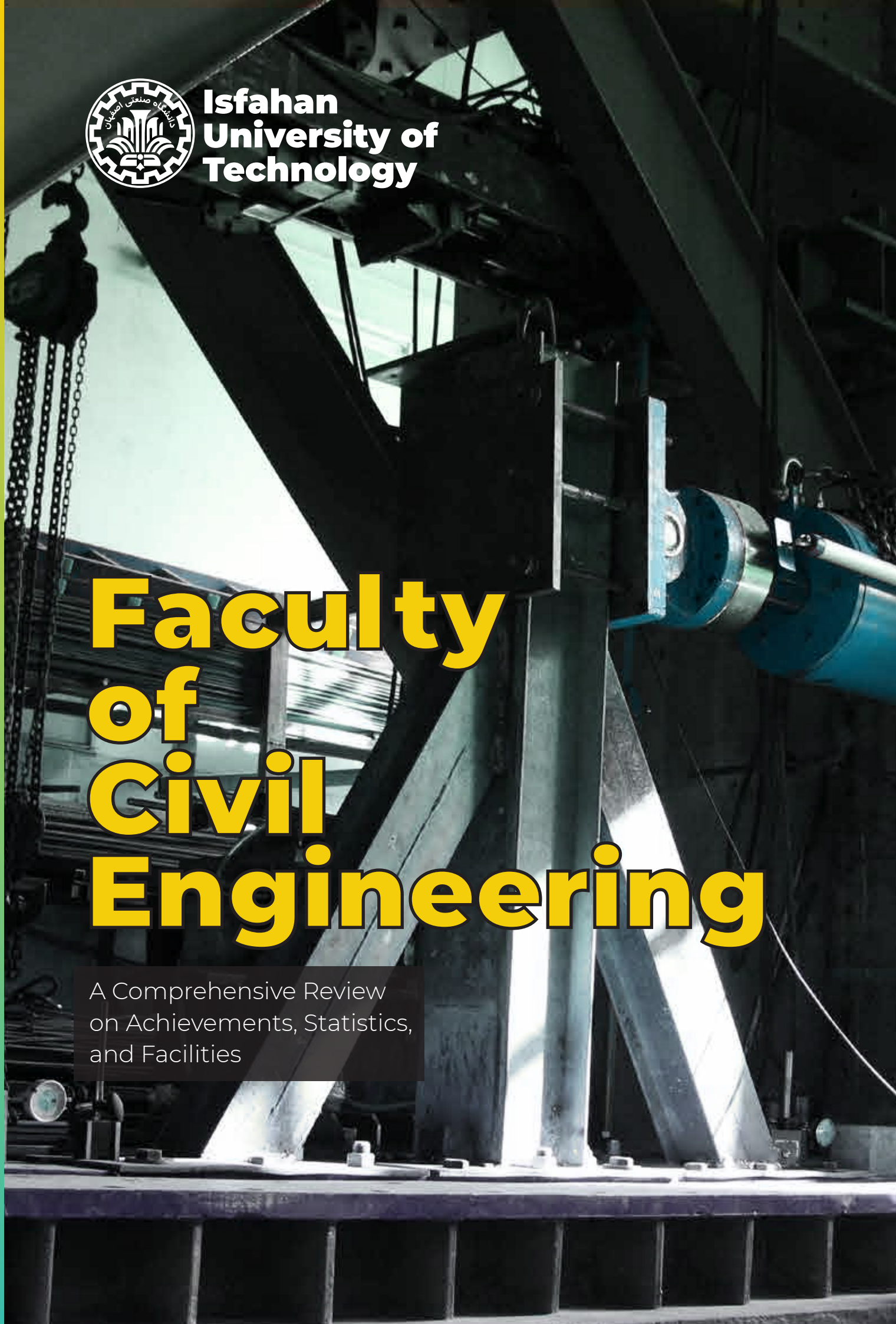

Isfahan University of Technology

Faculty of Civil Engineering

A Comprehensive Review on Achievements, Statistics, and Facilities

In the Name of God

Contents

Overview

Faculty of Civil Engineering is one of the oldest faculties at IUT, established in 1977. We strive to create a dynamic research environment and train qualified/knowledgeable students capable of identifying problems and providing solutions constrained to environmentally sustainable strategies.

The faculty has thirty-one full-time faculty members and fifteen staff dedicated to the research and education of more than 380 undergraduate and 300 master and Ph.D. students.

