



SABANCI UNIVERSITY

# Faculty of Engineering and Natural Sciences

ANNUAL REPORT

2023-2024

ACADEMIC YEAR

# Dean's Message



Greetings!

We are pleased to share the FENS Annual Report for the 2023-2024 academic year. This introduction provides a brief overview of our activities and highlights key accomplishments. For further details, I encourage you to explore the full report. I would like to extend my heartfelt gratitude to the dedicated team whose tireless efforts made the compilation and organization of this report possible - a truly remarkable achievement. I also wish to thank all contributors who provided content for this report.

The data for the 2023-2024 academic year reveal that **2,727 students** were enrolled across all **undergraduate programs** within FENS. During the same period, 572 undergraduate degrees were awarded. The graduate student numbers were equally impressive: 316 M.Sc. and 243 Ph.D. students were enrolled in FENS graduate programs, with 116 M.Sc. students and 29 Ph.D. students earning their degrees. You can refer to **pages 4 through 6 for details on the number of students in diploma programs**. Comprehensive information on all **Ph.D. dissertations can be found on pages 54-57** at the end of this report.

In the last year, the significant rise in the number of students in the Computer Science and Engineering (CSE) program continues, making it the largest program at our university and likely the largest CSE undergraduate program in Türkiye. Although there was a slight decline in new enrollments compared to previous years, the overall upward trend is expected to persist in the coming years. Meanwhile, the trend for Industrial Engineering saw a small but notable reversal compared to the last academic year, with enrollments decreasing from 563 to 546. Regardless of these shifts, FENS remains committed to adapting and planning to improve the experience and success of our students.

As part of these efforts, I am delighted to highlight recent developments in our educational offerings. In 2024, FENS launched a new undergraduate major in **Data Science and Analytics (DSA)** and a new minor program in **Battery Science and Engineering**, both detailed on **page 45**. The DSA program, an inter-faculty initiative, was established to equip students with the skills needed to address challenges associated with the growing demand for big data processing and data-driven decision-making. The minor program in Battery Science and Engineering emerged from a close collaboration between our faculty working on energy storage and SIRO, the primary battery provider for the domestic car company TOGG. This program aims to educate students on the fundamentals of batteries and the challenges of storing electrical energy - a critical need as energy storage becomes a cornerstone of human mobility and other essential activities in the coming decades. Both initiatives exemplify FENS's forward-thinking approach to addressing future societal needs.

Continuing our tradition, I extend a warm welcome to the new faculty members, who joined our institution during the 2023-2024 academic year: **Çağlar Tunç, Özcan Öztürk, Dilara Keküllüoğlu, Dimitrios Papathanasiou, İhsan Sadati, İnanç Arın, and Özgür Kütük** (see **pages 9-10 for their short bios**). I also congratulate **Hüseyin Özkan, Murat Kaya Yapıcı, and Oğün Adebali** on their promotion to Associate Professor (see **page 11**). We are pleased to welcome our new lecturers, Murat Fadiloğlu, Ahmed Fuad Abdalaal, and Elif Koç, who joined us in the 2023-2024 academic year and have begun contributing to our teaching efforts.

In research, FENS members had an outstanding academic year. Not only have our faculty excelled, but our postgraduate researchers and students have also made significant contributions, publishing in high-impact journals and presenting their work at prestigious venues. In 2023, FENS produced a total of **372 articles**, an increase of 42 over the previous year. Of these, **71.4%** appeared in **Q1 journals** and **32.2% in the top 10% quartile by CiteScore Percentile** (**page 12** for details). Notably, 129 publications were collaborations with European institutions, while 215 involved global co-authors. These publications have garnered **1,467 citations**, underscoring the cutting-edge nature of our research and the global impact of our faculty's work.

This year's FENS research portfolio consists of **96 projects** funded by **TÜBİTAK**, with a cumulative budget of **198 million TL**; **15 projects** funded by the **EU**, with a total budget of **406.4 million TL**; 8 projects funded by non-governmental organizations, universities, and other entities, amounting to support of 30.1 million TL; along with 35 projects funded by

industry with over 134 million TL. Total project funding managed by FENS faculty members and researchers during the **2023-2024 academic year** exceeds **768 million TL**, an impressive feat. I would like to remind you here that all figures provided are as of May 2024 (refer to [page 16](#)).

A total of 17 patents were applied for or granted in the 2023-2024 period ([pages 17 and 18](#)). These patents encompass a wide range of areas, from super-absorbent new polymer materials for agriculture to wearable electronics and efficient systems for transportation.

In the "**Our Stories**" section featured on [pages 20-32](#), six stories of success are detailed: Nur Mustafaoğlu's ERC starting grant that focuses on understanding cancer metastasis to the brain; Ali Koşar and Ali Sadaghiani's work on advanced battery system management technologies for vehicles, in addition to their TRIATHLON project studying hydrogen-based propulsion in aviation; EU funded precision additive manufacturing project by Erhan Budak and Lutfi Taner Tunç; and research by Erkey Savaş on the applications of advanced cryptographic technologies on privacy-preserving cyber-threat intelligence and identity management, as well as his project with Kamer Kaya on privacy-compliant health data serving for AI training.

"Industry Focused Projects (Sanayi Odaklı Projeler, **SOP**)" is now a traditional component of our undergraduate senior year projects, consistently attracting notable interest from both students and industry. Since 2019, a total of **40 companies** have engaged as project stakeholders, involving **194 senior students** who have contributed to **56 projects** ([page 35](#)). SOP is a highly effective way of exposing our senior year students to real-life industry problems, and we always encourage FENS faculty to leverage their industry connections to submit projects in support of this program. Overall, 808 students have worked towards their graduation (please see [page 36](#)) and 694 internships have been completed 89 of which took place outside of Türkiye ([pages 36 and 37](#)). Another signature activity is the PURE program, which fosters undergraduate participation in research and now attracts increasing numbers of international students ([pages 38-39](#)).

I am also proud to highlight the accomplishments of our alumni in academia. To join me in celebrating this achievement, please see pages 40-43. Our alumni at domestic and international universities and institutions not only continue to make us proud but also serve as a key indicator of the world-class quality of education and training provided here at FENS, Sabancı University.

As with every academic year, several FENS faculty members were honored with prestigious national and international awards and recognition. These include the Science Academy **BAGEP Award** for **Ayesha Asloob Qureshi and Hatice Sinem Şaş Çaycı**, and the **#EITRIS Innovation Competition 2nd prize** for **Özge Akbulut. Canan Atılgan** was elected as a member of Europe's most prestigious organization in molecular biology: European Molecular Biology Organization (EMBO). **Ali Sadaghiani's** work, co-authored by **Ali Koşar** and Ph.D. student **Behnam Parizad Benam** in collaboration with Aselsan, was one of the **best paper** recipients at the 9th International Conference on Multiphase Flow and Heat Transfer 2024 held in London. Please join me in extending heartfelt congratulations to them (refer to [pages 44-49](#)).

For additional awards, including Best Paper, individual recognition within the society, and achievements in entrepreneurship by our members, please refer to page 44 and beyond. I extend my sincere congratulations to the recipient of the Gürsel Sönmez Award and the winners of the 3MT award (see [pages 50-51](#)). In addition six FENS undergraduate students have received the Sakıp Sabancı Award for graduating at the top of their class.

Staying in touch with global academia is a vital part of our mission in becoming a world-renowned research university. During the 2023-2024 academic year, thanks to the global network of our members, FENS hosted an impressive number of seminars and talks by world-class researchers, including 71 weekly seminars, seven Dean's Speaker Series events, and two talks on sharing experiences. Two talks were given by the **Distinguished Research Fellows** of Sabancı University on topics spanning quantum optics and nanotechnology in medicine (please refer to [pages 52 and 53](#)).

In closing, I sincerely thank and congratulate all FENS members for their invaluable contributions to these outstanding accomplishments. I warmly invite you to join me in celebrating our shared success. Being part of this exceptional community is truly one of my greatest honors.

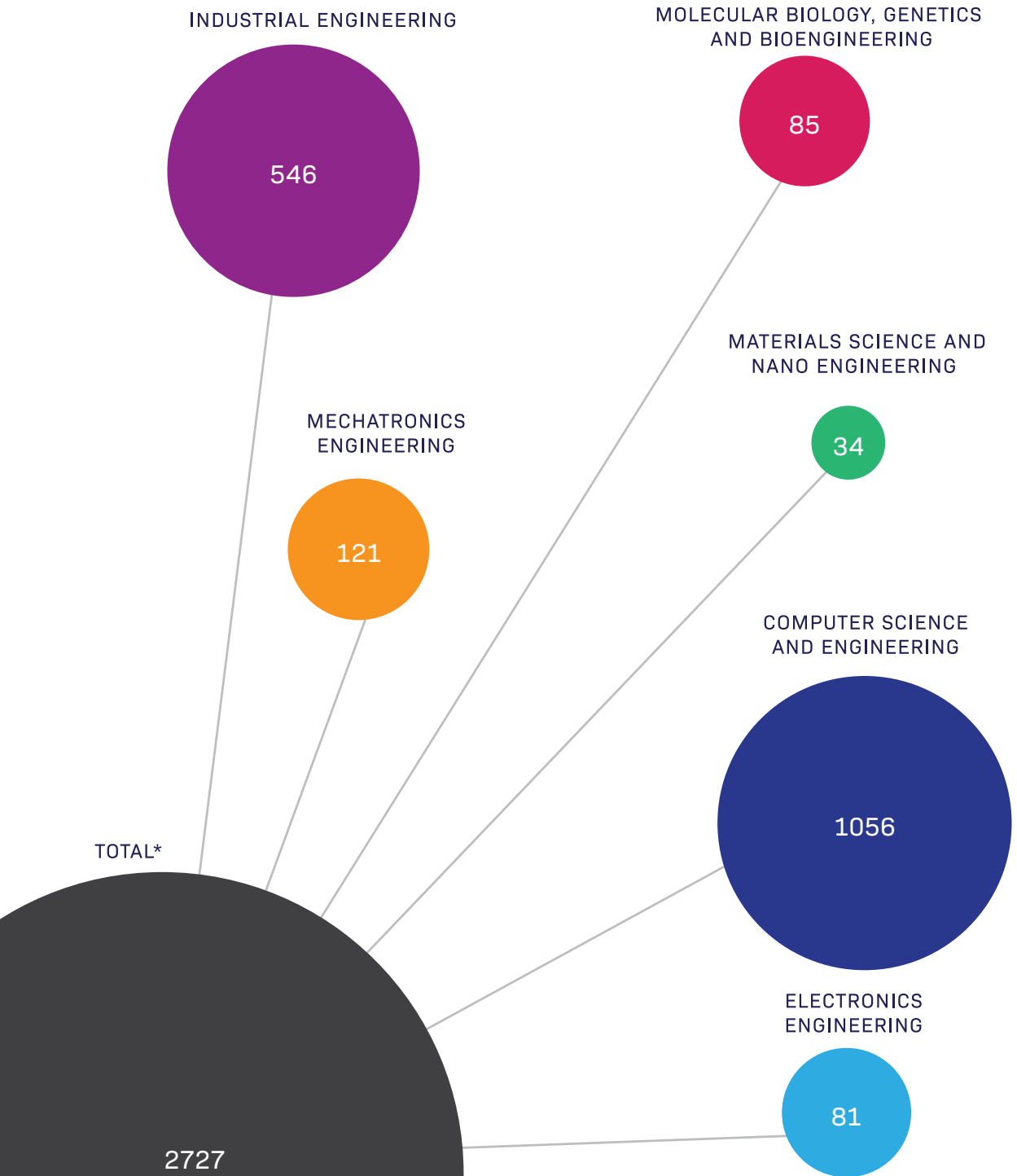
**Erkey Savaş**

*Dean*

*Faculty of Engineering and Natural Sciences*

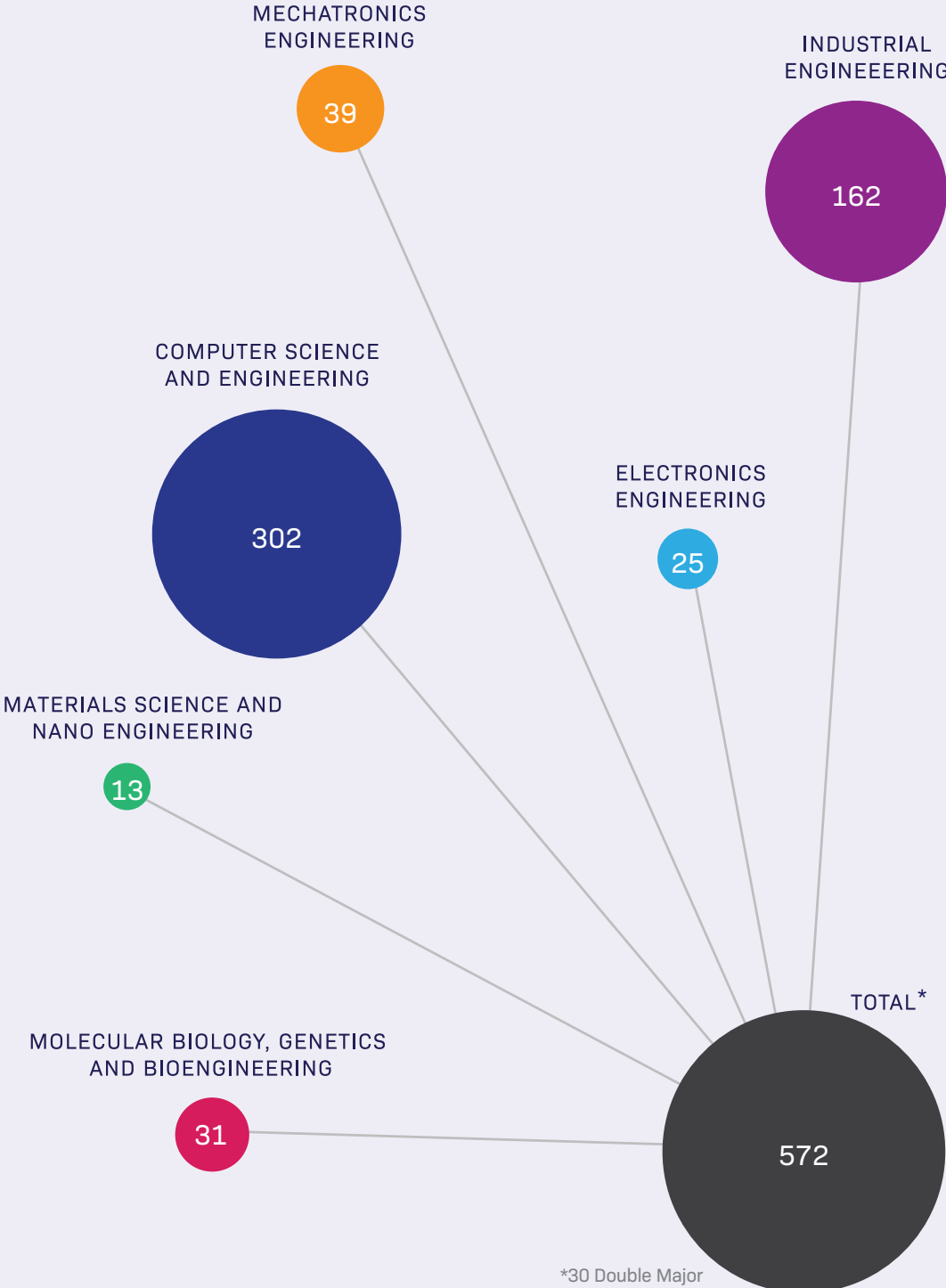
# Student Numbers

## Undergraduate Student Enrollment 2023 –2024



\* Undeclared students: 804

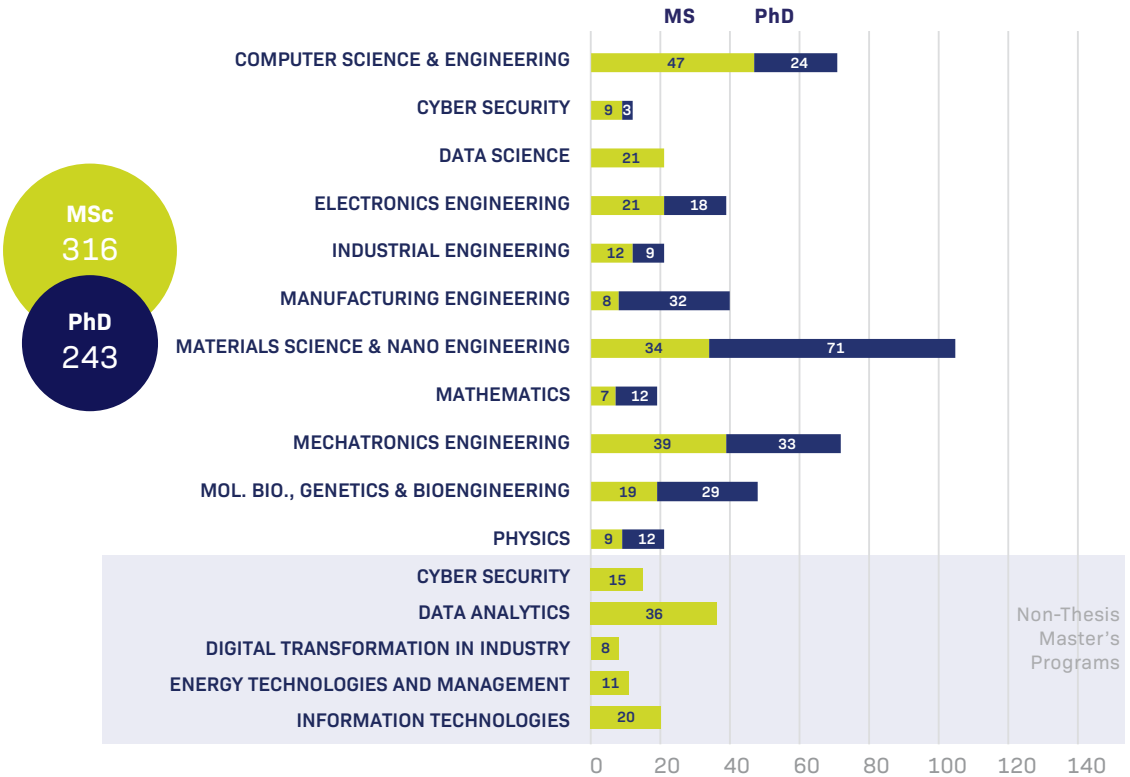
# Undergraduate Student Alumni 2023–2024



