



المعهد الهندي للتكنولوجيا دلهي
أبوظبي

INDIAN INSTITUTE OF TECHNOLOGY DELHI
ABU DHABI

Master of Technology (M.Tech.) in Energy Transition and Sustainability



Agriculture



Industries



Transportation



Buildings/
Infrastructure

IIT Delhi - Abu Dhabi

Master of Technology (M.Tech)

Energy Transition and Sustainability

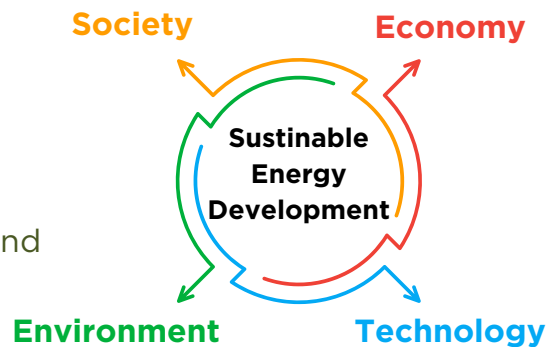
VISION



Train students from diverse background to contribute in Energy Transition initiatives



Create multidisciplinary and system-level perspectives on technology, economics, policy, and environmental sustainability



INTERDISCIPLINARY APPROACH



Improved and Cost-effective Technologies

Renewable Energy Integration, Dynamic Loads



Centralized and Decentralized Electricity options

Situation Aware Consumers



New Business Model

Regulatory Framework



Specializations Offered

1. **Technologies for Decarbonisation**
2. **Economics, Policy and Planning for Energy Transition**



M. Tech. (ET&S)

Program Learning Outcomes

- Acquire advanced knowledge and understanding of principles, theories, practices, and interrelationships between energy, environment, sustainability.
- Evaluate the vital need and multifaceted routes for the energy transition considering interplay between technology, economics, social and policy perspectives of sustainability.
- Model and optimize complex multi-energy systems for different end use applications.
- Conduct in-depth financial feasibility studies in sustainable energy transition.
- Apply diverse range of computational and technological resources in solving problems.
- Conduct comprehensive research by critically examining existing body of knowledge to identify gaps and formulate innovative solutions and ideas.
- Apply ethical principles and knowledge of relevant regulatory frameworks in decision-making related to energy transition and sustainability at an advanced level.
- Demonstrate proficiency in written and verbal communication with the ability to effectively convey complex concepts, data, and solutions to diverse audiences.
- Demonstrate leadership competencies in fostering a culture of sustainability in relevant professional environments.

Career Opportunity



Industry, Clean Energy Technology, EPC Contractors (System Design, Erection and commissioning, Operation and maintenance, Manufacturing)



NGOs/Think Tanks (Energy policy advocacy, Start-up ideas, Energy solutions)



Academia / Research Organizations (Higher studies, Energy system design, Technology Research, Cleantech Start up)



