



Fifth level courses (Senior -2) - First semester (Fall)

No.	Cod CECE 436	Course Name Electrical Machines III	Instructor Ass. Prof. Dr. Shady Abdel Aleem
2	CECE 489	Professional Training	Dr. Salem Abdel Aziz Fikri Ahmed Sheikh
3	CECE 323	Power System Analysis II	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
4	CECE 439	Protection & Switchgear in Electrical Power	Dr. Salem Abdel Aziz Fikri Ahmed Sheikh & Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
5	BASE 494	High Voltage Engineering	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
6	BASE 496	High Voltage Engineering Lab	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
7	CECE 490	Senior project I	Ass. Prof. Dr. Shady Abdel Aleem & Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
8 9	BASE 307 BASE 308	Contracts, Bids & Liabilities Seminar	Dr. Ashraf Abd El-Khalik Dr. Ahmed Refaat





Course specification

Course code:	Course name
CECE 436	Electric Machine III
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023

B-Basic Information

Course Name Electric Machine III

Code CECE 436

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 3Cr. Hr
Lectures 2hr
Tutorial 2hr
Lab 2hr
Total 6hr

Prerequisite CECE 318

Instructor name/Email Ass. Prof. Dr. Shady Abdel Aleem

Shady.Sebai@sva.edu.eg

C- Professional information

1- Course core

Synchronous machines: Theory and design: Introduction, Cylindrical-rotor and salient-pole synchronous machines, Types of windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-phase synchronous machines, Synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus, The synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit characteristics, Potier reactance, Zero power-factor characteristic, Damper bars, Testing of synchronous machines, Construction, Design, Main dimensions, Examples on the design of turbo-generators and low speed generators.

2- Course learning objectives:

Explain the principle of synchronous machines, Theory and design, Cylindrical-rotor and salient-pole synchronous machines, Types of





	windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-phase synchronous machines.								
oc 2	Recognize the synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus.								
oc 3	Able to understand with the synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars.								
oc 4	Able to understand testing of synchronous machines, Construction, design, main dimensions, examples on the design of turbogenerators and low speed generators.								
	3- program objectives served by the course:								
Upon the con	repletion of the course the student should be able to:								
OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.								
OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.								
OP 7	Explain how to use experimental and data analysis techniques for electrical power engineering applications								
OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.								
4- 7	The relation between the course objectives and the program objectives								
C	ourse objectives program objectives								
oc 1	Explain the principle of synchronous machines, Theory and design, Cylindrical-rotor and salient-pole synchronous machines, Types of windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-								





	phase synchronous machines.		
oc 2	Recognize the synchronous impedance steady state operation, Voltage regulation, Parallel operation,	OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
	Synchronous machine to an infinite bus.	OP 7	Explain how to use experimental and data analysis techniques for electrical power engineering applications
oc 3	Able to understand with the synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit	OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
	characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars.	OP 7	Explain how to use experimental and data analysis techniques for electrical power engineering applications
oc 4	Able to understand with the synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit	OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits,
	characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars.	OP 7	and systems. Explain how to use experimental and data analysis techniques for electrical power engineering applications





OP 12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

Identifies the basics of synchronous machines, Theory and design, Cylindrical-rotor and salient-pole synchronous machines, Types of CS(2.1,3.1) windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-phase synchronous machines. Apply knowledge about synchronous impedance steady state operation, CS(2.2,3.2)Voltage regulation, Parallel operation, Synchronous machine to an infinite bus. Prepare and present the Phasor diagrams in three-phase synchronous CS(2.3,3.3)machines and obtain its parameters. Utilize the synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, CS(2.4,3.4)Short circuit characteristics, Potier reactance, Zero-power-factor characteristic, Damper bars. Express the main dimensions, solve examples on the design of turbogenerators and low speed generators, do testing of synchronous CS(2.5,3.5)machines and obtain its parameters.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.

CS3 Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.

7- The relation between the course learning outcomes and the program competencies

Course (LOs) program competencies





CS(2.1.2.1)	Identifies the basics of synchronous machines, Theory and design, Cylindrical-rotor and salient-pole synchronous machines, Types of windings in as machines.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(2.1,3.1)	windings in ac machines, Winding coefficients, Generator performance, Motor performance, Phasor diagrams in three-phase synchronous machines.		Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
	Apply knowledge about synchronous impedance steady state operation,	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(2.2,3.2)	Voltage regulation, Parallel operation, Synchronous machine to an infinite bus.	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control,
	Prepare and present the Phasor diagrams in three-phase synchronous machines and obtain its parameters.	CS2	and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(2.3,3.3)		CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.





CS(2.4,3.4) CS(2.4,3.4) CP P p cl	synchronization process, The V curves, power angle characteristics, The two-reaction theory, Open circuit characteristics, Short circuit characteristics, Potier reactance, Zero- cower-factor characteristic, Damper toars.	CS2	through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
CS(2.5,3.5) de extended to the model of the	Express the main dimensions, solve examples on the design of turbo-generators and ow speed generators, do testing of synchronous machines and obtain its parameters.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.

8- Course content and the relation between the course contents and the course LOs

Week	Topic	Lecture	Tutorial	Practical	course
No.		hr.	hr.	hours	LOs
1	Introduction: Magnetic Fields.	2	2	2	CS(2.1,3.1)
2	Focuses on Asynchronous (Induction) Machines.	2	2	2	CS(2.1,3.1)
3	Focuses on Asynchronous			2	CS(2.1,3.1)
	(Induction) Machines +	2	2		
	Principle of operation.				
4	Quiz (1) +Focuses on Power			2	CS(2.2,3.2)
	and Torque and Phasor diagram of a synchronous generator and solved examples.	2	2		
5	Focuses on measurement of model parameters and Open-	2	2	2	CS(2.3,3.3)





	circuit characteristic (OCC), Short-Circuit Characteristics (SCC).				
6	Focuses on synchronous generators measurement of	2	2	2	CS(2.3,3.3)
	model parameters.				
7	The Synchronous Generator Operating Alone –Variable	2	2	2	CS(2.3,3.3)
	Loads.				
8	Midterm		1.0		
9	Focuses on active and reactive power angle characteristics	2	2	2	CS(2.4,3.4)
10	Capability Curve of a Synchronous Generator.	2	2	2	CS(2.4,3.4)
11	Focuses on Terminal characteristics of synchronous generators and solved examples.	2	2	2	CS(2.5,3.5)
12	Quiz (2) + Basic Principle of Synchronous Motor.	2	2	2	CS(2.5,3.5)
13	Focuses on Equivalent Circuit of a Synchronous Motor	2	2	2	CS(2.4,3.4)
14	Focuses on Solved examples on load chan.	2	2	2	CS(2.3,3.3)
15	Focuses on Applications of Synchronous Motors.	2	2	2	CS(2.5,3.5)
16	Final Exam		2.0		
Total hor	urs	28	28	28	

9- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

Course learning Outcomes (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1,3.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(2.2,3.2)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark





| CS(2.3,3.3) | \checkmark | ✓ | \checkmark | \checkmark | \checkmark | ✓ |
|-------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|---|--------------|--------------|--------------|--------------|
| CS(2.4,3.4) | \checkmark | ✓ | \checkmark | \checkmark | \checkmark | ✓ |
| CS(2.5,3.5) | \checkmark | ✓ | \checkmark | \checkmark | \checkmark | \checkmark |

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

						ssment i					
a- Assessment method and its relation to the Los of the course											
	Tools of assessment										
Course ILOs	duizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(2.1,3.	✓	✓	✓	✓	✓	\checkmark	✓	\checkmark	\checkmark	✓	✓
CS(2.2,3. 2)	✓	✓	\checkmark	✓	✓	✓	✓	\checkmark	\checkmark	✓	✓
CS(2.3,3.	✓	✓	\checkmark	√ √ √ √ √ √ √ √ √							✓
CS(2.4,3.	✓	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓
CS(2.5,3. 5)	✓	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓
				b-				sessment	t		
Quizzes				Quiz (1 Quiz (2	,		ek (3) ek (1)				
Discussion Presentation Sheets and Researche the Project Practical mandance Attendance Mid-term e	ons d Sket s and s nodelli	reports		,	,	Eve we we We We		ek for any 3) ,8) 8)	student		





final exam	Week (16)
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IIII ON ONOTH		110011 (10)					
c- Grading system							
quizes	Quiz (1) Quiz (2)	(5) marks (5) marks					
Discussions	15%	, ,					
Sheets and Sketches	20%						
Researches and reports	20%	5 marks	(40) marks				
the Projects	30%						
Practical modelling	20%						
Attendance		(10) marks					
Mid-term exam		(15) marks					
final exam			60) marks				
Total		(1	00) marks				

	10- List of references:					
a) Course notes	Lecture notes and handouts					
b) Required books	■ Ion Boldea, Syed A. Nasar," The Induction Machine					
	Handbook," CRC Press ,Boca Raton London New York					
	Washington, D.C.					
	• P.C.SEN, "PRINCIPLES OF ELECTRIC					
	MACHINES AND POWER ELECTRONICS, "John					
	Wiley & Sons.					
	■ TURAN GÖNEN," ELECTRICAL MACHINES					
	WITH MATLAB,"CRC Press, Taylor& Francis Group.					
c) Recommend books	Mentioned at time.					
d) Periodicals, Web	No periodicals are needed.					
sites, etc	-					

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research





Course coordinator:
program Coordinator
Head of the Department
Date:

Ass. Prof. Dr. Shady Abdel Aleem Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul Dr. Ibrahim Ali Mahmoud Abdel Dayem 2022/2023







Course specification

Course code:	Course name
CECE 489	Professional Training
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023
	B-Basic Information
	D. C LT
Course Name	Professional Training
Code	CECE 489
Course Level	Fifth level courses (Senior -2) - First semester (Fall)
Credit Hours	1Cr. Hrs.
Lectures	0Hrs.
Tutorial	3 Hrs.
Total	3Hrs.
Prerequisite	Senior Standing
Instructor name/Email	Dr. Salem Abdel Aziz Fikri Ahmed Sheikh
	salem. abdelaziz @sva.edu.eg

C- Professional information

1- Course core

Each student is required to spend a minimum of eight weeks in some related concentration field. A report followed by discussion is submitted to a departmental committee for evaluation.

	2- Course learning objectives:
oc 1	Able to understand solar Systems Classifications and Applications, Solar Radiation, and Solar PV Fundamentals.
oc 2	Explain the principle of Stand-alone system Components, Solar pumping system Components.
oc 3	Explain how to deduce sizing and design of Solar PV standalone system, Solar pumping sizing and design.
oc 4	Explain the principle of the off-grid Systems Installation, testing and commissioning, Off-grid systems maintenance, System Feasibility, and standalone system and solar pumping.





3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP4 Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
- OP5 Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies..
- Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
- OP9 Provide students with an awareness of the tools and skills necessary for participating effectively in building a robust national economy and meeting current and future modern industry needs
- OP12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives

	Course objectives		program objectives
	Able to understand solar Systems Classifications and Applications, Solar Radiation, and Solar PV Fundamentals.	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
oc 1		OP6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
oc 2	Explain the principle of Stand- alone system Components, Solar pumping system Components.	OP5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies
		OP9	Provide students with an awareness of the tools and skills necessary for





and

students

applying

Explain how to deduce sizing design Solar PV of standalone Solar system, pumping sizing and design.

Explain the principle of the off-

testing and commissioning, Off-

System Feasibility, and stand-

Installation,

maintenance,

solar

and

Systems

systems

system

OP4

OP6

fundamentals sciences to

society's

Prepare

principles,

applications.

industry needs

of engineering practical problems

by

using design and syntheses of electrical components, circuits, and

participating effectively in building a robust national economy and meeting current and future modern

Provide various industries with

highly qualified electrical power

engineers with a broad knowledge

of electrical engineering and related

undergraduate

who can create new ways to meet

needs

theories.

systems.

OP12

Prepare engineers who can work on electrical power systems, including designing and realizing such

systems.

OP4

OP9

Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories.

applications.

Provide students with an awareness

of the tools and skills necessary for

participating effectively in building a robust national economy and meeting current and future modern

industry needs

Prepare engineers who can work on

electrical power systems, including OP12 designing realizing and such

systems.

5- Learning outcomes of the course (LOs)

oc 3

oc 4

grid

grid

alone

pumping.





Upon the completion of the course, the student should be able to:

- CS(1.1) Identifies the basics about sizing and design of Solar PV standalone system.
- CS(2.1) Recognize the solar pumping system Components, Solar pumping sizing and design
- CS(3.1) Explain the heighten awareness of the off-grid Systems installation, testing and commissioning.
- CS(5.1) Express the off-grid systems maintenance, System Feasibility, and stand-alone system and solar pumping

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- CS1 Design and analyze the construction of systems to generate, transmit, control and distribution systems.
- Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
- CS3 Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
- Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.

7- The relation between the course learning outcomes and the program competencies

	Course (LOs)	program competencies				
CS(1.1)	Identifies the basics about sizing and design of Solar PV standalone system.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.			
CS(2.1)	Recognize the solar pumping system Components, Solar pumping sizing and design	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.			
CS(3.1)	Explain the heighten awareness of the off-grid Systems installation, testing and commissioning.	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power			





		generation, transmission, control, and distribution systems.
CS(5.1)	Express the off-grid systems maintenance, System Feasibility, and stand-alone system and solar pumping CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.
• •		

8- Course content and the relation between the course contents and the course LOs

Week	Topic	Lecture	Tutorial	Practical	course
No.		hr.	hr.	hours	LOs
1	Explain how the training report is fulfillment.	0	0	0	CS(5.1)
2	Solar Systems Classifications and Applications	0	0	0	CS(1.1)
3	Solar Radiation	0	0	0	CS(1.1)
4	Solar PV Fundamentals	0	0	0	CS(1.1)
5	Stand-alone system Components	0	0	0	CS(1.1)
6	Sizing and design of Solar PV standalone system	0	0	0	CS(1.1)
7	Sizing and design of Solar PV standalone system	0	0	0	CS(1.1)
8	Solar pumping system Components		0		0
9	Solar pumping sizing and design	0	0	0	CS(2.1)
10	Solar pumping sizing and design	0	0	0	CS(2.1)
11	Off-grid Systems Installation, testing and commissioning	0	0	0	CS(3.1)
12	stand-alone system and solar pumping, Final Test	0	0	0	CS(3.1)
13	Feedback and submit report.	0	0	0	CS(5.1)
14	Semifinal feedback and submit report.	0	0	0	CS(5.1)
15	Final feedback and semifinal report.	0	0	0	CS(5.1)
16	Final Report.		0.0		





Total hours 0 0 --

9- The Teaching and learning methods and their relation to the Los of the course

		Teaching and Learning Methods											
Course learning Outcomes (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self learning / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(1.1)								✓	✓		✓	✓	
CS(2.1)								✓	✓		✓	✓	
CS(3.1)								✓	✓		✓	✓	
CS(5.1)								✓	✓		✓	✓	

Notes:

The research concerns the discussion, the site visit and the presentations.

10- Student assessment method											
á	a- Assessment method and its relation to the Los of the course										
					-	Tools of	assess	ment			
Course ILOs	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1.1)			$ $ \checkmark					✓	\checkmark	\checkmark	
CS(2.1)			✓					✓	\checkmark	\checkmark	
CS(3.1)			✓					✓	\checkmark	\checkmark	
CS(5.1)			✓					✓	\checkmark	\checkmark	
CS(1.1)			✓					✓	\checkmark	\checkmark	
				b-	Time	sched	ule of a	ssessment	t		

Discussions Presentations Every week for any student Weekly





Sheets and Sketches	Weekly
Researches and reports	Week (2,3)
the Projects	Week (4,8)
Practical modelling	Week (4,8)
Attendance	Weekly
final exam	Week (16)

c- Grading system

Final Report	(10) marks
Final Discussion	(50) marks
Training organization assessment	(40) marks
Total	(100) marks

	10- List of references:
a) Course notes	Student have to take written note based on the instructor's lecture Submission must be a periodical technical presentation. Final submission is A4 paper. The student has to report his own work through the current academic course. Printing and electronic versions of the report are required. The discussion and students' participants are very essential. The evaluations are internal periodical assessments. Student grades are available and posted in the class.
b) Required books	 "Solar Photovoltaic Technology: Basics, Design, and Applications" by Chetan Singh Solanki "Photovoltaic Systems Engineering" by Roger A. Messenger and Amir Abtahi "Handbook of Photovoltaic Science and Engineering" edited by Antonio Luque and Steven Hegedus "Solar Electric Handbook: Photovoltaic Fundamentals and Applications" by Michael Boxwell "Renewable Energy Systems: Design and Analysis





with Induction

Generators" by Mukhtar Ahmad

6. H.S. Rauschenbach, Solar Cell Array Design Handbook., New York:

Va Nostrand Reinhold, 1980.

7. A.L.F.a.R.H.Bube, "Fundamentals Of Solar Cells", San Francisco, C

Academic, 1983.

8. J.A.a.S.A.C. Carrero, "A single procedure for helping PV designers

select silicon PV module and evaluate the loss resistances", Renewable

Energy, 2007.

9. R.T.a.P.R.D.Sera, "PV panel model based on datasheet values", P

IEEE Int. Symp. Ind.Electron.(ISIE),2007.

c) Recommend books

d) Periodicals, Web sites, etc

Mentioned at time.

No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:

Dr. Salem Abdel Aziz Fikri Ahmed Sheikh

program Coordinator

Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

Head of the Department

Dr. Ibrahim Ali Mahmoud Abdel Dayem

Date:

2022/2023





Course code:	Course name
CECE 323	Power system analysis II
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023
	B-Basic Information
C N	р , 1 : п
Course Name	Power system analysis II
Code	CECE 323
Course Level	Fifth level courses (Senior -2) - First semester (Fall)
Credit Hours	3Cr. Hr
Lectures	2hr
Tutorial	2hr
Lab	2hr
Total	6hr
Prerequisite	CECE 322
Instructor name/Email	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
	ihab.nabil@sva.edu.eg
	0 1 11 0 1

C- Professional information

1- Course core

Transients in electrical systems: Types of transients, Equivalent circuits of power system elements, Multi-machine linear systems, Maximum power and loading limit, Modeling of basic elements of electrical systems: Vector diagram representation, Simplified systems, Excitation and speed control systems, Block diagram representation, Simplified criteria of transient stability: Concept of transient stability, Equal area criterion, Numerical solutions of rotor electromechanical equation, Dynamic stability: Analysis of uncontrolled systems, Controlled systems, Power system stabilizers, Voltage stability of loads and power systems: Criteria of voltage stability, Voltage collapse in electrical power.