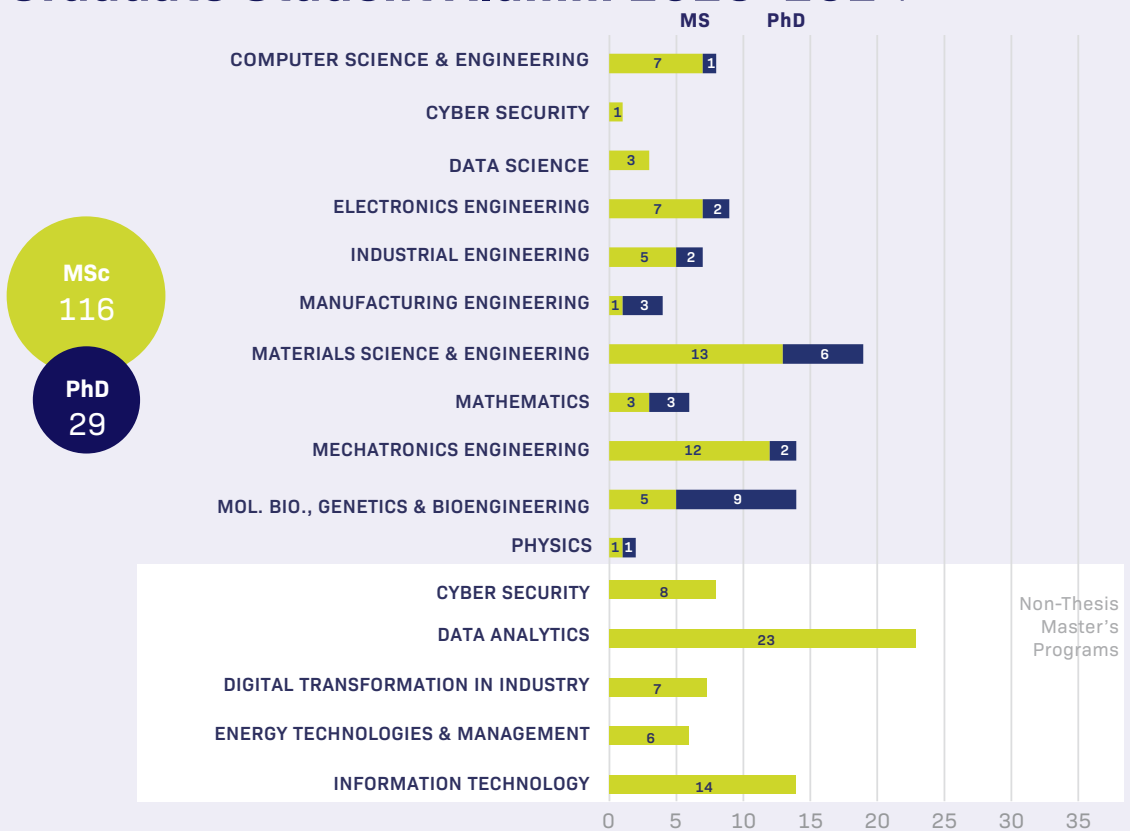
\*30 Double Major

# Student Numbers

## Graduate Student Enrollment 2023–2024



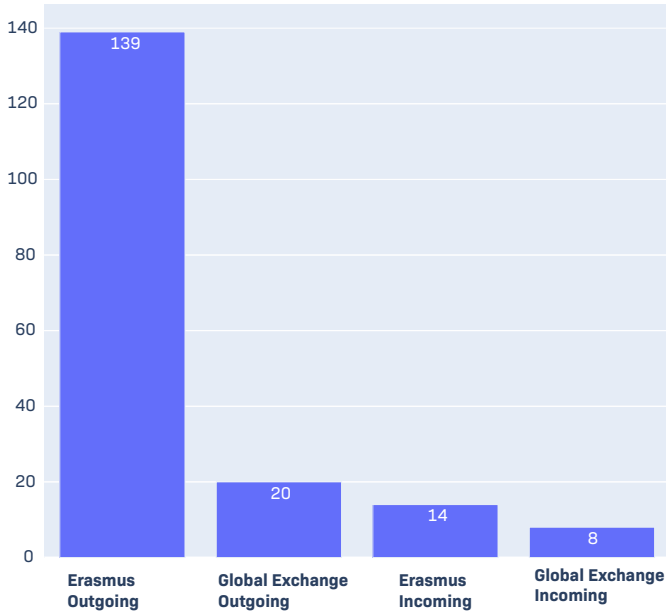
## Graduate Student Alumni 2023–2024



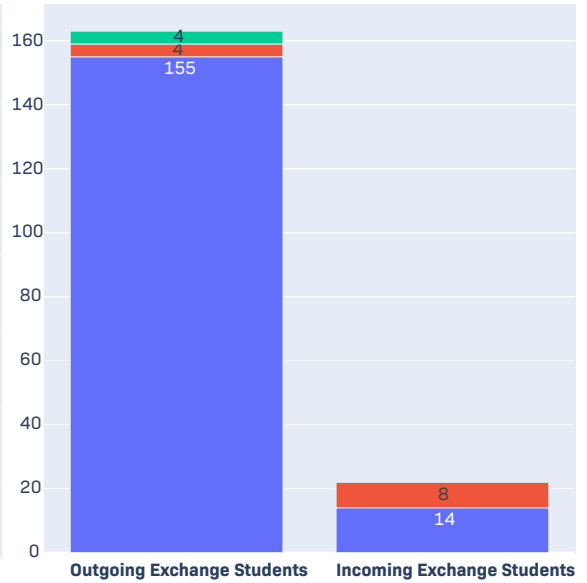
# Exchange Student Numbers

2023–2024 Academic Year

### Erasmus vs Global Exchange Undergraduate Students

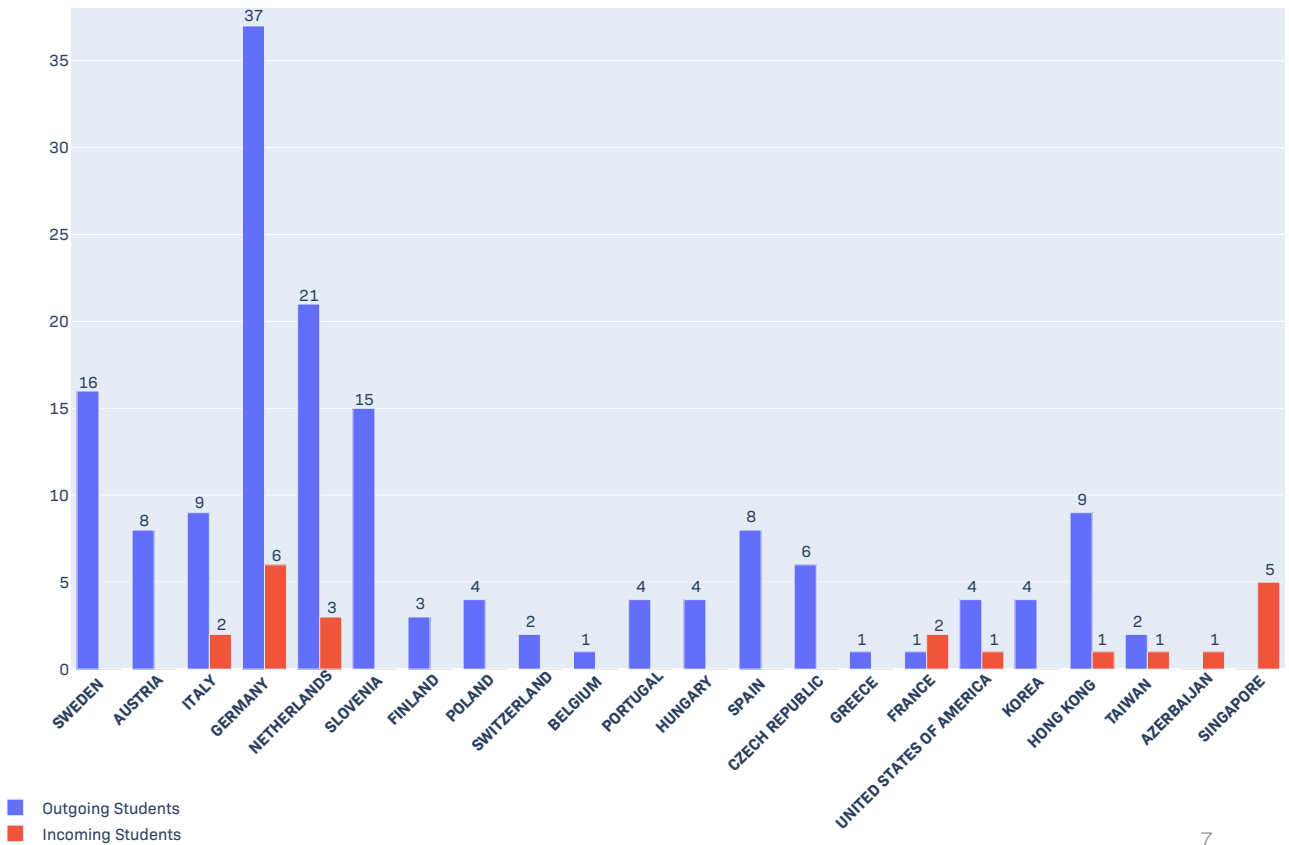


### Outgoing vs Incoming Students



- Undergraduate
- Master (MS/PhD)
- Short Term Mobility (PhD)

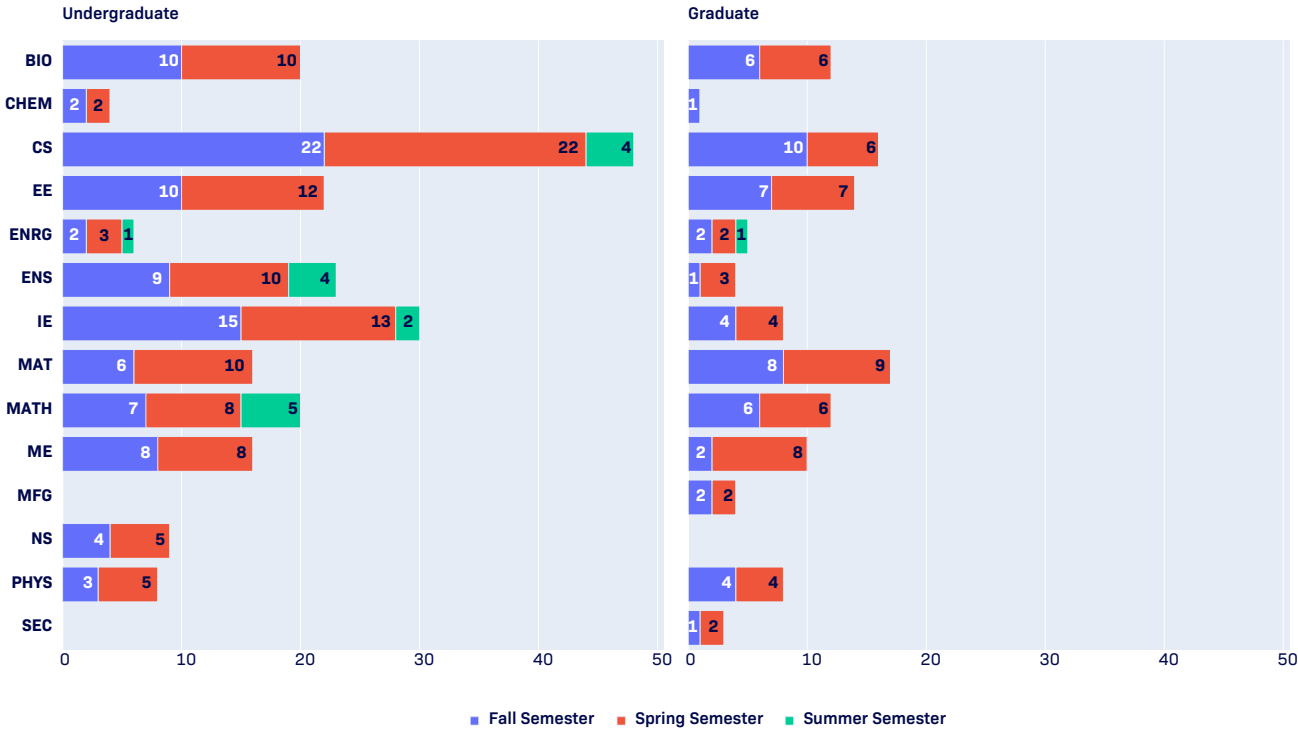
### Outgoing vs Incoming Students by Country



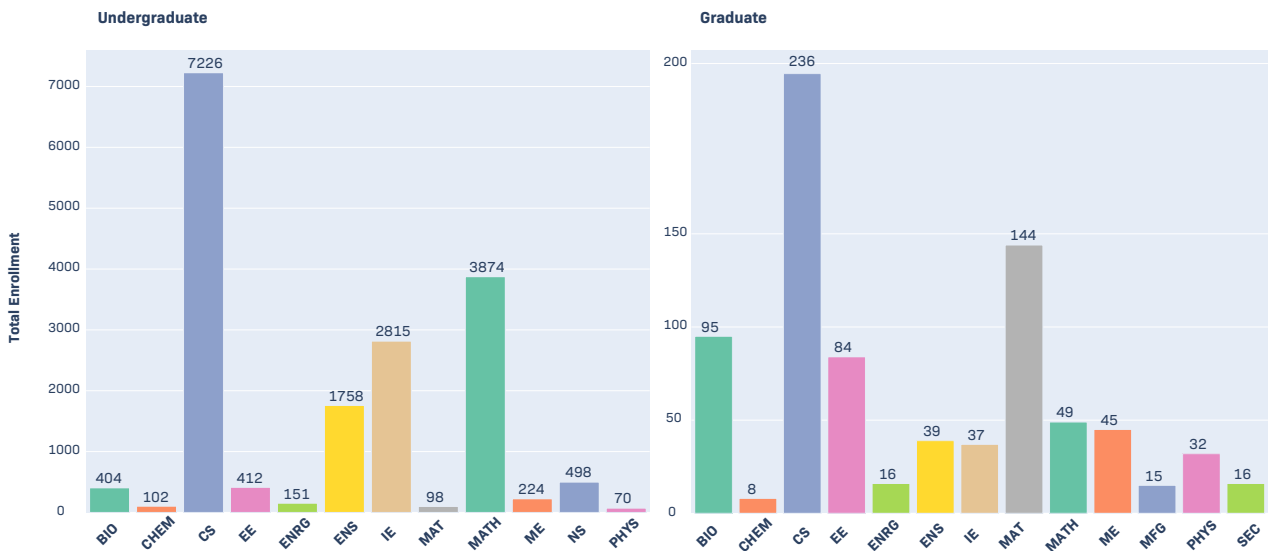
- Outgoing Students
- Incoming Students

# Offered Courses 2023-2024

## Number of Courses by Subject Code



## Total Enrollment to Courses by Subject Code





# Newcomers

7 new faculty members have joined FENS,  
bringing the total number of full-time faculty to 110



## Çağlar Tunç

Çağlar Tunç is a faculty member in the Electronics Engineering Program at Sabancı University, Faculty of Engineering and Natural Sciences. He received

his B.S. and M.S. degrees in Electrical and Electronics Engineering from Bilkent University in 2013 and 2016, and his Ph.D. in Electrical and Computer Engineering from NYU Tandon School of Engineering in February 2022. Before joining Sabancı University, he worked as a 6G researcher at Turkcell 6GEN Lab and as a Senior Inventive Scientist at AT&T Labs Research, where he led projects on O-RAN automation and Digital Twins for cellular networks. His research focuses on 6G technologies, including Network Digital Twins, O-RAN, AI-native architectures, non-terrestrial networks (NTNs), and quantum communications. He also works on wireless communication, network modeling, and performance analysis of random systems. He is an associate editor for IEEE Wireless Communications Letters.