Some of our research institutes and laboratories are among the top research centers of the country in structures and design, sustainable urban systems, and water and environmental engineering supporting strong collaborations with national organizations, and academic and industrial partners.

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Faculty of Civil Engineering

Degree Programs

B.Sc *140 credits*

- Civil Engineering

M.Sc *26 credits of coursework + 6 credits of thesis*

- Earthquake Engineering
- Environmental Engineering
- Geotechnical Engineering
- Highway and Transportation Engineering
- Structural Engineering
- Water and Hydraulic Structures Engineering
- Water Resources Management

Ph.D *15 credits of coursework + 21 credits of dissertation*

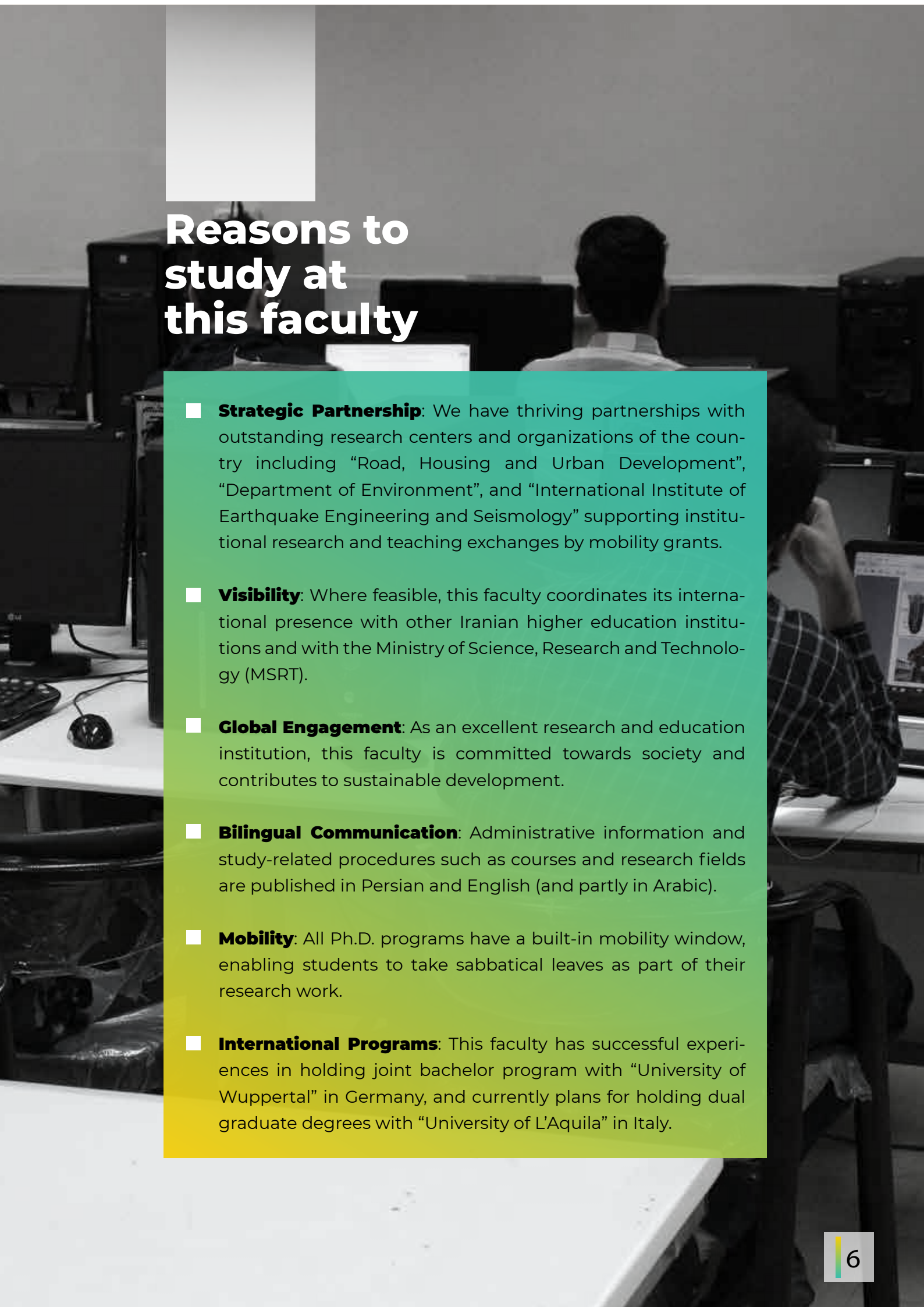
- Geotechnical Engineering
- Structural Engineering
- Water and Hydraulic Structures Engineering
- Water Resources Management

To accomplish a successful B.Sc. in Civil Engineering, undergraduate students must take 20 credits in general courses, 26 credits in basic courses, 84 credits in compulsory courses, and 10 credits in elective courses (total 140 credits).

