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

No.	Cod	Course Name	Instructor
1	CECE 436	Electrical Machines III	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	BASE 307	Contracts, Bids & Liabilities	Dr. Ashraf Abd El-Khalik
9	BASE 308	Seminar	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 ministry of education	27/1/2008
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:

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

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

	phase synchronous machines.		
oc 2	Recognize the synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus.	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
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.	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
oc 4	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.	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.

5- Learning outcomes of the course (LOs)

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

CS(2.1,3.1)	Identifies the basics 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.
CS(2.2,3.2)	Apply knowledge about synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus.
CS(2.3,3.3)	Prepare and present the Phasor diagrams in three-phase synchronous machines and obtain its parameters.
CS(2.4,3.4)	Utilize 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.
CS(2.5,3.5)	Express the main dimensions, solve examples on the design of turbo-generators and low speed generators, do testing of synchronous machines and obtain its parameters.

6- Program competencies served by the course:

Upon the completion 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.

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

Course (LOs)	program competencies

CS(2.1,3.1)	Identifies the basics 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.	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.
CS(2.2,3.2)	Apply knowledge about synchronous impedance steady state operation, Voltage regulation, Parallel operation, Synchronous machine to an infinite bus.	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.
CS(2.3,3.3)	Prepare and present the Phasor diagrams in three-phase 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.
		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)	Utilize 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.	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.
CS(2.5,3.5)	Express the main dimensions, solve examples on the design of turbo-generators and low 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.
		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.

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course 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 (Induction) Machines + Principle of operation.	2	2	2	CS(2.1,3.1)
4	Quiz (1) +Focuses on Power and Torque and Phasor diagram of a synchronous generator and solved examples.	2	2	2	CS(2.2,3.2)
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 model parameters.	2	2	2	CS(2.3,3.3)
7	The Synchronous Generator Operating Alone –Variable Loads.	2	2	2	CS(2.3,3.3)
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 hours		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 learning / Self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(2.1,3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

CS(2.3,3.3)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.4,3.4)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.5,3.5)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

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.

10- Student assessment method

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

Course ILOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling	
CS(2.1,3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(2.2,3.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(2.3,3.3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(2.4,3.4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(2.5,3.5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)

final exam		Week (16)	
c- Grading system			
quizes	Quiz (1)	(5) marks	
	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 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.
d) Periodicals, Web sites, etc	No periodicals are needed.

11- Facilities required for teaching and learning:

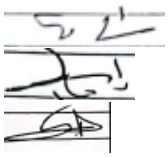
- Appropriate teaching design studios including presentation board, data show
- Google classroom
- E- learning

12- Requirements for Disable facilities:

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

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

Course coordinator:	Ass. Prof. Dr. Shady Abdel Aleem
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem
Date:	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 ministry of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

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 stand-alone 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..
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.
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	
oc 1	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.
		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

			participating effectively in building a robust national economy and meeting current and future modern industry needs
oc 3	Explain how to deduce sizing and design of Solar PV standalone system, Solar pumping sizing and design.	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
		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.
		OP12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.
oc 4	Explain the principle of the off-grid Systems Installation, testing and commissioning, Off-grid systems maintenance, System Feasibility, and stand-alone system and solar pumping.	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
		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.

5- Learning outcomes of the course (LOs)

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.
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.

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 No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course 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	0	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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

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

Course ILOs	Tools of assessment										
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1.1)			✓					✓	✓	✓	
CS(2.1)			✓					✓	✓	✓	
CS(3.1)			✓					✓	✓	✓	
CS(5.1)			✓					✓	✓	✓	
CS(1.1)			✓					✓	✓	✓	

b- Time schedule of assessment

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
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	1. "Solar Photovoltaic Technology: Basics, Design, and Applications" by Chetan Singh Solanki 2. "Photovoltaic Systems Engineering" by Roger A. Messenger and Amir Abtahi 3. "Handbook of Photovoltaic Science and Engineering" edited by Antonio Luque and Steven Hegedus 4. "Solar Electric Handbook: Photovoltaic Fundamentals and Applications" by Michael Boxwell 5. "Renewable Energy Systems: Design and Analysis

	with Induction Generators" by Mukhtar Ahmad 6. H.S. Rauschenbach, Solar Cell Array Design Handbook., NewYork: 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	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. 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 ministry of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

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

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

	for both small and large disturbances.
oc 4	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.
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	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.
oc 2	Able to understand how analyze power system voltage stability problems.	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.
oc 3	Able to understand how analyze power system angle	OP 7	Teach students to use experimental and data analysis

	stability problems for both small and large disturbances.		techniques for electrical power engineering applications
		OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.
		OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications
oc 4	Explain how to analyze load frequency control problems.	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:

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 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.
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.
		CS2	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.
		CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.