## Özcan Öztürk

Özcan Öztürk is a Professor of Sabancı University, Faculty of Engineering and Natural Sciences, Computer Science and Engineering and Electronics

Engineering programs. Before joining Sabancı in Spring 2024, he worked as a Professor in the Department of Computer Engineering between 2008 and 2024 at Bilkent University. Before Bilkent, he worked as a software optimization engineer in the Cellular and Handheld Group at Intel and Marvell. His research interests include heterogeneous computing, hardware accelerators, GPU computing, computer architecture, and compiler optimizations. He has more than 150 papers published in these areas. Dr. Öztürk has been recognized by Bilkent University Distinguished Teaching Award in 2019, Science Academy's Young Scientist Award (BAGEP) in 2018, HiPEAC Paper Award in 2016, Turkish Academy of Sciences (TUBA) Associate Membership since 2015, Fulbright Senior Researcher Award in 2014, Intel Research Award in 2013, Turk Telekom Research Collaboration Award in 2012, IBM Faculty Award in 2009, European Network of Excellence on High Performance and Embedded Architecture and Compilation (HiPEAC) Paper Award in 2009, and ICPADS Best Paper Award in 2006. Dr. Öztürk received his Ph.D. in Computer Science and Engineering from Pennsylvania State University, his M.S. degree in Computer Engineering from the University of Florida, and his B.Sc. degree in Computer Engineering from Bogaziçi University.



## Dilara Keküllüoğlu

Dilara Keküllüoğlu is an Assistant Professor in the Computer Science and Engineering Program at Sabancı University. She earned her Ph.D. from the University of

Edinburgh in 2022 with a thesis titled "Analysing Privacy in Online Social Media," focusing on user behaviors and privacy perceptions online. Prior to her current role, she was a postdoctoral research associate at the School of Informatics, University of Edinburgh. Dr. Keküllüoğlu holds a BS (2015) and MS (2017) in Computer Engineering from Boğaziçi University. Her research interests include privacy, responsible AI, natural language processing, computational social science, and human-computer interaction.



## Dimitrios Papathanasiou

Dimitrios Papathanasiou is an Assistant Professor at Sabancı University. He earned his degree in Mathematics and a Master's degree in Pure Mathematics

from Aristotle University of Thessaloniki, followed by graduate studies at Bowling Green State University in the United States. After completing his Ph.D., he worked as a postdoctoral fellow at Université de Mons (Belgium), Université Blaise Pascal (France), and Saint Petersburg State University (Russia). His research focuses on operator theory, specifically the study of linear dynamical systems. He has co-authored around 15 mathematical articles, most of which have been published in prestigious journals. He has also participated in research at CIRM and a mini-workshop in Oberwolfach.



## İhsan Sadati

İhsan Sadati is a faculty member in the Industrial Engineering Program at Sabancı University's Faculty of Engineering and Natural Sciences. He earned his BSc in Industrial Engineering

from the University of Tabriz in 2012 and his MSc from Urmia University in 2014. He completed his PhD at Koç University in 2018 in the Industrial Engineering and Operations Management Department. Before joining Sabancı University, Dr. Sadati served as an Assistant Professor at İstanbul Kültür University in 2019. He then became a Postdoctoral Research Fellow at Sabancı University, contributing to the Smart Mobility and Logistics Lab from June 2019 to May 2021. Following this, he was appointed as an instructor, teaching courses like Introduction to Industrial Engineering, Logistics Systems, and Engineering Optimization. In 2024, he became a faculty member. His research focuses on optimization in logistics, including electric vehicle routing, green logistics, and metaheuristics. He has published widely in high-impact journals, addressing critical challenges in electric vehicle routing and last-mile delivery.



## İnanç Arın

İnanç Arın is a faculty member at Sabancı University's Faculty of Engineering and Natural Sciences. He received his bachelor's (2010), master's (2012), and Ph.D. (2017)

degrees in Computer Science and Engineering from Sabancı University. From 2017 to 2024, he was an instructor in the Foundations Development Directorate, teaching undergraduate core curriculum courses. He now teaches Introduction to Data Analytics and Machine Learning in the Professional Master's Program in Data Analytics and provides consultancy and training through the Center of Excellence in Data Analytics (VERİM). His research focuses on data mining, machine learning, and natural language processing.



## Özgür Kütük

Özgür Kütük, MD, PhD is a faculty member at the Faculty of Engineering and Natural Sciences, Molecular Biology, Genetics and Bioengineering Program. He received his

MD degree from Marmara University, School of Medicine and PhD degree from Biological Sciences and Bioengineering Program from Sabancı University. He conducted his postdoctoral studies at Dana-Farber Cancer Institute, Harvard Medical School between 2006 and 2013. His research interests cover high-throughput small molecule screening, cancer cell death and 3D tumor organoids.

# Promotions



**HÜSEYİN ÖZKAN HAS BEEN PROMOTED TO ASSOCIATE PROFESSOR EFFECTIVE MARCH 1, 2024.**



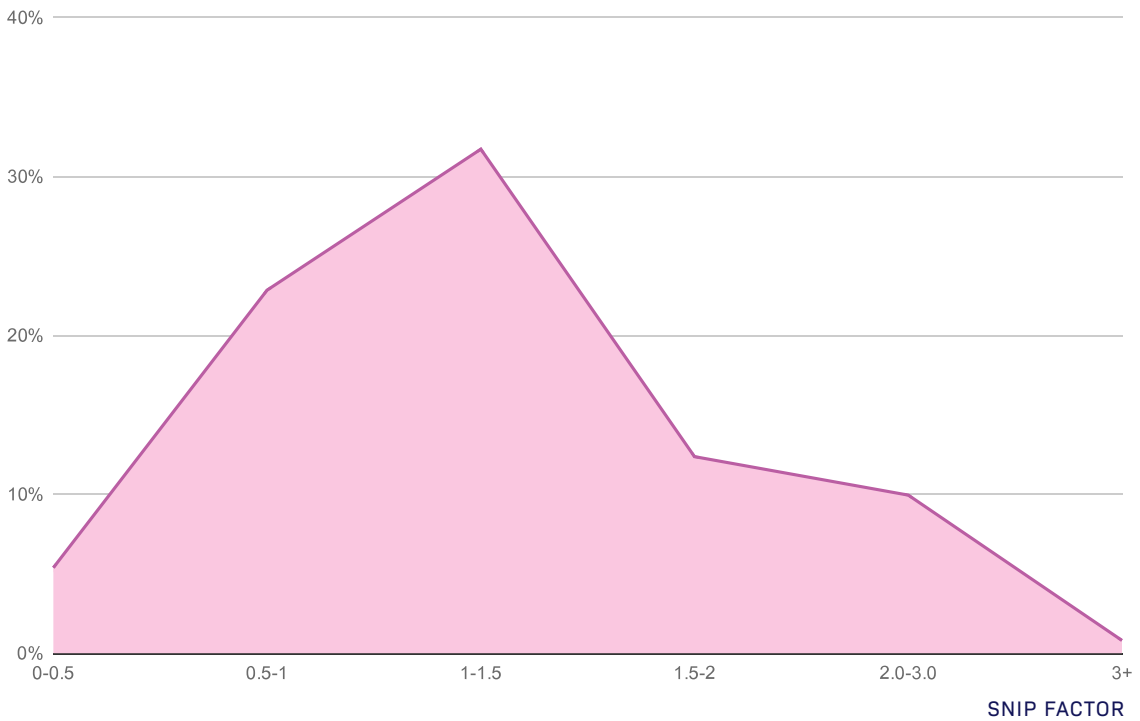
**MURAT KAYAYAPICI HAS BEEN PROMOTED TO ASSOCIATE PROFESSOR EFFECTIVE MARCH 1, 2024.**



**OGÜN ADEBALİ HAS BEEN PROMOTED TO ASSOCIATE PROFESSOR EFFECTIVE MARCH 1, 2024.**

# Publications

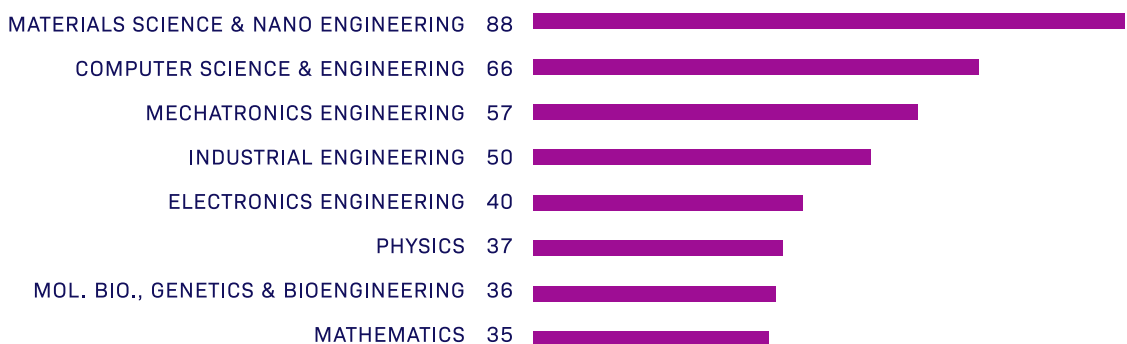
## SNIP Factor Distribution



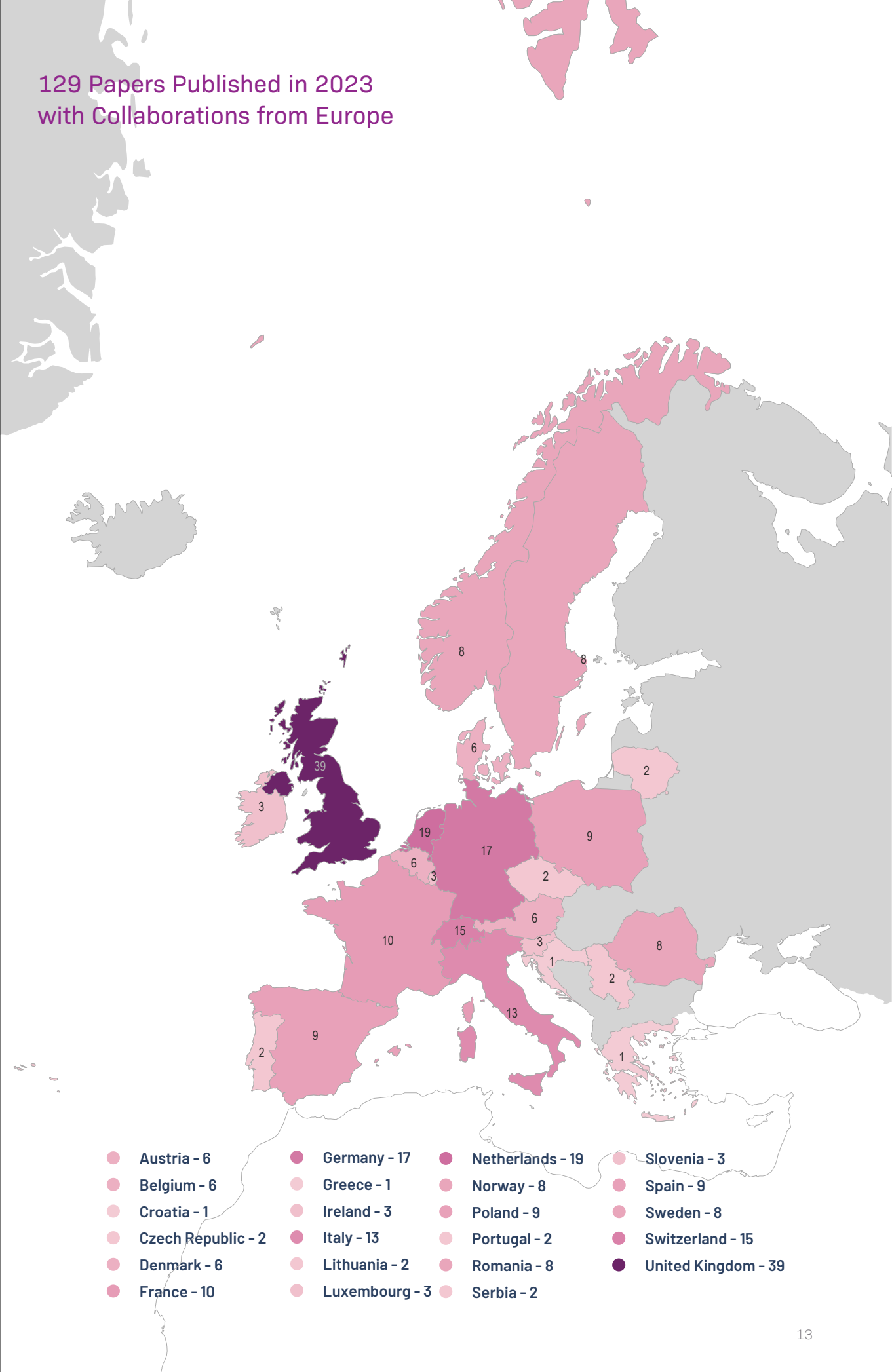
### FENS 2023

Scholarly Output	372
Citation Count	1467
Field-Weighted Citation Impact	1.76
Publications in Q1 Journal Quartile by CiteScore (%)	71.4
Publications in Top 10% Journal Percentiles by CiteScore Percentile (%)	32.2

