

Programme Template

1. Name of the Programme and Code	<i>Master of Technology in Renewable Energy Technologies and Management</i> ESR
2. Degree (UG/PG)	PG
3. Minimum Duration of the Programme (Specify for FT and PT, if applicable)	2 years, FT 3 years, PT
4. Maximum Duration of the Programme (Specify for FT and PT, if applicable)	3 years, FT 5 years, PT
5. Capacity (Max. Student Strength) of the Programme	35 (Sponsored International Working Professionals)
6. Number of Regular Faculty Members Involved as Teaching Faculty in the Programme	23 (As of November 05, 2025)
7. Minimum Credit Requirements for the Degree	60

8. Articulate the Program Learning Outcomes (PLO): *Graduates of this program will be able to:*

Abbreviation	Description
PLO1	Model and analyze energy systems to assess strategies for the efficient use, storage, and management of energy resources.
PLO2	Analyze the technical and economic feasibility of renewable energy systems, assess project viability, and evaluate the project development and financing approaches
PLO3	Design and operate renewable energy devices and integrated systems.
PLO4	Develop expertise in carrying out independent research and conveying findings through oral and written communication methods

9. Map PLOs with Institute Learning Outcomes (ILOs) of the Degree

[Indicate '1' for weak, '2' for good, and '3' for excellent relation. Leave the cell blank to indicate no relation]

	PLO1	PLO2	PLO3	PLO4
ILO1	3	2	2	1
ILO2	1	1	2	3

10. Number of Programme Core (Non-Project)	19
11. Number of Programme Elective	24
12. Number of Open Credits	0
13. Number of Project Core Credits	3 + 3 + 6 + 5 = 17
14. Details of Creative Expression and Ethical Reasoning (CEER) Component in the Programme [Only for UG]	
Number of Credits Assigned	N/A
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. ...

15. Details of Emerging Trends (ETT) Component in the Programme [Only for UG]

Number of Credits Assigned	N/A
Courses Involved and Credits Accounted [e.g., <i>If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)</i>]	1. xxx (Z1 credits) 2. xxx (Z2 credits) 3. ...

16. Details of Environment and Sustainability (E&S) Component in the Programme [Mandatory for UG]

Number of Credits Assigned	
Courses Involved and Credits Accounted	ESL7339: Bio-energy: Resources, Technologies & Applications (3 credits) ESL 7365: Solar Thermal and Photovoltaic Technologies (3 credits) ESL 7368: Wind and Small Hydro Energy Systems (3 credits) ESP 7305: Renewable Energy Laboratory (3 credits) and many more courses in the elective list

17. Details of Research/Technical Communication Component in the Programme [Only for PG]

Number of Credits Assigned	
Courses Involved and Credits Accounted	1. ESL7349: Developing Energy Efficiency and Renewable Energy Projects (0.5 credits) 2. ESD7952: Cornerstone project (ESR) (Winter) (1 credits) 3. ESD7995: Minor Project – I (ESR) (0.5 credits) (Winter) 4. ESD7996: Summer Internship (ESR) (0.5 credits) 5. ESD7998: Minor project – II (ESR) (0.5 credits) 6. ESD8951: Major Project Part-I (ESR) (1 credits) 7. ESD8952: Major Project Part-II (ESR) (2 credits)

18. Details of Professional Ethics Component in the Programme [Only for PG]

Number of Credits Assigned	
Courses Involved and Credits Accounted <i>[e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]</i>	1. ESN7001: Ethics in Science and Engineering (1 credit)

19. Details of External Connect Component in the Programme [Only for PG]

Number of Credits Assigned	
Courses Involved and Credits Accounted <i>[e.g., If one module in AMLXXX with contact hours YY satisfies Z credits, then write AMLXXX (Z credits)]</i>	- ESD7952: Cornerstone project (ESR) (Winter) (1 credits) - ESD7996: Summer Internship (ESR) (0.5 credits) - ESD8951: Major Project Part-I (ESR) (1 credits) - ESD8952: Major Project Part-II (ESR) (2 credits) For (1) and (2): Both has option to have connect industry / other AU / other universities in India / or However, there will be a mentor from DESE faculty and will also need to have to make a department presentation front of an evaluation panel set-up by the department getting the credits (as will be done for 3 and 4).