CS(1.4,2.3)	Demonstrate the equations of PV and VQ curves, Develop the power angle equation before, during and after fault.	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.
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.	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.
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.	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.
		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.
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.	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.
		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.
CS(1.8,2.7,5.2)	Apply knowledge about Power World Simulator to analyze voltage stability problem.	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.
		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 No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs

1	Introduction: Per unit system and Power System Stability.	2	2	2	CS(1.1)
2	Power System Model for Stability: swing equation	2	2	2	CS(1.2,2.1)
3	Power-angle characteristics, Vector diagrams.	2	2	2	CS(1.2,2.1)
4	Small Signal Stability of unregulated systems.	2	2	2	CS(1.3,2.2)
5	Small Signal Stability of regulated systems.	2	2	2	CS(1.4,2.3)
6	Transient Stability, Equal Area Criterion+ Quiz (1).	2	2	2	CS(1.5,2.4)
7	Examples on Equal Area Criterion.	2	2	2	CS(1.5,2.4)
8	Midterm		1.0		
9	Numerical solution of swing equation.	2	2	2	CS(1.6,2.5, 1.8,2.7,5.2)
10	Maximum Deliverable power for 2-node system.	2	2	2	CS(1.6,2.5)
11	PV curve and voltage stability.	2	2	2	CS(1.6,2.5)
12	VQ curve and shunt compensation +Quiz (2).	2	2	2	CS(1.5,2.4)
13	Droop Characteristic of Synchronous Generators, load frequency control, control of generation overview	2	2	2	CS(1.7,2.6, 5.1)
14	Power Generation Station Components	2	2	2	CS(1.7,2.6, 5.1)
15	Parallel generators sharing active power of load, Load Increase and System Frequency	2	2	2	CS(1.7,2.6, 5.1)
16	Final Exam		2.0		
Total hours		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 learning / self	Site visit	Reports/ researches	Cooperative work	presentation	Discussion	modelling
CS(1.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.2,2.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

CS(1.3,2.2)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.4,2.3)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.5,2.4)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.6,2.5)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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

Course ILOs	Tools of assessment											
	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)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.3,2.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.4,2.3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
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 schedule of assessment

Quizzes	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)
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 Edition, 2010.
c) Recommend books	Thierry Van Cutsem, Costas Vournas, “Voltage Stability of Electric Power System".
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

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

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	

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

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 education	27/1/2008
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:

oc 1	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 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:

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
oc 1	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.	OP 5 Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
oc 2	Explain the principle of switching over-voltages, resistance switching, Capacitance switching.	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

oc 3	Able to understand the protection of different power system components, security, dependability, reliability, current transformers.	OP 6	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 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications
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.	OP 12	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(1.1)	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 components, 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
CS(1.	Communicate effectively with over-current relay and coordination between other

7,2.6, 5.3)	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.
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.

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.	Cs1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.2,2.1)	Demonstrate the Interruption of fault currents and arcs in circuit breakers, Circuit breaker test oscillograms	Cs1 CS2	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 circuit breaker test oscillograms, Circuit breakers synthetic and direct tests.	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.

CS(1.4,2.3)	Analysis the switching over-voltages, Resistance switching, Capacitance switching.	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
		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.
		Cs1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.5,2.4,5.1)	Identifies the basic of the protection of different power system components, security, dependability, reliability, current transformers	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental 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.

CS(1.6,2.5,5.2)	Apply knowledge to the protection of different power system components, security, dependability, reliability, current transformers	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.
		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.
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 between overcurrent relay and fuse.	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.
		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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	Introduction for power Circuit Breakers (CBs)	2	2	0	CS(1.1)
2	Bulk oil (CBs), Minimum oil (CBs), Air (CBs), SF6(CBs)	2	2	0	CS(1.1)
3	Arcing duration in (CBs), Arc length, problem of arcing duration in (CBs), fault clearing time.	2	2	0	CS(1.2,2.1)
4	Time characteristics of (CBs), long time delay, short time delay, instantaneous, example of adjusting (CBs).	2	2	0	CS(1.3,2.2)
5	(CBs) performance, short circuit calculations, the switching over-voltages, Resistance switching, Capacitance switching.	2	2	0	CS(1.4,2.3)
6	Growth of current when purely inductive circuit to a sinusoidal supply, Growth of current when resistance and inductive are connected series to a sinusoidal supply +Quiz (1).	2	2	0	CS(1.4,2.3)
7	Interpretation of CBs test oscillogram.	2	2	0	CS(1.4,2.3)
8	Midterm		1.0		
9	Introduction of the protection of different power system components, security, dependability, reliability.	2	2	0	CS(1.5,2.4,5.1)
10	current transformers	2	2	0	CS(1.5,2.4,5.1)

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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(1.4,2.3)	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓
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- Student assessment method

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

Course ILOs	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
	Tools of assessment										
CS(1.1) CS(1.2 ,2.1)											
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 of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

Quizzes	Quiz (1)	(5) marks	(40) marks

	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 books	Sunil S. Rao, "Switchgear, Protection and Power Systems", 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
Date:	2022/2023

Course specification

Course code:	Course name
CECE 494	High Voltage Engineering
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 ministry of education	27/1/2008
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.
oc 5	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.
		OP12	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.