## Web of Science Categories

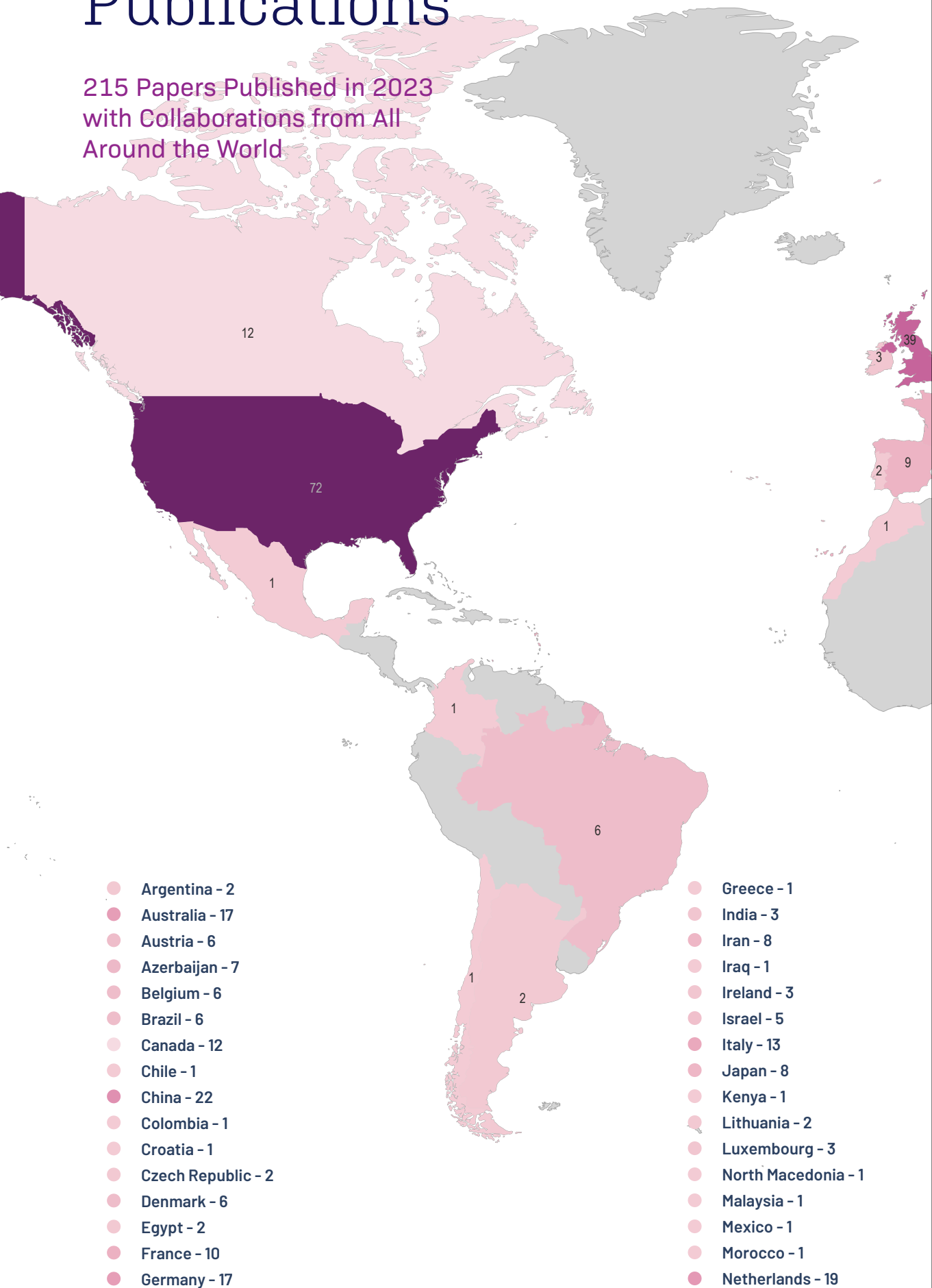


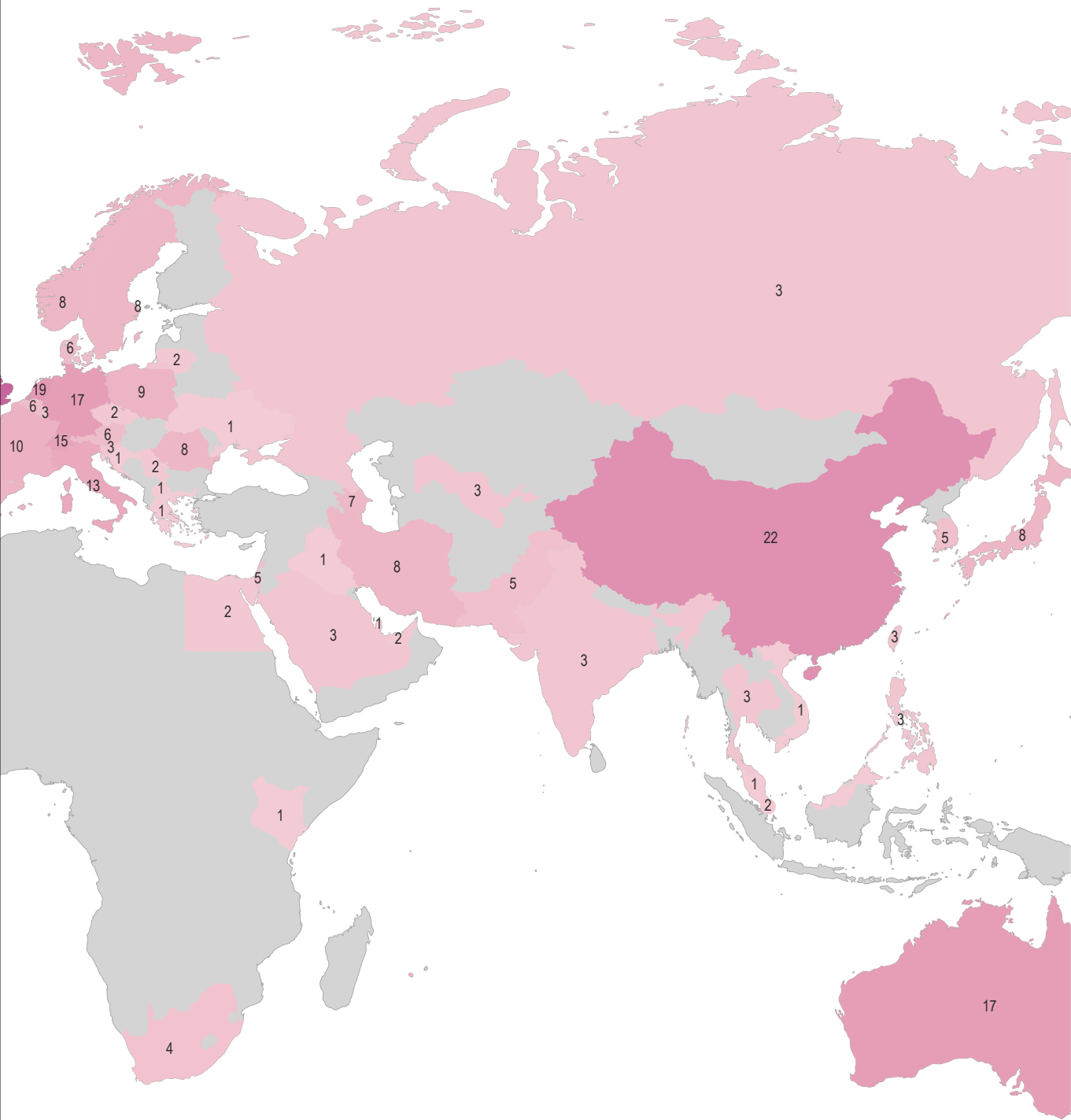
# 129 Papers Published in 2023 with Collaborations from Europe



# Publications

215 Papers Published in 2023  
with Collaborations from All  
Around the World





- Norway - 8
- Pakistan - 5
- Philippines - 3
- Poland - 9
- Portugal - 2
- Qatar - 1
- Romania - 8
- Russia - 3
- Saudi Arabia - 3
- Serbia - 2
- Singapore - 2
- Slovenia - 3
- South Africa - 4
- South Korea - 5
- Spain - 9
- Sweden - 8
- Switzerland - 15
- Taiwan - 3
- Thailand - 3
- Ukraine - 1
- United Arab Emirates - 2
- United Kingdom - 39
- United States - 72
- Uzbekistan - 3
- Vietnam - 1

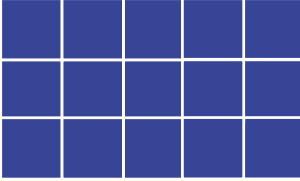
# Projects

**Source** as of May 2024

- EU
- Non-Governmental Organizations/University/Other
- TUBITAK
- Business Enterprises

## FACULTY OF ENGINEERING AND NATURAL SCIENCES

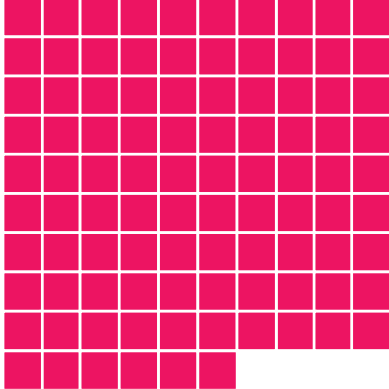
15 Projects  
₺ 406.4 M



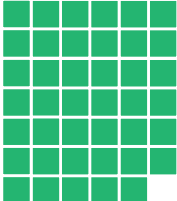
8 Projects  
₺ 30.1 M



96 Projects  
₺ 197.9 M



35 Projects  
₺ 134.5 M



\*The budgets of Center of Excellence in Data Analytics (CEDA) Integrated Manufacturing Research and Application Center (SU IMC) are included.



# Patents

	INVENTORS	GRANT DATE	TYPE
System And Method For Climatisation Of Electric Vehicles, Using Kinetic Energy Recovered From Transmission Sub-Systems	Ali Koşar, Morteza Ghorbani, Moein Talebian Gevari, İsmail Cem Alatay	5/21/2024	Patent
A Polymer-Based Electrolyte And Method For Obtaining The Same	Bekir Dızman, Mehmet Yıldız, Serkan Ünal, Yusuf Menciloğlu, Leila Haghigi Poudeh	6/26/2024	Patent
Low-Temperature Method For Boron Carbide Production	Cengiz Kaya, Figen Kaya	9/6/2023	Patent
A Method For Paste Boriding	Erhan Budak, Emre Özlü, Esmâ Baytok, Hüseyin Çimenoğlu, Cevat Fahir Arısoy	4/22/2024	Patent
Design Optimization For Tool Holder Extensions	Erhan Budak, Gamze Karataş, Hasan Nevzat Özgüven, Orkun Özşahin	3/21/2024	Patent
Hiyerarşik Yapıya Sahip Mikro-/Ya Da Nanomalzeme	Fevzi Çakmak Cebeci, Deniz Köken, Hülya Cebeci, Elif Özden Yenigün, Nuri Solak, Ayşemin Top	1/22/2024	Patent
A System Based On Multi-Sensory Learning and EEG Biofeed Back for Improving Reading Ability	Günet Eroğlu, Müjdat Çetin, Selim Balcısoy	4/22/2024	Patent
A Polymeric Hybrid Material With Photothermal Properties And Production Method Thereof	Hayriye Ünal, Serkan Ünal, Cüneyt Erdinç Taş	6/19/2024	Patent

# Patents

	INVENTORS	GRANT DATE	TYPE
A Method For Generating A Tool Path To Manufacture A Part Using A Computer Numerical Control Machine System	Lütfi Taner Tunç, Erhan Budak	3/19/2024	Patent
Single Or Hybrid Nano Additive Coating Method To Provide High Conductivity To Electrically Non-Conductive Textile/Fabric Surfaces	Mehmet Yıldız, Burcu Saner Okan, Egemen Yıldırım, Yasin Özdoğan, Mehmet Erim İnal, Tuğçe Altuntop Ersan, Özgür Birer	4/22/2024	Patent
Otomatik Sinek Tuzağı	Merve Senem Avaz Seven, Utku Seven, Yusuf Menceloğlu, Selçuk Hazır, Harun Çimen, İbrahim Çakmak	7/22/2024	Utility Model
Wearable Graphene Textile-Based Electro-Ocular Monitoring And Object Interaction System	Murat Kaya Yapıcı, Ata Jedari Golparvar	7/25/2024	Patent
Öz Girişim Giderimi Performansı İyileştirilmiş Bir Tam Dupleks Haberleşme Sistemi	Özgür Gürbüz, Hayrettin Ayar	10/23/2023	Patent
Force-Feedback Break Pedal System	Volkan Patoğlu	1/22/2024	Patent
A Polymer Matrix Based Superabsorbent Material	Yusuf Menceloğlu, Merve Senem Avaz, Yeşim Menceloğlu, Ogeday Rodop	11/21/2023	Patent
A Stable Aqueous Formulation Containing Quaternary Ammonium Organosilane Hydrolysate And A Method For Preparing Same	Yusuf Menceloğlu	10/18/2023	Patent

The background is a solid purple color. Overlaid on this are several large, overlapping circles made of white dotted lines. The circles are arranged in a way that they appear to be part of a larger, repeating pattern.

# Our Stories

# META-BRAIN:

## Deciphering METAstasis of lung cancer to BRAIN and developing new therapeutic approaches via a human metastatic cascade platform

### ERC Grand Project

***"Dr. Nur Mustafaoglu of Molecular Biology, Genetics, and Bioengineering Program has been selected for funding with a budget of 1.5 million EURO through the ERC-2023-StG call under the Horizon Europe Programme. The project is titled "META-BRAIN: Deciphering METAstasis of lung cancer to BRAIN and developing new therapeutic approaches via a human metastatic cascade platform".***



#### **Main Goal of the Project**

Dr. Mustafaoglu and her team have launched the META-BRAIN Project, an ambitious research initiative aimed at better understanding and combating cancer metastasis to the brain. The project focuses on cancer's journey from the lungs to the brain, addressing important questions related to the metastasis process and the role of the blood-brain barrier (BBB).

A key goal of the project is to map the entire cancer metastasis process, providing a comprehensive picture of how cancer cells cross the BBB and form secondary tumors in the brain. The team will also work on identifying target proteins involved in this process and developing novel nano-delivery systems to improve treatment options.

The META-BRAIN Project's objectives include building a human-derived in vitro platform that closely mimics in vivo conditions. Through this model, the team will study the interactions between extracellular vesicles (EVs), circulating tumor cells (CTCs), and brain endothelial cells that drive cancer spread. They will also focus on identifying therapeutic targets specific to brain cancer and developing advanced drug delivery systems.

By combining life sciences and engineering, this project not only aims to make breakthroughs in cancer treatment but also pave the way for developing physiologically relevant models for other brain-invasive cancers. Ultimately, it offers new hope for advanced treatments that can cross the BBB, providing innovative solutions for both cancer metastasis and other brain diseases.

This groundbreaking project began on August 1st, 2024, and will span five years. You can follow its progress at: <https://mustafaoglu.com/projects/MetaBrain.html>.



### **The story behind the writing of the project**

Nur Mustafaoglu shares her experiences before and during the writing of the project.

“The project holds a special place in my heart. During the early years of my doctorate, I lost a beloved family member to brain metastasis caused by lung cancer. This project is one of the first steps in fulfilling a promise I made to myself and my family after that loss. Once the project is successfully completed, I will have fulfilled that promise.

In developing the project, I greatly benefited from the consulting support provided by Sabancı University and the TÜBİTAK ERC Principal Researcher Development Program (EBAG). Their guidance was invaluable in shaping the concept of the project and refining it during the writing stages. One of the most helpful aspects was being able to discuss the project's initial ideas—particularly the bioengineering approach to cancer—with experts in the field and adjusting the project based on their feedback.

After the project successfully passed the first stage of evaluation in the LS9 panel, I received tremendous support while preparing for the interview process. Academics at Sabancı University, including our Rector, generously provided advice on both my presentation and the possible questions from the panel. I also continued to receive consulting support through the EBAG program during this stage.

In preparing for the interview, I presented to experts abroad whom I had never met before, gathering their feedback on both my presentation and the questions it raised for them. Through multiple iterations, I worked to improve my presentation and prepare for the interview, making every effort to achieve the best possible outcome in a short time.

Overall, the entire process—from developing the project to the application and interview stages—has been a highly educational experience for me. I had the opportunity to meet and collaborate with a range of academics, both locally and internationally. I was able to share my ideas openly, receive valuable feedback, and even establish new collaborations. I plan to continue these interactions as the project moves forward, working together to ensure its successful completion.

I am deeply grateful to everyone who contributed to this journey. Their support has been invaluable.”

### **Importance of the subject**

The project aims to investigate how large cancer cells metastasize to the brain despite the presence of the blood-brain barrier, a structure that makes it difficult for even small molecules and drugs to penetrate the brain. Using a comprehensive bioengineering approach with human cells, this research tackles the challenge of replicating human physiology in an in vitro environment—a highly complex and ambitious goal.

Constructing a platform to understand cancer metastasis poses significant risks due to the intricate nature of brain biology. However, this platform offers more than just answers to scientific questions; it holds transformative potential by creating an environment that can be directly applied in drug development processes.

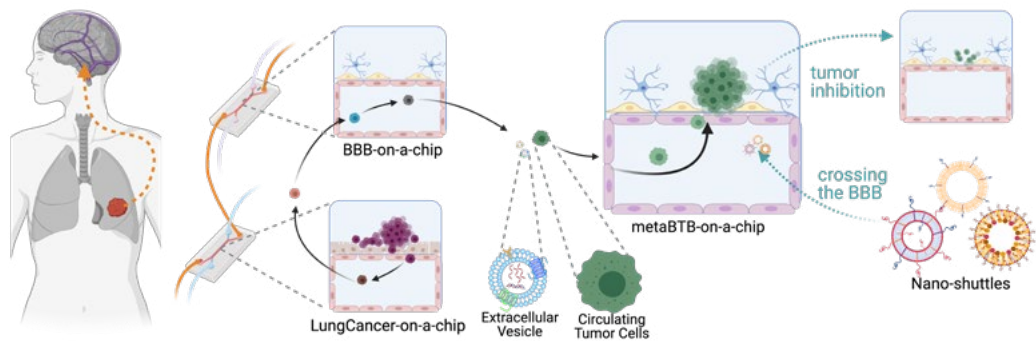
The META-BRAIN project embodies the core characteristics of ERC-funded research—high-risk, but with the potential for high reward and significant impact in both the understanding of cancer metastasis and the advancement of therapeutic approaches.

### **About Nur Mustafaoğlu's research at Sabancı**

Established in January 2021 at Sabancı University, Dr. Mustafaoğlu's bioengineering laboratory focuses on understanding interactions at the blood-brain barrier (BBB) during brain-related diseases and developing innovative drug delivery strategies for treating these disorders. In this context, the laboratory has successfully completed three unique projects, while eleven others are currently supported by national and international funding.

One notable project is the NVU-Chip, funded by Marie Curie Actions, which was successfully completed in June 2023. This project aimed to develop a unique neurovascular unit (NVU) chip model that includes all brain cell types to study the effects of neuroinflammatory factors in a human BBB environment. Innovative microfluidic chip models were created as part of this initiative. Beginning in July 2023, the laboratory launched a new project called EnhancedDDS, also supported by a Marie Curie grant. The goal of this project is to develop novel drug delivery systems for treating brain diseases by enabling the passage of silica nanoparticles, derived from plant-based bio-wastes, through the BBB, with specific surface modifications to enhance their efficacy.

As part of the ProFFile consortium, which includes partners from Italy, Spain, and Germany for the ERA-NET JPND project, the group is developing a novel human cell-based Fatal Familial Insomnia (FFI)-on-a-chip model. This model, derived from human stem cells, aims to provide a pioneering environment for identifying biomarkers for the early detection of FFI while also enabling the first investigation of the relationship between FFI and the BBB. Funded by the ERA-NET Neuron project in collaboration with Germany and Switzerland, the BBBiota project explores the effects of microbiota metabolites on stroke through the gut-brain axis. Additionally, the lab is working on an epilepsy-on-a-chip model, which is uniquely equipped with an intact BBB that can mimic the in vivo characteristics of epileptic seizures and facilitate screening for anti-epileptic drugs. This initiative is part of a recently completed bilateral collaboration project with Iran, which continues with follow-up studies.



"Prepared by Nur Mustafaoglu using BioRender"

In the GBM-Shuttle project, funded by the European Molecular Biology Organization (EMBO), Dr. Mustafaoglu's group is developing a novel glioblastoma model that assesses nanomechanics to enhance drug delivery across the BBB. This project also offers a valuable opportunity for the members of the Mustafaoglu Lab to engage actively with the European community through networking activities and sectoral meetings.

