



UNESCO Chair on
Engineering Education
University of Tehran



UNESCO Chair on Engineering Education (UCEE) Annual Report, April 2021-2022

- **Title of the Chair:** UNESCO Chair on Engineering Education, UCEE (<https://ucee.ut.ac.ir>)
- **Host Institution:** University of Tehran, Iran, (www.ut.ac.ir)
- **Date of establishment of the Chair:** April 26, 2014
- **Period of activity under report:** April 2021-April 2022
- **Report composed by:** Hossein Memarian, UNESCO Chair holder for Engineering Education, and Professor of Geo-engineering, University of Tehran, (<https://profile.ut.ac.ir/en/~memarian>)

1. Executive Summary

The primary initiative for launching the UNESCO Chair on Engineering Education (UCEE) started in 2010. The Chair was officially founded on April 26, 2014, at a ceremony, in the presence of UNESCO Director General, **Ms. Irina Bokova**, and the president of the University of Tehran. The first annual report of the Chair was presented in May 2015. The following report covers the activities of the Chair from April 2021 to April 2022.

The main activities and research projects can be summarized as follows:

- **Educational design:** Designing new courses and educational programs for engineering education.
- **Educational Training:** Holding educational workshops on engineering education.
- **Lecture:** Conducting oral and virtual presentations in various areas of engineering, at different universities and professional centers.
- **Research:** Conducting diverse research projects on different areas of engineering education.
- **Publications:** Publishing new books and research articles in engineering education.

Contributions:

UCEE has been actively involved as:

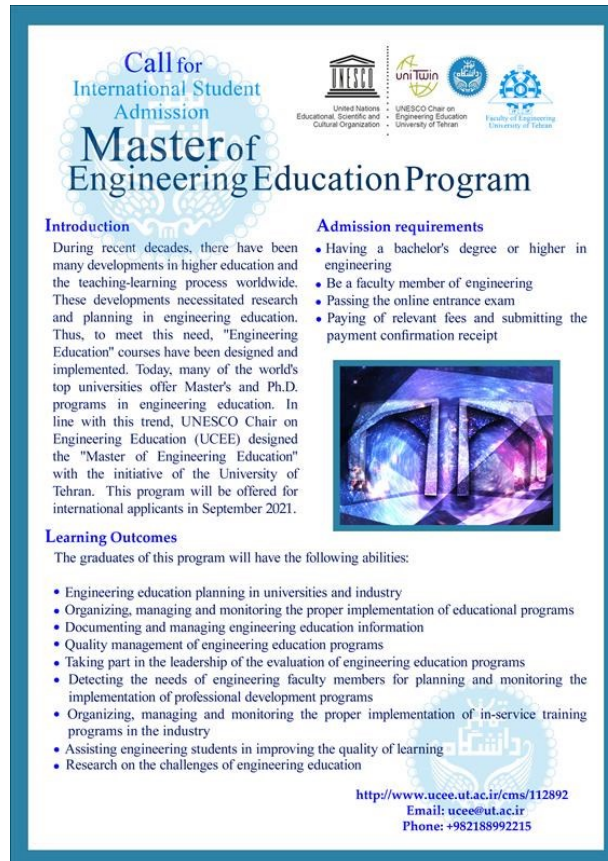
- Board member of the Iran Society of Engineering Education (ISEE).
- Head of ISEE's branch at the University of Tehran.
- Board member of the Iranian Institute for Accreditation of Engineering Education (IIAEE).
- Center for the Quality Assessment of the College of Engineering of the University of Tehran.
- Associate Member, Engineering Branch of the Academy of Sciences of Iran.

2. Activities

2-1. Education/Training/Research

2-1-1. Education (leading to certificate)

- Continuing the implementation and management of the new graduate program “Master of Engineering Education”, which is the first of its kind in Iran. The third group of applicants was admitted to this program in September 2022.



The poster is titled "Call for International Student Admission Master of Engineering Education Program". It features logos for the United Nations Educational, Scientific and Cultural Organization (UNESCO), the UNESCO Chair on Engineering Education at the University of Tehran, and the Faculty of Engineering at the University of Tehran. The text is organized into several sections: "Introduction" which discusses the need for engineering education research and the program's origin; "Admission requirements" which lists criteria such as having a bachelor's degree, being a faculty member, passing an exam, and paying fees; "Learning Outcomes" which lists various skills graduates will acquire; and contact information at the bottom including a website, email, and phone number. A small image of a modern building is also present.

