

International Institute of Earthquake Engineering and Seismology
IIEES
MISSION AND ACHIEVMENTS

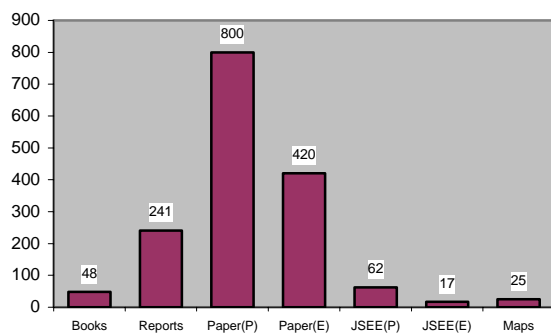
The International Institute of Earthquake Engineering and Seismology (IIEES) is a comprehensive international research institute in the field of earthquake that was established in Iran based on the 24th UNESCO General Conference Resolution DR/250 and the Iranian government approval in 1989; as an independent institute under the Iran's Ministry of Science, Research and Technology. The main goal of IIEES is seismic risk reduction and mitigation both in Iran and the region by promoting research and education in science and technology related to seismotectonic, seismology and earthquake engineering as well as risk reduction. IIEES activity in research covers all aspects and components of earthquake risk assessment and management; and in education from public education to Ph.D. program in seismology and earthquake engineering. IIEES is composed of 4 Research Centers: Seismology, Geotechnical Earthquake Engineering, Structural Earthquake Engineering, Risk Management; National Center for Earthquake prediction and Graduate School, Public Education and Information Division.

IIEES action plan are as follow:

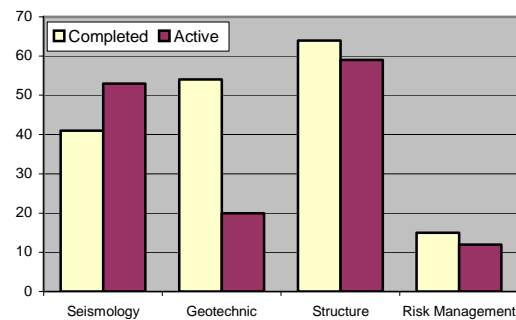
1. Seismotectonic and seismological research on the earth crust, active faults, seismicity and earthquake hazard; mapping active faults, hazard zonation; and earthquake catalogues.
2. Developing and expanding the Iranian National Seismic Network and mobile seismic networks for a better understanding of the seismic activity, and providing online post event information to the disaster management authorities.
3. Conducting comprehensive theoretical and experimental researches in the fields of liquefaction, landslides, site effects, soil structure interaction, soil modelling, dynamic behaviour of porous media, earth-structures behaviour, zonation and geotechnical microzonation.
4. Conducting comprehensive analytical, experimental, field and instrumental studies and research for seismic safety of structures (buildings, lifelines, industrial structures, power plants, oil and petrochemical industries, and important facilities like dams, bridges, etc.);
5. Developing aseismic design methods, guidelines and codes for new buildings, strengthening of the existing structures; as well as adopting new technology for semi-industrial construction of buildings against earthquakes;
6. Vulnerability and risk assessment of cities, developing integrated, doable and effective risk management and reduction program, proposing effective risk reduction measures to the authorities, and cooperate toward its approval and implementation with the consideration of socio-economic and cultural aspects of the country;

7. Promoting the earthquake safety, prevention and preparedness culture in all levels of society (general public, specialist and decision makers) through comprehensive earthquake awareness program;
8. Education and training by offering M.S. and Ph.D. graduate program and specialized courses to transfer the technical know-how for experts and engineers; and by using all type of media and means to disseminate the research results, knowledge and information to all;
9. Providing technical and research consultancy to the government and industries for their seismically safe development and construction.
10. Expanding scientific and technical cooperation and exchange of knowledge with the international and regional organizations and institutions in all the fields related to earthquake risk reduction and mitigation according to the general rules of the country.