The laboratory is also leading two ongoing TÜBİTAK-1001 projects. The first project (, in collaboration with SUNUM, aims to identify new peptides that can effectively cross the BBB for use in drug delivery systems targeting central nervous system disorders. The second TÜBİTAK-1001 project focuses on identifying brain-specific transcytosis proteins that are expressed differently in brain capillaries compared to endothelial cells in other organs, utilizing two distinct computational approaches along with experimental characterization. Three academics from Sabancı University's BIO and MAT programs are also involved as researchers and advisors in the computational phases of this project.

Additionally, as part of the BiyoMaTR (<https://biyomatr.hacettepe.edu.tr/>), a TÜBİTAK-1004 project coordinated by Hacettepe University, the laboratory engages in multidisciplinary collaborations with Sabancı University, TÜBİTAK-MAM, and Hacettepe University to develop 3D human brain models that closely replicate disease physiology and functionality for drug testing, utilizing advanced three-dimensional bioprinting methods and stem cell technologies. Furthermore, they participate in the LIGNONANO project (<https://www.lignonanoplatform.net/>), funded by a second TÜBİTAK-1004 grant and coordinated by SUNUM, which aims to develop novel drug carrier systems.

Lastly, and perhaps most importantly, members of the Mustafaoglu team—including postdoctoral researchers, PhD students who have passed their qualification exams, and senior undergraduates—are leading their own exciting projects funded by the TÜBİTAK programs such as 2218, 1002, 2209A and Marie Curie Fellowships. These initiatives provide them with the opportunity to develop as independent researchers within a supportive scientific environment.



Through these diverse projects, Dr. Mustafaoglu's laboratory is making significant strides in understanding the complexities of the blood-brain barrier and developing innovative solutions for brain diseases.



You can follow Mustafaoglu Lab's research progress at:

<https://mustafaoglulab.com/research.html>



# Advanced Battery System Integration for Next Generation Vehicles (ARISE) Project

***"The Horizon Europe Program has announced the results of application submissions for the 2024 calls under Cluster 5: Climate, Energy, Mobility, specifically under "Objective 5 - Clean and Competitive Solutions for All Transport Modes."***



***Out of 388 projects that applied across 18 calls, featuring 2,474 institutions and organizations, 9 different projects have been selected for support, collectively receiving €4.5 million in grants.***

***The project titled "Advanced Battery System Integration for Next Generation Vehicles (ARISE)" has received funding under the call HORIZON-CL5-2024-D5-01-03 as part of the 2ZERO Partnership. This represents a significant achievement as one of the 9 chosen projects. This ambitious initiative is set to commence on February 1, 2025, and will run for a period of 42 months."***



With a total budget of €5,362,093.75, the project aims to make significant advancements in battery technology for the next generation of vehicles. Sabancı University will serve as the project coordinator, with Principal Investigators (PIs) Ali Koşar and Ali Sadaghiani leading the efforts. The budget allocated to Sabancı University for this project is €519,600. The project brings together a consortium of 12 organizations, collaborating to achieve innovative solutions in battery system integration. By focusing on cutting-edge advancements in battery technology, this initiative aims to contribute to the development of more efficient and sustainable vehicles, aligning with broader goals of environmental sustainability and technological innovation in the automotive industry.

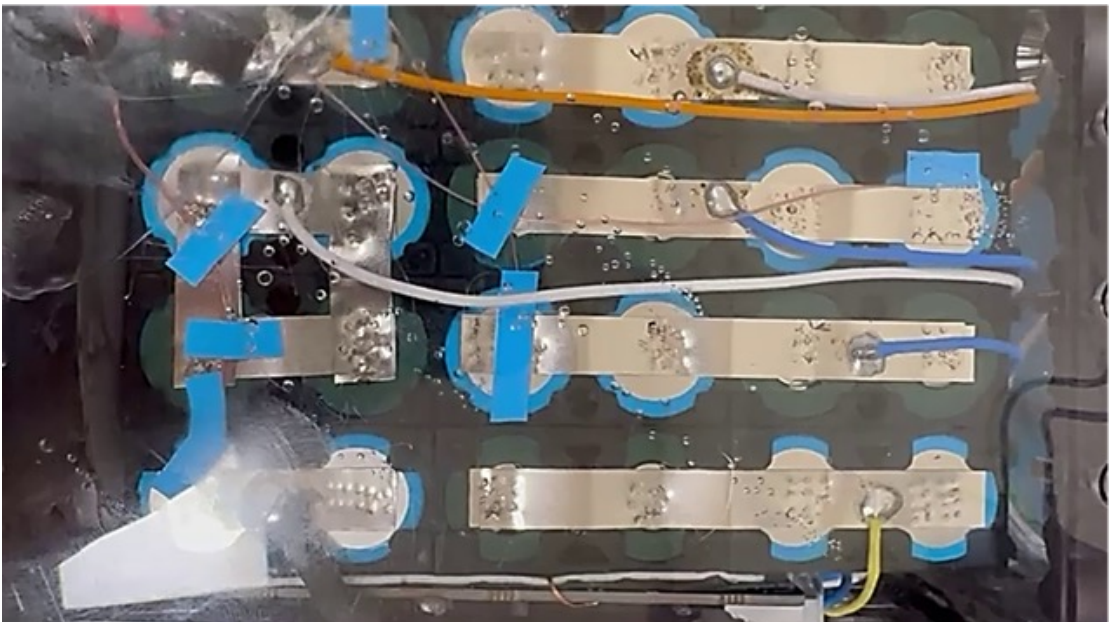
Led by Prof. Dr. Ali Koşar and Dr. Ali Sadaghiani from the Faculty of Engineering and Natural Sciences (MDBF) at Sabancı University, the project will involve a consortium of 12 organizations. It aims to develop an advanced fourth-generation (Gen-4) Li-ion battery system that offers high-performance features based on a cell-to-chassis concept with scalable modules applicable to any next-generation solid-state battery.

ARISE encompasses three different development approaches:

- A new chassis design for a city car utilizing solid-state batteries that can be scaled as needed.
- A Thermal Management System compatible with solid-state batteries.
- An Intelligent Battery Management System that ensures rapid charging and safety while controlling battery expansion.

### Goal of ARISE

The project focuses on developing an advanced fourth-generation (Gen-4) Li-ion battery system that utilizes a cell-to-chassis concept. This innovative design features expandable modules, making it adaptable for application in next-generation solid-state batteries. The Gen-4 battery system is characterized by its high-performance characteristics, ensuring efficiency and effectiveness in powering modern vehicles. This cutting-edge technology aims to enhance the capabilities of future battery systems, supporting the transition to more sustainable and advanced transportation solutions.



# Thermodynamics-Focused Control Management of Hydrogen-Powered Electric Propulsion Systems for Aviation (TRIATHLON) Project

*Our researchers' project is titled "Thermodynamics-Focused Control Management of Hydrogen-Powered Electric Propulsion Systems for Aviation." Ali Koşar summarizes the project as follows: Major efforts are being carried out at both global and European levels to reduce carbon emissions in order to mitigate the negative impact of human activities on the environment. The aviation industry aims to significantly target carbon emissions on a global scale.*



*In this transition toward net zero carbon emissions, new power transmission technologies using fuel cells and/or combustion systems based on hydrogen are gaining importance. TRIATHLON aims to create synergy among power transmission mechanism components to overcome the challenges associated with scaling hydrogen power transmission technology to the megawatt class.*

*The goal of TRIATHLON is to develop innovative approaches to design more robust, low-maintenance, low-emission, and highly responsive hydrogen-electric powertrains for megawatt-class aircraft. When the innovative technologies developed by TRIATHLON are adopted by relevant industries, they are expected to create game-changing effects in aviation.*

The project is coordinated by the Stichting Materials Innovation Institute. In addition to Sabancı University, project partners include Technische Universiteit Delft, Technische Universität Dresden, Ergon Research Srl, Cryomotive GmbH, Lithoz GmbH, and AMIRES s.r.o.

Sabancı University EFSUN researchers will serve as Work Package Leaders in the project, contributing to thermal management and achieving thermodynamic performance. The total budget for the "Thermodynamics-Driven Control Management of Hydrogen-Powered and Electrified Propulsion for Aviation TRIATHLON" project is €4 million, with a budget of €483,000 allocated to Sabancı University EFSUN.

Ali Koşar commented on the significance of the project: "Our project, titled Thermodynamics-Driven Control Management of Hydrogen-Powered and Electrified Propulsion for Aviation TRIATHLON, is Turkey's first funded project in aviation within Cluster 5."

### **Goal of TRIATHLON**

The goal of this initiative is to revolutionize aviation technology by developing innovative approaches for hydrogen-electric powertrains that are robust, require minimal maintenance, produce low emissions, and demonstrate high responsiveness, specifically tailored for megawatt-class aircraft.

A key objective is to design advanced storage solutions that feature higher gravimetric density, minimize atmospheric losses, and enhance safety—all while achieving cost reductions. By optimizing storage capabilities, we aim to support the efficient and sustainable use of hydrogen fuel in aviation.

In addition, the project group strives to develop a hybrid power generation system that boasts impressive efficiency, high power density, and ultra-low nitrogen oxide (NO<sub>x</sub>) emissions. This system will play a crucial role in meeting environmental standards and enhancing the overall sustainability of air travel.

To address the challenges associated with thermal management, in-depth studies on hydrogen phase changes and the heat and mass transfer processes within structured mini-channels will be conducted. This research will provide insights into optimizing thermal systems critical for the effective operation of hydrogen-electric powertrains.

Furthermore, a rigorous evaluation of these emerging technologies will be undertaken along with generation of a comprehensive roadmap aimed at increasing their Technology Readiness Levels (TRL). This strategic approach will ensure that the innovations transition smoothly from concept to practical application, paving the way for a greener aviation future.

## Targeted Impact

Triathlon Project aims to achieve significant milestones that will drive advancements in hydrogen-electric powertrains and the aviation industry. One of the primary expected outcomes is reaching Technology Readiness Level 3 (TRL3) for a megawatt-scale hydrogen-electric powertrain, with the goal of integrating this technology into next-generation aircraft between 2035 and 2050.

In terms of aviation and space industry outcomes, the project will focus on improving thermal management systems, which will result in reduced coolant flow requirements. Additionally, we aim to gain better control over combustion instabilities by regulating fuel temperature and implementing water injection strategies.

A critical component of the project involves the design of hydrogen storage systems that eliminate the need for cryopumps and prevent boil-off, all while achieving greater energy density. These innovations are expected to lead to a significant reduction in system costs—targeting a decrease of €100,000—and a weight reduction of 20% in the thermal management system.

Beyond aviation, TRIATHLON Project advancements will benefit multiple industries by facilitating advanced testing of hydrogen storage materials and enhancing heat transfer capabilities utilizing 3D-printed ceramics. Through these initiatives, the project strives to pave the way for sustainable and efficient energy solutions across various sectors.

# DIAMETER: Demonstration of a sustainable circular-by-design manufacturing system based on additive manufacturing

***"Among the 72 projects submitted to the HORIZON-CL4-2024-TWIN-TRANSITION-01-05 call within the scope of the Horizon Europe Program, the DIAMETER project, in which Sabancı University takes part as the Project Coordinator, has been deemed entitled to support from the European Commission."***



The achievements to be obtained in the project will be validated in four industrial use scenarios including (i) manufacturing of catalytic converters, (ii) valves, (iii) aircraft structural parts, and (iv) repair (remanufacturing) of pressing dies. With the DIAMETER project, significant contributions will be made to reducing the carbon footprint of the manufacturing sector, increasing recycling practices, developing a greener Industry 4.0, and encouraging local production. With the DIAMETER project, in which TUSAŞ Havacılık and Coşkunöz Kalıp Makina companies from Turkey also participate, an R&D budget of approximately 1 million Euros will be provided to our country.

Consortium international partners include KTH Royal Institute of Technology (Sweden), Optik am Fraunhofer IPT (Germany), Fraunhofer IWU (Germany), University of Sheffield - AMRC (England), CARTIF (Spain), Royal Melbourne Institute of Technology-Europe (Spain), ModuleWorks (Germany), OC Open Consulting (Italy), Stratagem Energy (South Cyprus), Uni Systems (Greece), F3nice (Italy), Trentino Sviluppo (Italy), ValCUN (Belgium), and Valland SpA (Italy), while Royal Melbourne Institute of Technology-University (Australia) and University of North Carolina at Charlotte (USA) will contribute to the project as associated partners. Thanks to the DIAMETER project, outputs with significant environmental and economic impacts will be obtained within the scope of compliance with the European Green Deal, which is also included in the strategic development goals of our country.

Additional benefits include publications in high-impact journals, training of experienced engineers and scientific researchers in a short time thanks to the DIAdemia platform to be created in the field of additive manufacturing and machining, providing qualified employment, high scientific, technological and social impacts with contributions to the start-up ecosystem and Industry 4.0.

# Privacy-preserving identity management for digital wallet and secure data sharing and processing for cyber-threat intelligence data (PRIVIDEMA)

***"The project entitled Privacy-Preserving Identity Management for Digital Wallets and Secure Data Sharing and Processing for Cyber-Threat Intelligence Data (PRIVIDEMA), in which ErKay Savaş, Özcan Öztürk, and Ferruh Özbudak represent the Sabancı University team, has been supported by EU Horizon Europe."***



The project, which received Horizon Europe support with a perfect evaluation score of 15.0/15.0, will benefit from Sabancı University's contributions in securing sensitive data through homomorphic encryption.

PRIVIDEMA is an industry-driven initiative aimed at improving and advancing privacy- and confidentiality-protecting technologies in application areas such as cyber-threat intelligence, data protection, and identity management. This multifaceted project spans various research and innovation maturity levels to deliver more robust, user-friendly, and scalable privacy and security technologies for the European ecosystem.

The studies and activities within the scope of PRIVIDEMA include:

1. Developing open-source software tools.
2. Organizing collaboration network events and initiating capacity-building activities.
3. Establishing infrastructures to democratize access to technology.
4. Creating new methods and tools deployable by cybersecurity professionals.

Additionally, the project encompasses enhancing capabilities in homomorphic encryption, developing and implementing hardware acceleration methods for these encryption systems and improving their usability.

The project aims to prototype a European identity card that ensures the protection of personal data. It also seeks to develop a prototype system for processing cyber-threat data in Europe while preserving confidentiality, which will be tested and validated under real-world conditions.

Aligned with the objectives of Horizon Europe, the PRIVIDEMA project will make significant contributions to the creation of secure digital infrastructures by actively supporting cybersecurity, data protection, and computer network security. The project stands out for its focus on supporting SMEs and open-source software development, fostering interdisciplinary collaboration, and embedding privacy and security as core design principles.

PRIVIDEMA's solution-oriented approach positions it as a pivotal initiative for advancing cyber-attack-resistant digitalization and driving the development of the data economy in Europe. The consortium's alignment with various European strategic initiatives highlights its emphasis on creating practical, real-world applications, delivering innovations beyond the status quo, and offering market-ready solutions.



# Privacy compliant health data as a service for AI development (PHASE IV AI)

*"The project titled "Privacy-Compliant Health Data as a Service for AI Development (PHASE IV AI)", submitted by a large consortium including Sabancı University and led by faculty members Erkay Savaş and Kamer Kaya, has received support under the Horizon Europe call HORIZON-HLTH-2022-IND-13-02."*



The total budget for the project, which involves 20 partners, is €7,599,713. The Sabancı University team will contribute expertise in cryptography, secure multiparty computation (SMPC), homomorphic encryption, federated learning, and privacy-preserving artificial intelligence, with a special emphasis on developing hardware accelerators for computationally demanding advanced cryptographic algorithms.

The project aims to advance existing data synthesis methods by creating a more generalized approach to the generation of synthetic data for use in developing artificial intelligence solutions for medical purposes. Since the data is private and distributed, new protocols will be developed using multiparty computation methods that rely on real data without directly utilizing it. Additionally, new metrics will be established for testing and verification purposes.