Graduate students must take 15-18 credits in compulsory courses, 6-9 credits from elective courses, two credits from a seminar, and 6 credits from a thesis, overall 32 credits to receive M.Sc. degree.

The Ph.D. program consists of 15 credits of coursework and 21 credits of dissertation. Students must pass the written and oral comprehensive exams after completion of coursework.

Students have freedom in course selection and planning, and can benefit from strong digital technologies and equipped laboratories available at this faculty.



Reasons to study at this faculty

- **Strategic Partnership**: We have thriving partnerships with outstanding research centers and organizations of the country including “Road, Housing and Urban Development”, “Department of Environment”, and “International Institute of Earthquake Engineering and Seismology” supporting institutional research and teaching exchanges by mobility grants.

- **Visibility**: Where feasible, this faculty coordinates its international presence with other Iranian higher education institutions and with the Ministry of Science, Research and Technology (MSRT).

- **Global Engagement**: As an excellent research and education institution, this faculty is committed towards society and contributes to sustainable development.

- **Bilingual Communication**: Administrative information and study-related procedures such as courses and research fields are published in Persian and English (and partly in Arabic).

- **Mobility**: All Ph.D. programs have a built-in mobility window, enabling students to take sabbatical leaves as part of their research work.

- **International Programs**: This faculty has successful experiences in holding joint bachelor program with “University of Wuppertal” in Germany, and currently plans for holding dual graduate degrees with “University of L’Aquila” in Italy.

Honors and Awards

1. **Outstanding Lecturer of IUT:** *2019, 2012, 2009, 2008, 2006, 2004, 2003*
2. **Best Manager of Technological Research with Industrial Sectors:** *2008*
3. **The Distinguished Book of Engineering National Award:** *2019, 2016, 2013, 2012*
4. **The Award of "Book of the year of Iran" :** *2007*
5. ***IUT Outstanding Researcher Award:*** *2011, 2010, 2007, 2001*
6. **IUT Distinguished Research Award for Authorship:** *2011*
7. **IUT Distinguished Teaching Award:** *2016*
8. **Distinguished Grade in Kharazmi Festival:** *1992*
9. **Distinguished Man of Concrete in Iran:** *2012*
10. **The Award of "Book of the year in Isfahan Province":** *2010*
11. **Outstanding Researcher of Isfahan Province:** *2019, 2012, 2009, 2003*
12. **Pioneer Engineer Award:** *2003*
13. **Best Author of the Engineering Book in Isfahan Province:** *2006, 2000*
14. **Distinguished Man of Steel Structures:** *2018*
15. **Youngest Distinguished Research Award:** *2011, 2010, 2009*
16. **Citation Award:** *2007, 2006*

Program Objectives

To achieve missions and educational objectives, the Civil Engineering Faculty ensures that graduates will attain the following program outcomes and abilities:

- Applied knowledge in mathematics, science, and engineering
- Experimental design and data interpretation
- Multi/Interdisciplinary teamwork
- Identification and solution of engineering problems
- Understanding professional responsibility
- Recognition and engagement in life-long learning
- Basic concepts in management, business, public policy, and leadership