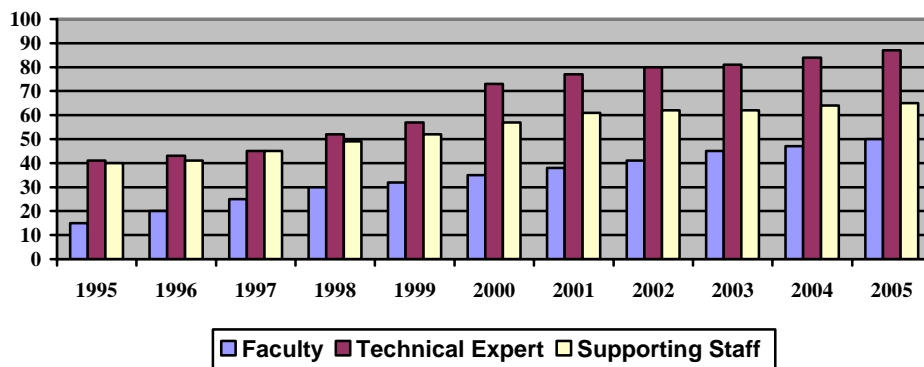
IIEES in past 15 years had major contribution toward the development and implementation of the earthquake risk reduction program in Iran as well as in decision making process and promoting the safety culture and public awareness.



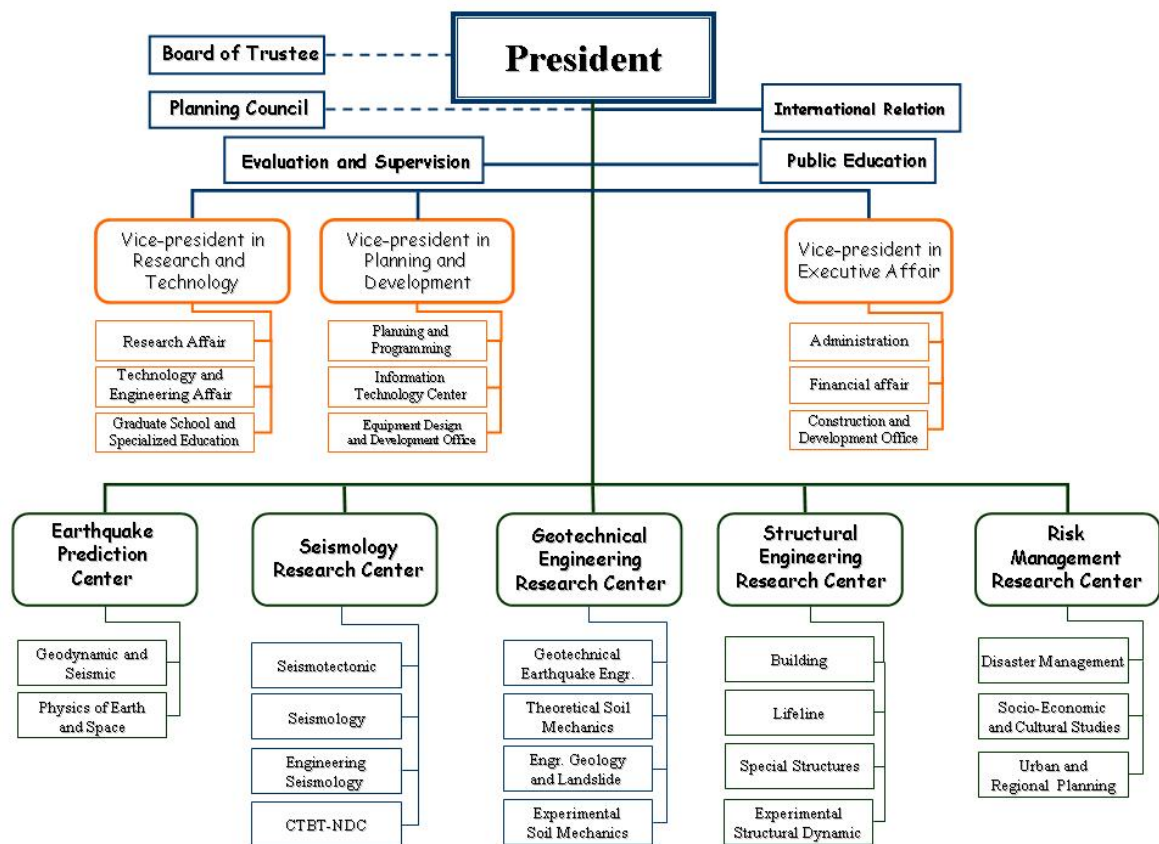
IIEES Publication Statistics



Distribution of Research Projects



IIEES Human Resource



The brief description and major accomplishments in various IIEES Centers are as follows:

1. Seismology Research Center

Iran being location one of the seismogenic regions of the world with the possibility of the occurrence of destructive earthquakes in all parts of the country, the recognition of the seismic characteristics from the view point of seismotectonic, seismicity and consequent seismic hazard is of great importance. The Seismology Research Center was established with the final objectives of providing a reliable seismic hazard assessment of Iran has been established. The Center composes of: Seismotectonic, Seismology, Engineering Seismology and Seismic Monitoring of Nuclear Experiments Departments.

Seismotectonic:

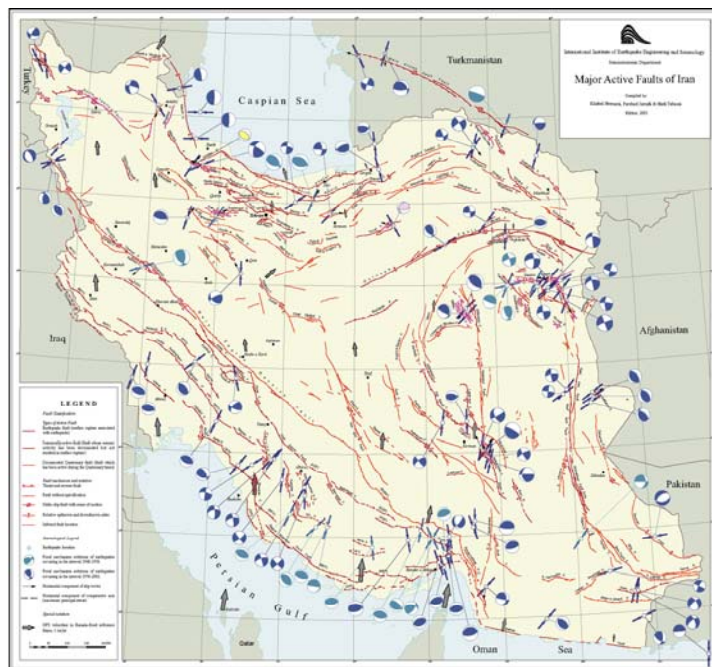
- Development of major active faults map of Iran (scale 1:1,000,000); and of Tehran and Tabriz (scale 1:100,000) .
- Paleoseismological study of Tabriz, Eshtehard, Kahrizak and Mosha active faults for more accurate hazard assessment of cities of Tabriz and Tehran.
- Investigation of active tectonic of Alborz, Zagros and the transitional zone between Zagros and Makran.
- Detail study of the site of petrochemical city (Asaluyeh) in south of Iran.

Seismology:

- Installation and maintenance of Broadband National Seismic Network.
- Seismicity catalog of Iran: Historical and 1900-Present.
- Global and local GPS measurement for evaluation of the continental deformations.
- Long passive seismic monitoring across Zagros Belt (Busheher to Yazd), Aloborz, Makran, South-North, Zagros-Alborz, etc. for crustal and upper mantle structural definitions and investigation of subduction zone.
- Application of various methods for mid-term and long-term earthquake prediction.

Engineering Seismology:

- Processing and detail analysis of the strong motion data recorded in Iran (1975-2000).
- Development of PGA and spectral value attenuation relationship for Iran.
- Development of detail (PGA and Spectral) seismic hazard zoning map of Tehran and other major cities.



2. Geotechnical Earthquake Engineering Research Center

Geotechnical, sub-surface conditions and surface irregularities have crucial influences on ground response, damage severity and their spatial distribution during strong earthquakes. To provide required know-how and information and the analytical and experimental tools in this field, the Geotechnical Engineering Research Center has organized its activities in the following four departments: Geotechnical Earthquake Engineering, Theoretical Soil Mechanics and Foundation Engineering, Engineering Geology, and Experimental Soil Mechanics and Physical Modeling departments.

