

İTÜ



Role of the EU Framework Programmes in İTÜ's R&D Strategy

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İSTANBUL TECHNICAL UNIVERSITY

History



Imperial School of Naval Engineering
1773 ▶



School of Architecture
1847 ▶

Ottoman | Republic

Acquired the University Status
1928 ▶

4+2 BSc/MSc
1971 ▶



ABET Sub. Equiv. Accreditation
2004 ▶ Full ABET Accreditation
2011 ▶

1795 ▶

Imperial School of Military Engineering



1883 ▶

Imperial Academy of Civil Engineering

1944 ▶

Istanbul Technical University



1996 ▶

Education Reform

2010 ▶

100% English Programs

239 Years

Academic Staff

2200 Academic members

Undergraduate Education

40 Degree Programs, 19000 students

Graduate Education

144 graduate degree programs, 7000 students

6 Graduate Institutes

- *Science and Technology*
- *Social Sciences*
- *Energy*
- *Earth Sciences*
- *Informatics*
- *Earthquake Eng. and Disaster Management*

Alumni

130 000 graduates, 2 former Presidents and 3 Prime Ministers of Turkey



Our Vision

- Full integration to the European Research Area with interdisciplinary research
- Managing **the change in full** cooperation with local and global stakeholders

Our Mission in Compliance with Horizon 2020 Priorities

- Science and knowledge with long term public welfare in mind
 - “Excellence in Science”
 - “Better Society”
- Full penetration of scientific methods to all societal levels
 - “Competitive Industries”

New Perspectives

- Focus on thematic areas
 - Energy and Environment
 - Telecommunication
 - Materials Science
 - Health/Bioengineering
 - Complemented by Social Science Programs and Research
- Increased interdisciplinary research

New Perspectives

- Improve infrastructure
- Remove barriers to research
 - Improve habitat
 - Reduce course load
 - Increase funding and mobility

EU FP Projects @ ITU –Current State

- Lagging behind other major Turkish universities in applications per faculty
- Success due to individual initiatives, not a concerted effort
- Faculty unaware of breadth of EU support
- Need strong improvement in Implementation and Impact Maximization aspects of research

EU Horizon 2020 and İTÜ's New R&D Strategy: Excellence in Science

- Full utilization of *Marie Curie* programs for mobility
 - Career Integration Grants for all new hires
 - Training and Career
 - Staff Exchange (IRSES) for eligible departments
- Continued emphasis of İTÜ on *Research Infrastructure*

EU 2020 Priority: Industrial Competitiveness/Leadership

- *Leadership in enabling and industrial technologies*
 - Intersection with our thematic focus areas: advanced materials and biotechnology

EU 2020 Priority: Societal Challenges

- *Health, demographic change and well-being;*
 - Intersection with our thematic focus areas: health and improving social sciences at ITU
- *Secure, clean and efficient energy*
 - Intersects with our thematic focus area: Energy and Environment

Impact Maximization

- ITU's New Perspectives will focus on maximizing the benefits of R&D on society
- EU FPs has helped and will continue to help in communicating science to the society, along with technical, financial, and social benefits

ITU Laboratories

- Over 360 research laboratories with 4000 state-of-the-art equipment
- All infrastructure is available to serve researchers in other universities and industry



Main Research Areas and Centers

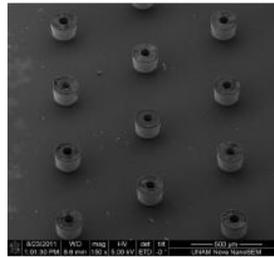
- Nanotechnology research and fabrication Facility
- MEMS Research Center
- Energy Institute
- National Research Center for Membrane Technologies
- Surface and Colloid Chemistry Research Group
- Advanced Mineralogy Mineral Deposit R&D Center
- Earthquake and Disaster Management Institute
- Eurasia Institute of Earth Sciences
- National Center for High Performance Computing
- Mechatronics Education and Research Center
- Molecular Biology-Biotechnology&Genetics Research Center
- Center for Satellite Communications and Remote Sensing
- Controls and Avionics Laboratory
- Aeronautics Research Center

Nanotechnology Research and Fabrication Facility



- Full scale nanofabrication facility
- 400 m² “class 100” and “class 1000” clean rooms
- E-beam lithography, thin film deposition tools, physical and chemical characterization equipment
- Project and reservation-based facility