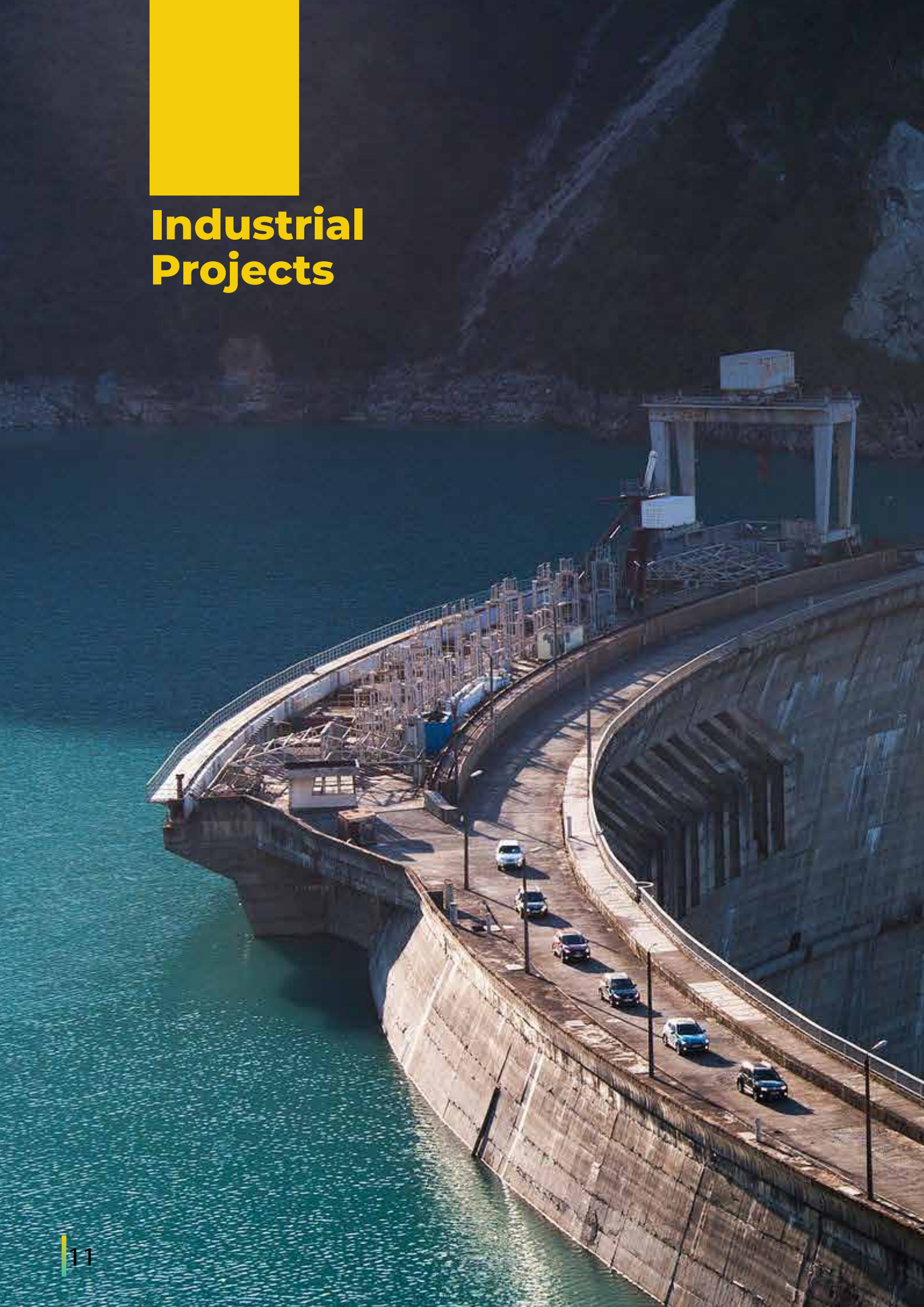
Within a few years of graduation, our graduates will:

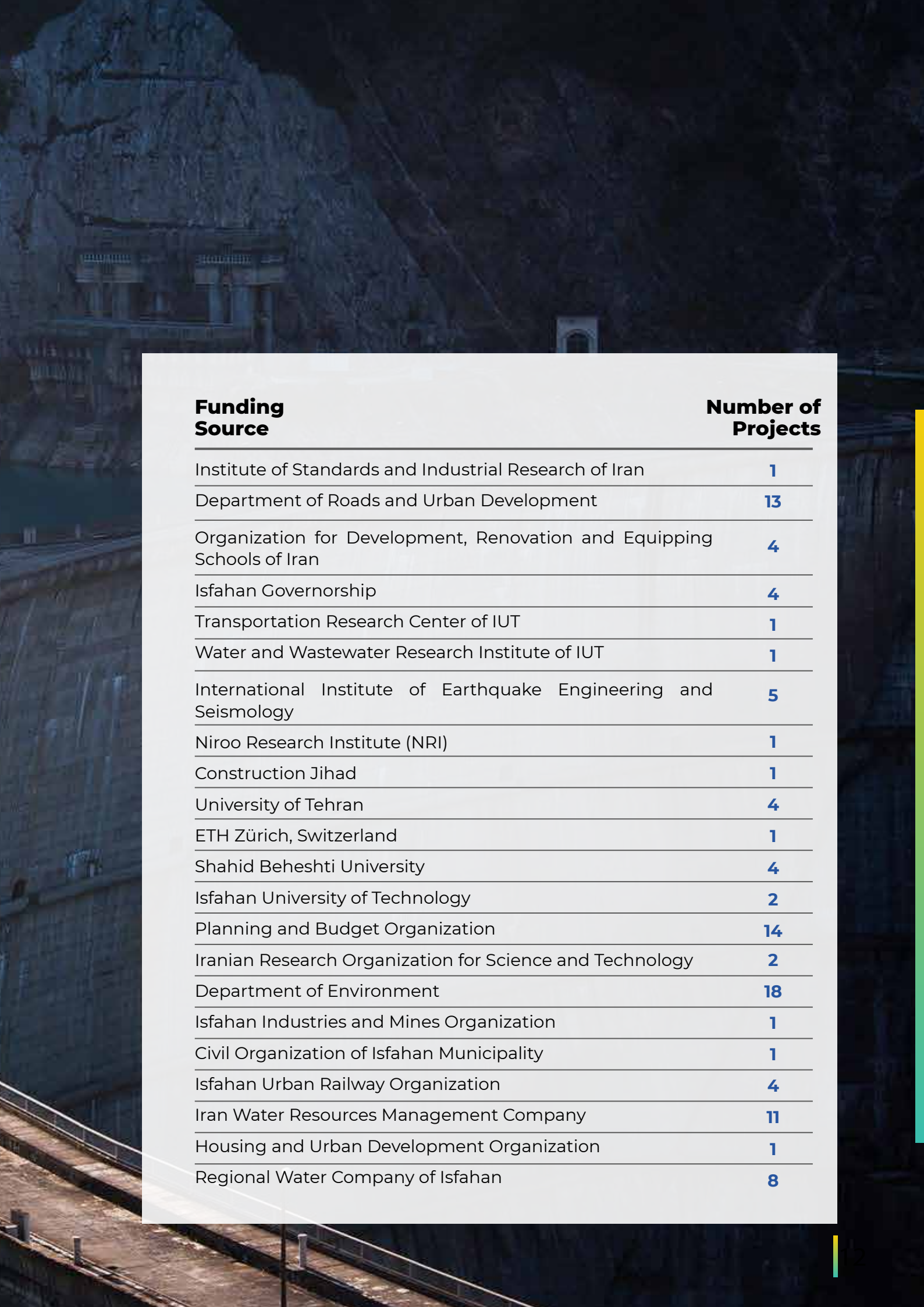
- Practice the profession of civil engineering, make progress towards certification as licensed professional engineers and/or pursue graduate studies
- Get involved in engineering and professional organizations
- Possess the expertise that allows them to make judgment-based decisions with confidence
- Contribute new ideas and innovations that empower advancements in their profession

Research Areas

1 Nano and composite materials
2 Topology optimization of structures
3 Computational methods in structural analysis
4 Principles and methods of pre-stressing
5 Solid-fluid interaction
6 Advanced concrete technology
7 Seismic behavior of concrete precast structures
8 Fiber-reinforced polymer in concrete and masonry structures
9 Sustainable development and environmental assessment
10 Water quality and quantity management in river/reservoir systems
11 Groundwater contaminant transport modeling
12 Conjunctive use of surface water and groundwater
13 Integrated water resources management
14 Drought and flood management
15 Multiphase flows
16 Marine geotechnics
17 Rubble mound breakwaters
18 Floating sea-water desalination technology

Industrial Projects





Funding Source	Number of Projects
Institute of Standards and Industrial Research of Iran	1
Department of Roads and Urban Development	13
Organization for Development, Renovation and Equipping Schools of Iran	4
Isfahan Governorship	4
Transportation Research Center of IUT	1
Water and Wastewater Research Institute of IUT	1
International Institute of Earthquake Engineering and Seismology	5
Niroo Research Institute (NRI)	1
Construction Jihad	1
University of Tehran	4
ETH Zürich, Switzerland	1
Shahid Beheshti University	4
Isfahan University of Technology	2
Planning and Budget Organization	14
Iranian Research Organization for Science and Technology	2
Department of Environment	18
Isfahan Industries and Mines Organization	1
Civil Organization of Isfahan Municipality	1
Isfahan Urban Railway Organization	4
Iran Water Resources Management Company	11
Housing and Urban Development Organization	1
Regional Water Company of Isfahan	8