	2- Course learning objectives:
oc 1	Explain the principle about per unit system and power system stability and dynamics.
oc 2	Able to understand how analyze power system voltage stability problems.
oc 3	Able to understand how analyze power system angle stability problems



oc 4

Ministry of higher education High valley institute for engineering and technology Electrical power engineering program



To, accessor

for both small and large disturbances.

Explain how to analyze load frequency control problems.

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP 5
 Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.

 Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.

 OP 7
 Teach students to use experimental and data analysis techniques for electrical power engineering applications
 - OP 12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives

C	Course objectives	program objectives				
oc 1	Explain the principle about per unit system and power system stability and dynamics.	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.			
	Able to understand how	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies. Prepare undergraduate students			
oc 2	Able to understand how analyze power system voltage stability problems.	OP 6	who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and			
oc 3	Able to understand how analyze power system angle	OP 7	systems. Teach students to use experimental and data analysis			





oc 4	stability problems for both small and large disturbances. OP 12 work on electrical power systems, including designing and realizing such systems. Teach students to use experimental and data analysis techniques for electrical power engineering applications OP 7 experimental and data analysis techniques for electrical power engineering applications Prepare engineers who can engineering applications OP 12 work on electrical power engineering applications Prepare engineers who can op 12 work on electrical power systems, including designing and realizing such systems.						
T.T.,	5- Learning outcomes of the course (LOs)						
Opon the comp	pletion of the course, the student should be able to:						
CS(1.1)	Differentiate between types of power system stability, State the swing equation in electrical units and per-unit forms.						
CS(1.2,2.1)	Demonstrate understanding of the equal area criterion, Model the power system components for small signal study.						
CS(1.3,2.2)	Evaluate the synchronizing power and Damping coefficients, Derive the maximum power equation under a given power factor.						
CS(1.4,2.3)	Demonstrate the equations of PV and VQ curves, Develop the power angle equation before, during and after fault.						
CS(1.5,2.4)	Utilize the system transient stability using equal area criterion, Analyze the small signal stability of a single-machine infinite bus system.						
CS(1.6,2.5)	Apply knowledge to analyze the voltage stability using PV curve, Use VQ curve to select suitable size of shunt capacitors for voltage stability requirements.						
CS(1.7,2.6,5.1)	Conduct and develop suitable numerical methods to solve the swing equation, Analyze and solve load frequency control problems.						
CS(1.8,2.7,5.2)	Apply knowledge about Power World Simulator to analyze voltage stability problem.						

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:





CS1	Design and analyze the control and distribution sy		ion of systems to generate, transmit,						
CS2		notors,	ysis through simulations for heavy transmission lines, and distributing results.						
CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.								
7- The relation between the course learning outcomes and the program competencies									
	Course (LOs)		program competencies						
CS(1.1)	Differentiate between types of power system stability, State the swing equation in electrical units and per-unit forms.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.						
CS(1.2,2.1)	Demonstrate understanding of the equal area criterion, Model the power system components for small signal study.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.						
CS(1.3,2.2)	Evaluate the synchronizing power and Damping coefficients, Derive the maximum power equation under a given power factor.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.						





	Demonstrate the equations of PV and VQ curves, Develop the	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.	
	power angle equation before, during and after fault.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.	
		Utilize the system transient stability using	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
	CS(1.5,2.4)	equal area criterion,	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Design and analyze the construction
			CS1	of systems to generate, transmit, control and distribution systems.
	CS(1.6,2.5)	Apply knowledge to analyze the voltage stability using PV curve, Use VQ curve to select suitable size of shunt capacitors for voltage	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
		stability requirements.	CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and



We ek No.



			distribution systems.
		CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis
CS(1.7.2.6.5.1)	Conduct and develop suitable numerical methods to solve the swing equation, Analyze	CS2	through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
	and solve load frequency control problems.	CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and
		CS1	distribution systems. Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis
CS(1.8,2.7,5.2)	Apply knowledge about Power World Simulator to analyze voltage	CS2	through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
	stability problem.	CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.

Topic Lectur Tutori Practical course LOs	8-	Course content and the relation between	en the cours	se content	ts and the co	ourse LOs
e hr. al hr. hours		Topic			_	course LOs





Introduction: Per unit system and Power	2	2	2	CS(1.1)
Power System Model for Stability: swing	2	2	2	CS(1.2,2.1)
Power-angle characteristics, Vector	2	2	2	CS(1.2,2.1)
Small Signal Stability of unregulated	2	2	2	CS(1.3,2.2)
Small Signal Stability of regulated systems.	2	2	2	CS(1.4,2.3)
Transient Stability, Equal Area Criterion+ Quiz (1).	2	2	2	CS(1.5,2.4)
Examples on Equal Area Criterion.	2	2	2	CS(1.5,2.4)
Midterm		1.0		
Numerical solution of swing equation.	2	2	2	CS(1.6,2.5, 1.8,2.7,5.2)
Maximum Deliverable power for 2-node system.	2	2	2	CS(1.6,2.5)
•	2	2	2	CS(1.6,2.5)
VQ curve and shunt compensation +Quiz	2	2	2	CS(1.5,2.4)
Droop Characteristic of Synchronous Generators, load frequency control, control	2	2	2	CS(1.7,2.6, 5.1)
Power Generation Station Components	2	2	2	CS(1.7,2.6, 5.1)
Parallel generators sharing active power of load, Load Increase and System Frequency	2	2	2	CS(1.7,2.6, 5.1)
Final Exam		2.0		
l hours	28	28	28	
	System Stability. Power System Model for Stability: swing equation Power-angle characteristics, Vector diagrams. Small Signal Stability of unregulated systems. Small Signal Stability of regulated systems. Transient Stability, Equal Area Criterion+Quiz (1). Examples on Equal Area Criterion. Midterm Numerical solution of swing equation. Maximum Deliverable power for 2-node system. PV curve and voltage stability. VQ curve and shunt compensation +Quiz (2). Droop Characteristic of Synchronous Generators, load frequency control, control of generation overview Power Generation Station Components Parallel generators sharing active power of load, Load Increase and System Frequency Final Exam	System Stability. Power System Model for Stability: swing equation Power-angle characteristics, Vector diagrams. Small Signal Stability of unregulated systems. Small Signal Stability of regulated systems. Small Signal Stability, Equal Area Criterion+ Quiz (1). Examples on Equal Area Criterion. Midterm Numerical solution of swing equation. Maximum Deliverable power for 2-node system. PV curve and voltage stability. VQ curve and shunt compensation +Quiz (2). Droop Characteristic of Synchronous Generators, load frequency control, control of generation overview Power Generation Station Components Parallel generators sharing active power of load, Load Increase and System Frequency Final Exam	System Stability. Power System Model for Stability: swing equation Power-angle characteristics, Vector diagrams. Small Signal Stability of unregulated systems. Small Signal Stability of regulated systems. Small Signal Stability, Equal Area Criterion+ Quiz (1). Examples on Equal Area Criterion. Midterm Numerical solution of swing equation. Maximum Deliverable power for 2-node system. PV curve and voltage stability. VQ curve and shunt compensation +Quiz (2). Droop Characteristic of Synchronous Generators, load frequency control, control of generation overview Power Generation Station Components Parallel generators sharing active power of load, Load Increase and System Frequency Final Exam 2 2 2 2 2 2 2 2 2 2 2 2 2	System Stability. Power System Model for Stability: swing equation Power-angle characteristics, Vector diagrams. Small Signal Stability of unregulated systems. Small Signal Stability of regulated systems. Small Signal Stability, Equal Area Criterion+ Quiz (1). Examples on Equal Area Criterion. Midterm Numerical solution of swing equation. Maximum Deliverable power for 2-node system. PV curve and voltage stability. PV curve and shunt compensation +Quiz (2). Droop Characteristic of Synchronous Generation Overview Power Generation Station Components Parallel generators sharing active power of load, Load Increase and System Frequency Final Exam 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2

9- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

Course learning Outcomes (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling	
CS(1.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark	
CS(1.2,2.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark	





CS(1.3,2.2)	✓	✓	\checkmark	\checkmark	\checkmark	\checkmark	✓	\checkmark	✓	\checkmark	✓	✓
CS(1.4,2.3)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.5,2.4)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.6,2.5)			\checkmark	\checkmark	\checkmark	\checkmark	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.7,2.6, 5.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.8,2.7, 5.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

10- Student assessment method											
a- Assessment method and its relation to the Los of the course											
Tools of assessment											
Course ILOs	duizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1.1)	✓	✓ _	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.2,2. 1)	✓	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓
CS(1.3,2. 2)	✓	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓
CS(1.4,2.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.5,2. 4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.6,2. 5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.7,2. 6,5.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.8,2. 7,5.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				b-	Time	schedul	e of as	sessment			
Quiz (1) Week (3) Quiz (2) Week (10)											





Discussions	Every week for any student		
Presentations	weekly		
Sheets and Sketches	weekly		
Researches and reports	Week (2,3)		
the Projects	Week (4,8)		
Practical modelling	Week (4,8)		

Practical modelling Week (4,8)
Attendance weekly
Mid-term exam Week (8)
final exam Week (16)

c- Grading system

quizes	Quiz (1) Quiz (2)	(5) marks (5) marks	
Discussions	15%	()	
Sheets and Sketches	20%		
Researches and reports	20%	5 marks	(40) marks
the Projects	30%		
Practical modelling	20%		
Attendance		(10) marks	
Mid-term exam		(15) marks	
final exam			(60) marks
Total			(100) marks

	10- List of references:
a) Course notes	Lecture notes and handouts
b) Required books	Hadi Saadat, "Power System Analysis", PSA Publishing, 5th
c) Recommend books	Edition, 2010. Thierry Van Cutsem, Costas Vournas, "Voltage Stability of
,	Electric Power System".
d) Periodicals, Web	No periodicals are needed.
sites, etc	

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research





Course coordinator:	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	4
Date:	2022/2023	





Course specification

Course code: Course name

CECE 439 Protection & Switchgear in Electrical Power

A- Affiliation

Relevant program: Electrical power engineering

Department offering the program: Electrical and communication engineering

Department offering the course: Electrical and communication engineering

Date of program operation: 2008-2009

Date of approval from the higher ministry of 27/1/2008

education

Date of course operation 2022-2023

B-Basic Information

Course Name Protection & Switchgear in Electrical Power

Code CECE 439

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 3Cr. hr
Lectures 2hr
Tutorial 2hr
Total 4hr

Prerequisite CECE 322

Instructor name/Email Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

ihab.nabil@sva.edu.eg

C- Professional information

Course core

Protection relaying philosophy and fundamental considerations, Transmission line protection, Short lines, Medium length lines, Long distance power transmission, Compensating distance relaying. Rotating machinery protection: Relay protection for ac generators, Loss of field relay operation, Power transformer protection, Relay input sources, Switchgear engineering: Circuit breakers, Types, Construction, Performance and ratings, Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms, Circuit breakers synthetic and direct tests. Switching over-voltages, Resistance switching, Capacitance switching

1- Course learning objectives:

Recognize the circuit breakers, Types, Construction, Performance and ratings, Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms, Circuit breakers synthetic and direct tests.

oc 1





oc 2	Explain the principle of switching over-voltages, resistance switching, Capacitance switching.
oc 3	Able to understand the protection of different power system components, security, dependability, reliability, current transformers.
oc 4	Able to understand concept of over-current relay and coordination between other relays, coordination between two circuit breakers, coordination between two fuses, coordination between over-current relay and fuse, earth relay and coordination between other relays.
	2- program objectives served by the course:
Upon the	completion of the course the student should be able to:
OD 5	Prepare students for engineering analyses and problem solving using appropriate mathematical and

opon in	opon the completion of the course the student should be able to.				
OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.				
OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.				
OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications				
OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.				

3- The relation between the course objectives and the program objectives **Course objectives** program objectives Prepare students for engineering analyses Recognize the circuit breakers, Types, and problem-solving using appropriate Construction, Performance mathematical and computational and ratings, Interruption of methodologies. OP fault currents and arcs in oc 1 5 circuit breakers, Circuit breaker test oscillograms, Circuit breakers synthetic and direct tests. Prepare students for engineering analyses and problem-solving using OP 5 Explain the principle of appropriate mathematical and switching over-voltages, computational methodologies. oc 2 resistance switching, Prepare undergraduate students who can Capacitance switching. OP create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using





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	oc 3	design and syntheses of electrical components, circuits, and systems. Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems. OP 6 8 90P 6 90P 6 90P 6 90P 7 100 100 100 100 100 100 100 100 100 1			
	oc 4	Able to understand concept of over-current relay and coordination between other two circuit breakers, coordination between two fuses, coordination between over-current relay and fuse, earth relay and coordination between other relays. Prepare engineers who can work on electrical power systems, including designing and realizing such systems. OP 12			
		4- Learning outcomes of the course (LOs)			
	Upon th	ne completion of the course, the student should be able to:			
	CS(1.	Differentiate between types of circuit breakers, Construction, Performance, and ratings.			
	CS(1. 2,2.1)	Demonstrate the Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms			
	CS(1. 3,2.2)	Evaluate the circuit breaker test oscillograms, Circuit breakers synthetic and direct tests.			
	CS(1. 4,2.3)	Analysis the switching over-voltages, Resistance switching, Capacitance switching.			
	CS(1. 5,2.4, 5.1) Identifies the basic of the protection of different power system compon security, dependability, reliability, current transformers				
	S(1.6, 2.5,5. 2)	Apply knowledge to the protection of different power system components, security, dependability, reliability, current transformers			
		Communicate effectively with over-current relay and coordination between other			





7,2.6, relays, coordination between two circuit breakers, coordination between two fuses, coordination between overcurrent relay and fuse.

5- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- Cs1 Design and analyze the construction of systems to generate, transmit, control and distribution systems.
- CS2 Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
- Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.

6- The relation between the course objectives and the program objectives

	Course objectives	program objectives		
CS(1.1)	Differentiate between types of circuit breakers, Construction, Performance, and ratings.	control and distribution systems.		
CS(1.2,2	Demonstrate the Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms	Design and analyze the construction of systems to Cs1 generate, transmit, control and distribution systems. Design, develop and make analysis through simulations for heavy CS2 equipment (generators, motors, transmission lines, and distributing systems to		
CS(1.3,2	Evaluate the circuit breaker test oscillograms, Circuit breakers synthetic and direct tests.	interpret experimental results. Design and analyze the construction of systems to		





			
		CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
	Analysis the switching over-voltages, Resistance	Cs1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make
CS(1.4,2.3)	switching, Capacitance switching.	CS2	analysis through simulations for heavy equipment (generators, motors, transmission lines, and
		Cs1	distributing systems to interpret experimental results. Design and analyze the construction of systems to generate, transmit, control and distribution
CS(1.5,2.4,5.1)	Identifies the basic of the protection of different power system components, security,	CS2	systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to
	dependability, reliability, current transformers	CS5	interpret experimental results. Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.





		Cs1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis through simulations
CS(1.6,2.5,5.2)	Apply knowledge to the protection of different power system components, security, dependability, reliability, current transformers	CS2	for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Apply modern techniques, skills, and engineering tools while performing the development load lists, low
		CS5	voltage power systems, design reviews, and checks for electric power generation and distribution systems. Design and analyze the
		Cs1	construction of systems to generate, transmit, control and distribution
CS(1.7,2.6,5.3)	Communicate effectively with over-current relay and coordination between other relays, coordination between two circuit breakers, coordination between two fuses, coordination	CS2	systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
	between overcurrent relay and fuse.	CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power





generation and distribution systems.

7- Course content and the relation between the course contents and the course LOs							
Wee	Topic	Lecture	Tutoria	Practica	course LOs		
k	Торіс	hr.	I hr.	I hours	course 200		
No.		1111.	1 111.	THOUTO			
1	Introduction for power Circuit				CS(1.1)		
1	Breakers (CBs)	2	2	0	CS(1.1)		
2	Bulk oil (CBs), Minimum oil				CS(1.1)		
_	(CBs), Air (CBs), SF6(CBs)	2	2	0	CS(1.1)		
3	Arcing duration in (CBs), Arc				CS(1.2,2.1)		
	length, problem of arcing	2	2	0	(,)		
	duration in (CBs), fault clearing	2	2	0			
	time.						
4	Time characteristics of (CBs),				CS(1.3,2.2)		
	long time delay, short time delay,	2	2	0			
	instantaneous, example of	2	2	U			
	adjusting (CBs).						
5	(CBs) performance, short circuit				CS(1.4,2.3)		
	calculations, the switching over-	2	2	0			
	voltages, Resistance switching,	_	_	Ŭ			
	Capacitance switching.				CC(1 4 2 2)		
6	Growth of current when purely				CS(1.4,2.3)		
	inductive circuit to a sinusoidal						
	supply, Growth of current when resistance and inductive are	2	2	0			
	connected series to a sinusoidal						
	supply +Quiz (1).						
7	Interpretation of CBs test		_		CS(1.4,2.3)		
·	oscillogram.	2	2	0	0~(11.,=.0)		
8	Midterm		1.0				
9	Introduction of the protection of				CS(1.5,2.4,5.1		
	different power system	2	2	0)		
	components, security,	<i>L</i>	L	U			
	dependability, reliability.						
10	current transformers	2	2	0	CS(1.5,2.4,5.1		
		4	2	J)		





11	Explain the basis of overcurrent	2	2	0	CS(1.6,2.5,5.2
	relay	2	2	0)
12	Protective coordination between	2	2	0	CS(1.6,2.5,5.2
	the relays,	2	2	U)
13	coordination between two circuit				CS(1.6,2.5,5.2
	breakers, coordination between)
	two fuses, coordination between	2	2	0	
	overcurrent relay and fuse +Quiz				
	(2).				
14	Explain the basis of earth relay	2.	2	0	CS(1.6,2.5,5.2
		2		O)
15	Protective coordination between				CS(1.7,2.6,5.3
	the relays,)
16	Final Exam		2.0		
Total	hours	28	28	0	

8- The Teaching and learning methods and their relation to the Los of the course

0-	1110 100	ching and	a louir					g Method		0 01 11	10 000	.00	
Course learning Outcomes (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(1.1)	✓												
CS(1.2,2 .1)	✓	✓											
CS(1.3,2 .2)	✓	✓	✓	✓	✓		✓		✓	✓			
CS(1.4,2	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
CS(1.5,2 .4,5.1)	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
S(1.6,2.5 ,5.2)	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.





Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

			9- 3	Student	assess	ment me	ethod				
	a- As	ssessmer						of the co	urse		
					Too	ls of ass	essme	ent			
Course ILOs	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1.1											
) CS(1.2 ,2.1)										ш	
CS(1.3,2.2)	✓	✓	✓	✓	✓		✓		✓		✓
CS(1.4 ,2.3)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.5 ,2.4,5. 1)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
S(1.6,2 .5,5.2)	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
,,,,,,,				b-	Time	schedule	e of as	sessmei	nt		
Quizzes Quiz (1) Quiz (2) Week (3) Week (10) Every week for any student weekly Sheets and Sketches Researches and reports Week (2,3) Week (4,8) Practical modelling Attendance Week (4,8) Mid-term exam Week (8) Week (8) Week (16)											
						ng syster	n				
Quizzes				Quiz	:(1)	((5) ma	arks	((40) marl	ks





	Quiz (2)	(5) marks	
Discussions	15%		
Sheets and Sketches	20%		
Researches and reports	20%	5 marks	
the Projects	30%		
Practical modelling	20%		
Attendance		(10) marks	
Mid-term exam		(15) marks	
final exam		, ,	(60) marks
Total			(100) marks

10- List of references:

a) Course notes Lecture notes and handouts

b) Required Sunil S. Rao, "Switchgear, Protection and Power Systems", books Khanna Publishers, 14 thEdition, 2008.

c) Recommend books

Horwitz, S. H. and Phadke, A. G., "Power System Relaying", John Wiley, 1992.

d) Periodicals, Web sites, etc No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:

Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
program Coordinator

Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department
Dr. Ibrahim Ali Mahmoud Abdel Dayem
2022/2023







Course specification

Course code:	Course name
CECE 494	High Voltage Engineering
A- Affilia	tion
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication
	engineering
Department offering the course:	Basic Science
Date of program operation:	2008-2009
Date of approval from the higher ministry of	27/1/2008
education	
Date of course operation	2022-2023
	B-Basic Information

Course Name High Voltage Engineering

Code CECE 494

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 3Cr. hr
Lectures 2hr
Tutorial 2hr
Total 4hr

Prerequisite CECE 323

Instructor name/Email Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

ihab.nabil@sva.edu.eg

C- Professional information

1- Course core

Advantages and limitations of using high voltages for transmission, Generation, and measurement of high voltage for testing, Generation of impulse waves, The impulse generators.

2- Course learning objectives:						
oc 1	Recognize the the basis of high voltage generation, measurement and testing.					
oc 2	Explain the principle of the electrical breakdown theories in different insulators (gases, liquids, & solids)					
oc 3	Able to understand the different types of insulators in overhead transmission line.					
oc 4	Explain how to measure, construct and examine the high voltage					





cables and insulators under controlled guidance and supervision while
gaining the experience through application and analysis of realistic
power system protection problem.
D : 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

Recognize how apply basis of High voltage cables, Earthling systems,

Neutral Grounding, Earth resistivity measurement, Overvoltage on power systems.

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

OP4	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.
OP12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives

	Course objectives	program objectives				
oc 1	Recognize the the basis of high voltage generation, measurement and testing.	OP4	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.			
		OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.			
oc 2	Explain the principle of the electrical breakdown theories in different insulators (gases, liquids, & solids)	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications. Prepare engineers who can work on electrical power systems, including designing and realizing such systems.			
oc 3	Able to understand the different types of insulators in overhead transmission line.	OP4	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.			



,4.2)

Ministry of higher education High valley institute for engineering and technology Electrical power engineering program



			OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.			
			OP12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.			
C	ос 4	Explain how to measure, construct and examine the high voltage cables and insulators under controlled guidance and supervision while gaining the experience through application and analysis of realistic power system protection problem.	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.			
C	oc 5	Recognize how apply basis of High voltage cables, Earthing systems, Neutral Grounding, Earth resistivity measurement, Overvoltage on power systems.	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications. Prepare engineers who can work on electrical power systems, including designing and realizing such systems.			
	5- Learning outcomes of the course (LOs)						
	Upon the completion of the course, the student should be able to:						
	CS(2,4.1)						
	CS(1,4,2)	Cras Liquid and Solids) Sili		ators and their applications the electrical breakdown theories			

CS(1.3, 4.3,2. Analysis the electric field and construction of high voltage cables.

1)
CS(4.4 Apply knowledge to propose the suitable earthling schemes for specific

in different insulators (gases, liquids, & solids).





)	application, Evaluate the breakdown voltage for different insulating material.
CS(4.5 ,2.2)	produce the capability of performing the different high voltage tests at the High Voltage Laboratory, Practice the different precautions of the high voltage laboratory.
CS(4.6	Apply knowledge to the proper earthing systems& grounding schemes, Neutral
,2.3)	Grounding schemes, Earth resistivity measurement.
CS(1.4 ,4.7,2. 4)	Utilize the basis of High voltage cables.
CS(1.5,4.8,2.5)	Conduct and develop the Overvoltage on power systems

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- CS1
 Design and analyze the construction of systems to generate, transmit, control and distribution systems.

 Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.

 Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
 - **7-** The relation between the course objectives and the program objectives

	Course objectives		program objectives
CS(1. 1,4.1)	Differentiate between the normal, extra, and ultra-high voltage signals, describe the high voltage generation, measurement, and testing procedures.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.





CS(1. 2,4.2)	Demonstrate the different types of insulators and their applications (Gas, Liquid, and Solids), Summarizes the electrical breakdown theories in different insulators (gases, liquids, & solids).	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
		CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1. 3,4.3, 2.1)	Analysis the electric field and construction of high voltage cables.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Test and examine components and
		CS4	equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
CS(4. 4)	Apply knowledge to propose the suitable earthling schemes for specific application, Evaluate the breakdown voltage for different insulating material.	CS4	Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
CS(4. 5,2.2)	produce the capability of performing the different high voltage tests at the High Voltage Laboratory,	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing





		Practice the different precautions		systems to interpret experimental results.
		of the high voltage laboratory.	CS4	Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
		Apply knowledge to the proper	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems
	CS(4. 6,2.3)	earthing systems& grounding schemes, Neutral Grounding schemes, Earth resistivity measurement.	CS4	to interpret experimental results. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation,
			CS1	transmission, control, and distribution systems. Design and analyze the construction of systems to generate, transmit, control and distribution systems.
4	CS(1. 4,4.7, 2.4)	Utilize the basis of High voltage cables.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
	,		CS4	Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.





	Conduct and develop the Overvoltage on power systems	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1. 5,4.8,		CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems
2.5)		CS4	to interpret experimental results. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.

	8- Course content and the relation between the course contents and the course LOs									
We	Topic	Lectur	Tutori	Practica	course LOs					
ek		e hr.	al hr.	I hours						
No										
1	Introduction for Generation of AC	2	2	0	CS(1.1,4.					
	voltage at Power Frequency.	2	2	O	1)					
2	H.V Generation of AC voltage at high	_	_	_	CS(1.1,4.					
	Frequency& Problem., H.V Generation	2	2	0	1)					
2	of impulse Generator& Problem.				CC(1.2.4					
3	Sphere ap measures peak voltage, Gas	2	2	0	CS(1.2,4.					
4	discharge in Gas Generation of H.V DC& Problem.				2) CS(1.2,4.					
7	Generation of II. v Dea 1 toolein.	2	2	0	2)					
5	Resistance, capacitance potential				CS(1.2,4.					
	divider &Problem.	2	2	0	2)					
6	Theory of breakdown in gas, oil&	2	2	0	CS(1.2,4.					
	Problem +Quiz (1).	2	2	0	2)					
7	Resistance of single core cable +multi				CS(1.3,4.					
	core cable& Problem.	2	2	0	3,2.1,					
					1.4,4.7,2.					





					4)
8	Midterm		1.0		
9	H.V Corona Discharge Gas in Transmission Line	2	2	0	CS(4.4, 4.5,2.2)
10	Grounding System, Hemi Sphere Grounding, Rod of Grounding.	2	2	0	CS(4.5,2. 2)
11	Earthing systems.	2	2	0	CS(4.4)
12	Neutral Grounding.	2	2	0	CS(4.4)
13	Earth resistivity measurement +Quiz (2).	2	2	0	CS(4.4)
14	Overvoltage on power systems.	2	2	0	CS(1.5,4. 8,2.5)
15	Overvoltage on power systems.	2	2	0	CS(1.5,4. 8,2.5)
16	Final Exam		2.0		
Tota	l hours	28	28	0	

9- The Teaching and learning methods and their relation to the Los of the course

		Teaching and Learning Methods											
Course learning Outcome s (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
Lo1	✓												
Lo2	\checkmark	\checkmark											
Lo3	\checkmark	\checkmark	✓	✓	✓		✓		✓	✓			✓
Lo4	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓		\checkmark	\checkmark	✓	✓	✓
Lo5	\checkmark	\checkmark	\checkmark	\checkmark	✓		√		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Lo6	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓		\checkmark	\checkmark	\checkmark	\checkmark	✓
Lo7	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
Lo8	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓		\checkmark	\checkmark	\checkmark	\checkmark	✓

Notes: The research concerns the cooperative work, the discussion, and the presentations. The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used





teaching and learning methods will be on line.

				01							
10- Student assessment method											
a- Assessment method and its relation to the Los of the course Tools of assessment											
		E			100		5699111	ent			
Course	တ္သ	exa	am	/s	જ	: <u>lab</u>	Ш	ons	s/ Jes	tion	<u>p</u>
ILOs	quizzes	E	<u>ĕ</u>	sheets/ sketches	projects	ical	Oral exam	JSSİ	Reports/ esearches	enta	modelling
	Вb	Mid -term exam	Final exam	sh Ske	bro	Practical: lab	Ora	discussions	Re	presentation	Ĕ E
		Ž				<u> </u>				<u> </u>	
CS(1.1,4											
.1) CS(1.2,4											
.2)											
CS(1.3,4	√	√	√	√	√		✓		✓		✓
.3,2.1)	•	•	•	•	•		,				
CS(4.4)	√	✓	✓	✓	✓		~	✓	✓	✓ .	✓
CS(4.5,2 .2)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	•
CS(4.6,2		_	/	_	_				/		✓
.3)	V	V	V	V	•		•	V	V	•	
CS(1.4,4	\checkmark	\checkmark	\checkmark	\checkmark	✓		✓	\checkmark	\checkmark	\checkmark	\checkmark
.7,2.4) CS(1.5,4										-	
.8,2.5)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	✓	\checkmark	
. ,				b-	Time s	chedule	of ass	sessment			
Quizzes				Quiz (1	•		/eek (3				
Discussion	c			Quiz (2)		/eek (10) reek for an	v etudont		
Presentation							very w eekly	eek ioi aii	y Student		
Sheets and		ches					eekly				
Researche							/eek (2	2,3)			
the Project							/eek (,			
Practical m		ng					/eek (4	1,8)			
Mid-term e							eekly /eek (8)			
final exam							/eek (,			
						g systen	า				
quizes				Qu	iz (1)		(5) n	narks	(40)	marks	





Discussions Sheets and Sketches Researches and reports the Projects Practical modelling Attendance Mid-term exam final exam	Quiz (2) 15% 20% 20% 30% 20%	(5) marks 5 marks (10) marks (15) marks	(60) marks		
Total	40 1:a4 a4		(100) marks		
a) Course notesb) Required books	M-S NGrawE. Ku:	s and handouts Vaidu, "High Vo Hill Co., 1982. ffel , W. S. Zaer ge Engineering,	oltage Engineering",Tata Mc ngl, J. Kuffel, High 2nd edition, Newnes		
c) Recommend books	Abdel Salam, M., Anis, H., El-Morshedy, A., and Radwan, R., "High Voltage Engineering", Marcel Dekker Inc., 2000. M. Khalifa, High Voltage Engineering, Marcel Dekker, Inc.				
d) Periodicals, Web sites, etc	No periodica	ls are needed.			

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:	Dr. Ehab Mohamed Nabil Ismail Abdel	1
	Rasoul	16.5
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel	7-1
	Rasoul	16.5
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Date:	2022/2023	





Course specification

Course code: Course name

CECE 496 High Voltage Engineering Lab

A- Affiliation

Relevant program: Electrical power engineering

Department offering the program: Electrical and communication

engineering

Department offering the course: Electrical and communication

engineering

Date of program operation: 2008-2009

Date of approval from the higher ministry of 27/1/2008

education

Date of course operation 2022-2023

B-Basic Information

Course Name High Voltage Engineering Lab

Code CECE 496

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 1 Cr. hr
Lectures 0hr
lab 3hr
Total 3hr

Prerequisite Conc. with CECE 494

Instructor name/Email Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

ihab.nabil@sva.edu.eg

C- Professional information

1- Course core

Insulators for transmission lines and substations, Insulator materials: Shapes and types, Factors affecting performance of insulators, Testing of insulators: Destructive and non-destructive insulation tests- electrical breakdown in gases, Ionization and attachment coefficients, Electronegative gases, Electrical breakdown in liquids and solids. Corona discharge, Single and three-core cables, Electrical stresses in cables, High voltage equivalent circuits, High voltage cables, Thermal properties of cables, Earthing systems.

2- Course learning objectives:

oc 1 Explain how to measure the breakdown voltage in air in uniform field (plate to plate) under the DC and AC voltages

oc 2 Able to understand the influence of the factors affecting the breakdown voltage





	in air.
oc 3	Explain how to demonstrate the surface breakdown voltage (in air) of a solid insulator in the presence of uniform field (two parallel plates) under the DC and AC voltages.
oc 4	Utilize the influence of the factors affecting the breakdown voltage.
oc5	Recognize how be able to measure and test the dielectric strength of a sample of a commercial oil (using an oil tester). Such oil is used in some electrical apparatus such as power transformer and circuit breakers.

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP4 Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
- OP7 Teach students to use experimental and data analysis techniques for electrical power engineering applications.
- OP12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives

	Course objectives	program objectives				
oc 1	Explain how to measure the breakdown voltage in air in uniform field (plate to plate)	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.			
	under the DC and AC voltages	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.			
	Able to understand the influence	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering			
oc 2	of the factors affecting the breakdown voltage in air.	OP12	applications. Prepare engineers who can work on electrical power systems, including designing and realizing such systems.			





oc 3	Explain how to demonstrate the surface breakdown voltage (in air) of a solid insulator in the presence of uniform field (two parallel plates) under the DC and AC voltages.	OP4 OP7	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications. Teach students to use experimental and data analysis techniques for electrical power engineering applications. Prepare engineers who can work on electrical power systems, including designing and realizing				
oc 4	Utilize the influence of the factors affecting the breakdown voltage.	OP7	such systems. Teach students to use experimental and data analysis techniques for electrical power engineering applications.				
oc5	Recognize how be able to measure and test the dielectric strength of a sample of a commercial oil (using an oil tester). Such oil is used in some electrical apparatus such as power transformer and circuit breakers.	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications. Prepare engineers who can work on electrical power systems, including designing and realizing such systems.				
5- Learning outcomes of the course (LOs)							

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

opon me	completion of the course, the student should be able to.
`	Communicate effectively with the breakdown voltage in uniform field is
1)	higher than the non-uniform field
CS().1,4.	
۲)	firstly and then the breakdown occurs
CS(1.7, 1,7, 4.3)	Explain the heighten awareness of uniform field the breakdown occurs without proceeding corona
CS(4.4)	Communicate effectively with the breakdown voltage increases with increasing gap distance.
CS(2.3,4. 5)	Express the breakdown voltage with solid specimen is higher than the breakdown value without the solid specimen





CS(1.3,2. Express his opinion about the possible factors that affecting the breakdown voltage.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- CS1 Design and analyze the construction of systems to generate, transmit, control and distribution systems.
- Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
- Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.

7- The relation between the course objectives and the program objectives

	The relation between the course of	bjecuves	, and the program objectives
(Course objectives		program objectives
CS(2.1,4.1)	Communicate effectively with the breakdown voltage in uniform field is higher than the non-uniform field	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Test and examine components and equipment to prepare and review simple sketches, specifications, and
	Explain the heighten	CS4	
CS(1.1,4.1)	awareness of non-uniform field the corona is initiated firstly and then the breakdown occurs	CS1	construction of systems to generate, transmit, control and distribution systems. Test and examine components and equipment to prepare and review simple sketches, specifications, and





CS(1.7,7,7, 4.3)	Explain the heighten awareness of uniform field the breakdown occurs without proceeding corona	CS1 CS2	data sheets for electric power components of generation, transmission, control, and distribution systems. Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of
CS(4.4)	Communicate effectively with the breakdown voltage increases with increasing gap distance.	CS4	generation, transmission, control, and distribution systems. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution
CS(2.3,4.5)	Express the breakdown voltage with solid specimen is higher than the breakdown value without the solid specimen	CS2	systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to





interpret experimental results.

Test and examine components and equipment to prepare and review simple

sketches, specifications, and CS4 data sheets for electric power components of

generation, transmission, control, and distribution systems

systems.

CS1

Express his opinion about the possible factors that affecting the breakdown voltage.

Design and analyze the construction of systems to generate, transmit, control and distribution systems.

Design, develop and make analysis through simulations for heavy equipment

CS2 (generators, motors, transmission lines, and distributing systems to interpret experimental results.

Test and examine components and equipment to prepare and review simple sketches, specifications, and

sketches, specifications, and data sheets for electric power components of

CS4 generation, transmission, control, and distribution systems.

CS(1.3,2.4)

8- Course content and the relation between the course contents and the course LOs

Week No.