		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.
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.	OP7	Teach students to use experimental and data analysis techniques for electrical power engineering applications.
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.
		OP12	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 ,4.1)	Differentiate between the normal, extra, and ultra-high voltage signals, describe the high voltage generation, measurement, and testing procedures.
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).
CS(1.3 ,4.3,2. 1)	Analysis the electric field and construction of high voltage cables.
CS(4.4	Apply knowledge to propose the suitable earthling schemes for specific

)	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 ,2.3)	Apply knowledge to the proper earthing systems& grounding schemes, Neutral 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.
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.

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.
		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(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.
		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(1.3,4.3,2.1)	Analysis the electric field and construction of high voltage cables.	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.
		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(4.4)	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 of the high voltage laboratory.		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.
		CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to interpret experimental results.
CS(4.6,2.3)	Apply knowledge to the proper earthing systems& grounding schemes, Neutral Grounding schemes, Earth resistivity measurement.	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.
		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.
CS(1.4,4.7,2.4)	Utilize the basis of High voltage cables.	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(1.5,4.8, 2.5)	Conduct and develop the Overvoltage on power systems	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.
		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.

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	Introduction for Generation of AC voltage at Power Frequency.	2	2	0	CS(1.1,4.1)
2	H.V Generation of AC voltage at high Frequency& Problem., H.V Generation of impulse Generator& Problem.	2	2	0	CS(1.1,4.1)
3	Sphere ap measures peak voltage, Gas discharge in Gas	2	2	0	CS(1.2,4.2)
4	Generation of H.V DC& Problem.	2	2	0	CS(1.2,4.2)
5	Resistance, capacitance potential divider &Problem.	2	2	0	CS(1.2,4.2)
6	Theory of breakdown in gas, oil& Problem +Quiz (1).	2	2	0	CS(1.2,4.2)
7	Resistance of single core cable +multi core cable& Problem.	2	2	0	CS(1.3,4.3,2.1, 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		
Total hours		28	28	0	--

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

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

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

Course ILOs	Tools of assessment										
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
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)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CS(4.6,2.3)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CS(1.4,4.7,2.4)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓
CS(1.5,4.8,2.5)	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

quizes	Quiz (1)	(5) marks	(40) marks

	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 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.
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 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	

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 education	27/1/2008
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, Electro-negative 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) under the DC and AC voltages	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.
oc 2	Able to understand the influence of the factors affecting the breakdown voltage in air.	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.

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 OP12	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 such systems.
oc 4	Utilize the influence of the factors affecting the breakdown voltage.	OP7	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 OP12	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(2.1,4.1)	Communicate effectively with the breakdown voltage in uniform field is higher than the non-uniform field
CS(١.1,4.٢)	Explain the heighten awareness of non-uniform field the corona is initiated firstly and then the breakdown occurs
CS(١.٢, ٢,٢, 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(1.3,2.4)	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.
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.

7- The relation between the course objectives 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.
		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(١.1,4.٢)	Explain the heighten awareness of non-uniform field the corona is initiated firstly and then the breakdown occurs	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
		CS4	Test and examine components and equipment to prepare and review simple sketches, specifications, and

CS(١.٢,٢,٢, 4.3)	Explain the heighten awareness of uniform field the breakdown occurs without proceeding corona	CS1	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.
		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.
CS(4.4)	Communicate effectively with the breakdown voltage increases with increasing gap distance.	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(2.3,4.5)	Express the breakdown voltage with solid specimen is higher than the breakdown value without the solid specimen	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors, transmission lines, and distributing systems to

			interpret experimental results.
CS(1.3,2.4)	Express his opinion about the possible factors that affecting the breakdown voltage.	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.
		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.
		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.

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs

1	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, ١.١,4.٢)
2	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, ١.١,4.٢)
3	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, ١.١,4.٢)
4	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, ١.١,4.٢)
5	Breakdown of Gases Insulating Materials (Air)	-	-	3	CS(2.1,4.1, ١.١,4.٢)
6	Breakdown of Solid Insulating Material	-	-	3	CS(١.٢,٢,٢, 4.3,4.4)
7	Breakdown of Solid Insulating Material	-	-	3	CS(١.٢,٢,٢, 4.3,4.4)
8	Midterm		1.0		
9	Breakdown of Solid Insulating Material	-	-	3	CS(١.٢,٢,٢, 4.3,4.4)
10	Breakdown of Solid Insulating Material	-	-	3	CS(١.٢,٢,٢, 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 hours		-	-	42	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods

	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(2.1, 4.1)	✓	✓	✓			✓	✓			✓	✓	✓	
CS(١.1, 4.٢)	✓	✓	✓			✓	✓			✓	✓	✓	
CS(١.٢, ٢,٢, 4.3)	✓	✓	✓			✓	✓			✓	✓	✓	
CS(4.4)	✓	✓	✓			✓	✓			✓	✓	✓	
CS(2.3, 4.5)	✓	✓	✓			✓	✓			✓	✓	✓	
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- Student assessment method

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

Course ILOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation		modelling
CS(2.1, 4.1)		✓		✓	✓	✓	✓	✓			✓	
CS(١.1, 4.٢)		✓		✓	✓	✓	✓	✓			✓	
CS(١.٢, ٢,٢, 4.3)		✓		✓	✓	✓	✓	✓			✓	
CS(4.4		✓		✓	✓	✓	✓	✓			✓	