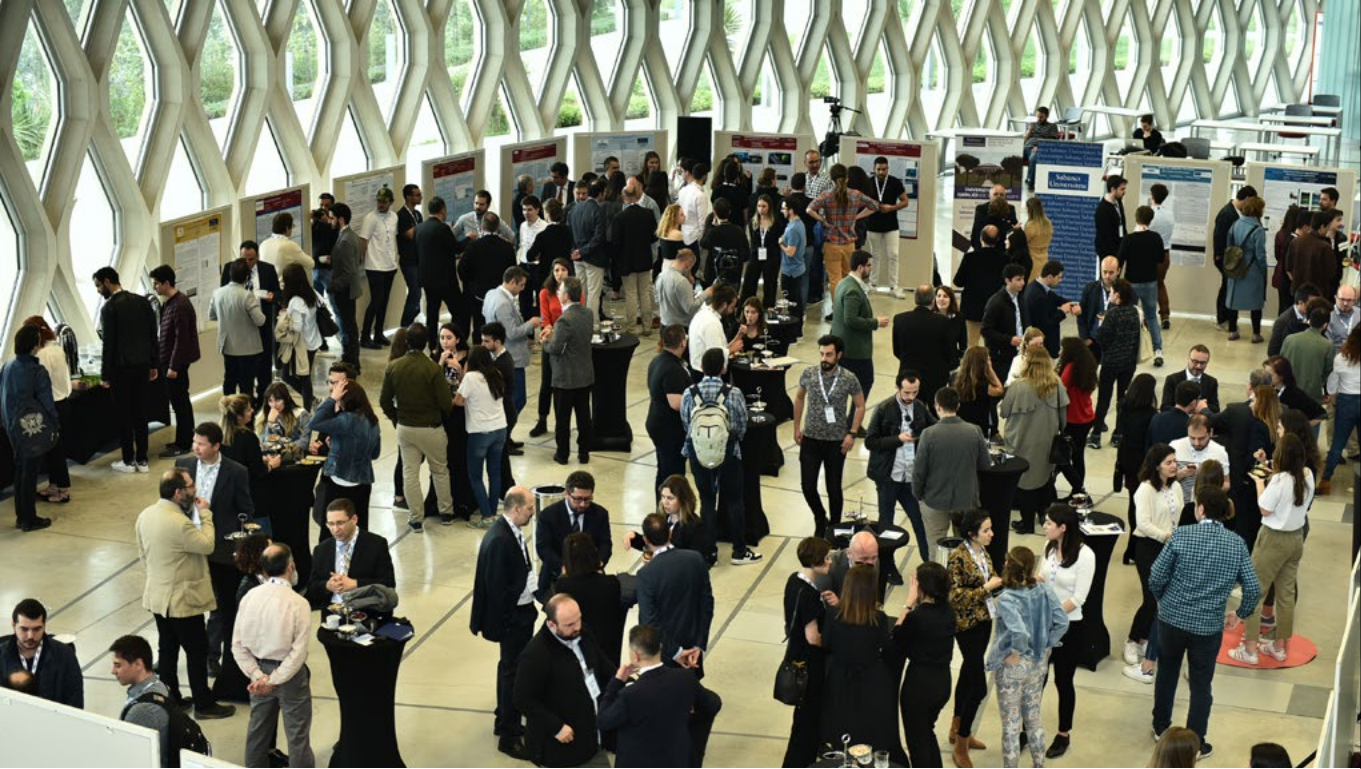
The project seeks to develop privacy-preserving synthetic data synthesis methods for various types of data, including electronic health records (EHR) and medical images. Furthermore, large, decentralized data pools will be created, allowing developers of artificial intelligence solutions to easily access, utilize, and adapt the data to meet their needs while maintaining privacy protections.

As part of the project, a data center will be established within the European Health Data Space. The data market and data service system will be integrated, and the project outputs will be tested and validated on real-world problems. The focus will be on high-impact diseases such as lung and prostate cancer and ischemic stroke.





# Industry-Focused Projects



## WHAT IS THE INDUSTRY-FOCUSED PROJECT PROGRAM ?

The Industry - Focused Project” is a program that enables companies to attack R&D challenges together with Sabancı University Engineering and Natural Sciences undergraduates. The program is carried out by senior undergraduate students of Sabancı University as part of their compulsory “Graduation Project” with the participating company representative and Sabancı University faculty member acting as advisors. The owner of the project is the commissioning company. Sabancı University and the companies are complements of the project.

- This program enables industrial companies to engage in research projects that require considerable time, human resources and technical ability by cooperating with Sabancı University.
- This program provide new project ventures and collaboration opportunity both for faculty members and for companies/institutions.
- Senior students involved in the project comprise a useful talent pool for prospective employers who find an opportunity to know and train their potential colleagues.

# OVERALL FACTS & FIGURES

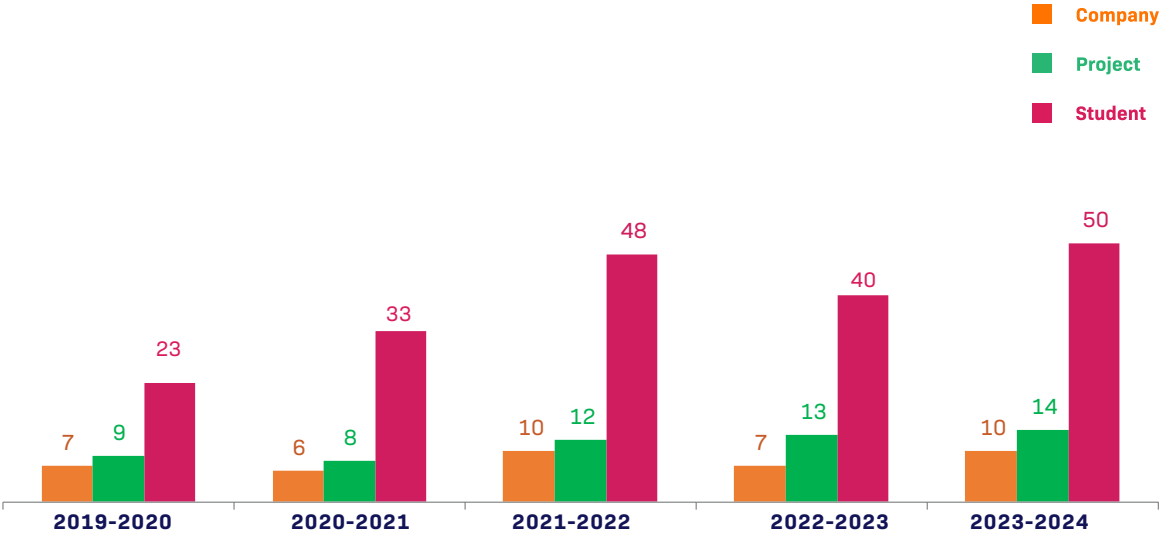
During the eight years since the beginning, 81 companies participated in the program as project stakeholders. Totally 120 projects were completed successfully. 417 senior students from various undergraduate programs were assigned as members of project working teams.

	COMPANY	PROJECT	STUDENT
2019/20	7	9	23
2020/21	6	8	33
2021/22	10	12	48
2022/23	7	13	40
2023/24	10	14	50
<b>Grand Total</b>	<b>40</b>	<b>56</b>	<b>194</b>

## THE NUMBER OF STUDENTS BY PROGRAM

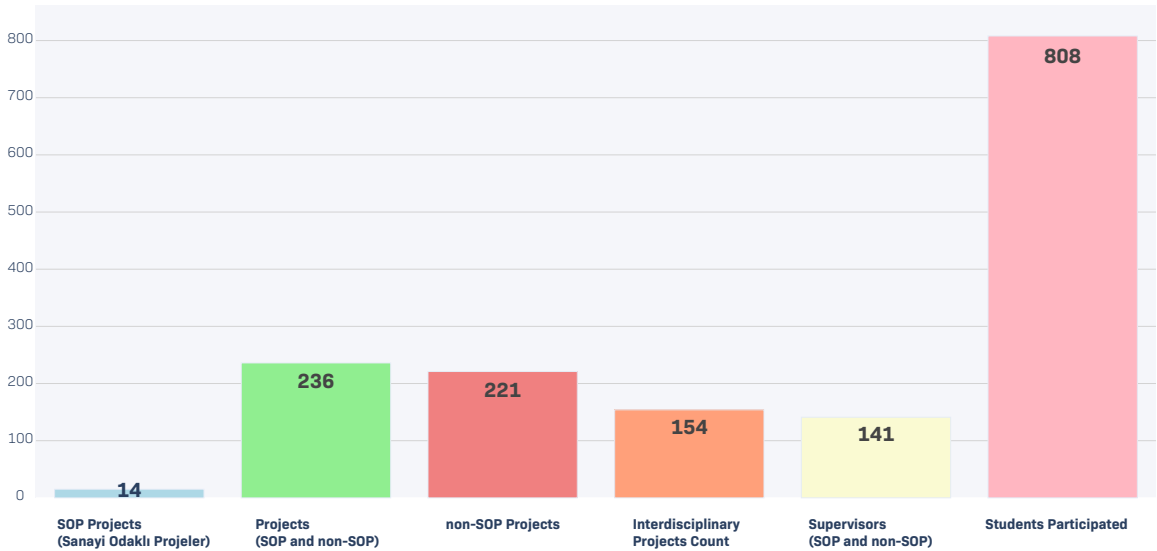
	2020	2021	2022	2023	2024
BIO	0	0	0	0	2
CS	4	9	14	9	20
EE	4	2	0	5	0
IE	15	18	28	24	21
MAT	0	2	1	3	3
ME	2	4	5	1	4
<b>Grand Total</b>	<b>23</b>	<b>33</b>	<b>48</b>	<b>40</b>	<b>50</b>

## SOP PROJECT DISTRIBUTIONS

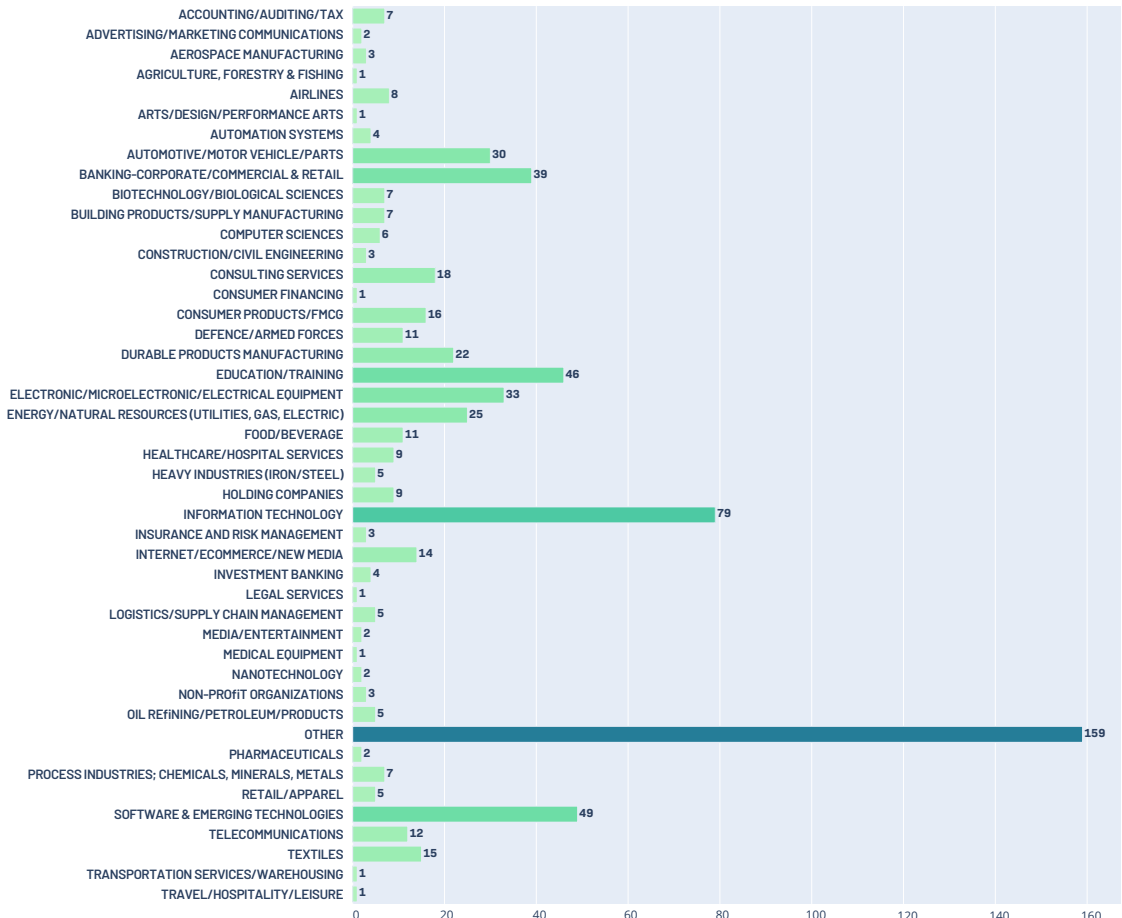


# Graduation Projects & Internship

## ENS 491/492 Graduation Projects



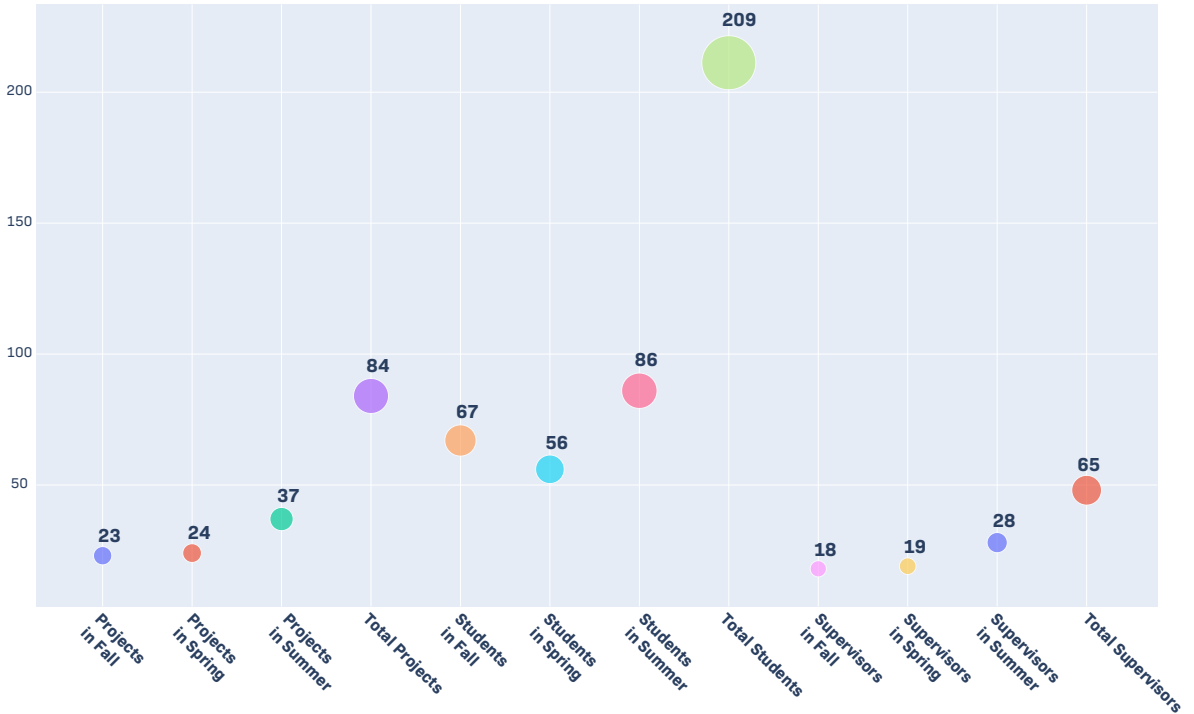
## Number of Internship Projects by Sector