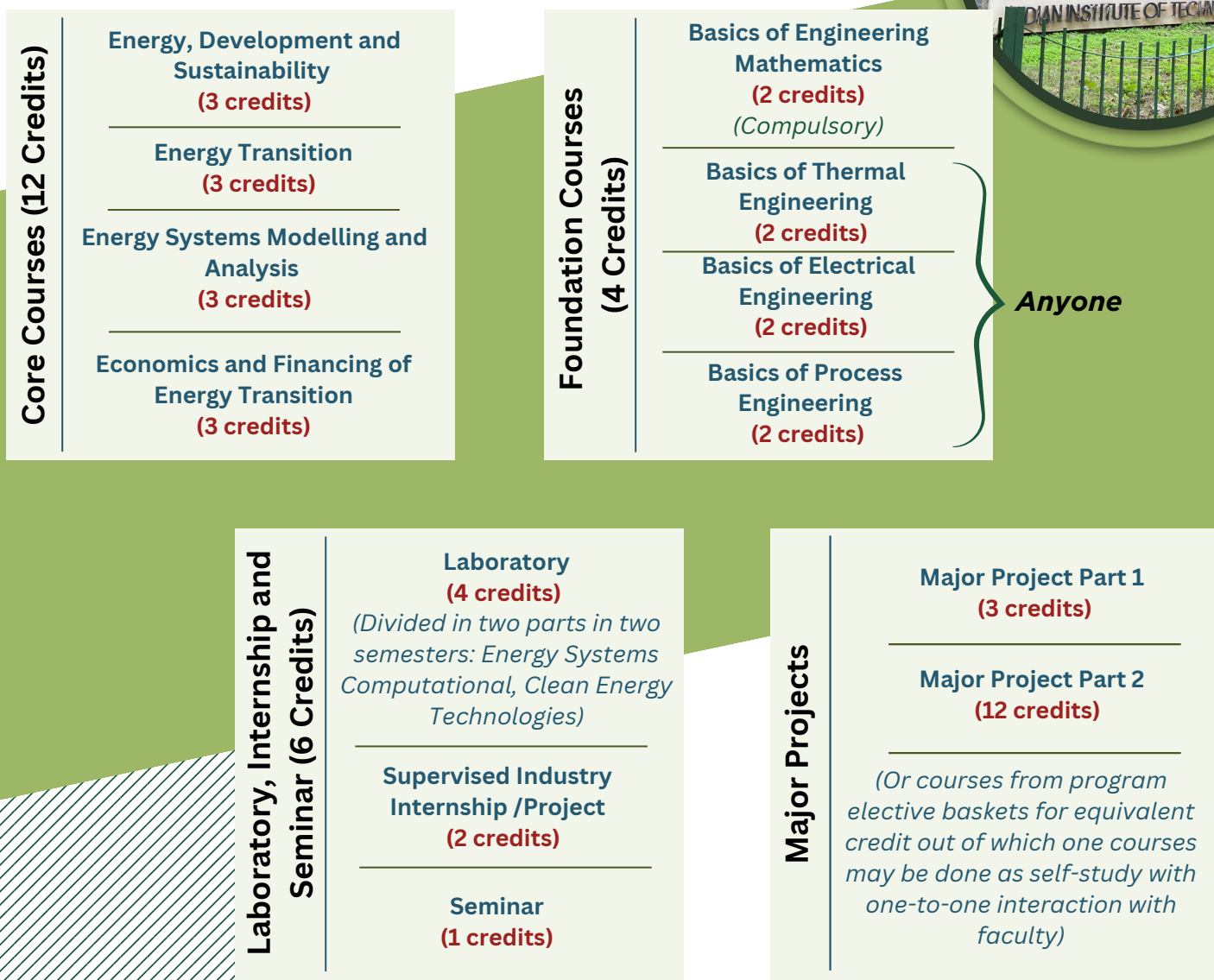
Govt. Consultancy (Project Development, Energy/ Carbon Markets, Policies)



Course Classification

Type	Total number of Courses	Total number of Credits
Program Core	4	12
Foundation	2	4
Program Elective	5	15
Laboratory	2	4
Research Project	2	15 (3+12)
Seminar	1	1
Supervised Industry Internship/Project	1	2
Short Term Courses	As per requirement (no credits)	
Total number of Credits		53

Program Structure



Program Elective Courses

(5 Courses to be chosen)

Specialization 1: Technologies for Decarbonization

- Low Carbon Technologies
- Decarbonizing Fossil Fuel Sector
- Science of Climate Change
- Carbon Capture, Utilization and Sequestration
- Hydrogen Energy Technologies
- Process Intensification
- AI Guided Energy Transition
- Energy Efficiency
- Solar Photovoltaic Systems and Applications
- Power Systems and Renewable Integration
- Electrochemical Energy Storage for Stationary and Mobility Applications
- Hybrid Energy Systems and Microgrids
- Waste to Energy
- Forecasting for Power System Operation and Planning
- Energy Conversion Systems
- Special Topics in Renewable Energy *
- Special Topics in Decarbonization *
- Special Topics in Sustainability *