Geotechnical Earthquake Engineering:

- Numerical 2D & 3D development of topography effects (surface & basin) on site effect
- Comprehensive microzonation of Tehran including topography effects through experimental investigations, microtremor measurement and analytical approaches.
- Geotechnical hazard microzonation of various provinces and industrial complexes.

Theoretical Soil Mechanics and Foundation:

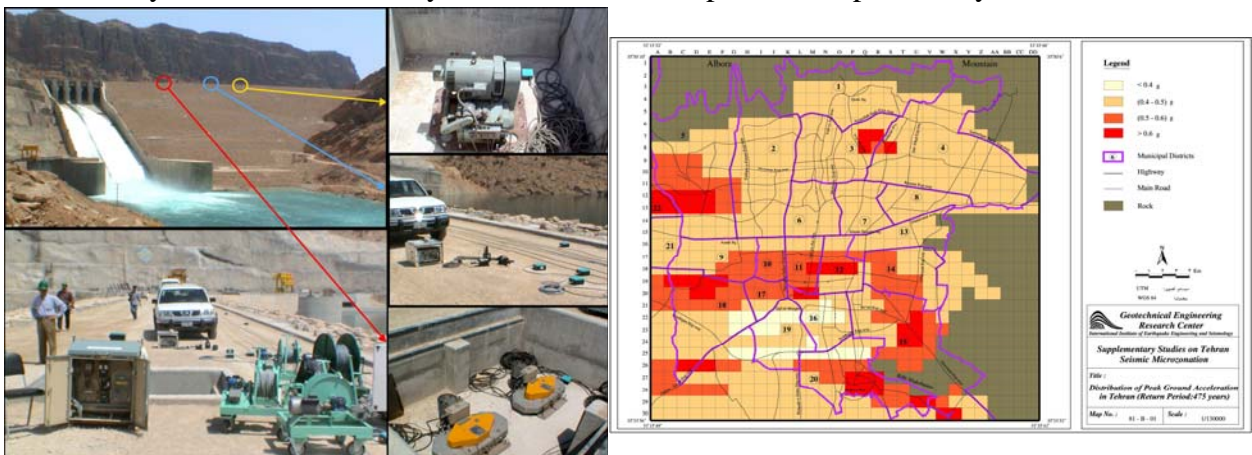
- Ambient and forced vibration studies on concrete and earth embankment dams.
- Dynamic behavior of underground structures.
- Providing guideline for seismic design of soil structures.

Engineering Geology:

- Development of comprehensive landslide data base and risk management.
- Quantification of dynamic behavior of rock masses.
- Evaluation of seismic related land subsidence and underground opening stability during earthquake

Experimental Soil Mechanics and Physical Modeling:

- Expansion of soil dynamic testing facilities.
- Study on monotonic and cyclic behavior of compacted composite clays



3. Structural Engineering Research Center

Earthquake risk and vulnerability of the built environment in urban and rural areas are due to inappropriate development with the level of seismic hazard, as well as lack of implementation of existing aseismic design and construction know-how, codes, guidelines, and standards. The objective of the Structural Research Center is to carry out comprehensive research for better understanding the dynamic behavior of all type of structures; as well as providing the best, simple, usable and socially compatible solutions for increasing structural safety. The Structural Research Center consists of the following departments: Building Systems, Special Structures, Lifeline Systems and Applied Structural Dynamics.

Building Structures:

- Development of advance structural laboratory with shaking table for static, quasi-static and dynamic testing.
- Increasing the technical knowledge on vulnerability assessments.
- Development of seismic vulnerability functions for typical Iranian buildings
- Development of guidelines for vulnerability assessment of common building type (masonry, concrete and steel structures)
- Performing pilot projects for various type of buildings such as: hospitals, fire stations, school, housing apartments, office building, etc.; as well as to show the applicability of the vulnerability reduction.
- Providing strengthening schemes for the typical Iranian steel structures.
- Study of the seismic vulnerability of the mega city of Tehran.
- Development of joint plan with Iran's Cultural Heritage Organization for the protection of historical buildings against earthquakes.
- Economical study on different aspects of earthquake resisting structures.
- Upgrading the technical knowledge of engineers through training programs and publication on aseismic design and construction.
- Establishing an authority in this field in Iran.