20. List of prescribed courses in all baskets (BS, GE, DC/PC, DE/PE, ...)

Basic Sciences (BS)	General Engineering (GE)	Departmental/Programme Core (DC/PC)			Departmental/Programme Elective (DE/PE)		
		ESD7952	Cornerstone Project (ESR) (Winter)	0-0-10	ESD8952	Major Project Part -II (ESR)	0-0-24
		ESD7995	Minor Project – I (ESR)	0-0-6	ESS8951	Independent Study (ESR)	0-3-0
		ESD7996 / ESD7998	Summer Internship (ESR) / Minor Project – II (ESR)	0-0-6	ESV8191	Special Topics on Emerging Trends in Energy and Environmental Technologies	1-0-0

		ESD8951	Major Project Part-I (ESR)	0-0-12			
		ESL7002	Introduction to Project Management	3-0-0	Elective Module A: Renewable Energy and Environment Technologies		
		ESL7339	Bio-energy: Resources, Technologies and Applications	3-0-0	ESL7130	Direct Energy Conversion	3-0-0
		ESL7365	Solar Thermal and Photovoltaic Technologies	3-0-0	ESL7176	Industrial Energy and Analysis	3-0-0
		ESL7368	Wind and Small Hydro Energy Systems	3-0-0	ESL7275	Liquid Sprays for Energy Sector and Industrial Applications	3-0-0
		ESL7742	Economics and Financing of Renewable Energy Systems	3-0-0	ESL7280	Zero Emission Vehicles	3-0-0
		ESN7001	Ethics in Science and Engineering	1-0-0	ESL7281	Alternative Fuels for Aircraft and Rocket Propulsion	3-0-0
		ESN7003	Technical Writing	1-0-0	ESL7329	Renewable Energy and Environment	3-0-0
		ESN7004	Basic Thermal Engineering (for non-Mechanical students)	1-0-0	ESL7332	Bioconversion and Processing of Waste	3-0-0
		ESN7412	Basic Electrical Engineering (for non-Electrical students)	1-0-0	ESL7346	Hydrogen Energy	3-0-0
		ESN7891	Applied Mathematics and Computational Methods	1-0-0	ESL7352	Emerging Materials for Next Generation Photovoltaic Applications	3-0-0
		ESP7305	Renewable Energy Laboratory	0-0-6	ESL7353	Solar Thermal Technologies and Systems	3-0-0
					ESL7355	Solar Photovoltaic Devices and Systems	3-0-0
					ESL7390	Atomistic Simulations for Energy Applications	2-1-0
					ESL7399	Solar Architecture	3-0-0
					ESL7418	Power Generation, Transmission and Distribution	3-0-0
					ESL7421	Pulse Width Modulation Techniques and AC Motor Drives	3-0-0
					ESL7491	Renewable Energy Integration and Power Systems	3-0-0

					ESL7496	Operation and Control of Electrical Energy Systems	3-0-0
					ESL7497	Operation of Electrical Energy Systems with Large Scale Integration of Renewable Energy Sources	3-0-2
					ESL7498	Distributed and Decentralized Energy Systems	3-0-0
					ESL7499	Essentials of Electrical Power Generation by Renewable Energy Sources	2-0-2
					ESL7537	Plasma Based Materials Processing	3-0-0
					ESL7544	Plasma for Energy and Environment	3-0-0
					ESL7660	Electrochemical Science and Engineering for Energy Applications	3-0-0
					ESL7672	Energy Storage	3-0-0
					ESL7673	Battery Storage	3-0-0
					ESL7679	Li-ion Batteries: Technology and Thermal Management	3-0-0
					ESL7871	Instrumentation and Control in Energy Systems	3-0-0
					ESL8142	Negative CO2 Emission Technologies	3-0-0
					ESL8145	Net Zero Emission Buildings	3-0-0
					ESL 8275	Alternative Fuels for Transportation	3-0-0
					ESL8350	Solar Refrigeration and Air-conditioning	3-0-0
					ESL8380	Solar Thermal Power Generation	3-0-0
					ESL8385	Solar Industrial Process Heating	3-0-0
					ESL8455	Solar Photovoltaic Power Generation	3-0-0
					ESP7306	Renewable Energy Simulation Laboratory	0-0-6
					Elective Module A: Programme Electives from Other Departments [subject to		