MEMS Research Center



Full scale microfabrication facility, 100 m² “class 1000” clean room

Research Areas

- ✓ Microfluidics systems
- ✓ Compliant microsystems
- ✓ Nano-on-micron surface tech
- ✓ BioMEMS
- ✓ Dye sensitized solar cells
- ✓ Textile-MEMS

Main Current Projects

- Dielectrophoresis for Cell Handling Applications
- Biosensor through Integration of Microchannel on Non-woven Textile Surfaces
- Microscale Combustion of Liquid Hydrocarbons with Electro spray Technique

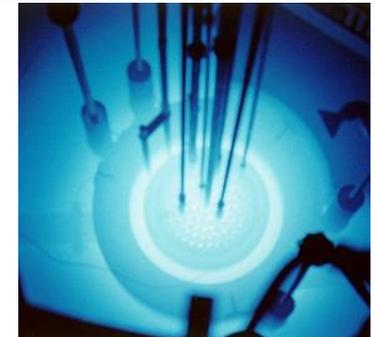
Energy Institute

Research Groups

- Nano Energy Research Group
- New Energy Technologies Research Group
- Wind Energy Research Group
- Carbon Based Materials and Hydrogen Research Group
- Wave and Ocean Current Energy Research Group

- Energy Economy Research Group
- Energy Planning and Modelling Research Group

- Nuclear Technics Research Group
- Radiation Protection and Radioecology Research Group
- Radiological Materials Research Group



Current Industrial R&D Projects

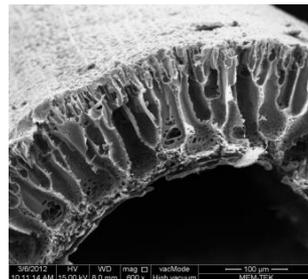
- **Battery Management Systems for GSM Base Stations and Electrical Vehicles**
(supported by *ERİCOM Telecom. & Energy Tech. Inc., TOFAŞ-FIAT*)
- **High Precision SOC and SOH Monitoring of Batteries by Impedance Analysis**
(supported by *İNCİ AKÜ*)
- **Design and Development of New Generation of Ground Source Heat Pumps**
(supported by *BAYMAK*)
- **Design of LED Armatures** (supported by *VESTEL*)

National Research Center for Membrane Technologies

- Dedicated Research Center for Design, fabrication and analysis of Membrane Technology

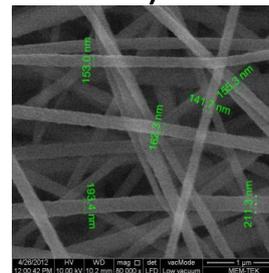
Main Research Projects

- ✓ Flat Plate Membrane Production
- ✓ Hollow Fiber Membrane Production
- ✓ Nanofiber Membranes by Electrospinning
- ✓ Spiral Membrane Design and Production
- ✓ Small and Big Scale Cross-flowed Membrane fabrication
- ✓ Nano-ceramic based membranes



Main Research Interests

- ✓ Production of polymeric, ceramic and composite membranes
- ✓ membranes in wastewater and drinking water systems
- ✓ new methods to prevent membrane fouling
- ✓ Lab and pilot scale membrane applications
- ✓ Membrane autopsy
- ✓ Microbial Fuel Cells and hydrogen production)



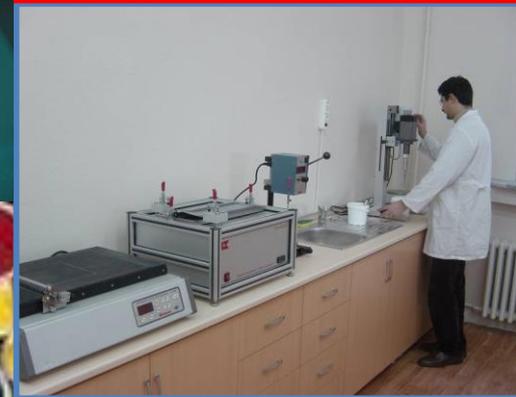
Surface and Colloid Chemistry Research Group

Research Areas

- ✓ Surface&Interface Chemistry
- ✓ Production of Nano and Micro Particles
 - ❖ Enrichment/purification, synthesis and characterisation
- ✓ Nanostructured materials, Rheology
 - ❖ Water and solvent based paints,
 - ❖ Composites, coatings and films,
- ✓ Nanoscale applications
 - ❖ Atomic Force Microscopy,
 - ❖ Force Spectroscopy,
 - ❖ Nanoindentation.