Special Structures:

- General studies concerning all lifeline systems, dealing with matters like needs and know-how, lifelines interactions, and urban design, etc.
- Forced vibration analysis of typical bridge, offshore structure, concrete dam, etc.
- Development of the technical capacity for vulnerability assessment of oil and chemical facilities.
- Performing vulnerability assessment of oil refinery and petrochemical plant.
- Establishing an awareness program for the oil and chemical industry manager on their risk and approach for its reduction.

Lifeline Systems:

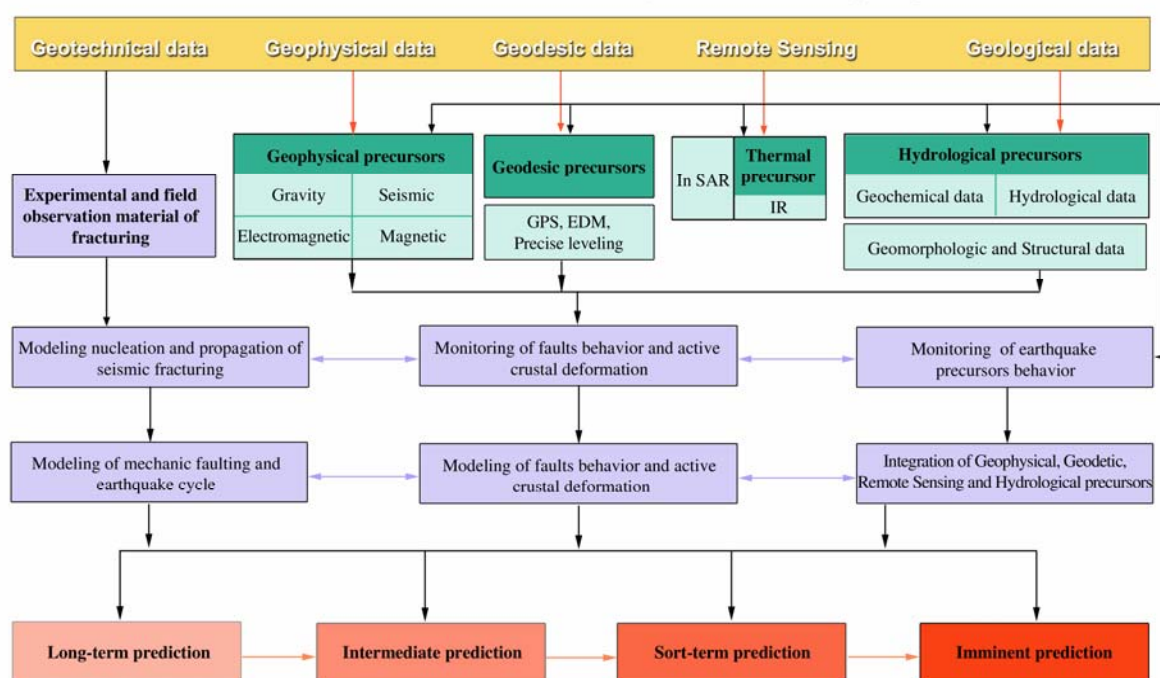
- Development of seismic risk map of the lifeline networks in Iran
- Development of guidelines and technical standards for seismic design of gas network.
- Vulnerability assessment of Tehran Water, gas and telecommunication system.

5. National Center for Earthquake Prediction (NCEP)

Earthquake Prediction center has been recently established at IIEES in order to increase the IIEES research activities in order to provide a scientific and logical answer to this demanding issue in Iran. The NCEP activities with the concentration on long and intermediate term prediction in the Geodynamics and Seismic Department; and Space and Earth Physics Department are as follows:

- Establishment of Test-site for earthquake precursors monitoring;
- Organization of a data base of earthquake precursors for the regions of higher risk;
- Better understanding and recognition of earthquake precursors;
- Definition of long, intermediate, short and impending earthquake prediction algorithms;
- Establishment of research and planning communities, organizing national and international workshops and conferences;

