/her assignment

Several synchronous and asynchronous communication mechanisms were employed in the courses with an emphasize on the synchronous ones. Synchronously, Virtual class rooms were conducted periodically in order to help the students, answer their questions and guide them through the learning process. A screenshot of one of these sessions in shown in Figure 14.



Virtual Class Room

Separate groups: All participants
Thursday, 30 June 2016, 9:18 AM --> Thursday, 30 June 2016, 9:54 AM

09:18: مصعب وائل صبحي الكيالي . has just entered this chat

09:18: زيد ربحي عبدالفتاح عطية . has just entered this chat

09:18 زيد ربحي عبدالفتاح عطية: يعطيكالعافيه دكتور

09:19 زيد ربحي عبدالفتاح عطية: القوانين بتكون معطي بالامتحان

09:19 مصعب وائل صبحي الكيالي: دكتور القوانين معطى بالامتحان؟

09:20: يزن زياد محمد زكريا حالوب . has just entered this chat

09:20: وعد عمر جبري السوالمة . has just entered this chat

09:20 Dr.Bashar Hammad: yes Laws and forumlas are given if needed

09:21 وعد عمر جبري السوالمة: ok thank u doctor ^_^

09:22 يزن زياد محمد زكريا حالوب: doctor even in quize tomorrow ?

Figure 14: Sample of synchronous virtual class rooms

The Communication Engineering Lab can also be accessed by experiments whose description is given elsewhere. The list of the experiments is shown in Fig. (8).

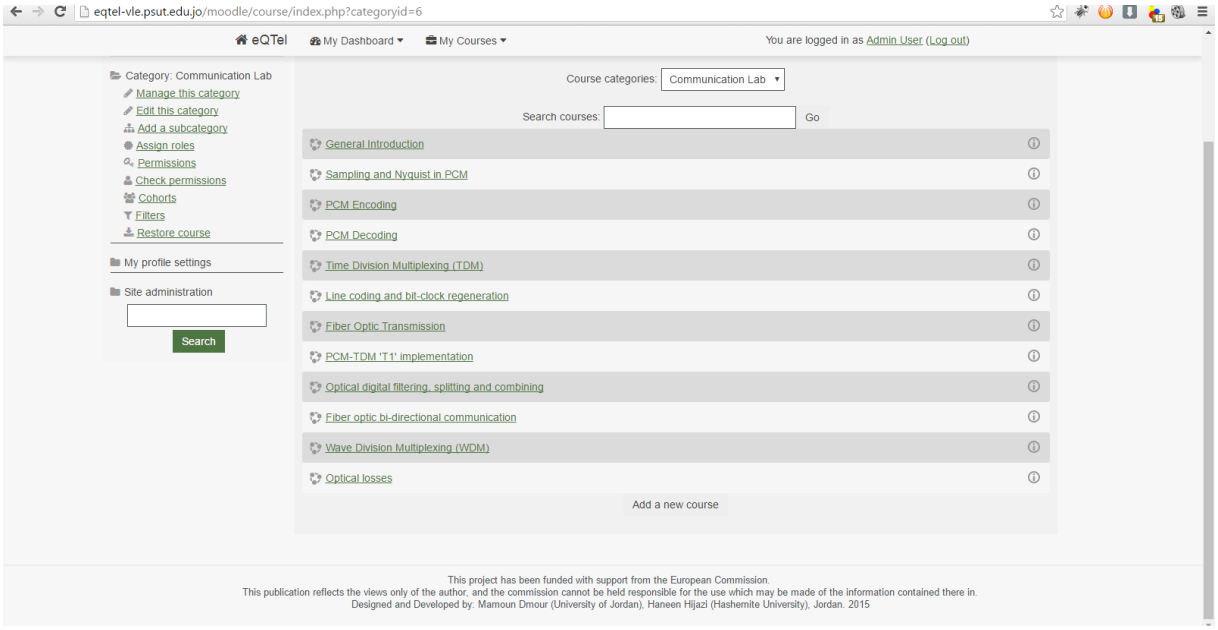


Fig. (8) Snapshot of the List of the Communication Engineering Lab Experiments.

A complete description of VLE description and access and the integration of the courses and the labs is given by the video at the home page of the project's website http://eqtel.psut.edu.jo/Home.aspx.