Water and Wastewater Company of Isfahan	1
Regional Electricity Company of Isfahan	4
National Iranian Oil Refining and Distribution Company	1
National Petrochemical Company	1
Pioneer Energy Development Company	1
Isfahan Steel Company	4
Isfahan Cement Company	3
National Iranian Gas Company	4
New Towns Development Company	17
Municipalities of Different Provinces	24
Mobarakeh Steel Company	10
Ministry of Science, Research and Technology	5
Ministry of Energy, Ministry of Petroleum, Ministry of Roads & Urban Development	4
Isfahan Science and Technology Town	7

Interdisciplinary Approaches

In collaboration with faculties of Mechanical Engineering, Electrical and Computer Engineering, Materials Engineering, Agricultural Engineering, and Textile Engineering, our department provides a platform for students to learn teamwork and thus enhance their technical knowledge through interdisciplinary projects pursued by our faculties.

A Profile of the Labs

Concrete Technology and Building Materials Lab

Construction of concrete prototypes and testing building materials are conducted in this lab. The major focus is on the training of undergraduate students. The lab is also used for research studies by graduate students, and annually 10 to 15 students make tests on concrete samples in various sizes (cubes, cylinders and small beams, structural beam elements).

Research equipment

- Los Angeles abrasion machine (to determine the abrasion percentage)
- Electric furnace in different volumes
- Concrete and other materials mixers in different volumes
- 40-, 200-, and 300-ton press for compressive strength of concrete, brick and other materials
- Cement tension and compression testing device
- 2-kg stone crusher for crushing aggregates of different sizes
- Vibrating table for vibrating concrete

- Flow tables for measuring the normal concentration of mortar
- Vicat apparatus for measuring the normal concentration and the cement mortar
- Mill for grinding materials in small volumes
- Le Chatelier flask for measuring the specific weight of cement and materials
- 75-liter autoclave for rapid preparation of concrete
- Apparatus for determining the concrete durability against the rapid freezing-melting cycle

Environmental Lab

The Environmental Laboratory has been operating since 1996 and recognized as one of the accredited laboratories of “Department of Environment” in 2011. Under the supervision of academic staff, this well-equipped laboratory is capable of measuring various physical, chemical, and biological quality parameters. This laboratory is prepared to undertake study, research and consulting projects and provide environmental monitoring services for industries.

Some of the equipment and available tests in this laboratory are:

Electrical Conductivity (EC); Phosphate, nitrate and nitrite; pH; Alkalinity; Chloride; Turbidity; Biochemical and Chemical Oxygen Demand (BOD_5 , COD); Dissolved Oxygen (DO); Total Hardness (TH); Sulfate; Detergent (ABS); Ammonia; Oil and grease; Cyanide; Coliforms (total and fecal); Total Suspended Solids (TSS); Total Dissolved Solids (TDS); Heavy metals.

Computational Lab

Our faculty benefits from high quality computational facilities supporting academic and industrial cutting-edge research in structural mechanics, fluid-structure interaction, materials science, and optimization problems. The computational lab provides high performance computing services for a considerable number of graduate students; in addition, supercluster of IUT is readily invoked to facilitate conduction of numerical projects whenever required.
Below is a list of available capacity in this lab:

- 10 Intel Core i7-7700K Processor units
- More than 50 GPUs
- 25 TB storage capacity
- 320 GB available RAM

Fluid Mechanics and Hydraulic Structures Labs

The Fluid Mechanics and Hydraulic laboratories have the potentials to perform practical experiments, be involved in teaching activities, and provide research facilities for graduate students. Different experimental setups and equipment are used in these laboratories to determine various parameters related to fluid flow in pipes and open channels.

Currently, the Hydraulic laboratory is equipped with different hydraulic flumes, experimental models and various measurement apparatus including LDVT, ADV, bed profilers etc. These devices are utilized to investigate flow in hydraulic structures, dam reservoir structures, river structures, scouring and sediment transport and erosion of concrete-lining of hydraulic structures.

The Fluid Mechanics laboratory is also equipped with facilities to investigate the fluid flow behavior including meta-centric height, Bernoulli's energy equation, transition from laminar to turbulent flow, discharge coefficient of obstruction flow meter facilities, weir discharge coefficient, hydraulics of flow through an orifice, longitudinal friction coefficient and minor head losses in pipelines and drag force.

