

Number of courses related to sustainability offered

Number of courses (2019) = 42

Department: Chemical Engineering

courses
Renewable and nonrenewable energy
Solar energy
Wind energy
Geothermal energy
Ocean energy
Hydropower energy
Energy from Biomass
Production of hydrogen and storage
Fuel cell

Department of Biotechnology

courses
Plant physiology
Bio fuel
Phytoremediation

Republic of Iraq
 The Ministry of Higher Education
 & Scientific Research



University: Al Nahrain
 College: Engineering college
 Department: Architecture
 Stage: Master
 Instructor name: Shaimaa Hameed Hussein
 Academic status: Assistant Professor
 Qualification: Doctorate
 Place of work: Architectural Engineering Dep

Urban Sustainability

Course Weekly Outline

Week	Topics Covered	Note
1	Sustainable Urban Design Strategies.	
2	Tactical Urbanism	books review
3	Green & Sustainable Cities	books review
4	Smart City Design Principles	books review
5	Resilient Design Principles & compact cities	books review
6	Sustainable Urban Dynamics	books review
7	Sustainable urban form& good city form	books review
8	Public good in the city	books review
9	LEED for Neighborhood Development	books review
10	Urban sprawl & high density	books review
11	Sustainable Urban Landscape - Theory and Method	books review
12	Biomimicry and urban design	books review
13	Exam	
14	Social responsibility	books review
15	Vibrant city	
16	Final exam	

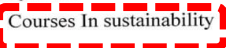
Department: Electronic and Communication Engineering

Week	Date	Topics Covered	Lab. Experiment Assignments	Notes
1.		Types of controlled switches and operation principles.	Single phase transformer principles.	
2.		Gate turn off Thyristors , Power MOSFET	DC machine principles and speed control	
3.		Diode rectifier , single phase rectifier	Induction machine operation methods	
4.		DC-DC Converters	Checking the Characteristic of controlled switches	
5.		DC-DC converter and applications	Design and application of single phase rectifier	
6.		Inverters principles	Operation of Boost DC-DC converter	
7.		Inverters principles and applications	Operation of Buck DC-DC Converter	
8.		Mid term examination	Mid term exam	
9.		Gate Drive circuits	Inverter operation and Control	
10.		Example for Gate drive circuit	Speed motor operation and control	
11.		Renewable sources general	Support motor operation and direction Control	
12.		Solar renewable energy	Design and application of renewable system part I	
13.		Photovoltaic renewable energy	Design and application of renewable system part II	
14.		Renewable energy operation and circuits	Final Term Exam	
15.		Final term examination		

Al-nahrain University		Study Plan for the B.Sc.				
College of Engineering		Academic year 2018-2019				
Department of Electronic and Communications Engineering		The Third Year				
The First Semester						
No.	Code	Subject	Hours per Week			Units
			Theory	Applied	Tutorial	
1	ECER310	Engineering Statistics and Probability	3	-	1	3
2	ECER311	Energy Conversion I	3	-	-	3
3	ECER312	Communication Systems I	3	3	1	4
4	ECER313	Electronics III	3	3	1	4
5	ECER314	Wave Propagation	2	-	-	2
6	ECER315	Microprocessor	2	3	-	3
7						
8						
Total			16	9	3	19
			28			
The total number of hours for the first semester is			420	hour.		

Department: Mechanical Engineering

Mechanical engineering Department



First: B.Sc.

Fourth Year Elective courses

1- Introduction to Renewable Energy

Introduction to renewable Energy, Photovoltaics, Wind power, Micro hydropower, Biomass energy, Waste power, Solar thermal power, Geothermal power, Ocean energy (tidal, tide-flow and wave), Ocean energy, Comparison of characteristics and cost of renewables, method of using the sun, wind, biomass, geothermal resources, and water to generate more sustainable energy., Energy from the sun is transferred and stored; used for heating, cooling, and lighting; collected and concentrated; and converted into electricity

2- Solar energy

Sun radiation measurements, Properties of photovoltaic devices, open circuit voltage and short circuit current, maximum power point (MPP), The efficiency of solar cells, parallel and series solar cells, shadow, temperature and dust effect, battery charging and control, off grid connection. on grid connection.

Second: M.Sc. Elective courses

1- Design of wind turbines

Historical applications of wind energy , Electrical Power from the Wind and the batteries ,Wind energy system (rotor blades, the tower, Mechanical Drive, Electrical System, etc) , Physical Principles of Wind Energy Conversion 9, 10 Basic concepts of wind energy Converters (turbines) , Aerodynamics of turbines , Using computer software for wind energy analysis, Electrical Power from wind energy, Electrical aspects of wind turbines, Wind turbine design, Wind turbine control. Wind turbine installation, siting, system design, integration and operation

2- Renewable Energy Sources

- **INTRODUCTION:** Energy demand growth and supply : Historical Perspectives ; Fossil fuels: Consumption and Reserve ; Environmental Impacts of Burning of Fossil fuels ; Sustainable Development and Role of 2- Renewable Energy
- **SOLAR ENERGY BASICS:** Solar geometry; Primary and Secondary Solar energy and Utilization of Solar Energy. Characteristic advantages and disadvantages. Low temperature applications: solar water heating, space heating, drying.
- **SOLAR THERMAL ELECTRICITY GENERATION:** Solar concentrators and tracking ; Dish and Parabolic trough concentrating generating systems, Central tower solar thermal power plants ; Solar Ponds.
- **SOLAR PHOTOVOLTAIC SYSTEMS:** Basic principle of power generation in a PV cell ; Band gap and efficiency of PV cells ; Manufacturing methods of mono- and polycrystalline cells ; Amorphous silicon thin film cells, Single and multi junction cells ; Application of PV ; Brief outline of solar, PV stand-alone system design ; Storage and Balance of system.
- **WIND Energy Systems:** Types of turbines, Coefficient of Power, Betz limit, Wind electric generators, Power curve; wind characteristics and site selection; Windfarms for bulk power supply to grid; Potential of wind electricity generation in India and its current growth rate.
- **BIOMASS ENERGY:** Biomass: Sources and Characteristics; Wet biogas plants ; Biomass gasifiers: Classification and Operating characteristics; Updraft and Downdraft gasifiers; Gasifier based electricity generating systems; Maintenance of gasifiers.
- **OCEAN ENERGY:** Tidal power plants : single basin and two basis plants, Variation in generation level ; Ocean Thermal Electricity Conversion (OTEC) ; Electricity generation from Waves : Shoreline and Floating wave systems.
- **GEOHERMAL ENERGY:** Geothermal sites in India ; High temperature and Low temperature sites ; Conversion technologies- Steam and Binary systems ; Geothermal power plants.

The number of sustainability-related courses that Al-Nahrain University studies for students during the academic year, which includes the following departments:

- Chemical Engineering
- Biotechnology
- Architecture Engineering
- Electronic and Communication Engineering
- Mechanical Engineering