Specialization 2: Economics, Policy, and Planning for Energy Transition

- Low Carbon Technologies
- Decarbonizing Fossil Fuel Sector
- Science of Climate Change
- Developing Renewable Energy Projects
- Circular Economy and Energy Transition
- Energy Policy and Planning
- Governing the Energy Transition
- Electricity Markets and Power System Operations
- Carbon Markets
- Power System Planning
- Forecasting for Power System Operation and Planning
- Carbon Accounting and Reporting
- Regulatory, Policy, and Legal Aspects of Energy Transition
- Special Topics in Renewable Energy*
- Special Topics in Decarbonization *
- Special Topics in Sustainability

**Courses on special topics may be delivered by experts visiting the campus.*

Students may opt to do M. Tech. in Energy Transition and Sustainability without any specialization. In that case, students would be allowed to choose a combination of courses from both the specialization baskets.



Program Elective Courses

ADDITIONAL PROGRAM ELECTIVE COURSES

- Solar Thermal Technologies and Applications
- Wind Energy Conversion Systems
- Principles of Electrochemical Energy Conversion and Storage Devices
- Sustainable Transportation
- Nuclear Energy
- Environmental Assessment Methodologies for Sustainability
- Energy, Environment, Climate Change and Sustainability
- Energy from Biomass
- Waste management
- Power Electronics applications to Energy Systems
- Clean Combustion Technologies
- Energy in buildings
- Sustainable Technology Options for Comfort Cooling
- Renewable Energy Meteorology
- Advanced Energy Material

Above additional program electives may be offered based on minimum course strength and interests of the students.

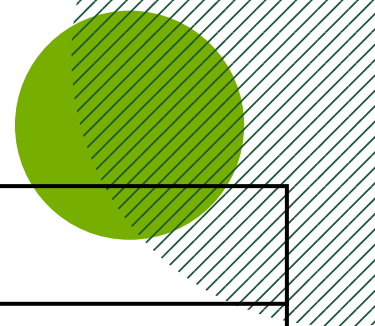
OVERALL SEMESTER-WISE COURSE DISTRIBUTION

Sem	Courses						No. of Lecture	Contact hours				Credits
								L	T	P	Total	
I	Energy, Development and Sustainability (3-0-0)	Engineering Mathematics (2-0-0)	(Any One) Basics of Thermal Engineering/ Basics of Electrical Engineering/ Basics of Process Engineering (2-0-0)	Energy Transition (3-0-0)	Field Visits/ Short Terms courses (need based)	4	10		0	10	10	
II	Energy Systems Modeling and Analysis (3-0-0)	Economics and Financing of Energy Transition (3-0-0)	PE-1 (3-0-0)	PE-2 (3-0-0)	Energy Systems Computational Lab (1-0-3)	4	13		3	16	14.5	
	Supervised Industry Internship / Project										2	
III	PE-3 (3-0-0)	PE-4 (3-0-0)	Major Project-1 (0-0-6)	PE-5 (3-0-0)	Energy Transition Laboratory (0-0-3)	Seminar (0-0-2)	3	9		11	20	14.5
IV	Major Project Part-2 (0-0-24)/ courses from program elective baskets for equivalent credit, one course may be done as self-study with one-on-one interaction with faculty.									24	24	12



Admission Criteria

(for session starting in **January 2024**)