# PURE Projects

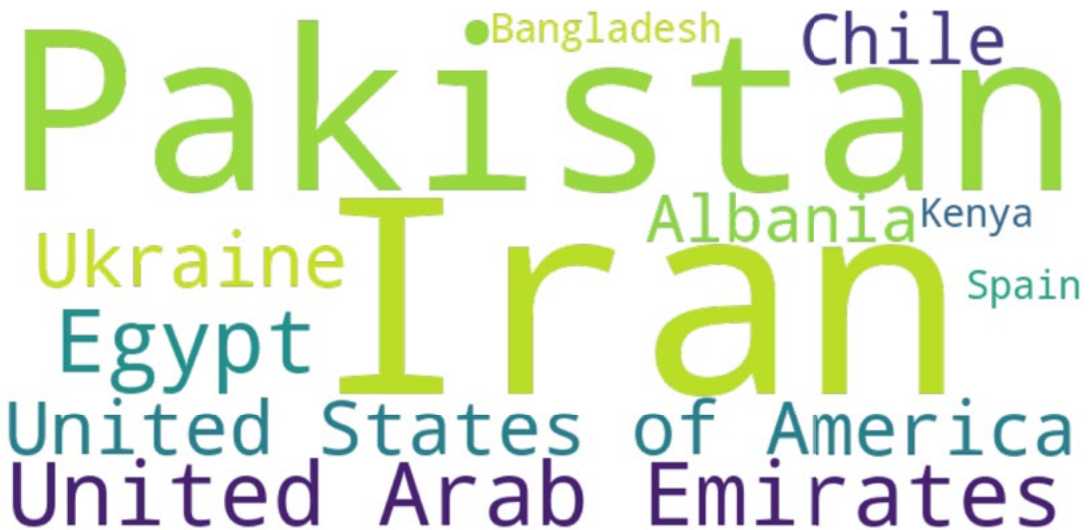
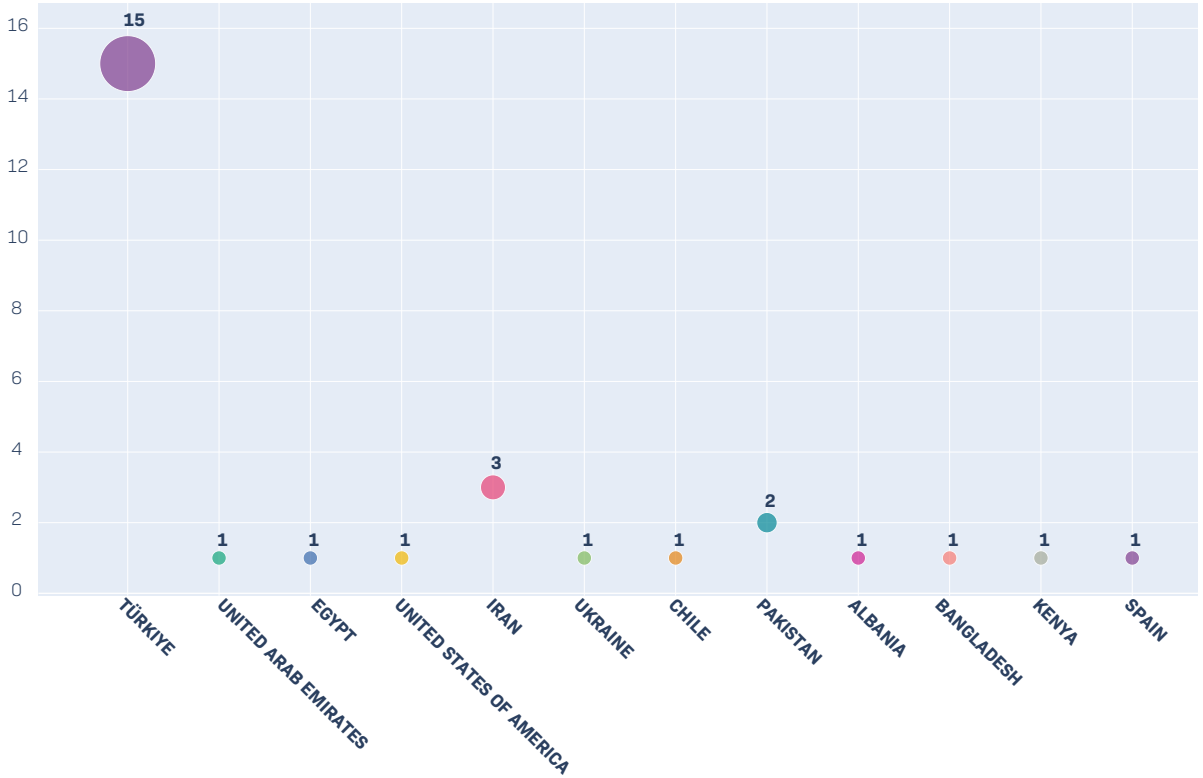
## PURE Projects, Students, and Supervisors Overview



Country	University
ALBANIA	Western Balkans University
BANGLADESH	Southern University Bangladesh
CHILE	Pontifical Catholic University of Chile
EGYPT	Cairo University
IRAN	Sharif University of Technology
	University of Tehran
	Islamic Azad University Ardabil Branch
KENYA	Kenyatta University
PAKISTAN	National University of Sciences & Technology (NUST)
	University of Agriculture Faisalabad Sub-campus Burewala
SPAIN	UIC Barcelona
UKRAINE	National Technical University of Ukraine
UNITED ARAB EMIRATES	Khalifa University
UNITED STATES OF AMERICA	University of California, Santa Cruz

# PURE Projects

## University Participation by Country



# Alumni in Academy



**Alparslan Emrah Bayrak (BSME,2011)** was promoted to Assistant Professor in Lehigh University



**Berkay Anahtarıcı (PHDMATH,2015)** was promoted to Assistant Professor in Özyeğin Üniversitesi



**Can Deha Karıksız (PHDMATH,2014)** was promoted to Assistant Professor in Ozyegin University



**Dicle Yağmur Özdemir (MSIE,2017)** was promoted to Assistant Professor in Rotterdam School of Management, Erasmus University





**Faraz Tehranizadeh (PHDMFE,2021)** was promoted to Faculty Member in Kadir Has University



**Gökhan Alcan (PHDME,2019)** was promoted to Assistant Professor in Tampere University



**Gökhan Kaçar (MSMAT,2009)** was promoted to Full Professor in Trakya University



**Emre Salman (BSEL,2004)** was promoted to Professor in Stony Brook University



**Erhun Ömer Kundakcioğlu (MSIE,2004)** was promoted to Professor in Ozyegin University

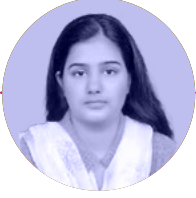
# Alumni in Academy



**Günseli Bayram Akçapınar (PHDBIO,2011)** was promoted to Professor in Acıbadem Üniversitesi



**İlknur Melis Durası (PHDBIO,2018)** was promoted to Research Assistant Professor in İstinye Üniversitesi



**Kousar Aslam (MSCS,2016)** was promoted to Assistant Professor in Vrije Universiteit Amsterdam (VU Amsterdam)



**Merve Acer Kalafat (PHDME,2012)** was promoted to Associate Professor in Istanbul Technical University



**Muhammad Ayat (MSIE,2015)** was promoted to Appointed Member of School Board, Computing, Engineering and Physical Sciences in University of the West of Scotland



**Mustafa Reşit Habođlu (BSME,2009)** was promoted to Assistant Professor in Hitit University



**Rahim Dehkharghani (PHDCS,2015)** was promoted to Assistant Professor in Kadir Has University



**Sevan Harput (MSEE,2007)** was promoted to Associate Professor in London South Bank University



**Ümmühan Akbay (PHDIE,2016)** was promoted to Assistant Professor in Piri Reis Üniversitesi



**Yasemin Yozgat (PHDBIO,2019)** was promoted to Assistant Professor in İstanbul Medipol University

# Awards & News



## 2024 BAGEP AWARDS

This award is presented to outstanding scientists under the age of 40. Ayesha Asloob Qureshi, a member of the Faculty of Engineering and Natural Sciences, has been recognized for her achievements in the field of mathematics. Hatice Sinem Şaş Çaycı, also a member of the Faculty of Engineering and Natural Sciences, has received the award in the field of mechanical engineering.



## FENS AND EFSUN RESEARCHER RECEIVED THE BEST PAPER AWARD

Sabancı University FENS and EFSUN Researcher Ali Sadaghiani's proceeding titled "Computational and Experimental Studies on HEF 7100 Two-Phase Spray Cooling" and co-authored by FENS faculty member and EFSUN researcher Ali Koşar, FENS Ph.D. student Behnam Parizad Benam, Aselsan engineers Osman Akdağ and Samet Saygan, is one of the Best Paper Award recipients in the 9th International Conference on Multiphase Flow and Heat Transfer 2024 held in London.



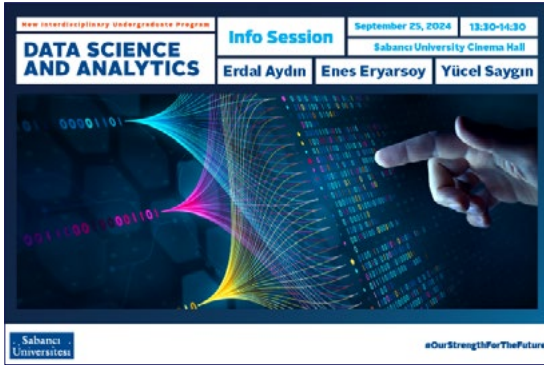
## MEANINGFUL AWARD TO OUR FACULTY MEMBER ÖZGE AKBULUT

Faculty of Engineering and Natural Sciences Faculty Member Özge Akbulut won the 2nd prize in the "#EITRIS Innovation Competition" with her environmentally friendly solutions for the ceramic industry.



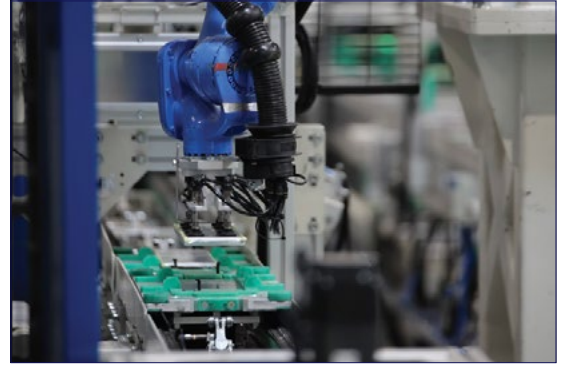
## CANAN ATILGAN BECAME A MEMBER OF EUROPE'S MOST PRESTIGIOUS ORGANIZATION IN MOLECULAR BIOLOGY

Prof. Dr. Canan Atılğan, member of Faculty of Engineering and Natural Sciences, was elected a member of the European Molecular Biology Organization (EMBO).



## **THE INFORMATION SESSION OF DATA SCIENCE AND ANALYTICS UNDERGRADUATE PROGRAM**

Our new Data Science and Analytics Undergraduate Program will provide innovative education with an interdisciplinary approach in the field of data analysis, which is of great importance for all sectors and stands out among the professions of the future.



## **NEW MINOR PROGRAM FROM SABANCI UNIVERSITY IN COLLABORATION WITH SIRO CLEAN ENERGY: "BATTERY SCIENCE AND ENGINEERING"**

Sabancı University and Siro Clean Energy are jointly launching a "Battery Science and Engineering" minor program on clean energy storage. Students will be able to choose this minor program starting from the 2024-2025 academic year.



## **FROM GRADUATION PROJECT TO USENIX SECURITY SYMPOSIUM: GREAT SUCCESS FROM SABANCI UNIVERSITY STUDENTS**

The project carried out by Faculty of Engineering and Natural Sciences 2023 graduates Aysun Öğüt, Berke Turanlıoğlu, and Doruk Can Metiner within the scope of their ENS 491/492 graduation project was presented at USENIX Security Symposium 2024, one of the world's most prestigious and distinguished conferences in the field of computer science.



## **OUR FACULTY OF ENGINEERING AND NATURAL SCIENCES BECAME A MEMBER OF THE GE4 NETWORK**

Faculty of Engineering and Natural Sciences (FENS) has expanded its connections by joining the Global Education for European Engineers and Entrepreneurs (Ge4) Network. This significant partnership aligns FENS with some of the world's premier Engineering and Management universities.



# Awards & News



## **REMARKABLE SUCCESS FROM OUR FACULTY MEMBER**

Sabancı University Faculty of Engineering and Natural Sciences Faculty Member Alhun Aydin's article has been accepted by "Physical Review Letters" one of the most prestigious journals in the field of physics. Congratulations to him! Selected as Editor's Suggestion, the article is now among a selection of few, groundbreaking studies. The paper explains the origin of the displaced Drude peak in optical conductivity, a topic falling into the field of quantum acoustics.

The Drude model treats conduction electrons as a classical gas of free particles that can move freely within the material. These electrons can absorb and re-radiate electromagnetic radiation. The Drude peak in optical conductivity, on the other hand, is a characteristic feature observed in the optical response of a metallic or semiconductor material. It arises from the free electron gas model, which describes how conduction electrons in a metal respond to an external electromagnetic field. The understanding of this phenomenon is important for the study of metals, semiconductors, and various nanostructures, as it provides insights into the electronic properties and behavior of materials under electromagnetic radiation, serving as an essential indicator of the behavior of free carriers in a material in response to electric fields at different frequencies.



## **PROF. SELMİYE ALKAN GÜRSEL NAMED AMONG TÜRKİYE'S 60 SUCCESSFUL WOMEN**

Prof. Selmiye Alkan Gürsel of the Materials Science and Nano Engineering Program was recognized by Para Magazine for her outstanding contributions across science, arts, politics, and business.



### **2023 OUTSTANDING ACHIEVEMENT AWARD FROM THE COUNCIL OF HIGHER EDUCATION TO SABANCI UNIVERSITY**

Sabancı University was found deserving of the University-Business Cooperation Award within the scope of the Council of Higher Education 2023 Outstanding Achievement Awards. At the award ceremony held at the Presidential Complex, Professor Yusuf Leblebici, President and Associate Professor Adnan Kefal, member of the Faculty of Engineering and Natural Sciences and principal investigator, were presented the award by President Recep Tayyip Erdoğan.



### **FOURTH NATIONAL CARBON CONFERENCE**

The Carbon Conference (UKK4) was held on March 28-29, 2024, at the Sabancı University Exhibition Center (SGM). The purpose of this conference was to bring together all stakeholders active in various fields of Carbon Science and Technology, including researchers, academics, entrepreneurs, engineers, students, industry representatives, and managers, to provide opportunities for participants to get to know each other and collaborate on future projects.

# Awards & News



## INTERNATIONAL SUCCESS OF OUR ALUMNUS

Our 2008 CS alumnus, Özgün Demir, has been recognized as one of the top healthcare leaders under 40 in the U.S. During his undergraduate years at Sabancı University, he interned at Eczacıbaşı and began part-time work at Pfizer, where he secured a job offer before graduation. Within two years, he became the Emerging Markets Europe Solution Manager at Pfizer. In 2012, Demir joined Bayer as the Digital Marketing Manager for Europe, Africa, and the Middle East, while also completing his master's degree at Boğaziçi University. He was promoted to Deputy Director of Digital Marketing at Bayer America in 2014 and later served as Digital Strategy Executive Director at Novartis in New York from 2017 to 2022. Since 2022, Demir has been leading digital marketing strategies at Genentech/Roche in California.



## A STARTUP BRIDGING THE GAP BETWEEN COMPANIES AND ARTIFICIAL INTELLIGENCE

Halit Erdoğan, a 2011 graduate of our Computer Science and Engineering program, founded the AI solutions startup Neural Bridge after working for many years in the field of artificial intelligence at Google.





### **OUR GRADUATE IS AMONG THE TOP 50 WOMEN IN TECH IN NORWAY**

Sabancı University Mechatronics Engineering Ph.D. student Behnam Parizad Benam's proceeding titled "On Saturated Flow Boiling Heat Transfer of Deionized Water and Ferrofluid on Structured Surfaces with/without External Magnetic Field" and co-authored by FENS faculty member and EFSUN researcher Ali Koşar, FENS and EFSUN research Abdolali K. Sadaghiani, FENS M.S. student Mandana Mohammadiloey, Seoul National University faculty member Hyun Sun Park, is one of the Best Paper Award recipients in the 8th World Congress on Momentum, Heat and Mass Transfer 2023 held in Lisbon.



### **WORLDWIDE SUCCESS OF OUR GRADUATE ALİ ÇAĞATAY CIRIK**

According to a research result on the IPR Gezgini website, our graduate Ali Çağatay Cırık ranked 4th in the list of "10 Turkish Inventors with the Most Patent Families in the World" with 386 patents.

# Our Awards

## THREE MINUTE THESIS (3MT™)



Held for the 7th time on Wednesday, June 12, 2024, the Three Minute Thesis (3MT®) competition was hosted by Sabancı University. Developed by the Queensland University of Australia for doctoral students to develop and showcase their research communication skills in 2008, the FENS 3MT competition was organized by the Sabancı University Faculty of Engineering and Natural Sciences Research Awards Committee.

Molecular Biology, Genetics and Bioengineering Program Ph.D. student Melike Seçilmiş won the first place among 6 competitors in the Three Minute Thesis competition. Ayşe Ay, Ph.D. student of the Materials Science and Nano Engineering Program, came second among the competitors evaluated by the jury members. In the “People’s Choice” category, in which the winners are determined by the votes of the audience, Molecular Biology, Genetics and Bioengineering Program PhD student Nafisa Tanjia was awarded the prize.



Winner  
**Melike Seçilmiş**  
(PHDBIO)



Runner-up  
**Ayşe Ay**  
(PHDMAT)



People's Choice  
**Nafisa Tanjia**  
(PHDBIO)



## GÜRSEL SÖNMEZ AWARDS



Dr. Gürsel Sönmez Research Award Committee has carefully evaluated the applications of seven candidates, considering their research outcomes and references, as well as the nature of each discipline and the degree awarded at the Institute of Engineering and Natural Sciences at Sabancı University. Based on their achievements and contributions to their fields, as summarized on our website, the committee has decided to award Roozbeh Saghatchi, a PhD student in Manufacturing Engineering.

Roozbeh Saghatchi completed his PhD in the Manufacturing Engineering Program in September 2022. His research focused on the hydrodynamics of soft matter, particularly under electrohydrodynamic effects, and the collective behavior of active matter. His work has applications in fields like microfluidics, 3D printing, and tissue engineering.

Roozbeh's PhD thesis made significant contributions to the understanding and practical applications of computational fluid dynamics (CFD) and led to six publications in prestigious international journals and one in an international conference on computational fluid mechanics for complex systems.



2023-2024 Dr. Gürsel Sönmez Research Award Committee members are Ferruh Özbudak, Gözde İnce, Melih Türkseven, Özgür Gürbüz and Özgür Kütük.

