UNIVERSITY OF AGRICULTURE, FAISALABAD
Faculty of Agricultural Engineering and Technology
Revised Scheme of Studies of B.Sc. Energy Systems Engineering

Existing w.e.f winter 2018-19 to spring 2027			**New Scheme of studies w.e.f Winter 2024-25**		
First Semester			**First Semester**		
Course No.	**Title of the Course**	**Credit Hours**	**Course No.**	**Title of the Course**	**Credit Hours**
Engineering Courses			**Engineering Courses**		
FMP-301	Metallurgy and Workshop Practices	3(2-1)	ESE-303	Introduction to Energy Systems Engineering	2(2-0)
SEE-301	Engineering Drawing and Graphics	2(1-1)	SEE-301	Engineering Drawing and Graphics	2(1-0)
Non-Engineering Courses			**General Education Courses**		
MATH-301	Linear Algebra and Calculus	3(3-0)	SOC-311	Introduction to Sociology	2(2-0)
PY-301	Applied Physics	3(2-1)	SSH-303	Ideology and Constitution of Pakistan	2(2-0)
CS-309	Fundamentals of Computer and programming	3(2-1)	PY-307	Fundamental of Natural Sciences	3(2-1)
AEE-317	Communication and Presentation Skills	3(2-1)	CS-305	Application to Information and Communication Technologies	3(2-1)
	Total Credit hours	**17(12-5)**	ENG-313	Functional English	3(3-0)
			Deficiency/ Compulsory Non-Credit Course		
			CHEM-308	Introduction to General Chemistry (Deficiency course for ICS students only)	**3(2-1)**
			TGM-301	Tutorial Group Meeting for Soft Skills	1(1-0) NCC
				TOTAL CREDIT HOURS	**17(14-3)**

Second Semester

Engineering Courses			**Engineering Courses**		
SEE-310	Engineering Mechanics	4(3-1)	ESE-306	Instrumentation Control and Automation	3(2-1)
SEE-304	Computer Aided Design	2(1-1)	SEE-304	Computer Aided Design	2(1-1)
ID-312	Fluid Mechanics	4(3-1)	ID-322	Fluid Mechanics	3(2-1)
Non-Engineering Courses			ESE-308	Energy Storage Technologies	2(2-0)
MATH-306	Differential Equations, Power Series, Laplace Transform	3(3-0)	**General Education Courses**		
STAT-312	Statistics and Probability	3(2-1)	EDU-306	Civics and Community Engagement	2(2 - 0)
ENG-302	English Composition and Comprehension	3(3-0)	FA-310	Introduction to arts and humanities	2(2-0)
	Total Credit hours	**19(15-4)**	ENG-314	Expository Writing	3(3-0)
				Total Credit hours	**17(14-3)**

Third Semester

Engineering Courses			**Engineering Courses**		
ESE-401	Basic Electrical Circuits and Network Analysis	4(3-1)	ESE-401	Basic Electrical Circuits and Network Analysis	3(2-1)
ESE-303	Introduction to Energy Systems Engineering	2(2-0)	FMP-409	Applied Thermodynamics	3(2-1)
FMP-401	Engineering Thermodynamics	3(2-1)	ESE-405	Boiler Engineering	3(2-1)
FMP-302	Manufacturing Engineering	3(2-1)	**General Education Courses**		
Non-Engineering Courses			IS-401/SSH-306	Islamic Studies/ Basic Ethics	2(2-0)
RS-415	Sociology for Engineers	2(2-0)	MATH-408	Quantitative Reasoning-I	3(3-0)
IS-401 or SSH-402	Islamic Studies or Ethics (for Non-Muslim students)	3(3-0)	**Allied/ Inter-disciplinary course**		
			BBA-403	Operations Management	2(2-0)
	Total Credit hours	**17(14-3)**		**Total Credit hours**	**16(13-3)**