Part I: Eligibility Criteria			
Qualifications requirement	Four-year Bachelor's degree in any of the engineering disciplines or Four-year Bachelor's degree in any of the following science disciplines or equivalent: physical science, chemical science, environmental science, earth science or Candidates holding a three-year Bachelor's degree in engineering or science disciplines must have completed at least a two-year Master's degree in any of the following science disciplines or equivalent: physical science, chemical science, environmental science, earth science.		
CGPA requirement	Cumulative grade point average (CGPA) of 7.5/10, or 3.0/4.0, or graduating aggregate marks of [75%] or above, or equivalent in the qualifying degree.		
Language proficiency	3.1 Minimum proficiency in English as per the below requirement. The test must be taken within the last 2 years from any certified provider.		
	EmsAT Score of 1400 on the English language	TOEFL Score of 550 or equivalent such as (213 CBT, 79 iBT)	IELTS Overall score of 6.0 in IELTS academic
	3.2 Candidates who have completed undergraduate education in an English-medium institution and have met all the criteria but do not have a valid English language proficiency test score yet, may be conditionally admitted to the program with the requirement to submit evidence of minimum English Language proficiency score as stated in 3.1 within the first semester to confirm the admission.		
	3.3 Candidates who have completed all their schooling (K-12) plus a Bachelor's degree in an English-medium institution in English-Speaking countries (e.g. UK, USA, Australia, New Zealand) might be allowed admission into the graduate program without demonstrating TOEFL score of 550 (or equivalent).		
Work Experience / Graduate aptitude test score	4.1. Minimum one-year relevant work experience 4.2. Candidates with less than one year experience are required to demonstrate a minimum score of 350 in Graduate Aptitude Test in Engineering (GATE) or a minimum quantitative score of 150 in the Graduate Record Examination (GRE).		

Part II: Admission Procedure

Submission of the application	<p>Submission of the documents (specified in Part III) are done through the portal IIT Delhi Abu Dhabi (abudhabi.iitd.ac.in) by Monday, 27th November 2023</p> <p>https://abudhabi.iitd.ac.in/postgraduate-programs</p>
Shortlisting	<p>Applicants to the program would be shortlisted based on the submission of the required evidence for eligibility defined in Part I. The shortlisted candidates will be invited to the concluding phase in the admission process as follows:</p>
Interview and/or written test	<p>3.1 Shortlisted candidates with minimum one year of relevant work experience would be invited for an interview.</p> <p>3.2 Shortlisted candidates with less than one year work experience and a minimum score of 350 in Graduate Aptitude Test in Engineering (GATE) or a minimum quantitative score of 150 in the Graduate Record Examination (GRE) would be invited to take a written test to demonstrate knowledge of engineering concepts linked to energy and sustainability followed by an interview</p>
Notification on admission	<p>Successful candidates will receive an official notification on admission by 15th December 2023</p>

Part III: Required Documents

Graduation documents	<p>1.1 Certified copy of the degree certificate 1.2 Copies of official transcript of records certified by the competent authority</p> <p>All documents submitted must be in English or notarized translation. The degrees and transcripts issued by the UAE Higher Education Institution must be attested by the UAE Ministry of Education. For a foreign university degree, an equivalency letter from the UAE Ministry of Education is required. In case of admission, the candidate will be given a conditional status to give enough time to the applicant to process the equivalency application with the MoE UAE.</p> <p>Note: Candidates should have completed all requirements of qualifying degree before joining the program and provide a certificate of completion/ qualifying degree within (maximum) one month of the date of registration for the program.</p>
Reference Letters	<p>Candidate must provide full names and contact details (email, phone number, official address, work affiliations, relationship to the applicant) of at least two referees from current or former supervisors of academic or any other course work, or employers. The referees will be requested to provide recommendation letters on candidates by email prior to the interviews. The referees would be requested to comment on the candidate's motivation, aptitude, proficiency in the chosen field, potential for research and critical thinking.</p>
Statement of Purpose	<p>A statement of purpose in 500-1000 words.</p>
Proof of language proficiency	<p>English language proficiency test score issued within 2-years on the date of application or proof to support the exemption request</p>
Proof of employment experience/ Graduate aptitude score report	<p>5.1. A certificate from the employer or 5.2. GATE scorecard or GRE score report</p>
Sponsorship letter, if any	<p>A letter from the sponsor confirming coverage of expenses and tuition fees and agreement to fully relieve candidate from job obligations by granting a study leave for a minimum period of 2 years.</p>

Experience Sharing from students of similar programs at IIT Delhi



Trishti Gupta
Software Engineering
Specialist
GE Digital

I pursued my masters in Energy and Environment Technology & Management programme from Department of Energy Science and Engineering, IIT Delhi. The interdisciplinary course provided us with knowledge of not only the Energy domain but also helped us extend our expertise in the core electrical/mechanical domain. I would like to extend my heartfelt appreciation to faculty who dedicated their time and expertise to shape our education. All my career growth is based on the strong power system knowledge I acquired with my M.Tech courses. I am forever grateful to the department for shaping me into the engineer I am today.