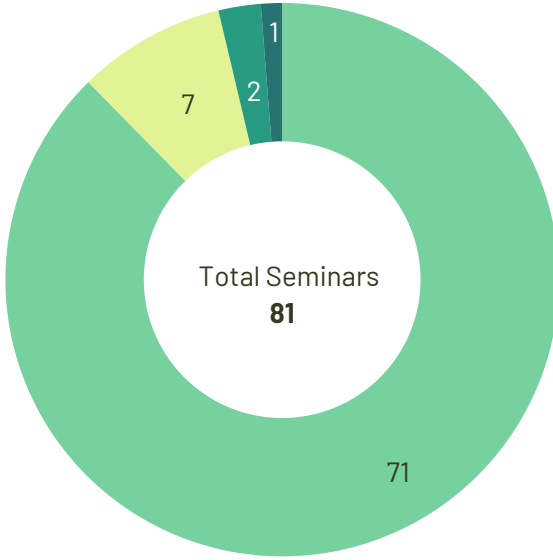


## SAKIP SABANCI AWARD FOR THE HIGHEST RANKING UNDERGRADUATE STUDENT

Recipients are **Özgür Yılmaz Beker**, **Ege Demirci**, **Efe Tüzün**, **Görkem Yar**, **Ege Zorlutuna** and **Eylül Öykü Şen** who graduated from the Computer Science & Engineering program.

# Seminars

2023-2024 Academic Year



- 71 Weekly Graduate Seminars
- 7 Dean's Speaker Series
- 2 Sharing Experiences
- 1 Distinguished Research Fellows

Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

## Dean's Speaker Series

Seeing the 'impossible': Imaging the magnetic realm using diamond quantum magnetometry

SU Distinguished Research Fellow

**Prof. Mete Atatüre**  
University of Cambridge Institute of Physics, and the Science Academy, Turkey



December 28, 2023  
16:40  
FMAN 1099 (Auditorium)


#OurStrengthForTheFuture

Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

## Dean's Speaker Series

Language processing: From Natural to Molecular Languages

Assoc. Prof. **Arzucan Özgür**  
Boğaziçi University



13 December, Wednesday  
13.40  
G032

#OurStrengthForTheFuture



Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

# Dean's Speaker Series

Day on Computer Science and Engineering

December 27, 2023 | FENS G032

**Kaan Kara** | 11:40  
Oracle  
Scaling In-Memory Relational Data Processing to Thousands of Cores

**İrem Boybat** | 13:40  
IBM Research Europe  
Analog In-Memory Computing-Based Deep Neural Network Inference Acceleration

**Fatma Güney** | 15:40  
Koç University  
Perception and Prediction in Self-Driving

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Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

# Dean's Speaker Series

SU students meeting with renowned scholar

**Prof. Mehmet Toner**  
Helen Andrus Benedict Prof.,  
Director Center for Engineering in Medicine and Surgery, MGH, Harvard-MIT

Sabancı University  
Distinguished Research Fellow

14 May 2024, Tuesday  
16:00-18:00  
Cinema Hall

#OurStrengthForTheFuture

Dean's Speaker Series

President of TUBITAK

**Prof. Hasan Mandal**  
meets faculty

February 23, 2024 | 14:00  
Cinema Hall

#OurStrengthForTheFuture

Distinguished Research Fellows Spring Meeting 2024

TUESDAY, MAY 14, 2024  
14:00 SEMINAR BY MEHMET TONER  
@ MAIN CAMPUS (TUZLA)

WEDNESDAY, MAY 15, 2024  
14:00 SEMINAR BY ASLI DEMİRGÜÇ-KUNT  
@ MAIN CAMPUS (TUZLA)

Prof. Mehmet Toner  
Dr. Asli Demirgüç-Kunt

Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

SHARING EXPERIENCES  
FACULTY LEARNING FROM EACH OTHER

**DR. SİNAN YILDIRIM**  
Sabancı University

NOVEMBER 15, 2023  
13:40 - 14:30  
G035 (PHYSICAL ONLY)

**DIFFERENTIALLY PRIVATE BAYESIAN ESTIMATION**

Sabancı Üniversitesi FACULTY OF ENGINEERING AND NATURAL SCIENCES

SHARING EXPERIENCES  
FACULTY LEARNING FROM EACH OTHER

**KÜRŞAT ŞENDUR**  
Sabancı University

DECEMBER 6, 2023  
13:40 - 14:30  
G032 (PHYSICAL ONLY)

**SUPPRESSING INFRARED RADIATION THROUGH FIBROUS THERMAL INSULATION MATERIALS**

# PhD Dissertations

NAME/ SURNAME	PROGRAM	THESIS TITLE	TERM	THESIS ADVISOR
ABDULLAH KENDIBILIR	MANUFACTURING ENGINEERING	PARTICLE BASED TOPOLOGY OPTIMIZATION METHODS FOR ADDITIVE MANUFACTURING TECHNOLOGIES	SPRING 2023-2024	ADNAN KEFAL
ABDULRAHMAN SAEED ABDULQADER AL- NADHARI	MATERIALS SCIENCE AND NANO ENGINEERING	THE APPLICATION AND OPTIMIZATION OF ATMOSPHERIC PLASMA ACTIVATION TECHNIQUE ONTO LARGE-SCALE THERMOSET AND THERMOPLASTIC COMPOSITE ADHESION SYSTEMS USING ROBOTIZED MULTIPLE NOZZLE HEADS	SPRING 2023-2024	MEHMET YILDIZ
AFRIM BOJNIK	MATHEMATICS	RANDOM HOLOMORPHIC SECTIONS ASSOCIATED WITH A SEQUENCE OF LINE BUNDLES ON COMPACT KAHLER MANIFOLDS'	SPRING 2023-2024	TURGAY BAYRAKTAR
AHMET CAN KIRLIOĞLU	MATERIALS SCIENCE AND NANO ENGINEERING	ADVANCED MATERIALS FOR SUSTAINABLE GREEN ENERGY: RADIATION GRAFTED DUAL- FIBER BASED ANION EXCHANGE MEMBRANES AND FE-N-C ELECTROCATALYSTS FOR FUEL CELLS	FALL 2023-2024	SELMİYE ALKAN GÜRSEL
ALI HOSSEINPOUR SHAFAGHI	MECHATRONICS ENGINEERING	GREEN ENERGY: RADIATION GRAFTED DUAL- FIBER BASED ANION EXCHANGE MEMBRANES AND FE-N-C ELECTROCATALYSTS FOR FUEL CELLS	SPRING 2023-2024	MURAT KAYA YAPICI
ALP YETİŞGİN	MATERIALS SCIENCE AND NANO ENGINEERING	MODELING THE COLLISION EVENT AT THE INTERFACE FOR CELL SEPARATION APPLICATIONS	FALL 2023-2024	ÖZLEM KUTLU
ARASH EBRAHIMI ARAGHIZAD	MANUFACTURING ENGINEERING	DEVELOPMENT OF TOPICAL DRUG FORMULATIONS FOR THE TREATMENT OF OCULAR NEOVASCULARIZATION	SPRING 2023-2024	ERHAN BUDAK
ASAL SAEIDFAR	MECHATRONICS ENGINEERING	MACHINE LEARNING-BASED MODELING AND MONITORING OF MACHINING PROCESSES AND TOOL WEAR	FALL 2023-2024	SERHAT YESILYURT
ASLI TUĞÇUOĞLU MUSAPAŞAOĞLU	MATHEMATICS	INVESTIGATING THE PERFORMANCE AND DEGRADATION OF LOW PLATINUM LOADED PROTON EXCHANGE MEMBRANE FUEL CELLS	SPRING 2023-2024	AYESHA ASLOOB QURESH
AYDA AMNIATTALAB	INDUSTRIAL ENGINEERING	ESTIMATING THE NUMBER OF FAILURES AND THE SPARE PARTS DEMAND-INSTALLED BASE APPROACH	FALL 2023-2024	HANS FRENK

NAME/ SURNAME	PROGRAM	THESIS TITLE	TERM	THESIS ADVISOR
AYŞE DURMUŞ SAYAR	MATERIALS SCIENCE AND NANO ENGINEERING	ENHANCEMENT OF INTERFACIAL INTERACTIONS IN FIBER-REINFORCED POLYMERIC COMPOSITES WITH MULTIFUNCTIONAL CARBON NANOMATERIALS	FALL 2023-2024	SERKAN ÜNAL
AYŞE AY	MATERIALS SCIENCE AND NANO ENGINEERING	THE SELF-STANDING MALLEABLE DOUGHS OF ADVANCED CERAMICS FACILITATE LOW-NUMBER PRODUCTION AND PROTOTYPING ON A BENCHTOP	SPRING 2023-2024	ÖZGE AKBULUT
BÜŞRA ŞİMŞEK	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	GENERATION OF NANOBODY BASED CHIMERIC ANTIGEN RECEPTOR CONSTRUCTS AGAINST CD19 POSITIVE B CELL LYMPHOMAS	SPRING 2023-2024	SELİM ÇETİNER
CEREN YILDIRIM	MANUFACTURING ENGINEERING	MULTIFACETED CHARACTERIZATION AND OPTIMIZATION OF AEROSPACE GRADE THERMOPLASTIC COMPOSITES JOINTS:ADVANCES IN SURFACE TREATMENTS,MECHANICAL PERFORMANCE AND ENVIRONMENTAL RESILIENCE	SPRING 2023-2024	MEHMET YILDIZ
EKİN BERKSUN	MATERIALS SCIENCE AND NANO ENGINEERING	UV CURABLE AND SELF-HEALING COATINGS AND FILMS	SPRING 2023-2024	SERKAN ÜNAL
FARID SAYAR IRANI	MATERIALS SCIENCE AND NANO ENGINEERING	PATTERNED EXFOLIATED GRAPHENE BY KINETIC MICROCONTACT PRINTING	SPRING 2023-2024	MURAT KAYA YAPICI
GİZEM SEMRA ARITÜRK	MATERIALS SCIENCE AND NANO ENGINEERING	A SUSTAINABLE APPROACH FOR THERMOPLASTIC COMPOSITES WITH TAILORABLE CHARACTERISTICS BY THERMOKINETIK HYBRIDIZATION OF WASTE CELLULOSE AND VERMICULITE	SPRING 2023-2024	YUSUF ZİYA MENCELOĞLU
HAMZA YUSUF ALTUN	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	INVESTIGATION OF HYDROGEN PEROXIDE AND NITRIC OXIDE SIGNALING UTILIZING GENETICALLY ENCODED BIOSENSORS	SPRING 2023-2024	SELİM ÇETİNER
HASAN ALP BOZ	COMPUTER SCIENCE AND ENGINEERING	COMPUTATIONAL SOCIAL SCIENCCE	FALL 2023-2024	SELİM BALCIŞOY
HOSSEIN MAHDAVI	ELECTRONICS ENGINEERING	EFFICIENT HEVC AND VVC VIDEO COMPRESSION HARDWARE DESIGNS	FALL 2023-2024	MURAT KAYA YAPICI

NAME/ SURNAME	PROGRAM	THESIS TITLE	TERM	THESIS ADVISOR
IŞIK KANTARCIOĞLU	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	DYNAMICS OF THE HOMOTRIMERIC TOLC TRANSMEMBRANE PROTEIN	SPRING 2023-2024	CANAN ATILGAN
KUDRET AKÇAPINAR	ELECTRONICS ENGINEERING	LEARNING BASED MULTIPLE INPUT MULTIPLE OUTPUT RADAR IMAGING	SPRING 2023-2024	ÖZGÜR GÜRBÜZ
KURAY DERİCİLER	MATERIALS SCIENCE AND NANO ENGINEERING	FABRICATION OF LIGHTWEIGHT AND DURABLE THERMOPLASTIC COMPOSITES FOR INJECTION MOLDING WITH THE INTEGRATION OF WASTE-DRIVEN REINFORCING MATERIALS	FALL 2023-2024	BURCU SANER OKAN
MAHSA SEYEDNOURANI	MANUFACTURING ENGINEERING	EXPERIMENTAL INVESTIGATION ON THE MECHANICAL RESPONSE OF THE IMPACTED CFRP COMPOSITE LAMINATES AND JOINTS UNDER DIFFERENT TEMPERATURE CONDITIONS	SPRING 2023-2024	HATİCE SİNEM ŞAŞ ÇAYCI
MEHMET CEM AYTEKİN	COMPUTER SCIENCE & ENGINEERING	ALL ASSISTED CONSTRUCTION OF EDUCATIONAL KNOWLEDGE GRAPHS	SPRING 2023-2024	YÜCEL SAYGIN
MELİKE BERKSÖZ	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	MOLECULAR MECHANISMS OF GENETICALLY ENCODED FLUORESCENT BIOSENSORS	SPRING 2023-2024	CANAN ATILGAN
MELİKE SEÇİLMİŞ	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	DEVELOPMENT OF A NON-ANIMAL -BASED TESTING METHOD FOR ASSESSING SKIN SENSITIZERS USING GENETICALLY ENCODED BIOSENSORS	SPRING 2023-2024	SELİM ÇETİNER
MELİKE NUR ÖNDER	MATERIALS SCIENCE AND NANO ENGINEERING	DESIGN AND FABRICATION OF GRAPHITE ENHANCED PVA/GNP COMPOSITE PIEZORESISTIVE INK	FALL 2023-2024	MEHMET ALİ GÜLGÜN
MOHAMMAD HASAN JOU DIVAND SARAND	MANUFACTURING ENGINEERING	DEVELOPING A PHYSICS-BASED MODEL WITHIN A CRYSTAL PLASTICITY FINITE ELEMENT FRAMEWORK TO ANALYZE TEXTURE EVOLUTION AND DEFORMATION HETEROGENEITY IN DUAL- PHASE STEEL MATERIALS	FALL 2023-2024	BURÇ MISIRLIOĞLU
MOHAMMAD YUSAF AZİMİ	COMPUTER SCIENCE AND ENGINEERING	MODEL-BASED TEST ADAPTATION FOR SMART TVS	SPRING 2023-2024	CEMAL YILMAZ
NİLÜFER ÇAKIR	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	DEVELOPING ADVANCED NON-INVASIVE NANO- FORMULATIONS AND DRUG-CONJUGATION STRATEGIES AGAINST GLIOBLASTOMA VIA COMPLETE ANTIBODY AND ANTIBODY FAB FRAGMENTS	FALL 2023-2024	NUR MUSTAFAOĞLU



NAME/ SURNAME	PROGRAM	THESIS TITLE	TERM	THESIS ADVISOR
OSMAN ŞAHİN	ELECTRONICS ENGINEERING	DEVELOPMENT OF MICRORNA-BASED LAB-ON-A-CHIP BIOSENSOR PLATFORMS WITH DIRECT ELECTRICAL READOUT FOR EARLY DIAGNOSIS OF COLORECTAL CANCER BIOMARKERS	SPRING 2023-2024	MURAT KAYA YAPICI
RIZWAN JAHANGIR	MATHEMATICS	HILBERT SERIES OF POLYOMINO IDEALS AND COHEN-MACAULAY POSETS	2022-2023 SPRING	ALİ KOŞAR
SAEEDAH AHMADI BASIR	INDUSTRIAL ENGINEERING	THE PERIODIC VEHICLE ROUTING PROBLEM WITH VISUAL ATTRACTIVENESS AND DRIVER CONSISTENCY CONSIDERATION	SPRING 2023-2024	AMİNE GİZEM ÖZBAYGIN
SAHER GUL	MANUFACTURING ENGINEERING	DEVELOPMENT OF HEXAGONAL BORON NITRIDE REINFORCED THERMOPLASTIC COMPOSITES FOR ADVANCED THERMAL MANAGEMENT WITH MULTI-PROCESSING TECHNIQUES	FALL 2023-2024	BURCU SANER OKAN
SALİHA DURAK	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	DEVELOPMENT OF NANOMEDICAL FORMULATIONS FOR THE TREATMENT OF OCULAR DISEASES	FALL 2023-2024	SİBEL ÇETİNEL
SEVILAY BURCU ŞAHİN YILDIZ	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	DEVELOPMENT OF CORNEAL TISSUE SUBSTITUTES	SPRING 2023-2024	SİBEL ÇETİNEL
SEZGİ KAYA	MOLECULAR BIOLOGY, GENETICS AND BIOENGINEERING	GENOME-WIDE UV-INDUCED DNA DAMAGE AND NUCLEOTIDE EXCISION REPAIR IN THE CONTEXT OF R-LOOPS	FALL 2023-2024	OGÜN ADEBALİ
SİNEM ELMAS	MATERIALS SCIENCE AND NANO ENGINEERING	EXPLORING THE RELATIONSHIP BETWEEN MANUFACTURING METHODS, PROCESSING PARAMETERS, ENVIRONMENTAL FACTORS, AND LONG-TERM PERFORMANCE OF CARBON FIBER REINFORCED POLY-ETHER-KETONE-KETONE COMPOSITES	SPRING 2023-2024	HATİCE SİNEM ŞAŞ ÇAYCI
SOLOMON BIRHANU SAMUEL	PHYSICS	GEOMETRICAL AND GROUP CHARACTERIZATION OF SIC-POVMS ON GENERALISED BLOCH SPHERE	SPRING 2023-2024	MEHMET ZAFER GEDİK
VAHİD CHARKHESHT	MATERIALS SCIENCE AND NANO ENGINEERING	ADVANCED MATERIALS FOR HIGH ENERGY DENSITY ELECTRODES FOR LI-ION BATTERIES	SPRING 2023-2024	SELMİYE ALKAN GÜRSEL

## FACULTY of ENGINEERING and NATURAL SCIENCES

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