) CS(2.3, 4.5)		✓		✓	✓	✓	✓	✓	✓		
CS(1.3, 2.4)		✓		✓	✓	✓	✓	✓	✓		

b- Time schedule of assessment

Discussions	Every week for any student
Presentations	weekly
Sheets and Sketches	weekly
the Projects	weekly
Attendance	weekly
Mid-term exam	Week (8)
final exam	Week (16)

c- Grading system

Discussions	20%		
Sheets and Sketches	70%	40 marks	
Researches and reports	0%		
the Projects	10%		
Attendance		(10) marks	
Mid-term exam		(10) marks	
final exam			(40) marks
Total			(100) marks

10- List of references:

a)	Course notes	Lecture notes and handouts
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.
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 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:	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 of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

Course Name	Senior Project I
Code	CECE 490
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.

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.
		OP7	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 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.		business, and technical activities. Prepare engineers who can work on electrical power systems, including designing and realizing such systems.
oc 4	Produce and prepare how to understand solar energy systems and linking them to the project.	OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems

1- Learning outcomes of the course (LOs)

Upon the completion 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 completion 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.

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
CS(2.1,3.1)	Identifies the basic of power system construction, function, voltage levels and load characteristics basic definitions and relevant equations.	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.
CS(2.2,3.2)	Demonstrate the principals of designing distribution systems consisting of dynamic and static loads.	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.
CS(5.1)	Apply knowledge to calculate the distribution systems performance	CS5	Apply modern techniques, skills, and engineering tools while performing the

CS(5.2)	Prepare and present analysis of load flow, short circuits results for distribution systems using power system analysis packages.	CS5	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 reviews, and checks for electric power generation and distribution systems.
CS(5.3,6.1)	Utilize the circuit's analysis, machine, and power system analyses fundamentals in sizing distribution systems equipment.	CS5 CS6	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

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	Project motivation, problem statement, and objectives	1	0	3	CS(2.1,3.1)
2	Hospital design criteria, Layouts sample	1	0	3	CS(2.2,3.2)
3	Load Estimation & Bulky Equipment Sizing	1	0	3	CS(5.1)
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 for Transformer, How do we select the appropriate generator .	1	0	3	CS(5.2)
7	Project progress seminar (2)	1	0	3	CS(5.2)
8	Midterm- Break				
9	UPS sizing, Type of ups, How do we select ups	1	0	3	CS(2.1,3.1)
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 hours		14	0	42	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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(2.1,3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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.

6- Student assessment method

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

Course ILOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling	
CS(2.1,3.1)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
CS(2.2,3.2)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
CS(5.1)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
CS(5.2)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓
CS(5.3,6.1)	✓	✓		✓	✓	✓	✓	✓		✓	✓	✓

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

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

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 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

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

Course specification

Course code:	Course name
BASE 307	Contracts, Bids & Liabilities
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 ministry of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

Course Name	Contracts, Bids & 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
oc 1	Recognize the basic principles of contracts, bids & liabilities.	OP4	Provide various industries with highly qualified electrical power engineers with a broad knowledge of electrical engineering and related principles, theories, and applications.
oc 2	Explain how to to execute projects considering time, cost & quality.	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.
oc 3	Able to understand how to demonstrate how to monitor and control projects.	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.
oc 4	Able to understand how to learn skills to issuing contracts.	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.
oc 5	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.
		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.
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.
C3	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.
C4	Utilize contemporary technologies, codes of practice and standards, quality guidelines, health and safety requirements, environmental issues, and risk management principles.
C6	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.	C1	Identify, formulate, and solve complex engineering problems by applying engineering fundamentals, basic science, and mathematics.
C(3.1)	Demonstrate the risks, and take appropriate steps to manage those risks	C3	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.
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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
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 - stages of project preparation	2	0	0	C(1.1,6.2)
6	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 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
C(1.1)	✓			✓	✓							✓	
C(1.2)	✓			✓	✓				✓			✓	
C(3.1)	✓								✓			✓	
C(4.1)	✓			✓					✓			✓	
C(6.1)	✓				✓				✓				
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.

10- Student assessment method

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

Tools of assessment

Course lLOs	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
C(1.1)		✓	✓					✓			
C(1.2)	✓	✓	✓	✓				✓	✓		
C(3.1)	✓		✓						✓		
C(4.1)	✓	✓	✓					✓	✓		
C(6.1)	✓		✓						✓		
C(6.2)		✓	✓	✓				✓			

b- Time schedule of assessment

Quizzes Quiz (1) Week (3)

	Quiz (2)	Week (10)
Discussions		Every week for any student
Sheets and Sketches		Week (2,3)
Researches and reports		Week (2,3)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

quizes	Quiz (1) Quiz (2)	(5) marks (5) marks	
Discussions	20%		
Sheets and Sketches	60%	10 marks	(50) marks
Researches and reports	20%		
Attendance		(10) marks	
Mid-term exam		(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.