					confirmation from respective departments]		
					ASL760	Renewable Energy Meteorology	3-0-0
					CHL7407	Hydrogen, Electrolyser, and Fuel Cell Technology	3-0-0
					ELL7521	Power Quality	3-0-0
					EEL765	Smart Grid Technology	3-0-0
					PYL7127	Energy Materials and Devices	3-0-0
					Elective Module B: Policy and Management		
					ESL7349	Developing Energy Efficiency and Renewable Energy Projects	3-0-0
					ESL7351	Renewable Energy Resource Assessment and AI/ML tools Forecasting	3-0-0
					ESL7357	Renewable Energy Regulations and Law	3-0-0
					ESL7490	Policy and Regulatory Aspects of Power System Operation with Increasing Renewable Energy Share	3-0-0
					ESL7750	Economics and Planning of Energy Systems	3-0-0
					ESL7752	Carbon Accounting, Reporting and Markets	3-0-0
					ESL7756	Energy Policy and Planning	3-0-0
					ESL7774	Quantitative Methods for Energy Mgmt. & Planning	3-0-0
					Elective Module B: Programme Electives from Other Departments		
					MSL802	Management of Intellectual Property Right	3-0-0
					MSV822	Contemporary Issues in Economic Policy	1-0-0
					SPL7720	Energy and Infrastructure Finance: A Public Policy Lens	3-0-0
					SPL722	Managing the Energy Transition	3-0-0

					SPL7724	Electricity Reforms in Renewables-era	3-0-0	

21. Nominal Semester-wise Academic Plan [*An example is provided below*]

Proposed Semester wise Course Distribution: ESR (FT)

SEMESTER	Courses (Number, Abbreviated Title, L-T-P, credits)							Lecture Course s	Contact hrs/week				Credits
	L	T	P	Total									
I	ESL7339 Bio-energy: Resources, Technologies & Applications (3-0-0) 3	ESL7365 Solar Thermal and Photovoltaic Technologies (3-0-0) 3	ESL7368 Wind Energy and Hydro Power Systems (3-0-0) 3	ESL7742 Economics and Financing of Renewable Energy Systems (3-0-0) 3	ESN7001 Ethics in Science and Engineering (1-0-0) 1	ESN7004 Basic Thermal Engineering/ ESN7412 Basic Electrical Engineering (1-0-0) 0	ESN7891 Applied Mathematics and Computational Methods (1-0-0) 0	7	15	0	0	15	13
WINTER	ESD7952 Cornerstone Project (ESR) (Winter) (0-0-10) 5 [2 credits to be completed within winter break]							0	0	0	4	4	2
II	ESL7002 Introduction to Project Management (3-0-0) 3	ESP7305 Renewable Energy Laboratory (0-0-6) 3	PE-1 (3-0-0) 3 [Elective Module A]	PE-2 (3-0-0) 3 [Elective Module A]	PE-3 (3-0-0) 3 [Elective Module B]	ESN7003 Technical Writing (1-0-0) 0	ESD7952 Cornerstone Project (ESR) (Winter) (0-0-10) 5 [remaining 3 credits to be completed within 2 nd semester]	5	13	0	12	25	18
SUMMER	ESD7996 Summer Internship (ESR) / ESD7998 Minor Project Part – II (ESR) (0-0-6) 3							0	0	0	6	6	3
III	ESD7995 Minor Project Part - I (ESR) (0-0-6) 3	ESD8951 Major Project Part-I (ESR) (0-0-12) 6				PE-4 (3-0-0) 3 [Elective Module B]		1	3	0	18	21	12
IV	ESD8952 Major Project Part-II (ESR) (0-0-24) 12 [with option to carry out in the home country for a foreign national student with provision for presentations through video conference]							0	0	0	24	24	12
	PE-5 (3-0-0) 3 [Elective Module A/B]	PE-6 (3-0-0) 3 [Elective Module A/B]	PE-7 (3-0-0) 3 [Elective Module A/B]	PE-8 (3-0-0) 3 [Elective Module A/B]			4	12	0	0	12		
Total													60

