

(It will be applied from 2019-2020 Fall)

**İZMİR INSTITUTE OF TECHNOLOGY
GRADUATE SCHOOL OF ENGINEERING AND SCIENCES
GRADUATE PROGRAMS AT THE DEPARTMENT OF
ENERGY ENGINEERING**

GRADUATE CIRRICULUM

MS. in Energy Engineering

Core Courses

ENE 500	M.S. Thesis	(0-1)NC	26
*ENE 599	Research Seminar	(0-2)NC	8
ENE 501	Fundamentals of Energy Engineering	(3-0)3	8
**ME 599	Methods and Ethics in Engineering Research	(0-2)NC	3
**CHE 591	Technical Writing and Ethical Issues	(3-0)3	8
ENE 8XX	Special Studies	(8-0)NC	4

*All MS students must register Research Seminar course until the beginning of their 4th semester.

** One course should be taken from the group.

Students in interdisciplinary programs register in the 8XX course in the department of their advisors.

Total minimum credit (min) : 21

Number of courses with credit (min) : 7

Elective Courses

ENE502	Advanced Engineering Thermodynamics	(3-0)3	8
ENE 509	Numerical Fluid Mechanics	(3-0)3	8
ENE 510	Fundamentals of Wind Energy Systems	(3-0)3	8
ENE 511	Wind Energy Meteorology	(3-0)3	8
ENE 512	Wind Turbine Aerodynamics I	(3-2)4	8
ENE 513	Wind Turbine Aerodynamics II	(3-2)4	8
ENE 520	Biomass Energy and Technologies	(3-0)3	8
ENE 521	Thermochemical Conversion of Biomass	(3-0)3	8
ENE 522	Modelling and Simulation of Bioenergy Processes	(3-0)3	8
ENE 530	Fundamentals of Photovoltaic Systems	(3-0)3	8
ENE 531	Power Systems Analysis	(3-0)3	8
ENE 540	Geothermal Energy and Environment	(3-0)3	8
ENE 541	Geothermal Power Plants	(3-0)3	8
ENE 556	Energy Engineering Workshop	(1-4)3 Pre. Cont. of the Inst.	8
ENE 572	Energy Economics and Management	(3-0)3	8
ENE 580	Special Topics in Energy Engineering	(3-0)3	8
ENE 590	Technical Report Writing	(0-2)NC	8

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biological and thermochemical process routes will be clarified. In modern biorefinery concepts, both process types are often combined. Combustion, carbonization, gasification, pyrolysis, and hydrothermal conversion. Biorefineries and biorefinery integration. Techno-economic analysis. Engineering calculations related to thermochemical conversion of biomass.

ENE 522 Modelling and Simulation of Bioenergy Processes (3-0)3 AKTS:8

Thermochemical conversion of biomass and related process configurations, modelling the processes with solid feedstocks, modelling of unit operations, flowsheeting, mass and energy balance calculations.

ENE 530 Fundamental of Photovoltaic Systems (3-0)3 AKTS:8

Semiconductor materials and their electronic, optical, physical and chemical properties, electronic structures, 1st and 2nd generation solar cells, design and modeling of c-Si based solar cells, solar panel design and installation principles.

ENE 531 Power Systems Analysis (3-0)3 AKTS:8

Introduction to power systems (Turkish and EU systems as examples, grid codes, integration of renewable power plants), fundamental concepts, power in single and three-phase circuits (Transmission lines, transformers, synchronous machines, wind turbines, PV units), load flow analysis, symmetrical three-phase short circuit calculations, contributions of wind turbines to symmetrical three-phase faults, power system stability, using a simulation tool for load flow and short circuit analysis.

ENE 540 Geothermal Energy and Environment (3-0)3 AKTS:8

Geothermal energy, distribution of geothermal system in the World, utilization of geothermal energy, tectonic properties of geothermal system, conception model of geothermal system, hydrogeochemical properties of geothermal system, environmental concerns and environmental impact assessment

ENE 541 Geothermal Power Plants (3-0)3 AKTS:8

Introduction to geothermal energy. Cycles: geothermal power cycles, energy and exergy analysis. Fluid mechanics, single and two phase pipe flow. Mass transfer and waste heat rejection: cooling towers, condensers. Gas extraction systems. Field trip. Term project.

ENE 556 Energy Engineering Workshop (1-4)3 AKTS:8

A group/individual design project. The design effort will integrate many aspects of the student's engineering background, including design concepts, technical analyses, economic and safety considerations, etc. A formal report and oral presentation are required.

Pre. Consent of the Instructor

ENE 572 Energy Economics and Management (3-0)3 AKTS:8

Introduction to energy economics and management. Economics and decision making. Investment decisions and analysis. Techniques used in energy economics and management. Break-even analysis. Linear programming. Special problems of linear programming. Pricing.

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ENE 580 Special Topics in Energy Engineering (3-0)3 AKTS:8

Directed group study of special topics in energy engineering

ENE 590 Technical Report Writing (0-2)NC AKTS:8

Conducting and preparing journal papers, reports and thesis. Methods of research. Procedures for drafting, outlining and revision. Design of layouts. Extensive writing. Practice with journal papers and reports.