Main Current Projects

- ✓ Use of fibrous sepiolite clay in ceramic adhesives,
- ✓ Clean coal technologies,
- ✓ Development of boron containing water based paints
- ✓ Controlling surface energies of nanostructured materials,
- ✓ Role of surface roughness in flotation and flocculation processes
- ✓ Mesoporous and nanosilica production from waste plant sources
- ✓ Adhesion and compatibility measurements by AFM Force Spectroscopy



Advanced Mineralogy Mineral Deposit R&D Center

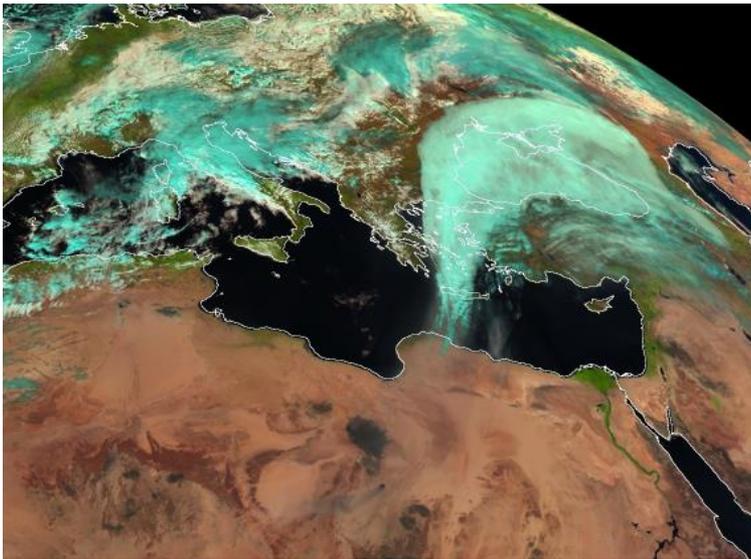
Project Topics

- ✓ Advanced microscopy
- ✓ Geochemistry
- ✓ Elementary research
- ✓ X-Ray mineralogy
- ✓ Organic biogeochemistry
- ✓ Precious and semi precious stone

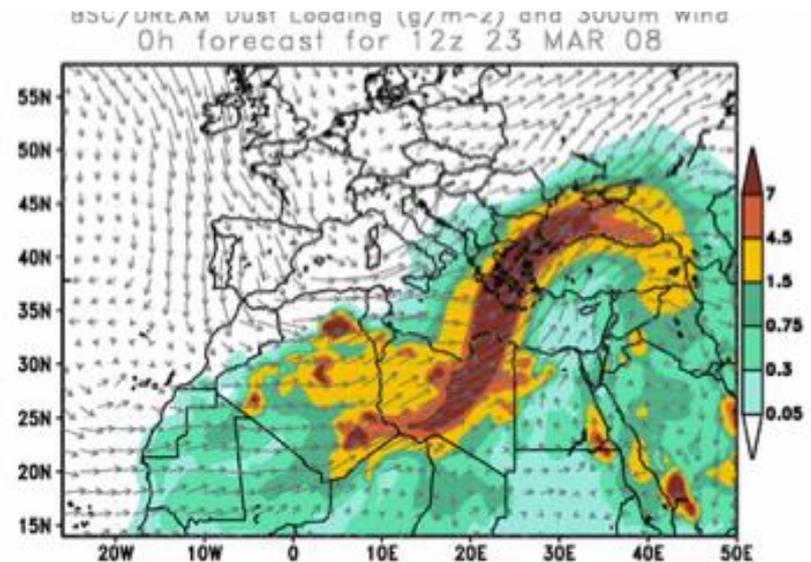


Eurasia Institute of Earth Sciences

Researchers at Eurasia Institute of Earth Sciences aims to understand, forecast and develop mitigation measures for human-induced and natural environmental change at local to global scales with a special emphasis on atmosphere. To tackle such a challenge, we utilize numerical methods to investigate earth system including interactions and feedbacks that link climate change to air pollution.