NOTE:

The elective courses have been divided into two baskets with students to take at least 2 from Module A and 2 from Module B.

Elective Module A: Renewable Energy and Environment Technologies

Elective Module B: Policy and Management

Proposed Semester wise Course Distribution: ESR (PT)

SEMESTER	Courses (Number, abbreviated title, L-T-P, Credits)					Lecture Courses	Contact h/week				Credits	
							L	T	P	Total		
I	ESL7339 Bio-energy: Resources, Technologies & Applications (3-0-0) 3	ESL7365 Solar Thermal and Photovoltaic Technologies (3-0-0) 3	ESL7368 Wind Energy and Hydro Power Systems (3-0-0) 3	ESN7004 Basic Thermal Engineering / ESN7412 Basic Electrical Engineering (1-0-0) 0	ESN7891 Applied Mathemat ics and Computat ional Methods (1-0-0) 0	5	11	0	0	11	9	
II	ESL7002 Introduction to Project Management (3-0-0) 3	ESP7305 Renewable Energy Laboratory (0-0-6) 3	ESN7003 Technical Writing (1-0-0) 0	ESN7001 Ethics in Science and Engineering (1-0-0) 1		3	5	0	6	11	7	
III	ESL7742 Economics and Financing of Renewable Energy Systems (3-0-0) 3	PE-1 (3-0-0) 3 [Elective Module A]	PE-2 (3-0-0) 3 [Elective Module B]			3	9	0	0	9	9	
WINTER	ESD7952 Cornerstone Project (0-0-10) 5 [2 credits to be completed within winter break]					0	0	0	4	4	2	
IV	PE-3 (3-0-0) 3 [Elective Module A]	PE-4 (3-0-0) 3 [Elective Module B]	ESD7952 Cornerstone Project (Winter) (0-0-10) 5 [remaining 3 credits to be completed within 2 nd semester]			2	6	0	6	12	9	
SUMMER	ESD7996 Summer Internship / ESD7998 Minor Project Part - II (0-0-6) 3					0	0	0	6	6	3	
V	ESD7995 Minor Project Part - I (ESR) (0-0-6) 3		ESD8951 Major Project Part-I (ESR) (0-0-12) 6			0	0	0	18	18	9	
VI	ESD8952 Major Project Part-II (ESR) (0-0-24) 12					0	0	0	24	24	12	
	PE-5 (3-0-0) 3 [Elective Module A/B]	PE-6 (3-0-0) 3 [Elective Module A/B]	PE-7 (3-0-0) 3 [Elective Module A/B]	PE-8 (3-0-0) 3 [Elective Module A/B]		4	12	0	0	12		
Total												60

NOTE:

The elective courses have been divided into two baskets with students to take at least 2 from Module A and 2 from Module B.
 Elective Module A: Renewable Energy and Environment Technologies
 Elective Module B: Policy and Management