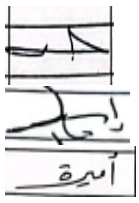
11- Facilities required for teaching and learning:

- 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 ministry of education	27/1/2008
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 1	Able to understand the design diverse aspects of development.
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 1	Able to understand the design diverse aspects of development.	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.
oc 2	Recognize how contribute with the latest business models concerning architectural design.	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.

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:

C5	Practice research techniques and methods of investigation as an inherent part of learning.
C7	Function efficiently as an individual and as a member of multi-disciplinary 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 modeling.	C7	Function efficiently as an individual and as a member of multi-disciplinary and multicultural teams.
C(8.1)	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 the course contents and the course LOs

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
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 2nd 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 hours		28	0	0	--

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

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

C(5.2)		✓						✓			✓	
C(7.1)		✓						✓	✓			
C(8.1)		✓						✓	✓	✓	✓	

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- Student assessment method

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

Course ILOs	quizzes	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)			✓				✓		✓	✓	

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	(20) marks	50 marks
Report Final Discussion	(30) marks	
Report Final Submission		(50) marks
Total		(100) marks

10- List of references:

a) Course notes

Lecture notes and handouts

b) Required books

- 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.
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- 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.
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	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	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. Ahmed Refaat
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department	Dr. Amera Marye
Date:	2022/2023

Ahmed

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
3	CECE 428	Power System Protection	Dr. Salem Abdel Aziz Fikri Ahmed Sheikh & Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
4	CECE 455	Selected topics in Electrical Power Engineering	Ass. Prof. Dr. Shady Abdel Aleem
5	CECE 491	Senior Project II	Ass. Prof. Dr. Shady Abdel Aleem & Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
6	CECE 424	Control System	Dr. Ehab Mohamed Nabil Ismail Abdel 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 ministry of education	27/1/2008
Date of course operation	2022-2023

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

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:

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.
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%.
oc 3	Able to understand equivalent circuit, Induction Motor Losses and Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque–speed Characteristics.
oc 4	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 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.
oc 5	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 diagram, Starting methods, Classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, Examples in motor performance.

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	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 OP 6	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.		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.
oc 4	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 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.	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.
oc 5	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 diagram, Starting	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.

	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.
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%.
CS(2.3,3.2)	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.
CS(2.4,3.3)	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 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.
CS(2.5,3.4)	Apply knowledge to present 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 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	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 objectives and the program objectives

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 CS3	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.
CS(2.3,3.2)	Apply knowledge to understand equivalent circuit, prepare and present induction Motor Losses and	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors,

	Efficiency, Torque Equation for an Induction Motor, Induction Motor Torque–speed Characteristics.		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.
CS(2.4,3.3)	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 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.	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.
CS(2.5,3.4)	Apply knowledge to present torque-speed characteristics, Speed control, Single-phase	CS2	Design, develop and make analysis through simulations for heavy equipment (generators, motors,

CS(2.6,3.5)	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 methods	CS3	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.
	Communicate effectively with classification of induction motors, High starting torque types, Performance with higher harmonics, Testing of induction motors, Examples in motor performance.	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.

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	Introduction: 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.	2	2	2	CS(2.1)
2	Rotating magnetic field, Analytical	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)
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 terminals during start, Minimum starting torque, Maximum starting torque, Load inertia, Process requirements, Economic aspect	2	2	2	CS(2.3,3.2)
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)
8	Midterm		1.0		
9	Focuses on Phase Induction Motor, Double revolving field theory, Torque, Equivalent circuits.	2	2	2	CS(2.4,3.3)
10	Torque speed curves, Phasor	2	2	2	CS(2.

	diagrams, The circle diagram.					4,3.3)
11	Focuses on Starting methods, Classification of induction motors, High starting torque types, Performance with higher harmonics.	2	2		2	CS(2.6,3.5)
12	Quiz (2) + Basic Principle of asynchronous Motor.	2	2		2	CS(2.6,3.5)
13	Focuses on Equivalent Circuit of a asynchronous Motor	2	2		2	CS(2.4,3.3)
14	Focuses on Solved examples on Equivalent Circuit of a asynchronous Motor.	2	2		2	CS(2.3,3.2)
15	Focuses on Applications of asynchronous Motors and examples on Torque speed curves, Phasor diagrams, The circle diagram.	2	2		2	CS(2.5,3.4)
16	Final Exam			2.0		
Total hours		28	28		28	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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(2.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.3,3.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.4,3.3)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.5,3.4)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

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

Course ILOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(2.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2.2,3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2.3,3.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2.4,3.3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2.5,3.4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

quizes	Quiz (1)	(5) marks	(40) marks
	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 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 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
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem
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 ministry of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

Course Name	Planning of Electrical Networks
Code	CECE 446
Course Level	Fifth level courses (Senior -2) - Second semester (Spring)
Credit Hours	3Cr. hr
Lectures	2hr
Tutorial	2hr
Lab	0hr
Total	4hr
Prerequisite	CECE 323
Instructor name/Email	Ass. Prof. Dr. Shady Abdel Aleem Shady.Sebai@sva.edu.eg

C- Professional 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 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	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.
oc 2	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.
		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 3	Recognize how to evaluate the peak demand and energy requirements of system using forecasting techniques.	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.
oc 4	Recognize how apply the developing of the solution methodology for optimizing the cost of power system under operation.	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.