Saharan dust transport to Istanbul on 23 March 2008 12:00
Satellite Image Met-9 RGB



Dust loading (g/m^2) for the selected episode by BSC/DREAM Model

Impact of Saharan Dust on Eastern Mediterranean: Atmospheric Modeling Framework (Meteorology, Emission, and Air Quality Model and Climatological Evaluation)

National Center for High Performance Computing

- Six Computing systems including GPGPU cluster
- Approximately 700 TB of storage space
- Lustre file System
- IB Performance network
- 41 server cabinets cooled by a cooling system 2 million BTUs

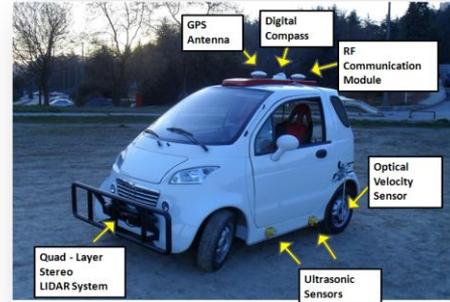


Mechatronics Education and Research Center

Mechatronics Education and Research Center, with its highly technological laboratories, has been providing a chance of making theoretical and applied studies to many students from a big number of departments starting with Mechanical Engineering and E.E Engineering.

Main Projects

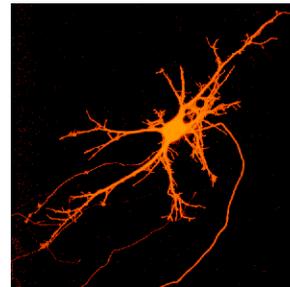
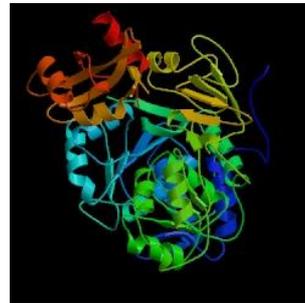
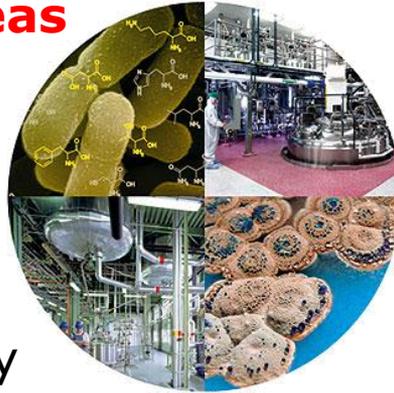
- Unmanned Ground Vehicle Project
- Electric Minibus Project
- Robocup SPL Project
- , Hybrid Vehicles Project and Unmanned Aerial Vehicles Project



Molecular Biology-Biotechnology & Genetics Research Center

Main Research Areas

- ✓ Biomimetics
- ✓ Biomaterials
- ✓ Bionanotechnology
- ✓ Enzyme Biotechnology
- ✓ Fermentation Technology
- ✓ Industrial microbiology
- ✓ Human-Bacterial-Yeast genetics
- ✓ Microbial Ecology
- ✓ Microbial fuel cells and waste management
- ✓ Molecular Immunology
- ✓ Molecular Modelling
- ✓ Neurobiology
- ✓ Protein Engineering



Projects

IN 10 years > 25 project...

EU Projects (IP ve COST)

EUREKA EI

NSF-MRSEC

TWAS Third World Academy of

Sciences

DPT

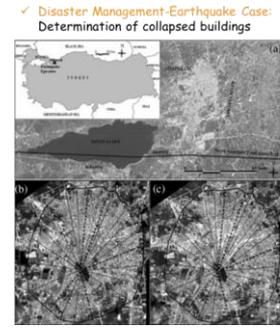
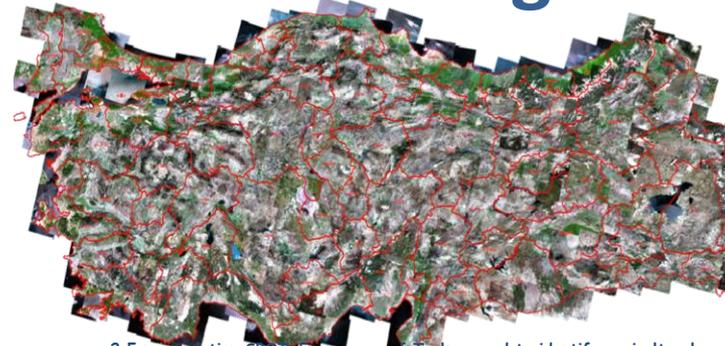
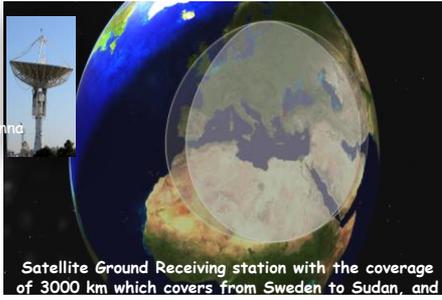
TÜBİTAK Bilateral projects