Topic

Lect Tutori Practi course LOs

ure al hr. cal

hr. hours





1	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, \(\frac{1}{1},4.\)\)
2	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, 1.1,4.1)
3	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, 1.1,4.1)
4	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, \(\cdot\).1,4.\(\cdot\)
5	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, \(\cdot\).1,4.\(\cdot\)
6	Breakdown of Solid Insulating Material	-	-	3	CS(1.7,7,7, 4.3,4.4)
7	Breakdown of Solid Insulating Material	-	-	3	CS(1.7,7,7, 4.3,4.4)
8	Midterm		1.0		
9	Breakdown of Solid Insulating Material	-	-	3	CS(1.7,7,7, 4.3,4.4)
10	Breakdown of Solid Insulating Material	-	-	3	CS(1.7,7,7, 4.3,4.4)
11	Breakdown of Liquid Insulating Material.	-	-	3	CS(2.3,4.5, 1.3,2.4)
12	Breakdown of Liquid Insulating Material	-	-	3	CS(2.3,4.5, 1.3,2.4)
13	Breakdown of Liquid Insulating Material	-	-	3	CS(2.3,4.5, 1.3,2.4)
14	Breakdown of Liquid Insulating Material	-	-	3	CS(2.3,4.5, 1.3,2.4)
15	Breakdown of Liquid Insulating Material	-	-	3	CS(2.3,4.5, 1.3,2.4)
16	Final Exam		2.0		
Total		-	-	42	

9- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

Course
learning
Outcom
es
(LOs)

ourse arning and reaching and r





	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1,	✓	✓	✓			✓	✓			✓	✓	✓	
CS(2.1, 4.1) CS(\(\).1, 4.\(\)) CS(\(\).\(\), \(\),\(\),4.3)	✓	✓	✓			✓	✓			✓	✓	✓	
CS(1.7,	✓	✓	✓			✓	✓			✓	✓	✓	
CS(4.4)	✓	✓	\checkmark			✓	\checkmark			✓	✓	✓	
CS(2.3, 4.5)	✓	\checkmark	✓			✓	✓			✓	✓	✓	
CS(1.3, 2.4)	✓	✓	✓			✓	✓			✓	✓	✓	

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns on sheets.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

					_						
			10-	Stud	lent asse	essment	metho	d			
		a- A	ssessr	nent m	ethod ar	nd its rela	ation to	the Los o	of the cou	ırse	
						ools of a					
Course ILOs	duizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(2.1, 4.1)		✓	\checkmark	\checkmark	\checkmark	\checkmark	✓	✓		✓	
CS(1.1, 4.1)		✓	✓	✓	✓	✓	✓	✓		✓	
CS(1.7,		✓	✓	✓	✓	✓	✓	✓		✓	
4.3) CS(4.4		✓	✓	✓	✓	✓	✓	✓		✓	





) CS(2.3, 4.5) CS(1.3, 2.4) ✓	✓ ✓ ✓ ✓	′ √ ′ √	√	✓ ✓	✓ ✓		✓ ✓	
Discussions Every week for any student Weekly Sheets and Sketches the Projects Attendance Mid-term exam Final exam Week (8) Week (16)								
Discussions Sheets and Sketches Researches and report the Projects Attend Mid-term final e	lance n exam exam	20% 70% 0% 10%		40 ma (10) m (10) m	arks arks arks	(40) mar (100) ma		
a) Course notes b) Required books M-S Naidu, "High Voltage Engineering", Tata Mc Graw Hill Co., 1982. E. Kuffel, W. S. Zaengl, J. Kuffel, High Voltage Engineering, 2nd edition, Newnes Press, 2000. Abdel Salam, M., Anis, H., El-Morshedy, A., and Radwan, R., "High Voltage Engineering", Marcel Dekker Inc., 2000.						ge		

11- Facilities required for teaching and learning:

• M. Khalifa, High Voltage Engineering, Marcel Dekker,

Appropriate teaching design studios including presentation board,

No periodicals are needed.

■ Inc.

data show

Periodicals, Web

d)

sites, etc





- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:	Dr. Ehab Mohamed Nabil Ismail Abdel	1
	Rasoul	16.5
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	1
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Date:	2021/2022	





Course specification

Course code:	Course name
CECE 490	Senior Project I
A-	Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher ministry	27/1/2008
of education	
Date of course operation	2022-2023

B-Basic Information

Course Name	Senior Project I
Code	CECE 490
	-104 4 4

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 1Cr. hr
Lectures 1hr
Tutorial 0hr
Lab 0hr
Total 1hr

Prerequisite Senior Standing

Instructor name/Email Ass. Prof. Dr. Shady Abdel Aleem

Shady.Sebai@sva.edu.eg

C- Professional information

1- Course core

Participating students select project topic according to their subject of interest and the availability of facilities and advisors. Students carry out necessary preliminary work and submit a progress report. Ethical responsibilities of a computing professional are covered by lectures and seminars and emphasized through the student's team work.

2- Course learning objectives:						
oc 1	Recognize how apply knowledge on power system and to provide them with in depth knowledge of the distribution system.					
oc 2	Able to understand distribution systems and networks, load characteristics and voltage levels					





oc 3	Able to understand main principles of distribution systems planning and design. Particular attention will be given to the issue of industrial medium voltage distribution systems through case studies, practical design assignments and design verification using power system analysis software.					
oc 4	Produce and prepare how to understand solar energy systems and linking them to the project.					
2 program objectives convert by the severe						

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP 1 Prepare engineers who will become leaders in the electrical power engineering profession.
- OP 2 Develop the student's ability to shape social, intellectual, business, and technical activities.
- OP 3 Prepare students to express themselves effectively in oral and written communication.
- OP 12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems

4- The relation between the course objectives and the program objectives

	Course objectives		program objectives
oc 1	Recognize how apply knowledge on power system and to provide them with in depth knowledge of the distribution system.	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications. Teach students to use experimental and data analysis techniques for electrical power engineering applications.
oc 2	Able to understand distribution systems and networks, load characteristics and voltage levels	OP 1	Prepare engineers who will become leaders in the electrical power engineering profession.
oc 3	Able to understand main principles of distribution	OP 2	Develop the student's ability to shape social, intellectual,





	systems planning and business, and technical activities. design. Particular
	attention will be given to OP12 Prepare engineers who can work the issue of industrial on electrical power systems, medium voltage including designing and realizing
	distribution systems such systems. through case studies,
	practical design assignments and design verification using power
	system analysis software.
4	Produce and prepare how to Prepare engineers who can work understand solar energy OP 12 on electrical power systems,
oc 4	systems and linking them including designing and realizing to the project. including designing and realizing such systems
	1- Learning outcomes of the course (LOs)
Upon the co	ompletion of the course, the student should be able to:
CS(2.1,3.1)	Identifies the basic of power system construction, function, voltage levels and load characteristics basic definitions and relevant equations.
CS(2.2,3.2)	Demonstrate the principals of designing distribution systems consisting of dynamic and static loads.
CS(5.1)	Apply knowledge to calculate the distribution systems performance
CS(5.2)	Prepare and present analysis of load flow, short circuits results for distribution systems using power system analysis packages.
CS(5.3,6.1)	Utilize the circuits analysis, machine, and power system analyses fundamentals in sizing distribution systems equipment.
	2- Program competencies served by the course:
Upon the co	empletion of the Program the student should be able to:
CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing
0.2 2	systems to interpret experimental results.
CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and

design reviews, and checks for electric power generation and

distribution systems.





CS6

Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems

	3- The relation between the course objectives and the program objectives								
	Course objectives	program objectives							
	Identifies the basic of power system construction, function voltage levels and load characteristics basic definitions and relevant equations.	analysis through simulations for heavy equipment							
CS(2.1,3.	1)	CS3 Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Design, develop and make							
CS(2.2,3.:	Demonstrate the principals of designing distribution systems consisting of dynamic and static	analysis through simulations for heavy equipment CS2 (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and							
	consisting of dynamic and static loads.	formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.							
CS(5.1)	Apply knowledge to calculate the distribution systems performance	Apply modern techniques,							





of load flow, short circuits results for distribution systems using power system analysis packages. CS5 CS5 white performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems. Apply modern techniques, skills, and engineering tools	CS(5.2)	results for distribution systems using power system analysis	CS5	voltage power systems, design reviews, and checks for electric power generation and distribution systems. Apply modern techniques,
while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.	CS(5.3,6.1)	machine, and power system	CS5	development load lists, low voltage power systems, design reviews, and checks for electric power generation and
analyses fundamentals in sizing distribution systems equipment. Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems			CS6	Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution
4- Course content and the relation between the course contents and the course LOs	4- Course			

	We ek	Торіс	Lecture hr.	Tutori al hr.	Practical hours	course LOs
	No.		111.	ar iii.	110010	203
	1	Project motivation, problem statement,	1	0	3	CS(2.1,3.1)
	_	and objectives		^	2	GG (2.2.2.2)
-	2	Hospital design criteria, Layouts	1	0	3	CS(2.2,3.2)
	2	sample	1	0	2	CC(5.1)
•	3	Load Estimation & Bulky Equipment	1	0	3	CS(5.1)
		Sizing				
4	4	Brief on load estimation, Loads	1	0	3	CS(5.3,6.1)





	classifications				
5	Project progress seminar (1)	1	0	3	CS(5.3,6.1)
6	Overview of the Egyptian Standards	1	0	3	CS(5.2)
	for Transformer, How do we select the				
	appropriate generator.				
7	Project progress seminar (2)	1	0	3	CS(5.2)
8	Midterm- Break				
9	UPS sizing, Type of ups, How do we	1	0	3	CS(2.1,3.1)
	select ups				
10	Indoor Lighting System Design	1	0	3	CS(2.2,3.2)
11	Project progress seminar (3)	1	0	3	CS(2.2,3.2)
12	Fundamentals and terminologies	1	0	3	CS(2.1,3.1)
13	Luminaires used in project	1	0	3	CS(2.1,3.1)
14	Verification from Dialux Evo software	1	0	3	CS(5.1)
15	Writing project final report	1	0	3	CS(5.1)
16	Writing project final report		2.0		
Total	l hours	14	0	42	

5- The Teaching and learning methods and their relation to the Los of the course													
		_				and Lea							
Course learning Outcome s (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1,3.	✓	\checkmark	\checkmark	✓	\checkmark	\checkmark	✓		✓	✓	✓	✓	\checkmark
CS(2.2,3. 2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.1)	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(5.2)	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(5.3,6.	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.





6- Student assessment method											
a- Assessment method and its relation						ation to			ourse		
Course ILOs	duizzes	Mid -term exam	Final exam	sheets/		Practical: lab	Oral exam	discussions	Reports/	presentation	modelling
CS(2.1,3. 1) CS(2.2,3.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	√ √
2)	✓	√	√	√	√	√	✓	√	√	√	
CS(5.1) CS(5.2)	√	√	√	√	√	√	√	√	✓ ✓	✓ ✓	√
CS(5.3,6.	✓	✓	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓
-)				l	b- Time	schedul	e of as	sessmer	nt		
Discussion Presentation Sheets and Researche the Projects Practical management Attendance Mid-term ex final exam	ons I Sketo s and s odellin	reports		Quiz (Ev We W W W	eekly eekly eek (2, eek (4, eekly eek (8 eek (1	eek for ar ,3) ,8) ,8)	ny studer	nt	
					uiz (1)		(5) m	arks			
Discussions Quiz (2) Discussions 15% Sheets and Sketches 20% Researches and reports 20%					(5) m	arks		(60) marl	ks		
the Projects 30% Practical modelling 20% Attendance Mid-term exam final exam Total						(5) ma (40) m	arks (40) mark 100) mar			





10- List of references:						
a) Course notes	Lecture notes and handouts					
b) Required books	 Egyptian Code & Regulations. 					
	Philips Lighting catalogue.					
	 Grounding and bounding electrical system 					
	book.					
	 Dr. Gilany Electrical design book. 					
	 Schneider Electric Sockets Catalogue. 					
	 Schneider circuit breaker catalogue 					
c) Recommend books	None					
d) Periodicals, Web	No periodicals are needed.					
sites, etc						

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	1
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Date:	2022/2023	





Course specification

0 1	
Course code:	Course name
BASE 307	Contracts, Bids & Liabilities
A- Affili	ation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication
	engineering
Department offering the course:	Basic Science
Date of program operation:	2008-2009
Date of approval from the higher ministry of	27/1/2008
education	
Date of course operation	2022-2023

B-Basic Information

Course Name	Contracts, Bids & Liabilities
Course Name	Contracts, Dius & Liabilities

Code BASE 307

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 2Cr. hr
Lectures 2hr
Tutorial 0hr
Total 2hr
Prerequisite -

Instructor name/Email DR. Ashraf Abdelkhalek

Ashref.abdel.khalek@sva.edu.eg

C- Professional information

1- Course core

Contract definition, formation principles of a contract, performance or breach of contract obligations, termination of agreements, types of construction contracts and legal implications, specifications, legal organizational structures (agency, proprietorship, partnership, corporation).

2- Course learning objectives: oc 1 Recognize the basic principles of contracts, bids & liabilities. oc 2 Explain how to to execute projects considering time, cost & quality. oc 3 Able to understand how to demonstrate how to monitor and control projects. oc 4 Able to understand how to learn skills to issuing contracts.





oc 5	Produce and prepare the professional knowledge of quantities estimation
oc 6	Recognize how apply the applications of basic principles of project management.

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP 5 Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
- OP 6 Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
- OP 12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives **Course objectives** program objectives Recognize the basic OP4 Provide various industries with principles of contracts, bids highly qualified electrical power & liabilities. engineers with a broad knowledge oc 1 electrical engineering related principles, theories, and applications. Prepare students for engineering Explain how to to execute projects considering time, analyses and problem-solving OP 5 cost & quality. using appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet oc 2 society's needs by applying fundamentals of engineering OP 6 sciences to practical problems using design and syntheses of electrical components, circuits, and systems. Able to understand how to Prepare students for engineering demonstrate how to monitor problem-solving analyses and OP 5 using appropriate mathematical and control projects. and computational methodologies. oc 3 Prepare undergraduate students OP 6 who can create new ways to meet society's needs by applying





	Able to understand how to learn skills to issuing	OP 5	fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems. Prepare students for engineering analyses and problem-solving
oc 4	contracts.		using appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet society's needs by applying
		OP 6	fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
	Produce and prepare the professional knowledge of quantities estimation	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet
oc 5		OP 6	society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems. Prepare engineers who can work
		OP 12	on electrical power systems, including designing and realizing such systems.
oc 6	Recognize how apply the applications of basic principles of project management.	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
		OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying





fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.

OP 12 Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

- C(1.1) Identifies the basic of quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.
- C(1.2) Display the business and management principles relevant to engineering.
- C(3.1) Demonstrate the risks, and take appropriate steps to manage those risks
- C(4.1) Apply knowledge to implement comprehensive engineering knowledge and understanding and intellectual skills in projects
- C(6.1) Prepare and present technical material.
- C(6.2) Utilize the basic organizational and project management skills.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- C1 Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
- Apply engineering design processes to produce cost-effective solutions that meet specified needs with consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
- Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
- Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.
 - 7- The relation between the course learning outcomes and the program competencies

Course (LOs)

program competencies





C(1.1)	Identifies the basic of quality assurance systems, codes of practice and standards, health and safety requirements and environmental issues.	C1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
C(1.2)	Display the business and management principles relevant to engineering. Demonstrate the risks, and take appropriate steps to manage those	C1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics. Apply engineering design processes to produce cost-effective solutions that meet specified needs with
C(3.1)	risks	C3	consideration for global, cultural, social, economic, environmental, ethical, and other aspects as appropriate to the discipline and within the principles and contexts of sustainable design and development.
C(4.1)	Apply knowledge to implement comprehensive engineering knowledge and understanding and intellectual skills in projects	C4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
C(6.1)	Prepare and present technical material.	C6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.
C(6.2)	Utilize the basic organizational and project management skills.	C6	Plan, supervise and monitor implementation of engineering projects, taking into consideration other trades requirements.





8- Course content and the relation between the course contents and the course LOs										
Wee	Topic	Lectur	Tutori	Practical	course LOs					
k		e hr.	al hr.	hours						
No.										
1	Introduction to the course and its objectives and learning outcomes	2	0	0	C(1.1)					
2	Contracts definitions – Formatting and types –	2	0	0	C(1.1)					
3	Components of contracts	2	0	0	C(1.2, 3.1)					
4	Bids and Liabilities	2	0	0	C(1.2, 3.1)					
5	Relationship between concerned people in construction projects -	2	0	0	C(1.1,6.2)					
6	stages of project preparation Tender documents	2	0	0	C(1.2)					
7	Tendering procedures	2	0	0	C(1.2)					
8	Midterm		1.0							
9	Calculations of quantities & (Quiz)	2	0	0	C(1.1, 1.2,3.1,6.2)					
10	Final invoice – Specifications: Types of specifications	2	0	0	C(1.2)					
11	Types of contracts and judgment	2	0	0	C(1.2)					
12	Public & Private sectors Partnership	2	0	0	C(4.1,6.1)					
13	B.O.T projects	2	0	0	C(4.1,6.1)					
14	Claims	2	0	0	C(1.1, 1.2,3.1,6.2)					
15	Final invoice – Specifications: Types of specifications	2	0	0	C(2.1)					
16	Final Exam		2.0							
Total	hours	28	0	0						

9- The Teaching and learning methods and their relation to the Los of the course Course Teaching and Learning Methods





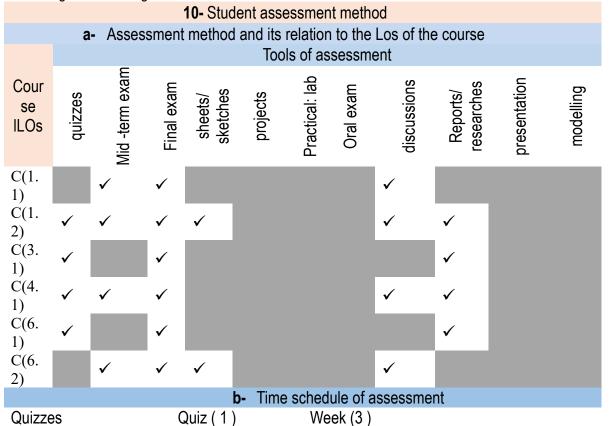
learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Reports/ researches	Cooperative work	presentation	Discussion	modelling
C(1.1)	✓			✓	\checkmark						$ \checkmark $	
C(1.2)	✓			✓	\checkmark			✓			✓	
C(3.1)	✓							✓			✓	
C(4.1)	✓			✓				✓			✓	
C(6.1)	✓				✓			\checkmark				
C(6.2)				✓							✓	

Notes:

The research concerns the discussion.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.







Quiz ((2)) Week ((10))

Discussions Every week for any student

Sheets and Sketches

Researches and reports

Attendance

Mid-term exam

Week (2,3)

Week (2,3)

Week (2,3)

Week (2,3)

Week (8)

Week (8)

c- Grading system

quizos	Quiz(1)	(5) marks			
quizes	Quiz (2)	(5) marks			
Discussions	20%				
Sheets and Sketches	60%	10 marks	(50) marks		
Researches and reports	20%				
Attendance)	(10) marks			
Mid-term exa	am	(20) marks			
final exam		(50) marks			
Total		(100) marks			

10- List of references:

a) Course notes Lecture notes and handouts

b) Required books Charoenngam, Chotchai, and Chien-Yuan Yeh.

"Contractual risk and liability sharing in hydropower

construction." International Journal of Project

Management 17.1 (1999): 29-37

c) Recommend books

Mentioned at time.

d) Periodicals, Web sites, etc

No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator: Dr. Ashraf Abdel Khaliq Mostafa

program Coordinator Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

Head of the Department Dr. Amera Marye





Date:	2022/2023

Course specification

Course code:	Course name
BASE 308	Seminar
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Basic Science
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023

B-Basic Information

Course Name	Seminar
Code	BASE 308

Course Level Fifth level courses (Senior -2) - First semester (Fall)

Credit Hours 2Cr. hr
Lectures 2hr
Tutorial 0hr
Total 2hr
Prerequisite -

Instructor name/Email Dr. Ahmed Refaat

ahmed.refaat@sva.edu.eg

C- Professional information

1- Course core

Engineering Topics conducted on a Weekly or Monthly Basis discussions with speakers from Industry and professors from the different Departments. Students should at least attend one seminar every year.