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, 2.1)	Display the maximum demand, monthly consumption of electricity, demand factor, load factor and form factor from load curve.
CS(1.3, 2.2)	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.
CS(5.1, 6.1)	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, 6.2)	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.
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.
CS6	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

Course 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.
CS(1.2,2.1)	Display the maximum demand, monthly consumption of electricity, demand factor, load factor and form factor from load curve.	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.
CS(1.3,2.2)	Apply knowledge to draw chronological load curve for each type of load and total load, load duration curve, energy load curve and mass curve.	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.
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

CS(5.2,6.2)	of generation, annual total cost of operating a certain plant, fixed change rate factors and average cost of generated energy per year. Apply knowledge to determine the energy cost at load bus, increase of the cost/kwh at load bus due to transmission systems.	CS6 CS5 CS6	performing the development load lists, low voltage power systems, design 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 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

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

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical 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)
4	Quiz (1) + Power System expansion planning	2	2	2	CS(1.2,2.1)

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 hours		28	28	28	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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(1.2, 2.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(1.3, 2.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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.

10- Student assessment method

d- Assessment method and its relation to the Los of the course

Course ILOs	Tools of assessment											
	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)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(1.3,2 .2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(5.1,6 .1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(5.2,6 .2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

e- Time schedule of assessment

Quizzes	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)
Attendance		weekly

Mid-term exam		Week (8)	
final exam		Week (16)	

f- 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	▪ 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 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

program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem
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 ministry of education	27/1/2008
Date of course operation	٢٠٢١-٢٠٢٢

B-Basic Information

Course Name	Power System Protection
Code	CECE 428
Course Level	Fifth level courses (Senior -2) - Second semester (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 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**	
oc 1	Recognize the performance of protective relays, components of protection	OP 5	Prepare students for engineering analyses and problem-solving using

	scheme and relay terminology.		appropriate mathematical and computational methodologies.
		OP 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
oc 2	Able to understand relay construction and operating principles.	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 5	Prepare students for engineering analyses and problem-solving using appropriate mathematical and computational methodologies.
oc 3	Able to understand Over-current protection using electromagnetic and static relays and Over-current protective schemes.	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	Explain how to discuss types of electromagnetic and static distance relays, effect of arc resistance, power swings, line length	OP 7	Teach students to use experimental and data analysis techniques for electrical power 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.
oc 5	Able to understand pilot protection; wire pilot relaying and carrier pilot relaying.	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.
oc 6	Explain the principle of construction, operating principles, and performance of various differential relays for differential protection.	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.
oc 7	Explain the principle of protection of generators, motors, Transformer and Bus Zone Protection.	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- 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-

	current protection.
CS(3.2)	Display the basic for working the distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance relays.
CS(3.3,5.1)	Apply knowledge to understand the pilot protection; wire pilot relaying and carrier pilot relaying.
CS(3.4,5.2)	Prepare and present construction, operating principles, and performance of differential relays for differential protection.
CS(3.5,5.3)	Communicate effectively with protection of generators, motors, Transformer and Bus Zone Protection

5- Program competencies served by the course:

Upon the completion of the Program the student should 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	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(3.1)	Identifies the basic about the performance of protective relays, components of protection scheme and relay terminology overcurrent protection.	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)	Display the basic for working the distance relays and the effects of arc resistance, power swings, line length and source impedance on performance of distance	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation,

	relays.		transmission, control, and distribution systems.
CS(3.3,5.1)	Apply knowledge to understand the pilot protection; wire pilot relaying and carrier pilot relaying.	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.
CS(3.4,5.2)	Prepare and present construction, operating principles, and performance of differential relays for differential protection.	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.
CS(3.5,5.3)	Communicate effectively with protection of generators, motors, Transformer and Bus Zone Protection.	CS3	Identify problems and formulate engineering solutions to manage the engineering activity during the diverse phases of electric power generation,

	CS5	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- Course content and the relation between the course contents and the course LOs

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	Introduction: Need for protective schemes, Nature and Cause of Faults, Types of Faults, Effects of Faults, Fault Statistics, Zones of Protection, Primary and Backup Protection,	2	2	2	CS(3.1)
2	Focuses on Essential Qualities of Protection, Performance of Protective Relaying, Classification of Protective Relays, Automatic Reclosing, Current Transformers for protection, Voltage Transformers for Protection.	2	2	2	CS(3.1)
3	Focuses on Electromechanical Relays, Static Relays – Merits and Demerits of Static Relays, Numerical Relays, Comparison between Electromechanical Relays and Numerical Relays	2	2	2	CS(3.1)
4	Quiz (1) + Time – current Characteristics, Current Setting, Time Setting. Overcurrent Protective Schemes, Reverse Power or Directional Relay, Protection of Parallel Feeders, Protection of Ring Mains.	2	2	2	CS(3.1)
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, Effect of Arc Resistance on the Performance of Distance Relays, Reach of Distance Relays.	2	2	2	CS(3.3,5.1)
7	Focuses on the Effect of Power Surges (Power Swings) on Performance of Distance Relays, Effect of Line Length and Source Impedance on Performance of Distance Relays.	2	2	2	CS(3.3,5.1)
8	Midterm		1.0		
9	Introduction, Differential Relays, Simple Differential Protection, Percentage or Biased Differential Relay.	2	2	2	CS(3.4,5.2)
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		
Total 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 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(3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.3,5.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.4,5.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(3.5,5.3)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓

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.