22. Average Contact Hours per Faculty <i>per Week</i> , for this Programme	2 h approx.
23. Average Credit Students per Faculty per Semester, for this Programme	52 credits approx.
24. If the program is a revision of an existing program, please list the major changes made.	✓ Inclusion of ethics course. ✓ Introduction to summer internships. ✓ Inclusion of cornerstone projects. ✓ Based on the basket of programme

	elective courses taken by the students, the department will certify the specialization in the respective domain* .
25. Please elaborate on,	
a) how flexibility for the students has increased?	✓ Programme Electives has two modules (A and B) from which registered students have to take two Programme Electives from each of Module A and Module B.
b) how engagement and interaction with the student have increased?	✓ Increased practical / laboratory and project contact hours (20 credits) compared to core lecture contact hours (16 credits).
c) how hands-on learning is emphasized in the program?	✓ The Corner-stone project has been allotted the maximum number of credits and it is expected to allow students to try to make some prototypes relevant to the energy sector towards the end of the tenure of the project. ✓ Higher credits dedicated to in Summer and Winter internships. Sponsored students will have the option to work with their sponsored

The overall credits structure for M. Tech. in Renewable Energy Technologies and Management (Programme Code: ESR)							
Programme Core (PC): ESR				Program Electives in Module A (From the Department): [Contd.]			
ESD7952	Cornerstone Project (ESR) (Winter)	0-0-10	5	ESL7673	Battery Storage	3-0-0	3
ESD7995	Minor Project Part – I (ESR)	0-0-6	3	ESL7679	Li-ion Batteries: Technology and Thermal Management	3-0-0	3
ESD7996 / ESD7998	Summer Internship (ESR) / Minor Project Part – II (ESR)	0-0-6	3	ESL7871	Instrumentation and Control in Energy Systems	3-0-0	3
ESD8951	Major Project Part -I (ESR)	0-0-12	6	ESL8142	Negative CO2 Emission Technologies	3-0-0	3
ESL7002	Introduction to Project Management	3-0-0	3	ESL8145	Net Zero Emission Buildings	3-0-0	3
ESL7339	Bioenergy: Resources, Technologies and Applications	3-0-0	3	ESL 8275	Alternative Fuels for Transportation	3-0-0	3
ESL7365	Solar Thermal and Photovoltaic Technologies	3-0-0	3	ESL8350	Solar Refrigeration and Air-conditioning	3-0-0	3
ESL7368	Wind and Small Hydro Energy Systems	3-0-0	3	ESL8380	Solar Thermal Power Generation	3-0-0	3
ESL7742	Economics and Financing of Renewable Energy Systems	3-0-0	3	ESL8385	Solar Industrial Process Heating	3-0-0	3
ESN7001	Ethics in Science and Engineering	1-0-0	1	ESL8455	Solar Photovoltaic Power Generation	3-0-0	3
ESP7305	Renewable Energy Laboratory	0-0-6	3	ESP7306	Renewable Energy Simulation Laboratory	0-0-6	3
Total PC			36				
Bridge Audit Courses (BA): ESR (Based on Student's background and preparedness)				Program Electives in Module A (From outside the Department) [subject to confirmation from respective departments]			
ESN7003	Technical Writing	1-0-0	0	ASL760	Renewable Energy Meteorology	3-0-0	3
ESN7004	Basic Thermal Engineering (for non-Mechanical students)	1-0-0	0	CHL7407	Hydrogen, Electrolyser, and Fuel Cell Technology	3-0-0	3
ESN7412	Basic Electrical Engineering (for non-Electrical students)	1-0-0	0	ELL7521	Power Quality	3-0-0	3
ESN7891	Applied Mathematics and Computational Methods	1-0-0	0	EEL765	Smart Grid Technology	3-0-0	3
				MCL825	Design of Wind Power Farms	3-0-2	4
Total PC (including bridge audit courses)			36	PYL7127	Energy Materials and Devices	3-0-0	3
Programme Electives (PE): ESR				Elective Module B: Policy and Management			