TÜBİTAK

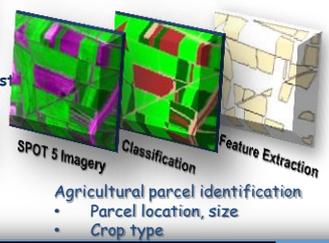
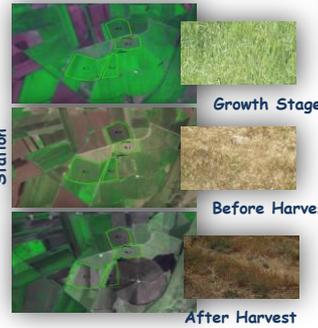
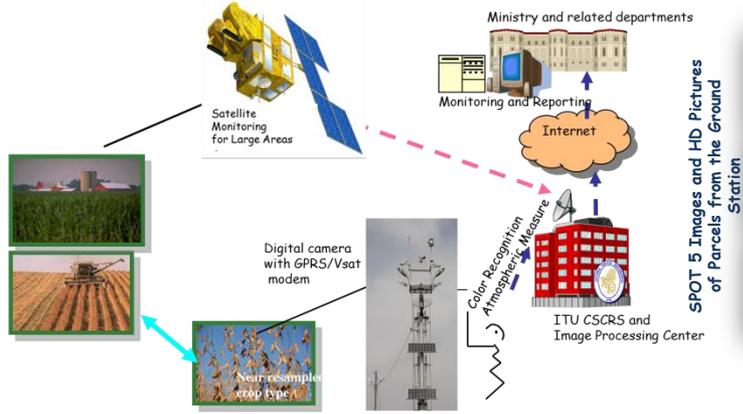
KOSGEB

İTÜ BAP

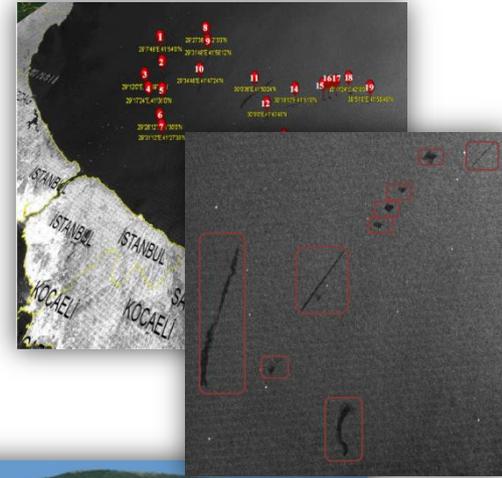
Center for Satellite Communications and Remote Sensing



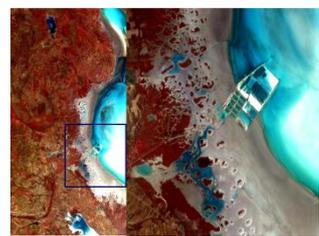
✓ Agricultural Crop Monitoring and Estimation System (TARIT)
 Aim: Determination of agricultural yield in basis of crop types and estimation of crop yield.



✓ Oil Spill Detection over Black Sea
 Determination of illegal and accidental oil pollution caused by ships.



✓ Monitoring Natural Resources
 Determination of the areal change and water quality of Salt Lake

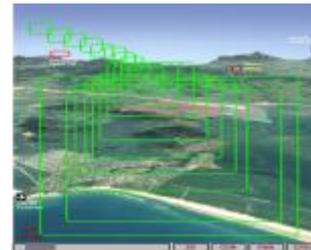


✓ Land use/cover mapping
 Environmental monitoring, Watershed analysis, Land cover/use change, Base maps for environment and city planning, Land parcel identification systems



Controls and Avionics Lab

- **Research Focus**
 - Advanced flight controls and avionics technologies
 - Unmanned air vehicles and Micro-nano satellites
- **Notable Achievements**
 - Designed the first Turkish indigenous commercial avionics systems 2006-2009
 - Designed and built the first Turkish university-level autopilot system for UAVs. 2006-2009
 - Designed and built the first Turkish University cubesat ITUpSAT I (TUBITAK) 2006-2009
 - Designed and built indigenous bus and ADCS components for nano and micro-satellites ITUpSAT II (TUBITAK 108M523) 2009-2012
- **Main Current Projects**
 - EU FP7 Project, Resilience2050 : DLR, NLR, Innaxis
 - EU – SESAR WP-E Fellowship, AUTOFLY-Aid Project, Boeing RTE, UPM, Crida

