Annual Course Report

Program on which this course is given:	**Diploma of Applications of Automatic Control of Mech. Power Systems**
Department offering the program:	**Mechanical Power Engineering Department - ACC control Lab**
Department offering the course:	**Mechanical Power Engineering Department - ACC control Lab**
Academic Level:	**Elective Course- 1st or 2nd Term of the Diploma of Graduate Studies**
Date	**1st Term 2014/2015**
Semester (based on final exam timing)	√ Fall √ Spring

A - Basic Information

1.Title:	**Applications of Virtual Labs for Control of HVAC-Central Air-Conditioning Systems**	**Code:**	**MEP 571**

2. Units/Credit hrs per week:	**Lectures**	**3 Credit hours per week**	**Tutorial**	**--**	**Practical**	**--**	**Total**	**3**

3. Names of lecturers contributing to the delivery of the course:
Associate Professor Dr. Mohsen S. Soliman & Assistance Professor Dr. Amro Abdel-Raouf

4.Course coordinator:	**Associate Professor Dr. Mohsen S. Soliman**	**External evaluator:**	**NA at this time**

B- Statistical Information (for 2014/2015)

See the Next Tables for all Grades and statistics for the last term and the one before it

جامعة القاهرة- كلية الهندسة — قسم هندسة القوى الميكانيكية
نتيجة الفصل الدراسى الأول للعام الأكاديمى 2014/2015
دبلوم تطبيقات التحكم الأوتوماتيكى فى نظم القوى - طلاب تم تسجيلهم حسب اللائحة الجديدة 2015

رقم الطالب	(مكق 560) أجهزة القياس والاختبارات والتحكم فى نظم القوى الميكانيكية	(مكق 561) التحكم الأتوماتيكى - النظرية والتطبيق فى نظم القوى الميكانيكية	(مكق 562) استخدام الدوائر الهيدروليكية فى نظم التحكم الأتوماتيكى	(مكق 571) تطبيقات المعامل الافتراضية فى التحكم فى أنظمة تكييف الهواء المركزية	(مكق 590) انتقال الحرارة والكتلة	عدد الفصول الدراسية	إجمالى الساعات المكتسبة	مجموع النقاط الكلية	المعدل التراكمى	التقدير	الحالة
1	-A	A	A		+B	1	12	45	3.8	-A	مستمر
2	-B	B	+B		C	1	12	33	2.8	-B	مستمر
3	A	A	+A	+C		1	12	43	3.6	+B	مستمر
4	B	+B	-A	B		1	12	39	3.3	+B	مستمر
5	B	B	B		-B	1	12	35	2.9	-B	مستمر
6	+C	+B	-A		F	1	9	28	2.3	+C	مستمر
7	+B	-A	-A		+C	1	12	39	3.3	+B	مستمر
8	+B	+B		-B		1	9	28	3.1	B	مستمر
9	A	A	A			1	9	36	4	+A	مستمر
10	-A	-A	-A		F	1	9	33	2.8	-B	مستمر
11	-A	B	B		-B	1	12	37	3.1	B	مستمر
12	-A	-A	A	C		1	12	40	3.4	+B	مستمر
13	+B	+B	A		+C	1	12	39	3.2	B	مستمر
14	C	-B	C			1	9	20	2.2	C	مستمر
15	A	+B	A		D	1	9	37	3.1	B	مستمر
16	+C	-A	+B	B		1	12	37	3.1	B	مستمر
17	+C	-A	+A		-B	1	12	38	3.2	B	مستمر
18	A	A	+A	+B		1	12	46	3.8	-A	مستمر
19	-A	A	+B		B	1	12	42	3.5	+B	مستمر
20		-B	-A		+C	1	9	26	2.9	-B	مستمر
21	-A	A	+B	B		1	12	42	3.5	+B	مستمر

جامعة القاهرة كلية الهندسة - قسم هندسة القوى الميكانيكية
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رقم الطالب	مكق 560 أجهزة القياس والاختبارات والتحكم فى نظم القوى الميكانيكية	مكق 561 التحكم الأتوماتيكى - النظرية والتطبيق فى نظم القوى الميكانيكية	مكق 562 استخدام الدوائر الهيدروليكية فى نظم التحكم الأتوماتيكى	مكق 599 المشروع	مكق 567 تطبيقات متقدمة لتكنولوجيا PLC فى نظم التحكم الأتوماتيكى	مكق 571 تطبيقات المعامل الافتراضية فى التحكم فى أنظمة تكييف الهواء المركزية	عدد الفصول الدراسية	إجمالى الساعات المكتسبة	مجموع النقاط الكلية	المعدل التراكمى	التقدير	الحالة
1				+B	+B		3	30	92.7	3.1	B	خريج
2				-A	+B		3	30	82.2	2.7	-B	خريج
3				+B	-A		3	30	107	3.6	+B	خريج
4				+B	A		3	30	104	3.5	+B	خريج
5				A	+B		3	30	101	3.4	+B	خريج
6				A	-A		3	30	99.3	3.3	+B	خريج
7				A	-A		3	30	96.3	3.2	B	خريج
8	+B	-A	+B	-B	-A	+C	2	30	92.7	3.1	B	خريج
9	-A	A	-A	-A	-A	-B	2	30	109	3.6	+B	خريج
10	A	A	A		A	+B	2	21	81	3.9	-A	مستمر