2- Course learning objectives:





oc 2 Recognize how contribute with the latest business models concerning architectural design.

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP 2 Develop the student's ability to shape social, intellectual, business, and technical activities.
- OP 3 Prepare students to express themselves effectively in oral and written communication.
- OP 8 Prepare undergraduate students to become successful engineering, life learners, innovators, and professionals in electrical power.

4- The relation between the course objectives and the program objectives

	Course objectives	program objectives						
oc	Able to understand the design diverse aspects of development.	OP 2	Develop the student's ability to shape social, intellectual, business, and technical activities.					
1		OP 3	Prepare students to express themselves effectively in oral and written communication.					
	Recognize how contribute with the latest business models concerning architectural	OP 2	Develop the student's ability to shape social, intellectual, business, and technical activities.					
oc 2	design.	OP 3	Prepare students to express themselves effectively in oral and written communication.					
		OP 8	Prepare undergraduate students to become successful engineering, life learners, innovators, and professionals in electrical power.					

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

- C(5.1) Communicate effectively with contemporary technologies, codes of practice and standards, quality guidelines.
- C(5.2) Explain the heighten awareness of research techniques and methods of investigation.
- C(7.1) Explain the heighten awareness of multidisciplinary team and communicate





effectively in conducting physical and multimedia modeling.

C(8.1) Communicate effectively with verbally and in writing – with a range of audiences.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- Practice research techniques and methods of investigation as an inherent part of learning.
- Function efficiently as an individual and as a member of multidisciplinary and multicultural teams.
- C8 Communicate effectively graphically, verbally and in writing with a range of audiences using contemporary tools.

1- The relation between the course learning outcomes and the program competencies

(Course (LOs)	program competencies					
C(5.1)	Communicate effectively with contemporary technologies, codes of practice and standards, quality guidelines.	C5	Practice research techniques and methods of investigation as an inherent part of learning.				
C(5.2)	Explain the heighten awareness of research techniques and methods of investigation.	C5	Practice research techniques and methods of investigation as an inherent part of learning.				
C(7.1)	Explain the heighten awareness of multidisciplinary team and communicate effectively in conducting physical and multimedia	C7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.				
C(8.1)	modeling. Communicate effectively with verbally and in writing – with a range of audiences.	C8	Communicate effectively – graphically, verbally and in writing – with a range of audiences using contemporary tools.				





7-	Course content and the relation between	en the cou	urse conte	nts and the	course LOs
Week	Topic	Lectur	Tutori	Practical	course LOs
No.		e hr.	al hr.	hours	
1	Introduction to the course and its objectives and learning outcomes	2	0	0	C(5.1)
2	Introduce the design diverse aspects of development	2	0	0	C(5.1, 7.1)
3	Research 1st draft discussion	2	0	0	C(5.2,8.1)
4	Research 2nd draft discussion	2	0	0	C(5.1,8.1)
5	Research 3rd draft discussion	2	0	0	C(5.1,8.1)
6	Research 4th draft discussion	2	0	0	C(5.1,8.1)
7	Research 5th draft discussion	2	0	0	C(5.1,8.1)
8	Midterm		1.0		
9	Learning Skills	2	0	0	C(5.1,7.1)
10	Contemporary design terms and concepts	2	0	0	C(5.1,7.1)
11	Research 1st draft discussion	2	0	0	C(5.2,8.1)
12	Research 2 nd draft discussion	2	0	0	C(5.2,8.1)
13	Business model dashboard	2	0	0	C(5.1,8.1)
14	Final feedback of Researches.	2	0	0	C(8.1)
15	Submitted Final Researches & Discussions.	2	0	0	C(8.1)
16	Final Exam		2.0		
Total h	ours	28	0	0	

	8- The T	eaching an	d learn				<mark>neir rela</mark> rning M			Los of	the co	ourse	
Course learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
C(5.1)		✓							✓		✓		





C(5.2)	✓	✓			✓	
C(5.2) C(7.1)	✓	✓	\checkmark			
C(8.1)	✓	✓	\checkmark	✓	✓	

Notes:

The research concerns the cooperative work and the presentations.

The Tutorials concerns on sheets.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

			9	9- Stude	ent asse	essmer	nt meth	od			
	a- Assessment method and its relation to the Los of the course										
					Too	ls of as	sessm	ent			
Cour se ILOs	duizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
C(5.1)			✓						✓	✓	
C(5.2))		✓					✓	✓		
C(7.1)			✓						✓		
C(8.1)			✓				✓		✓	\checkmark	

- Notes:
- Submission must be a periodical technical presentation.
- Final submission is A4 paper.
- The student has to report his own work through the current academic course.
- Printing and electronic versions of the report are required.
- The discussion and students' participants are very essential.
- The evaluations are internal periodical assessments.
- Student grades are available and posted in the class.

	b-	Time schedule of assessment
Discussions		Every week for any student
Presentations		weekly
Researches and reports		Week (2,3)
the Projects		Week (4,8)





Attendance weekly final exam Week (16)

c- Grading system

Attendance & Participation Report Final Discussion Report Final Submission Total (20) marks (30) marks

50 marks

(50) marks (100) marks

10- List of references:

a) Course notes

b) Required books

Lecture notes and handouts

- Adaptive Environments Center (AEC). 1989. A CONSUMER'S GUIDE TO HOME ADAPTATION. Boston: Author.
- BARRIER-FREE AND BEAUTIFUL HOUSE PLANS. Volume 1. 200?. Des Moines, IA: FMR Home Portfolio.
- Bringa, O. R., Christophersen, J., Nordang, A. & Ronnevig, T. 2004. BUILDING FOR ALL: GUIDE BOOK ON UNIVERSAL DESIGN OF BUILDINGS AND OUTDOOR SPACES. The National Office of Building
- Center for Universal Design. 1998.
 PROCEEDINGS: DESIGNING FOR THE 21ST
 CENTURY I: INTERNATIONAL UNIVERSAL
 DESIGN CONFERENCE. Raleigh, NC: NCSU
 School of Design.
- Dobkin, I. & Peterson, M. J. 2000. UNIVERSAL INTERIORS BY DESIGN: GRACIOUS SPACES. New York: McGraw-Hill.
- Home Planners, LLC. 2000. PRODUCTS AND PLANS FOR UNIVERSAL HOMES. Tucson, AZ: Hanley-Wood LLC.
- International Code Council/American National Standards Institute. 2003. VOL-UNTARY STANDARD FOR ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES (ICC/ANSI A117.1-2003).
- Leibrock, C. & Terry, J. E. 1999. BEAUTIFUL UNIVERSAL DESIGN: A VISUAL GUIDE. New York: Wiley.
- Levine, D. (Ed.) 2003. UNIVERSAL DESIGN





- NEW YORK 2. Buffalo: Center for Inclusive Design and Environmental Access, State University at Buffalo, NY
- Mueller, J. 1998. CASE STUDIES IN UNIVERSAL DESIGN. Raleigh, NC: Center for Universal Design (available at CUD).
- National Office of Building Technology (Norway).
 2005. BUILDING FOR EVERYONE: UNDERSTANDING UNIVERSAL DESIGN OF BUILDINGS AND OUTDOOR SPACES.
- Adaptive Environments Center (AEC). 1989. A
 CONSUMER'S GUIDE TO HOME
 ADAPTATION. Boston: Author.
- BARRIER-FREE AND BEAUTIFUL HOUSE PLANS. Volume 1. 200?. Des Moines, IA: FMR Home Portfolio.
- Bringa, O. R., Christophersen, J., Nordang, A. & Ronnevig, T. 2004. BUILDING FOR ALL: GUIDE BOOK ON UNIVERSAL DESIGN OF BUILDINGS AND OUTDOOR SPACES. The National Office of Building
- Center for Universal Design. 1998.
 PROCEEDINGS: DESIGNING FOR THE 21ST CENTURY I: INTERNATIONAL UNIVERSAL DESIGN CONFERENCE. Raleigh, NC: NCSU School of Design.
- Dobkin, I. & Peterson, M. J. 2000. UNIVERSAL INTERIORS BY DESIGN: GRACIOUS SPACES. New York: McGraw-Hill.
- Home Planners, LLC. 2000. PRODUCTS AND PLANS FOR UNIVERSAL HOMES. Tucson, AZ: Hanley-Wood LLC.
- International Code Council/American National Standards Institute. 2003. VOL-UNTARY STANDARD FOR ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES (ICC/ANSI A117.1-2003).
- Leibrock, C. & Terry, J. E. 1999. BEAUTIFUL UNIVERSAL DESIGN: A VISUAL GUIDE. New York: Wiley.
- Levine, D. (Ed.) 2003. UNIVERSAL DESIGN NEW YORK 2. Buffalo: Center for Inclusive Design and Environmental Access, State University at





Buffalo, NY

 Mueller, J. 1998. CASE STUDIES IN UNIVERSAL DESIGN. Raleigh, NC: Center for Universal Design (available at CUD).

National Office of Building Technology (Norway). 2005. BUILDING FOR EVERYONE:

UNDERSTANDING UNIVERSAL DESIGN OF BUILDINGS AND OUTDOOR SPACES.

c) Recommend books

d) Periodicals, Web sites, etc

Mentioned at time.

No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:

program Coordinator

Head of the Department

Date:

Dr. Ahmed Refaat

Dr. Ehab Mohamed Nabil Ismail Abdel

Rasoul

Dr. Amera Marye

2022/2023

Ahmed

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Fifth level courses (Senior -2) Second semester (Spring)

No.	Cod	Course Name	Instructor			
1	CECE 437	Electrical Machines IV	Ass. Prof. Dr. Shady Abdel Aleem			
2	CECE 446	Planning of Electrical Networks	Ass. Prof. Dr. Shady Abdel Aleem			
			Dr. Salem Abdel Aziz Fikri Ahmed			
3	CECE 428	Power System Protection	Sheikh & Dr. Ehab Mohamed Nabil			
			Ismail Abdel Rasoul			
4	CECE 455	Selected topics in	Ass. Prof. Dr. Shady Abdel Aleem			
		Electrical Power				
		Engineering				
			Ass. Prof. Dr. Shady Abdel Aleem & Dr.			
5	CECE 491	Senior Project II	Ehab Mohamed Nabil Ismail Abdel			
			Rasoul			
6	CECE 424	Control System	Dr. Ehab Mohamed Nabil Ismail Abdel			
O	CECE 424	Control System	Rasoul			





Course specification

Course code:	Course name
CECE 437	Electrical Machines IV
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023
	P. Pacic Information

B-Basic Information

Course Name	Electrical Machines IV
Code	CECE 437
Course Level	Fifth level courses (Senior -2) - Second semester
	(Spring)
Credit Hours	3Cr. hr
Lectures	2hr
Tutorial	2hr
Lab	2hr
Total	6hr
Prerequisite	CECE 436
Instructor name/Email	Ass. Prof. Dr. Shady Abdel Aleem
	Shady.Sebai@sva.edu.eg
	Course Level Credit Hours Lectures Tutorial Lab Total Prerequisite

C- Professional information

1- Course core

Induction machines: Theory and design: Introduction, Construction of three-phase induction motors, The magnetic circuit, Slip ring induction motors, Cage motors, Performance at constant flux, Electromotive force, Currents, Torque,





Equivalent circuits, Torque speed curves, Phasor diagrams, The circle diagram, Starting methods, Classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, The induction generator, The induction regulator, Induction type phase shifter, Single phase induction motors, Construction, Theory of rotating fields, Methods of starting, Fractional horsepower motors, Design of three-phase motors, The output equation, Selection of the main dimensions, Standard frames, Windings, Power.

2- Course learning objectives:

Explain the principle of Three-phase Induction Motors (Asynchronous Motors): Overview of three-phase induction motor, Construction, oc 1 Stator construction, Rotor construction, Squirrel cage type, Wound rotor type, Enclosure, Induction Motor Squirrel Cage Rotor, Nameplate. Explain the principle of Rotating magnetic field, Analytical & graphical method, Running operation, Slip speed, Per unit slip; Rotator induced oc 2 voltage and frequency under running at slip s%. Able to understand equivalent circuit, Induction Motor Losses and oc 3 Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque-speed Characteristics. Able to understand with starting Methods for Squirrel-cage Induction Motors, Starting Methods for Wound Rotor Induction Motors, Advantages of Squirrel-cage Induction Motors, Advantages of Wound Rotor Induction Motors, Uses of Three-phase Induction Motors, The oc 4 choice of starting method depends on Permitted starting current, Short circuit capacity on the network, Maximum allowed voltage drop on the terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, Process requirements, Economic aspect Principle of operation Power flow, losses and efficiency. Recognize how apply the torque-speed characteristics, Speed control, Single-phase induction motors, Speed Control of 3- Phase Induction Motor, Phase Induction Motor, Double revolving field theory, Torque, Equivalent circuits, Torque speed curves, Phasor diagrams, The circle oc 5 diagram, Starting methods, Classification of induction motors, High

3- program objectives served by the course:

induction motors, Examples in motor performance.

starting torque types, Performance with higher harmonics, Testing of

Upon the completion of the course the student should be able to:





OP 5	-	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.								
OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.									
OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications									
OP 12		Prepare engineers who can work on electrical power systems, including designing and realizing such systems.								
4	- The relation between the course of	bjecti	ves and the program objectives							
	Course objectives		program objectives							
oc 1	Explain the principle of Three-phase Induction Motors (Asynchronous Motors): Overview of three-phase induction motor, Construction, Stator construction, Rotor construction, Squirrel cage type, Wound rotor type, Enclosure, Induction Motor Squirrel Cage Rotor, Nameplate.	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.							
oc 2	Explain the principle of Rotating magnetic field, Analytical & graphical method, Running operation, Slip speed, Per unit slip; Rotator induced voltage and frequency under running at slip s%.	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.							
oc 3	Able to understand equivalent circuit, Induction Motor Losses and Efficiency, Torque Equation	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical							





for an Induction Motor, Induction Motor Torque—speed Characteristics.

Able to understand with starting Squirrel-cage Methods for Induction Motors. Starting Wound Methods for Rotor Induction Motors, Advantages Squirrel-cage Induction of Motors, Advantages of Wound Rotor Induction Motors, Uses of Three-phase Induction Motors, The choice of starting method depends on Permitted starting current, Short circuit capacity on the network, Maximum allowed voltage drop on the terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, Process requirements, Economic aspect Principle of operation Power flow, losses and efficiency.

Recognize how apply the torquespeed characteristics, Speed control, Single-phase induction motors, Speed Control of 3-Phase Induction Motor, Phase Induction Motor. Double revolving field theory, Torque, Equivalent circuits, Torque speed curves, Phasor diagrams, The circle diagram, Starting and computational methodologies.

Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.

OP Teach students to use experimental and data analysis techniques for electrical power engineering applications
Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

OP

OP

6

12

OP Teach students to use experimental and data analysis techniques for electrical power engineering applications

Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

oc 5

oc 4

OP

12





methods, Classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, Examples in motor performance.

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

- CS(2.1) Identifies the basic of three-phase Induction Motors (Asynchronous Motors): Overview of three-phase induction motor, Construction, Stator construction, Rotor construction, Squirrel cage type, Wound rotor type, Enclosure, Induction Motor Squirrel Cage Rotor, Nameplate.
- Display the Rotating magnetic field, Analytical & graphical method, Running operation, Slip speed, Per unit slip; Rotator induced voltage and frequency under running at slip s%.
- Apply knowledge to understand equivalent circuit, prepare and present induction Motor Losses and Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque—speed Characteristics.

Utilize the basics to calculate Starting Methods for Squirrel-cage Induction Motors, Starting Methods for Wound Rotor Induction Motors, Advantages of Squirrel-cage Induction Motors, Advantages of Wound Rotor Induction Motors, Uses of Three-phase Induction Motors, The

- CS(2.4,3.3) choice of starting method depends on Permitted starting current, Short circuit capacity on the network, Maximum allowed voltage drop on the terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, Process requirements, Economic aspect Principle of operation Power flow, losses and efficiency.
 - Apply knowledge to present torque-speed characteristics, Speed control, Single-phase induction motors, Speed Control of 3- Phase Induction
- CS(2.5,3.4) Motor, Phase Induction Motor, Double revolving field theory, Torque, Equivalent circuits, Torque speed curves, Phasor diagrams, The circle diagram, Starting methods
- CS(2.6,3.5) Communicate effectively with classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, Examples in motor performance.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:





CS2	-	, trans	through simulations for heavy smission lines, and distributing ts.
CS3	engineering activity during the generation, transmission, control	ne div	
	7- The relation between the course of	bjective	
	Course objectives		program objectives
CS(2.1)	Identifies the basic of three-phase Induction Motors (Asynchronous Motors): Overview of three-phase induction motor, Construction, Stator construction, Rotor construction, Squirrel cage type, Wound rotor type, Enclosure, Induction Motor Squirrel Cage Rotor, Nameplate.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(2.2,3.1	Display the Rotating magnetic field, Analytical & graphical method, Running operation, Slip speed, Per unit slip; Rotator induced voltage and frequency under running at slip s%.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission,
CS(2.3,3.2	Apply knowledge to understand equivalent circuit, prepare and present induction Motor Losses and	CS2	control, and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors,





and make

Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque speed Characteristics.

transmission lines. and distributing systems to interpret experimental results. Identify problems and

formulate engineering solutions to manage the engineering during the diverse activity CS3 phases of electric power transmission. generation, control, distribution and

systems.

analysis through simulations equipment for heavy (generators, motors, transmission lines. and distributing systems to interpret experimental results.

Design, develop

Utilize the basics calculate Starting Methods for Squirrel-cage Induction Motors, Starting Methods CS2 for Wound Rotor Induction Motors, Advantages of Squirrel-cage Induction Motors. Advantages Wound Rotor Induction Motors, Uses of Threephase Induction Motors, The choice of starting method depends Permitted starting current, Short circuit capacity on the network. Maximum allowed voltage drop on the terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, **Process**

Economic

of

flow,

Principle

Power

Identify problems formulate engineering solutions to manage the engineering activity during the diverse CS3 phases of electric power generation, transmission, distribution control, and systems.

Apply knowledge to present torque-speed characteristics, Speed Single-phase control.

losses and efficiency.

requirements,

aspect

operation

Design, develop and make analysis through simulations CS2 for heavy equipment (generators, motors.