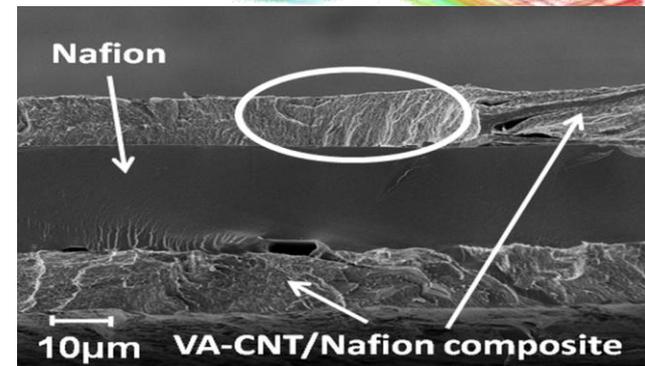
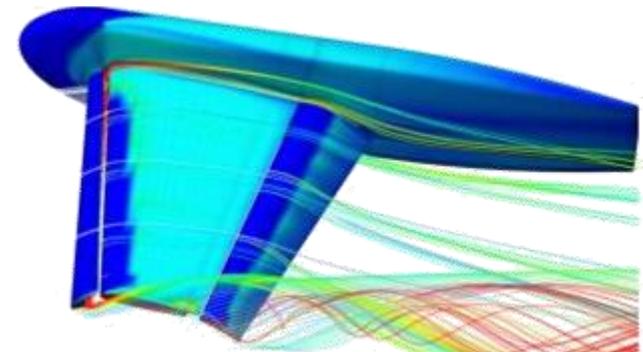


Aeronautics Research Center

- Central Laboratory for Aeronautics Research (2012-)
 - +12 Faculty, 15 Research Associates, +20 Ph.D. Level Researchers
- Established to promote advanced, interdisciplinary and experimental research
- Strong outreach at both university, national and international level
 - Nanotechnologies and Material Sciences
 - Environmental Sciences
 - Electronics and Software

Research Focus

- Design of manned and unmanned air vehicles
- Composites and structural technologies
- Engine technologies and combustion
- Aerodynamics, Aeroelasticity



Incentives in ITU-Technopark

ITU ARI Teknokent offers ITU academic staff & students; technology and sectoral based clustering, Synergy enriched, innovative and inspiring office spaces and environment with:

- Collaboration opportunities among the academia as well as with ARI Teknokent companies
- Industrial feedback and inspiration
- Full-time jobs/ Part-time jobs/ Internships opportunities for students
- Access to vast pool of investors and financial support mechanisms & networks
- Continuous information flow via shared networks of ITU
- Use of Istanbul Technical University infrastructure and superstructure:
 - 40% discount on usage of Laboratories and Research Centers
 - 20% discount on Training Centers
 - Discounted corporate membership in the Library etc.



Incentives for Research Academic Members

- In ITU's SciencePark, University Faculty Members can (individually or collectively):
 - be employed as a **researcher or consultant in an R& D Company**
 - take managerial positions in a R & D company
 - establish their **own R & D companies**
- **Free of Charge** Application & Admission Process to the ITU SciencePark
- Specially Designed **Academic Incubation Center** provides a Plug & Play System with readily furnished and flexible office spaces that are available 24/7. In this most vibrant environment academic staff is able to benefit from Secretarial Services and make use of fully equipped common areas (Conference/Seminar/Meeting) *free of charge*.
- **Discount on Rent Fees:**
 - 50% for ITU Academic Personnel
 - 20% for Other Universities and Retired Academic Personnel
- **Consultancy & Support Services** (*Free of Charge*) on a wide variety of areas such as Technical, Legal, Information Technologies, Project Management, Intellectual Property, Marketing & Public Relations.



Thematic Research Park @ ITU

Energy Technopolis

Turkey's First Thematic Technopolis
Expected Number of R&D Companies: 35-40



Collaboration Models
with
ITU Energy Institute

Industrially Supported Research Projects (ISRP)
Industrially Supported Research Assistants (ISRA)
Industrially Supported Education Activities (ISEA)

Thank you!