9- Student assessment method

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

Course ILOs	Tools of assessment												
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling		
CS(3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
CS(3.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		

CS(3.3,5.1)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
CS(3.4,5.2)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
CS(3.5,5.3)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

quizes	Quiz (1)	(5) marks	
	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 exam		(15) marks	
final exam			(60) marks
Total			(100) marks

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.

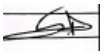
c) Recommend books d) Periodicals, Web sites, etc	Veerappan S.R. Krishnamurthy S. Chand 1 st Edition, 2009 ▪ Fundamentals of Power System Protection Y.G.Paithankar S.R. Bhide PHI 1 st Edition, 2009 Mentioned at time. No periodicals are needed.

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

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	

Course specification

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 ministry of education	27/1/2008
Date of course operation	٢٠٢١-٢٠٢٢

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:

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

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

	Course 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 & Structuring including issues on bankability and risk-mitigation	such systems.

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.),
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 site.
CS(2.3,3.2)	Differentiate between four main wind turbine design concepts, main differences, advantages, disadvantages.
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).
CS(1.2,2.5)	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),
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.
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.
CS(5.2,6.2)	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:

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.

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.
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.
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.
CS6	Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems

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

Course objectives		program objectives	
CS(1.1,2.1)	Identifies the basic definitions (power curve, overall efficiency, Betz limit, stall and pitch regulation, etc.),	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.
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 site.	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.
CS(2.3,3.2)	Differentiate between four main wind turbine design concepts, main differences, advantages, disadvantages.	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.
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	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.
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	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
		CS2	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.	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.
		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(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.	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.
		CS6	Review supplier 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.
		CS6	Review supplier documentation for compliance with specifications for electric power components of generation, transmission, control, and distribution systems

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

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

13	Focuses on Overview of Wind Turbines, Alignment of Rotating Axis.	2	2	2	CS(5.1,6.1)
14	Focuses on Speed of Rotation	2	2	2	CS(5.1,6.1)
15	Focuses on Assessment of FSWT and VSWT, Power Conversion, Control Actions	2	2	2	CS(5.2,6.2)
16	Final Exam		2.0		
Total 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 Outcomes (LOs)	/ face to face lectures	sheets/ sketch	project s	Proble m	Brain	Practic al: lab	Discov	Site visit	s/	Cooper ative	presen tation	Discus	modelli ng
CS(1.1,2.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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.

9- Student assessment method

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

Course ILOs	Tools of assessment

	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling
CS(1.1,2.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CS(2.2,3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
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	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

b- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

c- Grading system

quizes	Quiz (1)	(5) marks	(40) marks
	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 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 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 sh
- 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
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem
Date:	٢٠٢١/٢٠٢٢

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 ministry of education	27/1/2008
Date of course operation	2022-2023

B-Basic Information

Course Name	Senior Project II
Code	CECE 491
Course Level	Fifth level courses (Senior -2) - Second semester (Spring)
Credit Hours	2Cr. hr
Lectures	1hr
Tutorial	0hr
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 objectives:	
oc 1	Explain the principle of power system and to provide them with in depth knowledge of the distribution system.
oc 2	Recognize how cover types of distribution systems and networks, load characteristics and voltage levels
oc 3	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 software.
oc 4	Recognize the solar energy systems and linking them to the project.
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	Explain the principle of power system and to provide them with in depth knowledge of the distribution system.	OP 12	Prepare engineers who can work on electrical power 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 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 issue of industrial medium voltage distribution systems through case studies, practical design assignments and design verification using power system analysis software.		communication.
oc 4	Explain the principle of power system and to provide them with in depth knowledge of the distribution system.	OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such 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:

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 completion 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.
CS6	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

	Course objectives		program objectives
CS(2.1,3.1)	Apply knowledge to explain power system construction, function, voltage levels and load characteristics basic definitions and relevant equations.	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.
CS(2.2,3.2)	Prepare and present the principals of designing distribution systems consisting of dynamic and static loads.	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.
CS(5.1)	Explain the heighten awareness of distribution systems performance	CS5	Apply modern techniques, skills, and engineering tools while performing the 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.
CS(5.3,6.1)	Express the circuits analysis, machine, and power system analyses fundamentals in sizing distribution systems equipment.	CS5 CS6	Apply modern techniques, skills, and engineering tools while performing the development load lists, low voltage power systems, design 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 the course contents and the course LOs

Week No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs
1	HVAC, Types of HVAC systems, Chiller system, Firefighting, Basic components of a fire alarm system, Water pumps,	1	0	3	CS(2.1,3.1)