ESD8952	Major Project Part -II (ESR)	0-0-24	12	Program Electives in Module B (From the Department)			
ESS8951	Independent Study (ESR)	0-3-0	3	ESL7349	Developing Energy Efficiency and Renewable Energy Projects	3-0-0	3
ESV8191	Special Topics on Emerging Trends in Energy and Environmental Technologies	1-0-0	1	ESL7351	Renewable Energy Resource Assessment and AI/ML tools Forecasting	3-0-0	3
				ESL7357	Renewable Energy Regulations and Law	3-0-0	3
Elective Module A: Renewable Energy and Environment Technologies				ESL7490	Policy and Regulatory Aspects of Power System Operation with Increasing Renewable Energy Share	3-0-0	
Program Electives in Module A (From the Department):				ESL7750	Economics and Planning of Energy Systems	3-0-0	3
ESL7130	Direct Energy Conversion	3-0-0	3	ESL7752	Carbon Accounting, Reporting and Markets	3-0-0	3
ESL7176	Industrial Energy and Analysis	3-0-0	3	ESL7756	Energy Policy and Management	3-0-0	3
				ESL7774	Quantitative Methods for Energy Mgmt. & Planning	3-0-0	3
ESL7275	Liquid Sprays for Energy Sector and Industrial Applications	3-0-0	3	Program Electives in Module B (From outside the Department) [subject to confirmation from respective departments]			
ESL7280	Zero Emission Vehicles	3-0-0	3	MSL704	Science and Technology Policy Systems	3-0-0	3
ESL7281	Alternative Fuels for Aircraft and Rocket Propulsion	3-0-0	3	MSL801	Technology Forecasting and Assessment	3-0-0	3
ESL7329	Renewable Energy and Environment	3-0-0	3	MSL802	Management of Intellectual Property Right	3-0-0	3
ESL7332	Bioconversion and Processing of Waste	3-0-0	3	MSV822	Contemporary Issues in Economic Policy	1-0-0	3
ESL7346	Hydrogen Energy	3-0-0	3	SPL7720	Energy and Infrastructure Finance: A Public Policy Lens	3-0-0	3
ESL7352	Emerging Materials for Next Generation Photovoltaic Applications	3-0-0	3	SPL722	Managing the Energy Transition	3-0-0	3
ESL7353	Solar Thermal Technologies and Systems	3-0-0	3	SPL7724	Electricity Reforms in Renewables-era	3-0-0	3
ESL7355	Solar Photovoltaic Devices and Systems	3-0-0	3				
ESL7390	Atomistic Simulations for Energy Applications	2-1-0	3				
ESL7399	Solar Architecture	3-0-0	3				
ESL7418	Power Generation, Transmission and Distribution	3-0-0	3				
ESL7421	Pulse Width Modulation Techniques and AC Motor Drives	3-0-0	3				
ESL7491	Renewable Energy Integration and Power Systems	3-0-0	3				
ESL7496	Operation and Control of Electrical Energy Systems	3-0-0	3				
ESL7497	Operation of Electrical Energy Systems with Large Scale Integration of Renewable Energy Sources	3-0-2	4				
ESL7498	Distributed and Decentralized Energy Systems	3-0-0	3				
ESL7499	Essentials of Electrical Power Generation by Renewable Energy Sources	2-0-2	3				
ESL7537	Plasma Based Materials Processing	3-0-0	3				
ESL7544	Plasma for Energy and Environment	3-0-0	3				
ESL7660	Electrochemical Science and Engineering for Energy Applications	3-0-0	3				
ESL7672	Energy Storage	3-0-0	3				

Category	PC	PE	OE	Total
Credits	36	24	0	60

* The department specialization will be certified based on the basket of program elective courses which are mentioned below. The format of the course numbers are mentioned ESLWXYZ, the first number (W) is the level of the course whereas the second number (X) will indicate particular areas (basket) and will be the following:

▪ Fundamentals	: X = 0
▪ Energy & Environment	: X = 1
▪ Combustion	: X = 2
▪ Renewable Energy Technology	: X = 3
▪ Electrical Energy and Renewable Energy Power Systems	: X = 4
▪ Plasma Science and Technology	: X = 5
▪ Energy Storage	: X = 6
▪ Energy Economics, Planning, Policy and Management	: X = 7
▪ Other Areas	: X = 8
▪ Projects	: X = 9