Soil Mechanics Lab

The soil mechanics lab has a remarkable contribution in all fields of Geotechnical Engineering with supporting educational goals and conducting high-level researches.
Below is a list of some tests which can be done in this laboratory:

- Proctor compaction test
- Laboratory classification of soil
- Field density test
- Grain size analysis
- Determination of consistency limits
- Density index/relative density test

- Permeability test
- Direct shear test
- Unconfined compressive strength test of cohesive soil
- Static and dynamic triaxial test
- Consolidation test
- California bearing ratio test
- Measurement of liquid limit and plastic limit

Moreover, some large scale tests such as “Plate load test”, “SPT”, and “Large scale shear test” can be performed in this laboratory.


WEIGHT OF LOAD FRAME 7·4 KG

Structural Engineering Lab

Our structural engineering laboratory is well-equipped with modern equipment for testing large-scale structural elements and construction materials under static and quasi-static loading. This lab facilitates productive innovation and learning for a considerable number of graduate students.
Some of the available tests are:

- 3- and 4-point bending test of beams equipped with:
- 2500-kN loading frame with strong floor and wall for 500- to 2600-mm beams
- 600-kN loading frame for 500- to 2600-mm beams

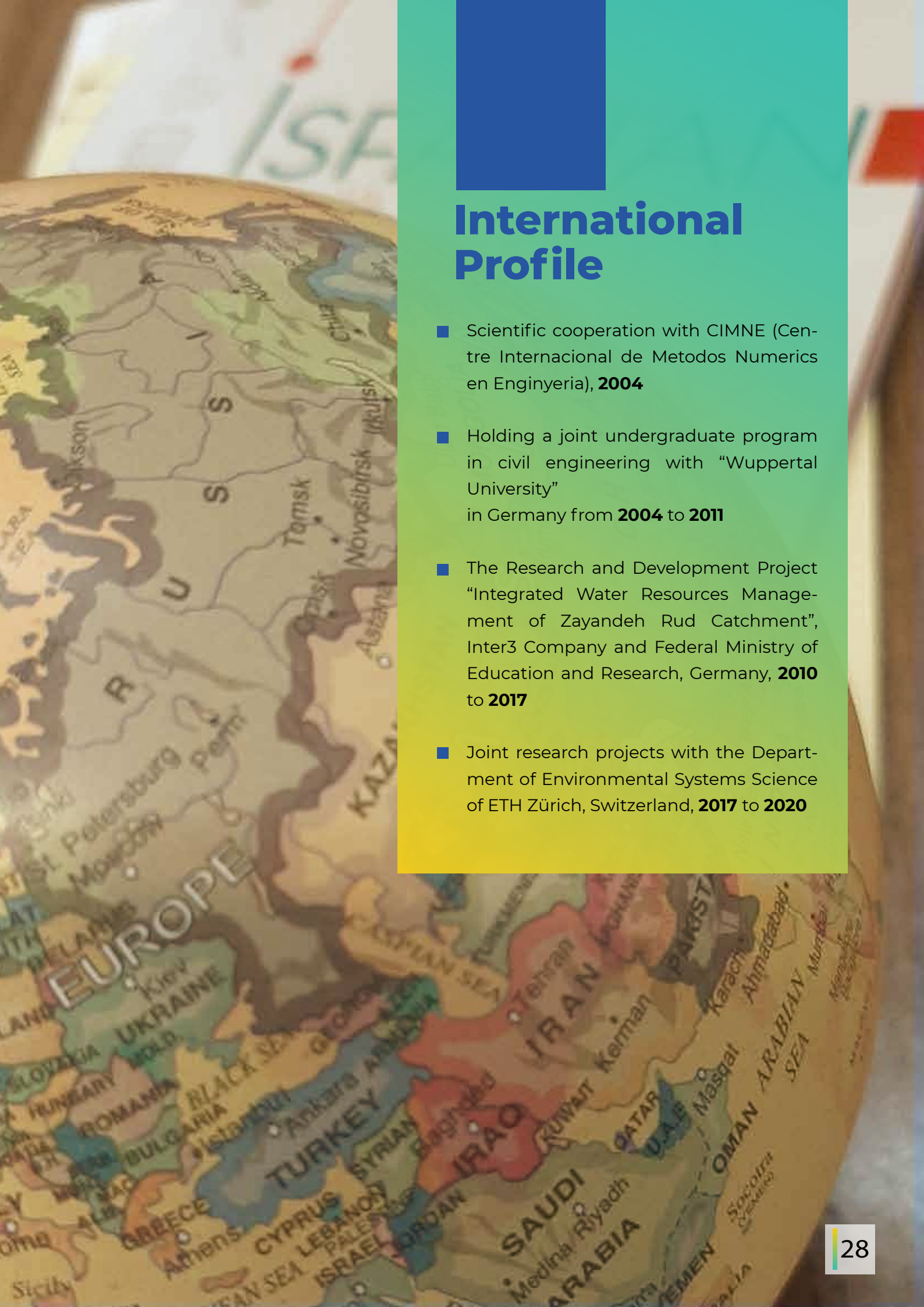
- 50-kN toughness test frame for specimens with 250 mm up to 950 mm length
- 2000-kN axial loading test for specimens with 900 to 2000 mm length
- Cyclic horizontal loading equipment
- Single lap-shear test for retrofitted specimens
- FRP pre-stressing device for beams with maximum 2600 mm length