CS(2.5,3.4)

CS(2.4,3.3)





	induction motors, Speed		transmission	n lines	, and
	Control of 3- Phase		distributing	systems to	interpret
	Induction Motor, Phase		experimenta	l results.	
	Induction Motor, Double		Identify		s and
	revolving field theory,		formulate en	_	
	Torque, Equivalent circuits,			the en	
	Torque speed curves,		_	ring the	-
	Phasor diagrams, The circle	CS3	phases of	_	
	diagram, Starting methods		generation,		smission,
	diagram, Starting methods		control,		stribution
				and un	Sulbunon
			systems.	1	
			Design, de	_	nd make
			analysis th	_	mulations
		CC2		avy e	
	Communicate effectively with	CS2	(generators,		motors,
	classification of induction		transmission		*
	motors, High starting		distributing	-	ınterpret
	torque types, Performance		experimenta		
CS(2.6,3.5)	with higher harmonics,		Identify	1	
	Testing of induction		formulate en		
	motors, Examples in motor	CS3	to manage		
	performance.		activity du	-	
	periormanee.	000	phases of		_
			generation,		smission,
			control,	and di	stribution
			systems.		
8- Course	content and the relation between	the co	urse contents a	and the cou	rse LOs
Week	Topic	L	ectu Tutori.	Practica	cours
No.		r	e hr. al hr.	I hours	e LOs
1 It.	eduction. Three phase Induct				CS(2
	roduction: Three-phase Induct				CS(2. 1)
	tors (Asynchronous Moto				1)
	erview of three-phase induct				
mot	,	itor	2 2	2	
	struction, Rotor constructi				
	irrel cage type, Wound ro				
	e, Enclosure, Induction Mo	otor			
_	irrel Cage Rotor, Nameplate.	: - 1	2 2	2	CS(2
2 Rot	tating magnetic field, Analyti	icai	2 2	2	CS(2.





		& graphical method, Running operation, Slip speed, Per unit slip, Rotator induced voltage and frequency under running at slip s%.				2,3.1)	
-	3	Focuses on Equivalent circuit, Induction Motor Losses and Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque—speed Characteristics.	2	2	2	CS(2. 1)	
2	4	Quiz (1) +Focuses on Starting Methods for Squirrel-cage Induction Motors, Starting Methods for Wound Rotor Induction Motors.	2	2	2	CS(2. 2,3.1)	
	5	Focuses on Advantages of Squirrel- cage Induction Motors, Advantages of Wound Rotor Induction Motors, Uses of Three-phase Induction Motors.	2	2	2	CS(2. 2,3.1)	
(6	Focuses on The choice of starting method depends on Permitted starting current, Short circuit capacity on the network, Maximum allowed voltage drop on the			2	CS(2. 3,3.2)	
		terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, Process requirements, Economic aspect	2	2			
,	7	Principle of operation Power flow, losses and efficiency, Torque-speed characteristics, Speed control, Single-phase induction motors. Speed Control of 3- Phase Induction Motor.	2	2	2	CS(2. 3,3.2)	
9	8	Midterm		1.0			
	9	Focuses on Phase Induction Motor, Double revolving field theory,	2	2	2	CS(2. 4,3.3)	
	10	Torque, Equivalent circuits.	2	2	2	CS(2.	
	10	Torque speed curves, Phasor	2	2	2	CS(2.	





					=	
	diagrams, The circle diagram.				4,3.3)	
11	Focuses on Starting methods,			2	CS(2.	
	Classification of induction motors,	2	2		6,3.5)	
	High starting torque types,	2	2			
	Performance with higher harmonics.					
12	Quiz (2) + Basic Principle of			2	CS(2.	
12	asynchronous Motor.	2	2	_	6,3.5)	
13	Focuses on Equivalent Circuit of a			2	CS(2.	
13	asynchronous Motor	2	2	2	4,3.3)	
1.4	•			2	*	
14	Focuses on Solved examples on	•	2	2	CS(2.	
	1	2	2		3,3.2)	
	Motor.					
15	Focuses on Applications of			2	CS(2.	
	asynchronous Motors and examples	2	2		5,3.4)	
	on Torque speed curves, Phasor	2	2			
	diagrams, The circle diagram.					
16	Final Exam		2.0			
Total ho	ours	2	28	28		
		8				
		_				

9- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

	40			Ital	illing a	iiiu Lea	iiiiiig	MEUIC					
Course learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	isit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1)	√	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		√	✓	\checkmark	\checkmark	\checkmark
CS(2.2,3 .1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	\checkmark
CS(2.3,3	✓	✓	✓	✓	✓	\checkmark	✓		✓	✓	✓	✓	✓
CS(2.4,3	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.5,3	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
Notes:													

The research concerns the cooperative work, the discussion and the presentations.





The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

10- Student assessment method											
a- Assessment method and its relation to the Los of the course Tools of assessment											
Course ILOs	duizzes	Mid -term exam	Final exam	sheets/	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(2.1)	✓	✓ _	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓
CS(2.2,3.	✓	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	✓
CS(2.3,3. 2)	✓	✓	✓	\checkmark	✓	✓	✓	\checkmark	\checkmark	✓	✓
CS(2.4,3.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	\checkmark
CS(2.5,3.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				b				sessme	nt		
Quizzes				Quiz (1 Quiz (2	•		eek (3) eek (1	•			
Discussions Presentations Sheets and Sketches Researches and reports Week (2,3) Week (4,8) Practical modelling Attendance Wid-term exam Wind-term exam Week (8) Final exam Every week for any student Weekly Weekly Week (2,3) Week (4,8) Week (4,8) Week (4,8) Week (4,8) Week (8)											
				C-		ng syste					
quizes					iz (1) iz (2)		(5) ma (5) ma		(4	0) mark	S





Discussions	15%
Sheets and Sketches	20%
Researches and reports	20% 5 marks
the Projects	30%
Practical modelling	20%
Attendance	(10) marks
Mid-term exam	(15) marks
final exam	(60) marks
Total	(100) marks
	10- List of references:
a) Course notes	Lecture notes and handouts
b) Required books	■ Ion Boldea, Syed A. Nasar," The Induction Machine
	Handbook," CRC Press ,Boca Raton London New York
	Washington, D.C.
	■ P.C.SEN, "PRINCIPLES OF ELECTRIC
	MACHINES AND POWER ELECTRONICS, "John
	Wiley & Sons.
	TURAN GÖNEN," ELECTRICAL MACHINES WITH
	MATLAB,"CRC Press, Taylor& Francis Group.
c) Recommend books	Mentioned at time.

11- Facilities required for teaching and learning:

No periodicals are needed.

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

d) Periodicals, Web

sites, etc

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:	Ass. Prof. Dr. Shady Abdel Aleem	21
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	751
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	5
Date:	2022/2023	





Course specification

Course code:	Course name
CECE 446	Planning of Electrical Networks
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023
	P. Pasis Information

B-Basic Information

Course Name Planning of Electrical Networks

Code CECE 446

Course Level Fifth level courses (Senior -2) - Second semester (Spring)

Credit Hours

Lectures

Tutorial

Lab

Total

3Cr. hr

2hr

2hr

0hr

4hr

Prerequisite CECE 323

Instructor name/Email Ass. Prof. Dr. Shady Abdel Aleem

Shady.Sebai@sva.edu.eg

<u>C- Profess</u>ional information

1- Course core

The utility perspective, utility financial, utility economic evaluation, fixed charge rate, total annual charge rate, revenue requirements, financial and regulatory analysis, corporate financial situation, regulatory incentive, utility incentives, Power generation economics, Co-generation over view and regulations, Stream turbine Co-generation cycles, Gas turbine cycles, Generation planning, Manual and automated generation planning, Dynamic programming, approximate techniques and automated generation planning, Approximate technique, Capacity resource planning. Integrated demand-supply planning, Marginal costs.





	2- Course learning objectives:												
oc 1	Explain the principle of the generation adequacy yin power system using probabilistic approach												
oc 2	Recognize how to analyze the configuration of substations and power pools												
oc 3	Recognize how to evaluate the peak demand and energy requirements of system using forecasting techniques.												
oc 4	Recognize how apply the developing of the solution methodology for optimizing the cost of power system under operation.												

3- program objectives served by the course:

Upon the completion of the course the student should be able to:

- OP Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
- Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
- OP Teach students to use experimental and data analysis techniques for electrical power engineering applications
- OP Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

4- The relation between the course objectives and the program objectives

	The relation between the boar	otives and the program objectives	
	Course objectives		program objectives
oc 1	Explain the principle of the generation adequacy yin power system using probabilistic approach	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
	Recognize how to analyze the configuration of substations and power pools	OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
oc 2		OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems



OP 5



Recognize how to evaluate the peak demand and energy requirements of system using forecasting techniques.

using design and syntheses of electrical components, circuits, and systems.

Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.

Prepare undergraduate students

who can create new ways to meet society's needs by applying OP 6 fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.

OP 7 and data analysis techniques for electrical power engineering applications

OP Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

Prepare students for engineering and problem-solving analyses OP 5 using appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet society's by needs applying fundamentals of engineering OP 6 sciences to practical problems using design and syntheses of electrical components, circuits, and systems.

OP 7 and data analysis techniques for electrical power engineering applications

oc 3

Recognize how apply the developing of the solution methodology for optimizing the cost of power system under operation.

oc 4





OP Prepare engineers who can work on electrical power systems, including designing and realizing such systems.

5- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

- CS(1.1) Identifies the basic of load curves, Single line diagram of any power system, types of generation stations, simple cycle and combined cycle based stations.

 CS(1.2, Display the maximum demand, monthly consumption of electricity,
- CS(1.2, Display the maximum demand, monthly consumption of electricity demand factor, load factor and form factor from load curve.
- CS(1.3, Apply knowledge to draw chronological load curve for each type of load and total load, load duration curve, energy load curve and mass curve.
- CS(3.1) Prepare and present calculation for plant capacity factor, utilization factor and diversity factor between sub-stations and feeders of substations.
- Prepare and present calculation for total cost of generation, annual total cost of operating a certain plant, fixed change rate factors and average cost of generated energy per year.
- CS(5.2, Apply knowledge to determine the energy cost at load bus, increase of the cost/kwh at load bus due to transmission systems.

6- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

- CS1 Design and analyze the construction of systems to generate, transmit, control and distribution systems.
- Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
- CS3 Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
- Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.
- Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems





7- The relation between the course objectives and the program objectives

Co	ourse objectives	program objectives					
CS(1.1)	Identifies the basic of load curves, Single line diagram of any power system, types of generation stations, simple cycle and combined cycle based stations.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.				
	Display the maximum demand, monthly consumption of	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design develop and make				
CS(1.2,2.1)	electricity, demand factor, load factor and form factor from load curve.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.				
CO(1.2.2.2)	Apply knowledge to draw chronological load curve for each type of load and	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make				
CS(1.3,2.2)	total load, load duration curve, energy load curve and mass curve.	CS2	analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.				
CS(3.1)	Prepare and present calculation for plant capacity factor, utilization factor and diversity factor between sub-stations and feeders of substations.	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.				
CS(5.1,6.1)	Prepare and present calculation for total cost	CS5	Apply modern techniques, skills, and engineering tools while				



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Ministry of higher education High valley institute for engineering and technology Electrical power engineering program



of generation, performing the development load annual total cost of operating a lists, low voltage power systems, certain plant, fixed design reviews, and checks for change rate factors and Calculate total cost of generation, of annual total cost of operating a average cost generated certain plant, fixed change rate energy per factors and average cost of year. generated energy per electric power generation and distribution systems. Review supplier documentation compliance specifications for electric power CS6 components of generation, transmission, control, and distribution systems Apply modern techniques, skills, and engineering tools while performing the development load CS5 lists, low voltage power systems, Apply knowledge design reviews, and checks for determine the electric power generation and cost at load bus, increase CS(5.2,6.2)distribution systems. of the cost/kwh at load Review supplier documentation bus due to transmission for compliance with systems. specifications for electric power CS6 components of generation, transmission. control, and distribution systems 8- Course content and the relation between the course contents and the course LOs

Week No.	Topic	Lectur e hr.	Tutori al hr.	Practic al hours	course LOs
1	Introduction: Generating System capability Planning	2	2	2	CS(1.1)
2	Interconnected Systems	2	2	2	CS(1.1)
3	Demand/ Energy forecasting	2	2	2	CS(5.2,6.2)

Quiz (1) + Power System 2 2 CS(1.2,2.1) expansion planning





5	Focuses on Design of Distribution Systems	2	2	2	CS(1.3,2.2)
6	Focuses on Load Curves	2	2	2	CS(1.3,2.2)
7	Generation Economy	2	2	2	CS(1.3,2.2)
8	Midterm		1.0		
9	Focuses on Transmission Economy	2	2	2	CS(3.1)
10	Tariffs	2	2	2	CS(5.2,6.2)
11	Focuses on Power factor Compensation.	2	2	2	CS(5.1,6.1)
12	Quiz (2) + Economic Dispatch	2	2	2	CS(5.1,6.1)
13	Focuses on Examples of Focuses on Power factor Compensation.	2	2	2	CS(3.1)
14	Focuses on Solved examples on Transmission Economy	2	2	2	CS(1.3,2.2)
15	Focuses on Examples on Generation Economy	2	2	2	CS(5.1,6.1)
16	Final Exam		2.0		
Total h	ours	28	28	28	

9- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

	45			Teac	illing a	IIU Lea	ııııııy	INICUIC					
Course learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	<u>v</u>	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(1.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		√	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.2, 2.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.3, 2.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark
CS(5.1, 6.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.2, 6.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓





Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

todom	10- Student assessment method										
	d- Assessment method and its relation to the Los of the course										
	Tools of assessment										
Cour se ILOs	duizzes	Mid -term exam	Final exam	sheets/		Practical: lab	Oral exam	discussions	Reports/	presentation	modelling
CS(1.1)	✓	✓	✓	✓	\checkmark	✓	✓	✓	✓	✓	✓
CS(1.2,2 .1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.3,2 .2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(3.1) CS(✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	√ ./
5.1,6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	•
CS(5.2,6 .2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
				E	- Time	schedu	le of a	ssessmer	nt		
Quizze	es			Quiz (1 Quiz (2	•		eek (3) eek (1	,			
Quiz (2) Week (10) Discussions Every week for any student Presentations weekly Sheets and Sketches weekly Researches and reports Week (2,3) the Projects Week (4,8) Practical modelling Week (4,8) Attendance weekly											





Mid-term exam	Week (8)						
final exam		Week (16)					
	f- Gradin	g system					
quizes	Quiz (1)	(5) marks					
quizes	Quiz (2)	(5) marks					
Discussions	15%						
Sheets and Sketches	20%						
Researches and reports	20%	5 marks	(40) marks				
the Projects	30%						
Practical modelling	20%						
Attendance		(10) marks					
Mid-term exan	n	(15) marks					
final exam			(60) marks				

(100) marks

10- List of references:							
a) Course notes	Lecture notes and handouts						
b) Required books	J. Bebic, 2008, Power System Planning:						
	Emerging Practices Suitable for Evaluating						
	the Impact of High-Penetration Photovoltaics.,						
	Niskayuna, New York, GE Global Research.						
	 Lennart Söder and Mikael Amelin,2011, 						
	"Efficient Operation and Planning of Power						
	System", 11th edition, Stockholm, Royal						
	Institute of Technology Electric Power						
	Systems.						
c) Recommend books	Mentioned at time.						
d) Periodicals, Web	No periodicals are needed.						
sites, etc							

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom

Total

• E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator: Ass. Prof. Dr. Shady Abdel Aleem







program Coordinator

Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

Dr. Ibrahim Ali Mahmoud Abdel Dayem

Head of the Department

Date: 2022/2023



Course specification

Course code:	Course name			
CECE 428	Power System Protection			
	A- Affiliation			
Relevant program:	Electrical power engineering			
Department offering the program:	Electrical and communication engineering			
Department offering the course:	Electrical and communication engineering			
Date of program operation:	2008-2009			
Date of approval from the higher	27/1/2008			
ministry of education				
Date of course operation	2021-2027			

B-Basic Information

<u>5 540.0 memation</u>					
Course Name	Power System Protection				
Code	CECE 428				
Course Level	Fifth level courses (Senior -2) - Second semeste				
	(Spring)				
Credit Hours	3Cr. hr				
Lectures	2hr				
Tutorial	2hr				
Lab	2hr				
Total	6hr				
Prerequisite	CECE 323				
Instructor name/Email	Dr. Ehab Mohamed Nabil Ismail Abdel				
	Rasoul ihab.nabil@sva.edu.eg				

C- Professional information

Course core

Covers unsymmetrical fault analysis, fuses, voltage and current transducers, fundamental relay operating principles and characteristics, over current protection, comparators and static relay circuits, differential protection and its application to generators, transformers and bus bars, motor protection, pilot wire protection of feeders and standard protective





schemes for system coordination of relays.