Call for International Student Admission
Master of Engineering Education Program

Introduction
During recent decades, there have been many developments in higher education and the teaching-learning process worldwide. These developments necessitated research and planning in engineering education. Thus, to meet this need, "Engineering Education" courses have been designed and implemented. Today, many of the world's top universities offer Master's and Ph.D. programs in engineering education. In line with this trend, UNESCO Chair on Engineering Education (UCEEE) designed the "Master of Engineering Education" with the initiative of the University of Tehran. This program will be offered for international applicants in September 2021.

Admission requirements

- Having a bachelor's degree or higher in engineering
- Be a faculty member of engineering
- Passing the online entrance exam
- Paying of relevant fees and submitting the payment confirmation receipt

Learning Outcomes
The graduates of this program will have the following abilities:

- Engineering education planning in universities and industry
- Organizing, managing and monitoring the proper implementation of educational programs
- Documenting and managing engineering education information
- Quality management of engineering education programs
- Taking part in the leadership of the evaluation of engineering education programs
- Detecting the needs of engineering faculty members for planning and monitoring the implementation of professional development programs
- Organizing, managing and monitoring the proper implementation of in-service training programs in the industry
- Assisting engineering students in improving the quality of learning
- Research on the challenges of engineering education

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2-1-2. Training (short-term)

During the reported period, a three-day training course titled "Developing Teaching-Learning Skills of Faculty Members" was held for engineering faculty members of the University of Tehran, by Dr. Hossein Memarian (13-15 June 2022).

2-1-3. Research

The Chair carried out several research projects during the reporting period. The results of these projects were presented to the Chair's steering committee. The 19 committee members represent different engineering fields at the College of Engineering of the University of Tehran. During its regular meetings, the steering committee approved the results of the following research projects. Most of these approvals were implemented at the College of Engineering of the University of Tehran. They were also posted on the website of the Chair as "Educational Suggestions" to be used by other universities.

Small-Scale Research Projects

One of the goals of the UNESCO Chair on Engineering Education is to observe findings and innovations in various aspects of engineering education and share them with academic colleagues and other interested parties. The following investigations and research were completed in the reporting period and were promoted and posted on the website of the Chair under the general title of educational innovations (as noted by our slogan: small steps for a better future).

1. **Cognition, metacognition, and learning:** What is metacognition and how is it different from cognition? What is the role of metacognition in learning?
<https://enged.ir/cms/112992>
2. **Mechanism of course design:** How is "course alignment" achieved? What is a "course map" and how is it prepared? What is the content of the "course guideline"?
<https://enged.ir/cms/113002>
3. **Principles of effective learning:** What are the seven principles that can enhance learning? Paying attention to what makes learning better. <https://enged.ir/cms/112978>
4. **Mindset and learning:** What is a mindset and how it can impact learning? What is the difference between the fixed mindset and the growth mindset? Is it possible to change the way of thinking? <https://enged.ir/cms/113033>
5. **Yesterday, today, and tomorrow of engineering education:** In the last few decades, what major developments have taken place in engineering education? What role have these developments played in improving engineering education?
<https://enged.ir/cms/113019>
6. **Identity development and learning:** What is identity? How is the growth and development of identity achieved in students? What is the role of identity development in learning? <https://enged.ir/cms/113033>
7. **Preparation of teamwork:** Why do so many student teamwork fail? What information does the Johari window provide? <https://enged.ir/cms/113075>

Supervising MSc thesis on Engineering Education (underway)

- The pathology of e-learning in the context of engineering education and developing a novel instructional design framework for blended learning
- Design of an engineering faculty development program in the area of teaching and learning
- Predicting university classrooms' mode of instruction in the post-corona world with the help of data mining approaches

2-2. Conference/Meeting

2-2-1. Conferences/organizational activities undertaken by the Chair

1. Webinar: "**Guidelines for the development of output-oriented training courses in the field of engineering**". UCEE, in cooperation with the branch of the Iranian Society of Engineering Education at the University of Tehran (February 16, 2022).