Fourth Semester

Engineering Courses			**Engineering Courses**		
FMP-406	Instrumentation and Controls	3(2-1)	SEE-401	Engineering Mechanics	3(2-1)
SEE-402	Mechanics of Materials	3(2-1)	ESE-402	Heat and Mass Transfer	3(2-1)
ESE-402	Heat and Mass Transfer	3(2-1)	ESE-404	I.C. Engines	3(2-1)
ID-414	Engineering Numerical Analysis	3(2-1)	ESE-406	Wind and Hydropower Conversion	3(2-1)
ESE-410	I.C. Engines	3(2-1)	**General Education Courses**		
Non-Engineering Courses			BMS-402	Entrepreneurship	2(2-0)
SSH-302	Pakistan Studies	2(2-0)	STAT-408	Quantitative Reasoning-II	3(3-0)
BBA-403	Operations Management	2(2-0)		**Total Credit hours**	**17(13-4)**
	Total Credit hours	**19(14-5)**			

Fifth Semester

Engineering Courses			**Engineering Courses**		
ESE-501	Solar Energy Systems	4(3-1)	ESE-501	Solar Energy Systems	3(2-1)
ESE-503	Wind and Hydropower Conversion	4(3-1)	ESE-503	Power Plants Engineering	3(2-1)
ESE-505	Energy Storage Technologies	2(2-0)	ESE-505	Basic Electronics	3(2-1)
FMP-505	Boiler Engineering and Power Plants	3(2-1)	ESE-507	Intelligent Energy Systems	3(2-1)
ID-511	Remote Sensing and GIS	3(2-1)	**Allied/ Inter-disciplinary courses**		
Non-Engineering Courses			MATH-406	Differential Equations	3(3-0)
	Non-Engineering Elective Course	3(2-1)	STAT-312	Statistics and Probability	3(2-1)
	Total Credit Hours	**19(14-5)**		**Total Credit Hours**	**18(14-4)**

Sixth Semester

Engineering Courses			**Engineering Courses**		
ESE-502	Petroleum and Gas Exploration (shifted from 7th as major)	3(2-1)	ESE-502	Computational Analysis of Solar systems	2(1-1)
ESE-504	Bio-Energy Engineering	3(2-1)	ESE-504	Bio-Energy Engineering	3(2-1)
ESE-506	Heating, Ventilation and Air Conditioning Systems	4(3-1)	ESE-506	Heating, Ventilation and Air Conditioning Systems	3(2-1)
ESE-507	Power Transmission, Distribution and Utilization	3(2-1)	ESE-508	Power Transmission, Distribution and Utilization	3(2-1)
Non-Engineering Courses			ESE-510	Microbial Fuels and Bioenergy	3(2-1)
MICRO-501	Microbial Bioenergy and Biofuels	3(2-1)	**Multidisciplinary Engineering Courses**		
	Total Credit Hours	**16(11-5)**		MDE Elective-I	3(2-1)
			SEE-528	Occupational Health and Safety	1(1-0)
				Total Credit Hours	**18(12-6)**

Seventh semester

Engineering Courses			**Engineering Courses**		
ESE-601	Energy Conservation and Auditing	3(3-0)	ESE-601	Energy Conservation and Auditing	3(3-0)
ESE-603	Project and Report-I	3(0-3)	ESE-603	Final Year Design Project (FYDP)-I	3(0-3)
	Engineering Elective-I	3(2-1)		Engineering Elective-I	3(2-1)
	Engineering Elective-II	3(3-0)		Engineering Elective-II	3(3-0)
Non-Engineering Courses			**Multidisciplinary Engineering Courses**		
CHEM-307	Organic Chemistry	3(2-1)		MDE Elective-II	2(1-1)
	Total Credit Hours	**15(10-5)**	**Allied/ Inter-disciplinary course**		
			CHEM-405	Photoactive Materials and Their Characterization	3(2-1)
			Deficiency/ Compulsory Non-Credit course		
			IS-402/SSH-403	Quran Translation ((ترجمته القرآن) / Interfaith Harmony	1(1-0)