1- Course learning objectives:						
oc 1	Recognize the performance of protective relays, components of protection scheme and relay terminology.					
oc 2	Able to understand relay construction and operating principles.					
oc 3	Able to understand Over-current protection using electromagnetic and static relays and Over-current protective schemes.					
oc 4	Explain how to discuss types of electromagnetic and static distance relays, effect of arc resistance, power swings, line length and source impedance on performance of distance relays.					
oc 5	Able to understand pilot protection; wire pilot relaying and carrier pilot relaying.					
oc 6	Explain the principle of construction, operating principles, and performance of various differential relays for differential protection.					
oc 7	Explain the principle of protection of generators, motors, Transformer and Bus Zone Protection.					
	2- program objectives served by the course:					
Upon the complete	ion of the course the student should be able to:					
OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.					
OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.					
OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications					
OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.					
3- The relation between the course objectives and the program objectives						
Cou	urse objectives program objectives					
oc 1	Recognize the performance of protective relays, components of protection OP 5 Prepare students for engineering analyses and problem-solving using					





		scheme and terminology.	relay		appropriate mathematical and computational methodologies. Prepare students for
				OP 5	appropriate mathematical computational
	oc 2	Able to understa construction and principles.	•		methodologies. Prepare undergraduate students who can create new ways to meet society's needs by applying
				OP 6	fundamentals of engineering sciences to practical problems using design and syntheses of
					electrical components, circuits, and systems. Prepare students for
				OP 5	engineering analyses and problem-solving using appropriate mathematical and computational
oc 3	current electron relays	Able to understand O current protection u electromagnetic and s	on using and static	using static	methodologies. Prepare undergraduate students who can create new ways to meet society's
		relays and Ove protective scheme			needs by applying fundamentals of engineering sciences to practical problems using
		Familia harry			design and syntheses of electrical components, circuits, and systems.
	oc 4	Explain how to types of electro and static distance effect of arc re	magnetic ce relays, esistance,	OP 7	Teach students to use experimental and data analysis techniques for electrical power
		power swings, lin	ne length		engineering applications





	and source impedance on performance of distance relays.	OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.					
	Able to understand pilot	OP 7	Teach students to use experimental and data analysis techniques for electrical power					
oc 5	protection; wire pilot relaying and carrier pilot relaying.	OP 12	engineering applications Prepare engineers who can work on electrical power systems, including designing and realizing					
oc 6	Explain the principle of construction, operating principles, and performance of various differential relays for differential protection.	OP 7 OP 12	such systems. Teach students to use experimental and data analysis techniques for electrical power engineering applications Prepare engineers who can work on electrical power systems, including					
	Explain the principle of	OP 7	designing and realizing such systems. Teach students to use experimental and data analysis techniques for electrical power					
oc 7	protection of generators, motors, Transformer and Bus Zone Protection.	OP 12	engineering applications Prepare engineers who can work on electrical power systems, including designing and realizing such systems.					
4- Learning outcomes of the course (LOs)								

Upon the completion of the course, the student should be able to:

CS(3.1)

Identifies the basic about the performance of protective relays, components of protection scheme and relay terminology over-





CS(3.2)			er swi	e distance relays and the effects ngs, line length and source					
CS(3.3,5.1)		•	erstand	the pilot protection; wire pilot					
CS(3.4,5.2)		Prepare and present con	nstructio	on, operating principles, and for differential protection.					
CS(3.5,5.3)		Communicate effectively Transformer and Bus Zon		otection of generators, motors, etion					
	5- Program competencies served by the course:								
Upon the c	omple	tion of the Program the stu	dent sho	ould be able to:					
CS3		Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.							
CS5		performing the develop systems, design review generation and distribution	ment lows, and on system						
6	- The	relation between the course of	bjectives	and the program objectives					
	Cou	rse objectives		program objectives					
CS(3.1)	perforelay prote term	cifies the basic about the formance of protective vs, components of ection scheme and relay inology overcurrent ection.	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.					
CS(3.2)	the effect pow sour	lay the basic for working distance relays and the ets of arc resistance, er swings, line length and ce impedance on ormance of distance	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation,					





CS(3.3,5.1)	Apply knowledge to understand the pilot protection; wire pilot relaying and carrier pilot relaying.	CS3	transmission, control, and distribution systems. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Apply modern techniques, skills, and engineering tools
	· -	CS5	while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems. Identify problems and
CS(3.4,5.2)	Prepare and present construction, operating principles, and performance of differential relays for differential protection.	CS3	formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Apply modern techniques, skills, and engineering tools while performing the
		CS5	development load lists, low voltage power systems, design reviews, and checks for electric power generation and
CS(3.5,5.3)	Communicate effectively with protection of generators, motors, Transformer and Bus Zone Protection.	CS3	distribution systems. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation,





transmission, control, and distribution systems.

Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.

CS5

	7- Course content and the relation between	the cours	se content	s and the co	ourse LOs
We	Topic	Lectur	Tutori	Practical	course LOs
ek		e hr.	al hr.	hours	
No.					
1	Introduction: Need for protective schemes,				CS(3.1)
	Nature and Cause of Faults, Types of				
	Faults, Effects of Faults, Fault Statistics,	2	2	2	
	Zones of Protection, Primary and Backup				
2	Protection, Focuses on Essential Qualities of			2	CS(3.1)
2	Protection, Performance of Protective			2	CS(3.1)
	Relaying, Classification of Protective	2	2		
	Relays, Automatic Reclosing, Current	2	2		
	Transformers for protection, Voltage				
	Transformers for Protection.				
3	Focuses on Electromechanical Relays,				CS(3.1)
	Static Relays – Merits and Demerits of	2	2		
	Static Relays, Numerical Relays,	2	2	2	
	Comparison between Electromechanical Relays and Numerical Relays				
4	Quiz (1) + Time – current Characteristics,				CS(3.1)
•	Current Setting, Time Setting. Overcurrent				
	Protective Schemes, Reverse Power or	2.	2	2	
	Directional Relay, Protection of Parallel	2	2	2	
	Feeders, Protection of Ring Mains.				
5	•	2	2		CS(3.2)
5	Focuses on Earth Fault and Phase Fault	2	2		CS(3.2)





	Protection, Combined Earth Fault and Phase Fault Protective Scheme, Phase Fault Protective Scheme, Directional Earth Fault Relay, Static Overcurrent Relays, Numerical Overcurrent Relays.			2	
6	Focuses on Impedance Relay, Reactance Relay, Mho Relay, Angle Impedance Relay,				CS(3.3,5.1)
	Effect of Arc Resistance on the Performance of Distance Relays, Reach of Distance Relays.	2	2	2	
7	Focuses on the Effect of Power Surges (Power Swings) on Performance of	2	2		CS(3.3,5.1)
	Distance Relays, Effect of Line Length and Source Impedance on Performance of Distance Relays.			2	
8	Midterm		1.0		
9	Introduction, Differential Relays, Simple		1.0		CS(3.4,5.2)
	Differential Protection, Percentage or Biased Differential Relay.	2	2	2	02(01.90.2)
10	Focuses on the Differential Protection of 3 Phase Circuits, Balanced (Opposed) Voltage Differential Protection.	2	2	2	CS(3.4,5.2)
11	Focuses on the Generator Protection	2	2	2	CS(3.5,5.3)
12	Design of Motor Protection	2	2	2	CS(3.5,5.3)
13	Focuses on Bus Protection	2	2	2	CS(3.5,5.3)
14	Quiz (2) + Line Protection+ Fault Location Techniques for Transmission Systems	2	2	2	CS(3.5,5.3)
15	Focuses on Distribution System Protection	2	2	2	CS(3.5,5.3)
16	Final Exam		2.0		
Tota	l hours	28	28	28	





8- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

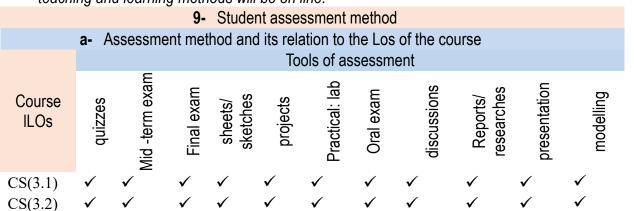
Course learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	<u></u>	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(3.1)	√	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		√	\checkmark	\checkmark	\checkmark	\checkmark
CS(3.2)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(3.3,5	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.4,5	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.5,5	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.







CS(3.3,5.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(3.4,5.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(3.5,5.	✓	✓	✓	✓	✓	√	✓	✓	✓	✓	✓
b- Time schedule of assessment											
Ouissa			(Quiz (eek (3				
Quizzes				Quiz (:	,		/eek (1	,			
Discussion	าร			,	,	Е	very we	ek for a	ny studer	nt	
Presentati							eekly				
Sheets an							eekly	٥.			
Researche		d reports	5				/eek (2,	,			
the Projec Practical n		lina					/eek(4 /eek (4,	. ,			
Attendanc		iii ig					eekly	,0)			
Mid-term e	-						/eek (8	3)			
final exam							/eek (1	,			
						ling syst	em				
	quize	2 S			uiz (1)		(5) m				
Б.	•			Qı	uiz (2)		(5) m	arks			
	scuss		.		15%						
		Sketche			20% 20%		5 ma	rke		(10) man	ke
Researd	e Proj		JI 15		30%		o illa	111/2		(40) mar	V2
	-	odelling	Ī		20%						
		U	ndance				(10) m	arks			
		Mid-te	rm exan	n			(15) marks				
		final	l exam				. ,		(60) mark	KS	
		Т	otal					((100) mar	ks	

10- List of references:

- a) Course notes
- b) Required books
- Lecture notes and handouts
 - Protection and Switchgear Bhavesh et al Oxford 1 st Edition, 2011
 - Power System Switchgear and Protection N.





c) Recommend books

d) Periodicals, Web sites, etc

Veerappan S.R. Krishnamurthy S. Chand 1 st Edition, 2009

Fundamentals of Power System Protection
 Y.G.Paithankar S.R. Bhide PHI 1 st Edition, 2009

Mentioned at time.

No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

1	1 1	
Course coordinator:	Dr. Ehab Mohamed Nabil Ismail Abdel	1
	Rasoul	
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel	1
	Rasoul	
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Data	·	
Date:	2022/2023	





Course specification

C 1	C
Course code:	Course name
CECE 455	Selected topics in Electrical Power
Engineering	
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2021-2027
_	

B-Basic Information

Course Name	Selected topics in Electrical Power Engineering
Code	CECE 455
Course Level	Fifth level courses (Senior -2) - Second semester
	(Spring)
Credit Hours	3Cr. hr
Lectures	2hr
Tutorial	2hr
Lab	0hr
Total	4hr
Prerequisite	Senior Standing
Instructor name/Email	Ass. Prof. Dr. Shady Abdel Aleem
	Shady.Sebai@sva.edu.eg

C- Professional information

1- Course core

Topics chosen according to special interests of faculty and students. May be repeated for credit more than once if content changes.

2- Course learning objectives:						
oc 1	Recognize how apply updated and latest trends in wind turbine technology					
oc 2	Produce and prepare knowledge on methods and approaches of site selection for wind turbines					
oc 3	Explain how to get knowledge on aspects of Wind turbines Project Planning & Structuring including issues on bankability and risk-mitigation					





3- program objectives served by the course:

Prepare undergraduate students who can create new ways to meet

Upon the completion of the course the student should be able to:

OP 6	society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.							
OP 9	Provide students with an awareness of the tools and skills necessary for participating effectively in building a robust national economy and meeting current and future modern industry needs.							
OP 10	energy with high quality,	Electrical power engineers serve society by providing electrical energy with high quality, safety, and reliability at any time and any place throughout the country.						
OP 12	Prepare engineers who including designing and re		ork on electrical power systems, such systems.					
C	ourse objectives		program objectives					
oc 1	Recognize how apply updated and latest trends in wind turbine technology	OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.					
oc 2	Produce and prepare knowledge on methods and approaches of site selection for wind turbines	OP 9	Provide students with an awareness of the tools and skills necessary for participating effectively in building a robust national economy and meeting current and future modern industry needs.					
		OP 10	Electrical power engineers serve society by providing electrical energy with high quality, safety, and reliability at any time and any place throughout the country.					
oc 3	Explain how to get knowledge on aspects of Wind turbines Project	OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing					





Planning &	Struc	turing	such systems.
including	issues	on	
bankability	and	risk-	
mitigation			

4- Learning outcomes of the course (LOs)

Upon the completion of the course, the student should be able to:

- CS(1.1,2.1) Identifies the basic definitions (power curve, overall efficiency, Betz limit, stall and pitch regulation, etc.),
- Display the basic concepts as power in the wind, vertical distribution of wind speeds, power production and efficiency of a wind turbine, energy yield of a wind turbine from a certain site.
- CS(2.3,3.2) Differentiate between four main wind turbine design concepts, main differences, advantages, disadvantages.
- Demonstrate the basic concepts from grid integration of wind turbines (voltage at the connection point, active, reactive power, strength of the grid, power quality of a wind turbine).
- Prepare and present some effects that wind power has on power system operation and grid investments, describe operation of hybrid systems (wind/diesel, wind/battery/diesel),
- Apply knowledge to show effects that wind power has on environment, analyze and compare characteristics of different wind turbines, present some control possibilities of wind turbines, analyze wind conditions, and wind farm layout possibilities of the particular site.
- CS(5.1,6.1) Conduct and develop to calculate energy yield of a wind turbine from a certain site using actual measurements or approximate data, perform basic calculations and analysis for grid connection of a wind turbine.
- Use the tool to describe main aspects treated in the Grid Codes for connection of wind turbines and explain why those aspects are importan

5- Program competencies served by the course:

Upon the completion of the Program the student should be able to:

systems to interpret experimental results.

Design and analyze the construction of systems to generate, transmit, control and distribution systems.

Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing





CS3		the div	neering solutions to manage the erse phases of electric power distribution systems.						
CS4	simple sketches, specification	est and examine components and equipment to prepare and review mple sketches, specifications, and data sheets for electric power emponents of generation, transmission, control, and distribution							
CS5	performing the development	pply modern techniques, skills, and engineering tools while erforming the development load lists, low voltage power systems, esign reviews, and checks for electric power generation and estribution systems.							
CS6		eview supplier documentation for compliance with specifications for ectric power components of generation, transmission, control, and							
6-	The relation between the course of	bjectives	s and the program objectives						
	Course objectives		program objectives						
	Identifies the basic	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.						
CS(1.1,2.1)	definitions (power curve, overall efficiency, Betz limit, stall and pitch regulation, etc.),	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Design, develop and make						
CS(2.2,3.1)	Display the basic concepts as power in the wind, vertical distribution of wind speeds, power production and efficiency of a wind turbine, energy yield of a wind turbine from a certain	CS2	analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and						

solutions

to

manage the





CS(2.3,3.2)	Differentiate between four main wind turbine design concepts, main differences, advantages, disadvantages.	CS2	engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Design, develop and make
CS(2.4,3.3)	Demonstrate the basic concepts from grid integration of wind turbines (voltage at the connection point, active, reactive power, strength of the grid, power quality of a wind turbine).	CS2 CS3	analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results. Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation,
CS(1.2,2.5)	Prepare and present some effects that wind power has on power system operation and grid investments, describe operation of	CS1	transmission, control, and distribution systems. Design and analyze the construction of systems to generate, transmit, control and distribution systems. Design, develop and make





	hybrid systems (wind/diesel, wind/battery/diesel),		analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(3.4,4.1)	Apply knowledge to show effects that wind power has on environment, analyze and compare characteristics of different wind turbines, present some control possibilities of wind turbines, analyze wind conditions, and wind farm layout possibilities of the particular site.		Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems. Test and examine components and equipment to prepare and review simple sketches, specifications, and data sheets for electric power components of generation, transmission, control, and distribution systems.
CS(5.1,6.1)	Conduct and develop to calculate energy yield of a wind turbine from a certain site using actual measurements or approximate data, perform	CS5	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems. Review supplier
	basic calculations and analysis for grid connection of a wind turbine.	CS6	documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems
CS(5.2,6.2)	Use the tool to describe main aspects treated in the Grid Codes for connection	CS5	Apply modern techniques, skills, and engineering tools while performing the





of wind turbines and explain why those aspects are importan		development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems.
		Review supplier documentation for compliance with specifications for electric
	CS6	power components of generation, transmission, control, and distribution systems

7- Course content and the relation between the course contents and the course LOs Week Tutorial Practical Topic Lecture course hours No. hr. hr. LOs 1 Introduction: Wind CS(1.1,2.1) energy technology covers many technological aspects, like 2 2 2 aerodynamics, mechanics, electrical physics, and engineering. 2 The physical power in the 2 CS(2.2,3.1)wind, the historical 2 2 development 2 wind turbine design concepts 2 2 CS(2.3,3.2)3 4 CS(2.4,3.3)Quiz (1) 2 2 2 Focuses on environmental 5 CS(1.2,2.5)2 2 2 impact of wind turbines, economics 2 2 2 CS(1.2,2.5)6 2 7 2 2 CS(3.4,4.1)Focuses network on integration 8 Midterm 1.0 9 Focuses on Relative Wind 2 CS(3.4,4.1) 2 2 Speed 10 Focuses on Coefficient of 2 CS(3.4,4.1)2 2 performance for Wind energy 2 2 2 11 Focuses on Tip-Speed ratio. CS(3.4,4.1)12 2 CS(3.4,4.1) Quiz (2) + Regions of 2 2 operation





13	Focuses on Overview of			2	CS(5.1,6.1)
	Wind Turbines, Alignment of	2	2		, , , , , , , , , , , , , , , , , , ,
	Rotating Axis.				
14	Focuses on Speed of Rotation	2	2	2	CS(5.1,6.1)
15	Focuses on Assessment of			2	CS(5.2,6.2)
	FSWT and VSWT, Power	2	2		
	Conversion, Control Actions				
16	Final Exam		2.0		
Total hou	ırs	28	28	28	

8- The Teaching and learning methods and their relation to the Los of the course Teaching and Learning Methods

Course learning															
Outcomes	Ф	e e	/s 4: 1	ಕ	<u>o</u>	- .	م ڍ. ۽	> >	!		e e	£ _	S	. ≒	
(LOs)	face	Tace lace lace lactions S:	sheets,	project s	Proble	Brain	Practic al: lab	Discov	Site visit	· \s	Ceseal ative	presen tation	Discus	modelli	2
	- 1	<u>호</u>	S	<u>o</u>	<u>п</u>	ш.	t σ σ		,		" رع	о Т		╘	
CS(1.1,2.1)	\checkmark	\checkmark	•		\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
CS(2.2,3.1)	\checkmark	\checkmark	•		\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
CS(2.3,3.2)	\checkmark	\checkmark	,		\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
CS(2.4,3.3)	\checkmark	\checkmark	,		\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
CS(1.2,2.5)	\checkmark	✓	•		\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
CS(3.4,4.1)	\checkmark	\checkmark	•		\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark	
CS(5.1,6.1)	\checkmark	✓	•	/	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark	
CS(5.2,6.2)	\checkmark	✓	,	/	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark	
Al (

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

9- Student assessment method

a- Assessment method and its relation to the Los of the course Tools of assessment

Cour se ILOs





	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentatio n	modelling
CS(1 .1,2. 1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2 .2,3.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2 .3,3. 2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2 .4,3. 3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1 .2,2. 5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(3 .4,4. 1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(5 .1,6.	✓	✓	✓	✓	✓	✓	✓	✓	√	✓	✓
1) Lo8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quizzes Quiz (1) Quiz (2) Week (3) Week (10) Discussions Presentations Sheets and Sketches Researches and reports the Projects Practical modelling Attendance Mid-term exam final exam Week (3) Week (10) Every week for any student weekly Weekly Week (2,3) Week (4,8) Week (4,8) Week (4,8) Week (8) Week (8)											
						ding syst	em				
	quiz	œs			z(1) z(2)		5) ma 5) ma		(4	0) marks	5





Discussions	15%		
Sheets and Sketches	20%		
Researches and reports	20%	5 marks	
the Projects	30%		
Practical modelling	20%		
Attendance		(10) marks	
Mid-term exam		(15) marks	
final exam		, ,	(60) marks
Total			(100) marks

10- List of references:

	10- List of references:
a) Course notes	Lecture notes and handouts
b) Required books	 Wind Energy Explained: Theory, Design, and
	Application, By James F. Manwell, Jon G.
	McGowan, and Anthony L. Rogers, Wiley; 2
	edition (February 2010)
	 Wind Power Plants: Fundamentals, Design,
	Construction and Operation, Gasch, Robert,
	Twele, Jochen (Eds.) Springer-Verlag Berlin
	Heidelberg; 2 edition (2012)
c) Recommend	Mentioned at time.
books	
d) Periodicals, Web	No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data she
- Google classroom
- E- learning

sites, etc

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:	Ass. Prof. Dr. Shady Abdel Aleem	5 2
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel	1
	Rasoul	-
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Date:	2021/2027	





- Second

Course specification

Course code:	Course name
CECE 491	Senior Project II
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2022-2023

B-Basic Information

Code Course Level	Senior Project II CECE 491 Fifth level courses (Senior -2) semester (Spring)
	(~P-1118)

Credit Hours

Lectures

1hr

Tutorial

Lab

3hr

Total

4hr

Prerequisite CECE 490

Instructor name/Email Ass. Prof. Dr. Shady Abdel Aleem

Shady.Sebai@sva.edu.eg

C- Professional information

1- Course core

Participating students carry on the plan of work they developed in CECE 490. Each participant gives an oral presentation of his/her results. On the approval of the supervisor, each group prepares and presents a complete





package. Further ethical issues of the computing profession are covered and emphasized all over the course work.