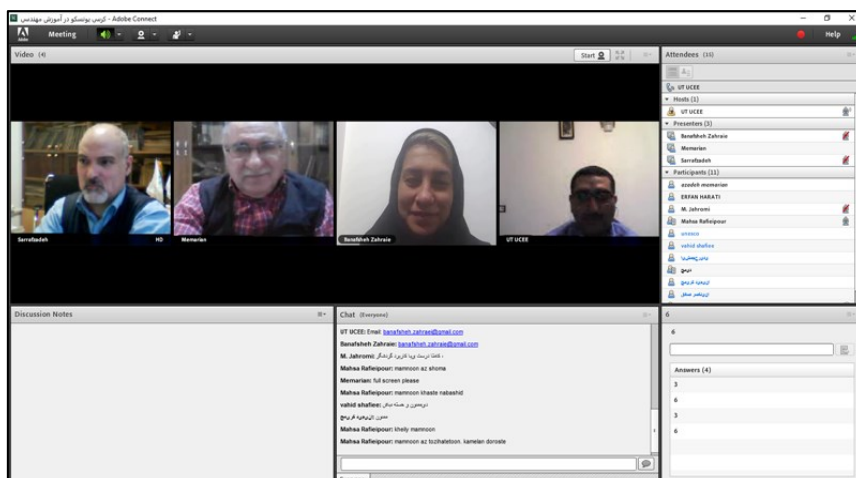
2. Webinar: "**Measuring the active academic participation of students in technical and engineering education centers of the country: analysis of the results of a national survey**". UCEE, in cooperation with the branch of the Iranian Society of Engineering Education at the University of Tehran, by Dr. Reza Maniee (January 19, 2022).
3. Webinar: "**Institutions of external evaluation of quality in Iran's higher education system: from ideal to reality**". In the 15th Conference on Assessment and Quality Assurance in University Systems. University of Kurdistan, by Professor Abbas Bazargan (10 & 11 August 2021).
4. Webinar: "**Review of 8 years of UNESCO Chair on engineering education achievements**". By Professor Hossein Memarian (UCEE Webinar, June 15, 2022),
5. Webinar: "**Updating the undergraduate engineering education programs**". By Professor Hossein Memarian (UCEE webinar, April 20, 2022).
6. Webinar: "**Developing student identity and learning**". By Professor Hossein Memarian (UCEE webinar, February 16, 2022).
7. Webinar: "**Introduction to the Chair's activities**". By Professor Hossein Memarian (UCEE webinar, January 19, 2022).
8. Webinar: "**Quality management in engineering education**". By Professor Hossein Memarian (UCEE webinar, November 17, 2021).
9. Webinar: "**Proposal for establishing a quality network**". By Professor Hossein Memarian (UCEE webinar, October 20, 2021).
10. Webinar: "**Principles of effective teaching**". By Professor Hossein Memarian (UCEE webinar, August 11, 2021).
11. Webinar: "**Challenges of engineering education, during the COVID-19 pandemic**". By Professor Hossein Memarian (UCEE webinar, July 14, 2021).

2-3. Interuniversity Exchange/Partnerships

- Professor Hossein Memarian and Professor Abbas Bazargan participated in a joint scientific webinar of the University of Tehran and Tomsk State University of Russia, focusing on the **exchange of educational and research experiences during the coronavirus pandemic** (26 April 2021).
- Professor Hossein Memarian took part in a webinar entitled "**The past, present, and future of engineering education**", at Bu-Ali Sina University, Hamadan (1 May 2021).



- Professor Hossein Memarian participated in a webinar entitled "**Increasing students' interest in research activities in the academic system**", which was hosted by the faculties of Philosophy of Science and History, Modern Pedagogy and Technical Engineering, Auezov University, Kazakhstan (30 April 2021).
- Specialized meeting on **water literacy**, presented by Dr Banafshe Zahraei, In a joint program of the UNESCO Chair on Engineering Education and the UNESCO Chair on Water Recycling (14 March 2022).



2-4. Publication

2-4-1. New Books

- Professor Hossein Memarian presented a preface (chapter) to the Persian translation of the book entitled "**Rethinking engineering education, the CDIO approach**".
- Professor Hossein Memarian presented a chapter in a book entitled "**Iran's scientific research in the mirror of 2021**", University of Tehran Publication.

3. Future Plans and Development Prospects

3-1. Current Investigations and Research:

- Continuing the current educational, research, and collaborative activities

Appendix

1. Human Resources:

The Chair structure consists of the Steering Committee, the Board of Advisors, and the office of the Chair.

Steering Committee: The role of this committee is to propose the general guidelines and monitor the macro policy of the Chair, by regular monthly meetings. Over 20 members of this committee (including 12 full professors) represent different fields of engineering at the College of Engineering, University of Tehran.

Advisory Board: The purpose of the advisory board is to provide consultation in the area of macro engineering education and to establish links between the UNESCO Chair on Engineering Education and other related centers at national, regional, and international levels. The members of the advisory board are pioneer professors in the fields of engineering and pedagogy and experts from industry.

Chair Office: Technical staff and secretary.

2. Financial Resources

Almost all the research and activities of UCEE are based on volunteer work.

Financial contributions (specified amounts in U.S. dollars)

- Host Institution: University of Tehran: \$ 1000
- NGO: Fanni Foundation (supports of College of Engineering, University of Tehran): \$3000
- Honorariums received by the Chair holder for presenting courses, workshops, and lectures: \$1000

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