I want to express my deepest gratitude to International Solar Alliance (ISA), the sponsor of the Master of Technology (MTech) program in Renewable Energy and Management pursued from the Department of Energy Science and Engineering (DESE) at the Indian Institute of Technology Delhi (IITD), India from September 2020 to September 2022. The program has equipped me with useful knowledge and skills in my daily duties at the Energy Regulation Board (ERB), Zambia. I can devise solutions to the challenges faced by policymakers, regulators, investors and industry players, and consumers of renewable energy technologies in Zambia. The MTech program is all-encompassing on renewable energy, from cutting-edge technologies to economic and financing of projects. MTech in Renewable Energy and Management is a very useful program for career development and knowledge enhancement in renewable energy. The sponsorship came at the right time, as Zambia is transitioning to renewable energy to meet its energy requirements.



Boyd Chilembo
Energy regulation
Board, Zambia



Pradeep Mallick
Lead Engineer
John Deere

I am deeply grateful for the transformative experience I had during my master's program at IITD. It was an incredible experience, studying at this premier institution at a time when the world was embracing renewable energy initiatives and we were sphere heading this shift. The curriculum's perfect blend of theoretical knowledge and practical applications equipped me with a comprehensive understanding of my field. Moreover, I am thankful for the opportunities to engage in professional networking and collaborative research, skills that have proven invaluable in my career at John Deere. The supportive faculty and stimulating academic environment have not only shaped my professional journey but have also instilled in me a profound sense of innovation and collaboration. I am proud to be an alumnus of IIT Delhi, and I carry the lessons and values from my education here into every endeavour.



Experience Sharing from students of similar programs at IIT Delhi

I feel privileged to have pursued my Master's at IIT Delhi's Department of Energy Science and Engineering, gaining valuable knowledge and experience. The program's interdisciplinary design enhanced my ability to synthesize concepts across domains, enriching my learning. The experience gained from this program also enhanced my performance during my PhD at NTU Singapore. What stood out was the faculty's approachability and attentiveness, ensuring that I developed critical thinking and analytical skills. I am profoundly grateful for IIT Delhi's faculty guidance, which greatly bolstered my research abilities. Additionally, I found great enjoyment in interacting with my peers whose feedback and ideas enhanced my growth.

For new students, my foremost advice is not to doubt your abilities and consider a PhD or Masters as a valuable learning process. Additionally, to enhance your critical thinking abilities, actively engage in discussions with peers.



Anshuman Singh
Research Scholar
NTU Singapore



Teddy Omoregbee
Principal Electrical
Engineer
Federal Ministry of
Power, Abuja, Nigeria

I had my M.Tech in Renewable Energy Technologies and Management from the Indian Institute of Technology, Delhi. (2019 - 2021) I was privileged to be among the pioneer batch of this program which was sponsored by the International Solar Alliance (ISA). The program has impacted me so much with knowledge of Renewable Energy design and implementation. I learnt the use of various designs and analytical softwares.

IITD was also a fantastic community with vast opportunities to resources for research and development it gave me the opportunity to realize my potentials. My minor Project was Review and Analysis of Energy Policy and Regulations with special reference to Renewable Energy in Nigeria working on this gave me a deeper understanding of my Country's energy policies and I came up with a recommendation of Establishment of the Nigerian Ministry of New and Renewable Energy. My major Project was Design and Techno-Economics of Hybrid Mini-Grid for Electrification of Un-Electrified Village Clusters in Nigeria my analysis was done using the HOMMER Pro software.

Some recommendations from my project work are currently being implemented in my country. I remain grateful to IITD and ISA for this opportunity to become a better Engineer.





Visit website for more details

<https://abudhabi.iitd.ac.in/postgraduate-programs>



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