				Total Credit Hours	**17(11-6)**

Eighth semester					
Engineering Courses			**Engineering Courses**		
ESE-602	Power Electronics	3(2-1)	ESE-602	Power Electronics	3(2-1)
ESE-604	Energy Economics, Policy and Management	3(3-0)	ESE-604	Energy Economics, Policy and Management	2(2-0)
ESE-606	Project and Report-II	3(0-3)	ESE-606	Final Year Design Project (FYDP) –II	3(0-3)
	Engineering Elective-III	3(2-1)		Engineering Elective-III	3(2-1)
	Engineering Elective-IV	3(3-0)		Engineering Elective-IV	3(3-0)
	Total Credit Hours	**15(10-5)**	**Allied/ Inter-disciplinary course**		
			PY-302	Environmental Physics	2(2-0)
			Deficiency/ Compulsory Non-Credit course		
			IS-403	Roohaniat (روحانیت) *(Deficiency/ Compulsory Non-Credit course)*	1(1-0)
				Total Credit Hours	**16(11-5)**

Total Credit Hours for B.Sc. Energy Systems Engineering = 136			**Total Credit Hours for B.Sc. Energy Systems Engineering = 137**		
Note:			**Note:**		
1. A supervised internship training to be arranged by the Institution after sixth semester as the requirement of the degree (Grades: Excellent, Good, Satisfactory)			**1. A supervised internship training to be arranged by the Institution after the sixth semester as the requirement of the degree (Grades: Excellent, Good, Satisfactory)**		
2. Project and Report will be completed in two semesters i.e. 7th and 8th.			**2. Project and Report will be completed in two semesters i.e. 7th and 8th.**		
Non-Engineering Elective			**MDE Elective - I**		
CHEM-405	Photoactive Materials and Their Characterization	3(2-1)	FMP-516	Industrial Engineering and Management	3(2-1)
PY-302	Environmental Physics	3(2-1)	SEE-507	Environmental Management System in Industry	3(2-1)
Engineering Elective-I			**MDE Elective - II**		
ESE-605	Renewable Energy Systems	3(2-1)	FMP-627	Artificial Intelligence and Robotics	2(1-1)

ESE-607	Hydrogen and Fuel Cells	3(2-1)	SEE-523	Environmental Engineering	2(1-1)
ESE-614	Control Systems	3(2-1)	ID-421	Pumps and Tubewells	2(1-1)
Engineering Elective-II			**Engineering Elective-I**		
ESE-609	Geothermal and Tidal Energy	3(3-0)	ESE-605	Renewable Energy Systems	3(2-1)
ESE-610	Nano Technology and Energy	3(3-0)	ESE-614	Control Systems	3(2-1)
FMP-501	Machine Design	3(3-0)	ESE-612	Clean Coal Technology	3(2-1)
Engineering Elective-III			**Engineering Elective-II**		
ESE-612	Clean Coal Technology	3(2-1)	ESE-609	Geothermal and Tidal Energy	3(3-0)
ESE-611	Fuels and combustion	3(2-1)	ESE-610	Nano Technology and Energy	3(3-0)
ESE-615	Electrical Machines	3(2-1)	FMP-501	Machine Design	3(3-0)
Engineering Elective-IV			**Engineering Elective-III**		
ESE-613	Dynamics and Mechanisms of Machinery	3(3-0)	ESE-607	Hydrogen and Fuel Cells	3(2-1)
ESE-608	Nuclear Energy Engineering	3(3-0)	ESE-611	Fuels and combustion	3(2-1)
SEE-609	Environmental Impact Assessment	3(3-0)	ESE-615	Electrical Machines	3(2-1)
			Engineering Elective-IV		
			ESE-613	Petroleum and Gas Exploration	3(3-0)
			ESE-608	Nuclear Energy Engineering	3(3-0)
			SEE-609	Environmental Impact Assessment	3(3-0)