C- Professional Information

1. Course Teaching:

• Topics actually taught	No. of hrs	Lecture	Tutorial/ Practical	Lecturer
-Introduction: Review of various definitions, basics, and conservation equations of different types of HVAC processes. -<u>HVAC case study:</u> Investigation of interactive virtual lab & computer-based practical training that includes simulation and flow visualization. It provides the participants a broad-based understanding of the most important concepts of practical automatic control & real thermo-fluid processes existing in an industrial HVAC plant used to air-condition a building to some pre-specified dry-bulb temperature and relative humidity. Air-locks are used to have different adjustable ratios of recycled air brought back to the building mixed with some renewal air. The plant includes 4 centrifugal pumps for the 4 battery cells for heating, cooling, humidification, and after-heating. Each pump has its on/off control board. Each battery cell has a control board that includes a pump flow rate-meter and both inlet and outlet cell temperature (except the humidification cell). The plant has an on/off air fans or ventilators control board and air locks control board. On-line, real psychometric diagram is plotted showing all performed processes. The diagram shows a point for Renewal air, point for Recycled air taken from inside the environment, a point for the mixture of Renewal and Recycled air, points for the air outlet from the various A/C plant batteries, and last point for the air going to the environment-building. The simulation includes many flow control valves and temperature read-out gauges. , many critical control alarms, input/output signals, operation and instrumentation parameter-boards, diagnostic tools, error-report filling tool, help and trouble-shooting and Thermal Balance Calculations and Plotting tools.	36 hrs	3 hrs/ week for 12 weeks before the final term exam	---	Associate Professor Dr. Mohsen S. Soliman & Assistance Professor Dr. Amro Abdel-Raouf

- Topics taught as a percentage of the content specified: ☐>90% √ 70-90% ☐<70%
- Reasons in detail for not teaching any topic:

- Reducing the number of weeks/ Semester for many social and political reasons.
- Many mandatory vacations as per requirements of the university management. The term is only 12 weeks.

- If any topics were taught which are not specified, give reasons in detail: Non

2.Teaching and Learning Methods:									
Lectures (√)	Practical/ Training ( )	Seminar/ Workshop ( )	Class Activity (√)	Case Study (√)	Projects ( )	Laboratory ( )	E-learning (√)	Assignments /Homework (√)	Other: Submitting reports
If teaching and learning methods were used other than those specified, list and give reasons: Non									

3. Student Assessment:	
• Method of Assessment	Percentage of total
-All in-term works, sheets, and Reports	30%
-Final-term formal, written Examination	70%
-Total	100%
• Members of Examination Committee:	Associate Professor Dr. Mohsen S. Soliman & Assistance Professor Dr. Amro Abdel-Raouf
• Role of external evaluator:	Review program ILOs
4. Facilities and Teaching Materials:	☐ Totally adequate √ Adequate to some extent ☐ Inadequate
List any inadequacies:	
Classes are not totally suits the Multi-Media Facilities Classroom has no white screen for the data show and it needs more ventilation fans.	

5. Exams/ILOs Matrix

• ILOs/Evaluation Source Matrix

	Source of Evaluation									
ILOs ❖ Knowledge and Understanding ❖ Intellectual Skills ❖ Professional and Practical Skills ❖ General and Transferable Skills	Assignments	Quizzes	Experiments	Lab Exam	Midterm Exam	Projects	Term Papers/Reports	Final Exam	Others 1	Others 2
a) Knowledge and Understanding: Having successfully completed this course, the post-graduate student should have knowledge and understanding of: a1- Basics, various definitions & terminologies associated with HVAC processes and control systems. a2- Requirements of general interactive virtual lab program to study & analyze HVAC control systems. a3- Basics of on-line interactive virtual lab to study and analyze HVAC control circuits/systems. a4- Essential components of HVAC circuits as important application of mechanical power systems. a5- Basics and main concepts of HVAC processes, functions and how to perform them, and what their inputs and outputs signals are? a6- Governing conservation eqns of HVAC automatic control processes. a7- Analysis of industrial HVAC automatic control systems by using modern PC-based Virtual lab program to simulate actual processes performed in real HVAC automatic control systems. a8- Main requirements of on-line chart plotting module for real psychometric diagram plotting to show all performed HVAC processes. a9- Structure, main components, various menus & submenus of HVAC automatic control Virtual lab.	√	√	-	-	-	-	√	√	-	-