2	Improving power factor Fixed capacitors, Automatic capacitors bank, Distribution Board Design, Normal Power Distribution Board,	1	0	3	CS(2.2,3.2)
3	Emergency Power Distribution Board, Medium Voltage Switchgear (MVSG), Ring Main Unit (RMU).	1	0	3	CS(5.1)
4	Project progress seminar (4)	1	0	3	CS(5.1)
5	PV System:	1	0	3	CS(5.2)
6	Inverter Sizing, Battery Sizing, Solar Charger Sizing, …etc.	1	0	3	CS(5.2)
7	Project progress seminar (5)	1	0	3	CS(5.2)
8	Midterm- Break				
9	Solar Tracking System	1	0	3	CS(2.2,3.2)
10	Actuator Types, Axis of Rotation	1	0	3	CS(2.2,3.2)
11	Software & hardware, Solar sensor, …etc.	1	0	3	CS(5.3,6.1)
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 Company Registration, Purpose, and Functionality of PVHOME, …etc.	1	0	3	CS(5.3,6.1)
15	Writing project final report	1	0	3	CS(5.1)
16	Final Exam		2.0		
Total hours		14	0	42	--

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

Course learning Outcomes (LOs)	Teaching and Learning Methods												
	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(2.1,3.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(2.2,3.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.1)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
CS(5.2)	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
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.

10- Student assessment method

d- Assessment method and its relation to the Los of the course

Course ILOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	Discussions	Reports/ researches	presentation	modelling	
CS(2.1,3.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(2.2,3.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

2) CS(5.1)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
CS(5.2)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
CS(5.3,6.1)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

e- Time schedule of assessment

Quizzes	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)
Attendance		Weekly
Mid-term exam		Week (8)
final exam		Week (16)

f- Grading system

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

10- List of references:

a) Course notes
b) Required books

Lecture notes and handouts

- Egyptian Code & Regulations.
- Philips Lighting catalogue.
- Grounding and bounding electrical system book.
- Dr. Gilany Electrical design book.

c) Recommend books	▪ Schneider Electric Sockets Catalogue. ▪ Schneider circuit breaker catalogue 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	
program Coordinator	Dr. Ehab Mohamed Nabil Ismail Abdel Rasoul	Ehab
Head of the Department	Dr. Ibrahim Ali Mahmoud Abdel Dayem	
Date:	٢٠٢١/٢٠٢٢	

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 ministry of education	27/1/2008
Date of course operation	202١-202٢

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 ihab.nabil@sva.edu.eg

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

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.	OP 5	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	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 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.
		OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications
oc 4	Able to understand explain the fundamentals of z-transform technique and digital control systems.	OP 12	Prepare engineers who can work on electrical power systems, including designing and realizing such systems.
		OP 7	Teach students to use experimental and data analysis techniques for electrical power engineering applications
oc 5	Recognize how demonstrate the principles of stability analysis and steady-state errors of digital control systems.	OP 12	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 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 and realizing such systems.
oc 7	Explain how to get the stability test of 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 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 about State space modelling & analysis
CS(1.2)	Display the basic for the Controllability & observability
CS(1.3)	Demonstrate the State feedback & pole placement
CS(1.4)	Prepare and present knowledge of Dynamics Observers
CS(1.5)	Conduct and develop knowledge of INTEGRATED FULL-STATE FEEDBACK AND OBSERVER
CS(1.6)	Use the tool to enrich knowledge of Reduced Order Observer
CS(1.7)	Generate the design of Optimal LQR (Linear Quadrature Regulator)
CS(1.8)	Apply knowledge to check the Lyapunov Stability

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.

1- The relation between the course learning outcomes 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	CS1	Design and analyze the construction of systems to generate, transmit, control and distribution systems.
CS(1.5)	Conduct and develop 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 No.	Topic	Lecture hr.	Tutorial hr.	Practical hours	course LOs

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	Midterm		1.0		
9	Focuses on INTEGRATED FULL-STATE FEEDBACK AND OBSERVER	2	2	2	CS(1.5)
10	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	Focuses on Lyapunov Stability	2	2	2	CS(1.8)
16	Focuses on INTEGRATED FULL-STATE FEEDBACK AND OBSERVER		2.0		
Total hours		28	28	28	--

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

Course	Teaching and Learning Methods

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

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

d- Assessment method and its relation to the Los of the course

Course lLOs	Tools of assessment											
	quizzes	Mid -term exam	Final exam	sheets/ sketches	projects	Practical: lab	Oral exam	discussions	Reports/ researches	presentation	modelling	
CS(1.1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.2)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.3)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.4)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.5)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.6)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
CS(1.7)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

CS(1.8)	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

e- Time schedule of assessment

Quizzes	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)
Attendance		weekly
Mid-term exam		Week (8)
final exam		Week (16)

f- Grading system

quizes	Quiz (1)	(5) marks	
	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 exam		(15) marks	
final exam			(60) marks
Total			(100) marks

10- List of references:

a) Course notes	Lecture notes and handouts
b) Required books	Katsuhiko Ogata, “Modern Control Engineering”, fourth edition,2002.
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

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Date:	2022/2023