Surveying Lab

Our well-equipped laboratory provides Civil and Mining Engineering students with hands-on experience to perform various fundamental measurements in land surveying. This lab benefits from state-of-the-art surveying and plotting equipment including GNSS-based surveying equipment, total station instruments, automatic levels, and digital theodolites for basic educational and research purposes.

The major equipment in surveying lab includes:

- 10 total station instruments
- 10 optical and digital laser levels
- 10 analog and digital theodolites
- 2 multi-frequency GNSS receivers and accessories



International Profile

- Scientific cooperation with CIMNE (Centre Internacional de Metodos Numerics en Enginyeria), **2004**
- Holding a joint undergraduate program in civil engineering with “Wuppertal University”
  in Germany from **2004** to **2011**
- The Research and Development Project “Integrated Water Resources Management of Zayandeh Rud Catchment”, Inter3 Company and Federal Ministry of Education and Research, Germany, **2010** to **2017**
- Joint research projects with the Department of Environmental Systems Science of ETH Zürich, Switzerland, **2017** to **2020**

Inventions and Innovations

- The process of producing fine particle coatings based on hydrophobic fluorine compounds for accelerating surface drainage and increasing the defrosting properties for asphalt and concrete pavements
- Energy absorber device with shape memory alloy
- Cement-free concrete with high compressive and thermal strength
- Bending and seismic bonding of beam to concrete column in prefabricated buildings
- Measurement device for stone resistance parameters using micro-drilling method
- The process of making a concrete containing phase change materials for the use of renewable energies

- Removal of coliform from wastewater by Moringa Peregrina
- Remediation of air pollutant gases and production of electrical potential
- Desalination of sea water by capacitive deionization method
- Flexible concrete using factory wastewater with high compressive and tensile strength
- Reduction of corner radius effects by installing FRP strips on the elastic floor to reinforce non-circular concrete columns (FRPFB)
- Seismic isolation system using steel sliding rings
- Installing FRP plates using nailing method
- Active column confinement using FRP reinforcement sheets with Wet Layup method

- Providing and classifying bending beam-to-column joints in prefabricated concrete structures
- Puncture method using glue injection
- Inclined drops with vibrating floor equipped with damper
- Shear reinforcement of reinforced concrete beams by vertical groove method (VGM) and using FRP sheets
- Groove method with EBROG technique for preventing detachment of FRP sheet from the surface of bending concrete columns
- Energy dissipation in water transfer structures using stepped spillways with dampers
- In-groove surface mounting method (EBRIG) for attaching FRP sheets to concrete beams
- Manufacturing a type of strong, flexible concrete based on metaquinoline and rubber particles
- Manufacturing a type of reinforced concrete based on zeolite and rubber particles

Contributions to Sustainable Development and its Impacts on Society

Demand for economic infrastructure has increased in developing countries that encompass environmental, economic, and social aspects. A sustainable construction involves the use of green building materials and energy-saving processes in the design and construction while maintaining the structure durability as well as comfort and health of users.

Recognizing the importance and effectiveness of this topic in engineering problems, our faculty is conducting several research studies on sustainable materials and design processes. Examples of ongoing research projects are as follow:

- Reducing the use of virgin binder content in asphalt through improved mix design and use of by-product and recycled additives
- Facilitating the use of effective design tools such as mechanistic-empirical pavement design procedure to assess better construction quality requirements and integration of materials
- Construction of evaporation suppression modular floating elements using ultra-lightweight alkali-activated slag concrete

We would like to express our gratitude to our colleagues at the Faculty of Civil Engineering and the International Scientific Cooperation Center (ISCC) of IUT for sincere assistance in providing the prospectus. Constructive supports of Mehrnoush Mahmoodi, Omid Khaghani, and Mohammadsadegh Rasa are appreciated.

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