	2- Course learning of	objectives:				
oc 1	Explain the principle of powdepth knowledge of the distribut	ower system and to provide them with in oution system.				
oc 2	Recognize how cover types of characteristics and voltage level	of distribution systems and networks, load				
oc 3	Particular attention will be given voltage distribution systems	Explain the principle of of distribution systems planning and design. Particular attention will be given to the issue of industrial medium voltage distribution systems through case studies, practical design assignments and design verification using power system analysis				
oc 4	Recognize the solar energy sys	stems and linking them to the project.				
	3- program objectives serv	ved by the course:				
Upon the completion	on of the course the student sh	hould be able to:				
OP 1	OP 1 Prepare engineers who will become leaders power engineering profession.					
OP 2	pility to shape social, intellectual, civities.					
OP 3	Prepare students to express themselves effectively in oral an written communication.					
OP 12	Prepare engineers who can including designing and rea	n work on electrical power systems, ealizing such systems				
4- The rel	ation between the course object	ctives and the program objectives				
Cour	se objectives	program objectives				
oc 1	Explain the principle of power system and to provide them with in depth knowledge of the distribution system.	Prepare engineers who can OP work on electrical power 12 systems, including designing and realizing such systems				
oc 2	Recognize how cover types of distribution systems and networks, load characteristics and voltage levels	OP 1 Prepare engineers who will op 1 become leaders in the electrical power engineering profession.				
oc 3	Explain the principle of of distribution systems planning and design. Particular	OP 3 Prepare students to express themselves effectively in oral and written				





	attention will be given to the communication. issue of industrial medium voltage distribution systems
	through case studies, practical design assignments and design verification using power system analysis software. Prepare engineers who can work on electrical power systems, including designing and realizing such systems
oc 4	Explain the principle of power system and to provide them with in depth knowledge of the distribution system. Prepare engineers who can work on electrical power systems, including designing and realizing such systems
	5- Learning outcomes of the course (LOs)
Upon the completion	on of the course, the student should be able to:
CS(2.1,3.1)	Apply knowledge to explain power system construction, function, voltage levels and load characteristics basic definitions and relevant equations.
CS(2.2,3.2)	Prepare and present the principals of designing distribution systems consisting of dynamic and static loads.
CS(5.1)	Explain the heighten awareness of distribution systems performance
CS(5.2)	Communicate effectively with analyzing load flow, short circuits results for distribution systems using power system analysis packages.
CS(5.3,6.1)	Express the circuits analysis, machine, and power system analyses fundamentals in sizing distribution systems equipment.
	6- Program competencies served by the course:
Upon the completic	on of the Program the student should be able to:
CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation, transmission, control, and distribution systems.
CS5	Apply modern techniques, skills, and engineering tools while



performing the development load lists, low voltage power systems, design reviews, and checks for electric power



generation and distribution systems. Review supplier documentation for compliance CS6 specifications for electric power components of generation, transmission, control, and distribution systems **7-** The relation between the course objectives and the program objectives **Course objectives** program objectives Design, develop and make analysis through simulations for heavy equipment (generators, CS2 motors, transmission lines, and Apply knowledge to explain distributing systems to interpret power system construction, experimental results. function, voltage levels and CS(2.1,3.1)Identify problems and formulate load characteristics basic engineering solutions to manage definitions and relevant the engineering activity during equations. CS3 the diverse phases of electric power generation, transmission, control, distribution and systems. Design, develop and make analysis through simulations for heavy equipment (generators, CS2 motors, transmission lines, and present the distributing systems to interpret Prepare and principals designing experimental results. of CS(2.2,3.2)distribution Identify problems and formulate systems consisting of dynamic and engineering solutions to manage static loads. the engineering activity during CS3 the diverse phases of electric power generation, transmission, control, and distribution systems. Apply modern techniques, skills, and engineering tools Explain the heighten of distribution CS5 CS(5.1)awareness while performing the systems performance development load lists, low voltage power systems, design





CS(5.2)	Communicate effectively with analyzing load flow, short circuits results for distribution systems using power system analysis packages.	CS5	reviews, and checks for electric power generation and distribution systems. Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design reviews, and checks for electric power generation and distribution systems. Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design
CS(5.3,6.1)	Express the circuits analysis, machine, and power system analyses fundamentals in sizing distribution systems equipment.	CS5	reviews, and checks for Calculate total cost of generation, annual total cost of operating a certain plant, fixed change rate factors and average cost of generated energy per year. electric power generation and distribution systems. Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems

8-	Course content and the relation between	een the cou	irse conte	nts and the	course LOs
Week	Topic	Lecture	Tutori	Practical	course
No.		hr.	al hr.	hours	LOs
1	HVAC, Types of HVAC	1	0	3	CS(2.1,3.1
	systems, Chiller system,)
	Firefighting, Basic				
	components of a fire alarm				
	system, Water pumps,				





					<u> </u>
	Improving power factor				
2	Fixed capacitors, Automatic	1	0	3	CS(2.2,3.2
	capacitors bank, Distribution)
	Board Design, Normal Power				
0	Distribution Board,		0	2	GG(7.1)
3	Emergency Power	1	0	3	CS(5.1)
	Distribution Board, Medium				
	Voltage Switchgear (MVSG),				
1	Ring Main Unit (RMU).	1	0	2	CC(5,1)
4	Project progress seminar (4) PV System:	1	$0 \\ 0$	3	CS(5.1)
5	Inverter Sizing, Battery	1	0	3	CS(5.2) CS(5.2)
O	Sizing, Solar Charger Sizing,	1	U	3	CS(3.2)
	etc.				
7	Project progress seminar (5)	1	0	3	CS(5.2)
8	Midterm- Break		· ·	3	CS(3.2)
9	Solar Tracking System	1	0	3	CS(2.2,3.2
	8 7		-	-)
10	Actuator Types, Axis of	1	0	3	CS(2.2,3.2
	Rotation)
11	Software & hardware, Solar	1	0	3	CS(5.3,6.1
	sensor,etc.)
12	Project progress seminar (6)	1	0	3	CS(5.2)
13	Web Application	1	0	3	CS(5.3,6.1
)
14	MERN technology, User and	1	0	3	CS(5.3,6.1
	Company Registration,)
	Purpose, and Functionality of				
1.5	PVHOME,etc.		0	2	GG(7.1)
15	Writing project final report	1	0	3	CS(5.1)
16	Final Exam		2.0	4.5	
Total hou	ırs	14	0	42	

⁹⁻ The Teaching and learning methods and their relation to the Los of the course





Course				Tead	ching a	and Le	arning	Metho	ods				
learning													
Outcome													
s (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1,3	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.1)	√	✓	✓	✓	√	✓	✓		✓	✓	✓	✓	✓
CS(5.1)	✓	√	✓	✓	✓	√ ·	√ ·		✓	✓	✓	✓	√ ·
CS(5.3,6 .1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

Notes:

The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

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				10- Stu	dent as	sessmen	t meth	od			
	d	- Asses	sment	metho	d and it	s relation	to the	Los of the	e course		
					To	ools of as	sessm	ent			
Cour se ILOs	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	Discussions	Reports/ researches	presentation	modelling
CS(2											\checkmark
.1,3.	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	
1)											
CS(2	✓	✓	✓	\checkmark	✓	\checkmark	✓	\checkmark	\checkmark	\checkmark	✓





2)							
2) CS(5 .1)	✓ ✓	/ /	✓	✓	✓	✓	
CS(5 .2)	✓ ✓ ,	/ /	✓	✓	✓	✓	
CS(5 .3,6. ✓ ✓ ✓	✓ ✓ ,	/ /	✓	✓	✓	✓	
	e- Time	schedule of a	assessme	ent			
Quizzes Quiz (1) Quiz (2) Week (3) Week (10) Every week for any student Weekly Sheets and Sketches Researches and reports Week (2,3) Week (4,8) Practical modelling Attendance Weekly Week (4,8)							
final exam	f- Gradi	Week (1) ng system	0)				
quizes Discussions Sheets and Sketches	Quiz (1) Quiz (2) 15% 20%	(5) ma (5) ma					
Researches and reports the Projects Practical modelling Attendance	20% 30% 20%	(5) ma	marks (60) marks				
Mid-term exa final exam Total	m	(40) ma	(4	10) mari 00) mai			
	10- List of	references:					
a) Course notesb) Required books	■ Ph ■ G1	s and hando gyptian Code nilips Lightin rounding and	e & Regi ng catalo	gue.		ystem	

book.

Dr. Gilany Electrical design book.





c) Recommend books

• Schneider Electric Sockets Catalogue.

Schneider circuit breaker catalogue

c) Recommend book

None

d) Periodicals, Web sites, etc

No periodicals are needed.

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator:	Ass. Prof. Dr. Shady Abdel Aleem	5/2
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel	Ehab
	Rasoul	
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	6
Date:	2021/2021	





Course specification

Course code:	Course name
CECE 424	Control System
	A- Affiliation
Relevant program:	Electrical power engineering
Department offering the program:	Electrical and communication engineering
Department offering the course:	Electrical and communication engineering
Date of program operation:	2008-2009
Date of approval from the higher	27/1/2008
ministry of education	
Date of course operation	2021-2027

B-Basic Information

Course Name	Control System
Code	CECE 424
Course Level	Fifth level courses (Senior -2) - Second semester (Spring)
Credit Hours	3Cr. hr
Lectures	2hr
Tutorial	2hr
Lab	0hr
Total	4hr
Prerequisite	CECE 305
Instructor name/Email	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
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C- Professional information

1- Course core





Covers state-space modeling and analysis, controllability, observability, state feedback design and pole placement, dynamic observers, output feedback design and stability analysis

and pole placement, dynamic observers, output recuback design and stability analysis										
2- Course learning objectives:										
oc 1	Recognize the knowledge about the fundamentals of digital control systems.									
oc 2	That the student gets used to analyse and design digital control systems									
oc 3	Explain the principle of the performance of digital control systems.									
oc 4	Able to understand explain the fundamentals of z-transform technique and digital control systems.									
oc 5	Recognize how demonstrate the principles of stability analysis and steady- state errors of digital control systems.									
oc 6	Recognize how Design and analyze the performance of digital control systems									
oc 7	Explain how to get the stability test of digital control systems.									
	3- program objectives served by the course:									
Upon the	completion of the course the student should be able to:									
OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.									
OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.									
OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications									
OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.									
	4- The relation between the course objectives and the program objectives									
	Course objectives program objectives									
oc 1	Recognize the knowledge about the fundamentals of digital control systems. Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.									
oc 2	That the student gets used to analyse and design digital control systems computational methodologies. Prepare students for engineering analyses and problem-solving using									





		OP 6	appropriate mathematical and computational methodologies. Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
		OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
oc 3	Explain the principle of the performance of digital control systems.	OP 6	Prepare undergraduate students who can create new ways to meet society's needs by applying fundamentals of engineering sciences to practical problems using design and syntheses of electrical components, circuits, and systems.
oc 4	Able to understand explain the fundamentals of z-transform technique and digital control systems.	OP 7 OP 12	Teach students to use experimental and data analysis techniques for electrical power engineering applications Prepare engineers who can work on electrical power systems, including designing
oc 5	Recognize how demonstrate the principles of stability analysis and steady-state errors of digital control systems.	OP 7 OP 12	and realizing such systems. Teach students to use experimental and data analysis techniques for electrical power engineering applications Prepare engineers who can work on electrical power systems, including designing





			and realizing such systems.
oc 6	Recognize how Design and analyze the performance of digital control systems	OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications Prepare engineers who can
	digital control systems	OP 12	work on electrical power systems, including designing and realizing such systems.
	Explain how to get the stability	OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications
oc 7	test of digital control systems.		Prepare engineers who can work on electrical power systems, including designing
	5- Learning outcome	es of the	and realizing such systems.
Upon the	e completion of the course, the stud		, , ,
CS(1.1)	Identifies the basic about State spa		
CS(1.2)	Display the basic for the Controlla		
CS(1.3)	Demonstrate the State feedback &	pole pl	acement
CS(1.4)	Prepare and present knowledge of	Dynam	ics Observers
CS(1.5)	Conduct and develop knowled FEEDBACK AND OBSERVER	ge of	INTEGRATED FULL-STATE
CS(1.6)	Use the tool to enrich knowledge of	of Redu	ced Order Observer
CS(1.7)	Generate the design of Optimal LO	QR (Lir	near Quadrature Regulator)
CS(1.8)	Apply knowledge to check the Lya	apunov	Stability
	6- Program competend		•
Upon the	e completion of the Program the stu		
CS1	Design and analyze the construction distribution systems.	of syste	ms to generate, transmit, control and
1-	The relation between the course learn	ing outc	omes and the program competencies
	Course (LOs)		program competencies





CS(1.1)	Identifies the basic about State space modelling & analysis	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.2)	Display the basic for the Controllability & observability	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.3)	Demonstrate the State feedback & pole placement	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.4)	Prepare and present knowledge of Dynamics Observers Conduct and develop	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.5)	knowledge of INTEGRATED FULL-STATE FEEDBACK AND OBSERVER	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.6)	Use the tool to enrich knowledge of Reduced Order Observer	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.7)	Generate the design of Optimal LQR (Linear Quadrature Regulator)	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.8)	Apply knowledge to check the Lyapunov Stability	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.

7- Course content and the relation between the course contents and the course LOs
 Week Topic Lectur Tutori Practical course LOs
 No. e hr. al hr. hours





1	Introduction: Mathematical Modelling of Dynamic Systems	2	2	2	CS(1.1)
2	Focuses on Modelling in state space.	2	2	2	CS(1.1)
3	Focuses on State-space representation of dynamic systems.	2	2	2	CS(1.1)
4	Quiz (1) + State-space representations of transfer function systems.	2	2	2	CS(1.1)
5	Focuses on the Controllability & observability	2	2	2	CS(1.2)
6	Focuses on the State feedback & pole placement	2	2	2	CS(1.3)
7	Focuses on the Dynamics Observers	2	2	2	CS(1.4)
8 9	Midterm Focuses on INTEGRATED FULL- STATE FEEDBACK AND	2	1.0	2	CS(1.5)
10	OBSERVER Focuses on the Reduced Order Observer	2	2	2	CS(1.6)
11	Focuses on the Design of Control Systems in State Space	2	2	2	CS(1.7)
12	Design of regulator systems with observers.	2	2	2	CS(1.7)
13	Focuses on Design of Control Systems with Observers.	2	2	2	CS(1.7)
14	Quiz (2) + Focuses on Optimal LQR (Linear Quadrature Regulator)	2	2	2	CS(1.7)
15 16	Focuses on Lyapunov Stability Focuses on INTEGRATED FULL-	2	2	2	CS(1.8)
10	STATE FEEDBACK AND OBSERVER		2.0		
Total hour	rs	28	28	28	

8- The Teaching and learning methods and their relation to the Los of the course Course

Teaching and Learning Methods





learning Outcom es (LOs)	On line / face to face lectures	Tutorials: sheets/ sketches	projects	Problem solving	Brain storming	Practical: lab	Discovering / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(1.1)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.2)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.3)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.4)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.5)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.6)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.7)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark
CS(1.8)	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		✓	\checkmark	\checkmark	\checkmark	\checkmark

Notes: The research concerns the cooperative work, the discussion and the presentations.

The Tutorials concerns the brain storming and the problem solving.

Online lectures used as hybrid learning, but in case of totally on-line learning all the used teaching and learning methods will be on line.

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	9- Student assessment method										
d- Assessment method and its relation to the Los of the course											
	Tools of assessment										
Cours e ILOs	duizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1. 1)	✓	✓	✓	✓	✓	✓	✓	✓	\checkmark	✓	✓
CS(1. 2)	✓	✓	✓	✓	✓	✓	✓	✓	\checkmark	✓	✓
CS(1. 3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1. 4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1. 5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	\checkmark	✓
CS(1.	✓	✓	✓	✓	✓	✓	✓	✓	\checkmark	✓	✓
ĆS(1. 7)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓





$\frac{\text{CS}(1.}{8)}$	✓ ✓	✓ ✓ ✓	✓							
e- Time schedule of assessment										
	iz (1) iz (2)	Week (3) Week (10)								
Discussions Presentations Sheets and Sketches Researches and reports the Projects Practical modelling Attendance Mid-term exam	- (-)	Every week for ar weekly weekly Week (2,3) Week (4,8) Week (4,8) weekly Week (8)	ny student							
final exam		Week (16)								
mar oxam	f- Grad	ding system								
quizes Discussions	Quiz (1) Quiz (2) 15%	(5) marks (5) marks								
Sheets and Sketches Researches and reports the Projects Practical modelling	20% 20% 30% 20%	5 marks	(40) marks							
Attendance Mid-term exan final exam		(10) marks (15) marks	(60) marks							
Total		(100) marks								
	10- List o	f references:	,							
a) Course notesb) Required books		es and handouts Ogata, "Modern Cor on.2002.	ntrol Engineering",							
c) Recommend books d) Periodicals, Web sites, etc No periodicals are needed.										

11- Facilities required for teaching and learning:

- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:





- On line teaching hours if it is needed
- Extra examples and topic-specified research

Course coordinator: Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

program Coordinator Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul

Head of the Department Dr. Ibrahim Ali Mahmoud Abdel Dayem

Date: 2022/2023