a10- Control parameters, Synoptic diagram, flow paths, instrumentation & control boards of HVAC Virtual Lab. **a11- Verification and engineering calibration of the outputs of a HVAC automatic control virtual lab program.**										
<u>b) Intellectual Skills:</u> **Having successfully completed this course, the student should have the ability to do:** **b1- Searching for scientific information and adopting automatic control self-E-learning capabilities.** **b2- Analyze and compare the component effects, performance, and efficiency of different types of automatic control HVAC systems.** **b3- Apply the concept of software simulation of diagnostics & operation of various types of practical HVAC systems.** **b4- Compare between various types of HVAC processes, components, and complete systems.** **b5- Select and apply appropriate HVAC processes, components to design, model, analyze, and solve automatic HVAC control problems.** **b6- Apply scientific and engineering analysis for HVAC circuits/systems.** **b7-Select and apply appropriate technical and optimum method in doing engineering design and analysis of automatic control problems.**	√	√	-	-	-	-	√	√	-	-
<u>c) Professional and Practical Skills:</u> **Having successfully completed this course, the student should have the ability to do:** **c1- Identify several types of automatic HVAC control problems which are essential for design and operation of mechanical power systems and energy transfer processes.** **c2- Perform professional design and modelling for different automatic HVAC control systems.** **c3- Suggest possible alternative solutions for various types of HVAC components and parts.** **c4- Diagnose efficiency and performance of different types of HVAC control circuits/systems.** **c5- Analyze different types of HVAC processes on real psychometric diagram/plotting schematics.**	√	√	-	-	-	-	√	√	-	-
<u>d) General and Transferable Skills:</u> **Having successfully completed this course, the student should have the ability to do:** **d1- Perform engineering assembly of many different HVAC processes and components in one control system.** **d2- Transfer knowledge, Work in group, and Communicate in written & oral forms, in English.** **d3- Use IT and evolutionary technological tools & PC applications (Excel, Mat lab, Virtual labs, .etc).** **d4- Prepare & write reports, Manipulate & sort data, Think logically, and continuous self-E-learning.** **d5- Identify practical problems, compare between different technologies for HVAC systems.** **d6- Organise and manage time & resources effectively; for short-term and longer-term commitments**	√	√	-	-	-	-	√	√	-	-

- **Midterm Exam: No Midterm Exam for graduate studies programs**

Question	ILOs									
	1	2	3	4	5	6	7	8	9	10
1. (problem 1)	x	x	x	x	x	x	x	x	x	x
2. (problem 2)	x	x	x	x	x	x	x	x	x	x

- **Final Exam:**

Different parts of the ILOs are evaluated adequately through-out various part of the final exam

Question	ILOs									
	1	2	3	4	5	6	7	8	9	10
1. (problem 1)	√	√	√							
2. (problem 2)			√	√	√					
3. (problem 3)					√	√	√	√		
4. (problem 4)							√	√	√	√
5. (problem 5)								√	√	√

6. Administrative Constraints: Reducing the number of the weeks per semester		
▪ **List any difficulties encountered:** **- Reducing the number of weeks/ Semester for many social and political reasons** **- Many mandatory vacations as per requirements of the university management. The term is only 12 weeks.**		
7. Comments from external evaluator(s):	**Response of Course Team**	
Not available in writing for instructors to respond to	**None**	
8. Comments from Students:	**Response of Course Team**	
Done but not available in writing for instructors to respond to	**None**	
9. Course Enhancement:		
Progress on actions identified in the previous year's action plan:		
Action	**State whether or not completed and give reasons for any non-completion**	
Upgrading Teaching facilities **Supply visual aids for the classrooms** **Maintenance of classrooms**	**Not completed due to administrative problems**	
10. Action Plan for Academic Year 2014 – 2015		
Actions Required	**Completion Date**	**Person Responsible**
Upgrading Teaching facilities **Supply visual aids** **Maintenance of classrooms** **Incorporate more practical materials & measurement experimental labs in the course** **Make a Mat lab programs to illustrate the basic ideas of each topic with graphs**	**End of 2015**	**Administration and Members of The Examination Committee**
Course Coordinator:	**Associate Professor Dr. Mohsen S. Soliman**	
Signature:		