The Flowchart of National Center for Earthquake Prediction Study Programs

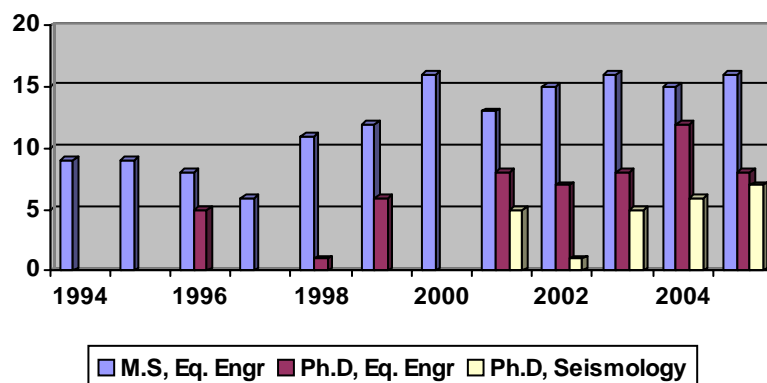


6. Graduate Studies:

In 1990, IIEES started the postgraduate studies program with the purpose of developing the science and technology skills related to earthquake. The program composes of:

- M.S and Ph.D. degree in Earthquake Engineering
- Ph.D. degree in Seismology
- Extension and special training program for engineers on aseismic design and construction.

So far IIEES have admitted more than 200 graduate students as well as more than 3000 engineers have been trained through short courses. IIEES welcomes graduate students from abroad and offers scholarship to the selective students from developing countries.



7. Public Education and Awareness:

The Iranian public is one of the most seismically literate in the world. This is largely because of the earthquake safety public awareness campaigns launched by the IIEES to communicate earthquake risk and provide practical ways to mitigate it. Starting with schools, the Program planners launched an innovative series of initiatives to educate young people through textbooks, competitions, art exhibitions and films. Some of the major activities are as follows:

- Increasing public awareness of earthquake hazard and preparedness by communicating with the general public through all type of media.
- Educating children and youngsters about earthquake preparedness at both elementary and high school levels by including materials in textbooks, showing films, conducting drill, painting and writing competitions and exhibitions, etc.
- Organizing the annual national “Earthquake and Safety” drill in more than 50,000 secondary and high schools with participation of more than 15 million students on 28th of November since 1998.
- Organizing bi-annual Asian painting as well as annual arts and craft exhibition on seismic safety on third week of October.
- Strengthening the key role of women in hazard mitigation program and promotion of seismic safety culture.
- Designing and posting street posters that teaches the basic point of seismically safe buildings.



8. International Cooperation:

Considering the IIEES scientific potential and its international mission in relation to its partnership with UNESCO, as well as the scientific interest on Iran's earthquake issues, cooperation and collaboration with the UN agencies and scientific institutions and organization is an integral part of IIEES research and scientific activities. Some of the activities are which related to all area of earthquake are:

- Active cooperation with UNESCO, UNDP, UN/ISDR, CTBTO, UNEP, ICTP, EMI, TWAS, GADR, ADPC and many international and scientific associations.
- Active cooperation with scientific associations specially IAEE and IASPEI
- Performing joint research with universities and research institutions in France, Russia, Norway, England, Armenia, Japan, Italy, China, Germany, USA, Turkey, India, Mexico, Switzerland, Algeria, Jordan, Kuwait, Saudi Arabia, etc.

9. Open Alliance of UNESCO-UNDP-UN/ISDR-IIEES on Earthquake Risk Reduction in developing countries.

After the Bam earthquake UNESCO, UNDP, UN/ISDR and IIEES have formed an open *Alliance* with the objective of initiating series of activities to protect people, building stock, lifelines and critical infrastructure from the impacts of future earthquakes in the developing countries. The Alliance will advocate a shift in emphasis from post-disaster reaction to pre-disaster prevention and risk reduction actions, and stress the importance of preventive approaches through the enhancement of research and knowledge capacities, the design and dissemination of risk mitigation measures as well as increased information, education and public awareness.

The Alliance's vision is:

- Expanding scientific and applied research, technical infrastructures and capacities for implementation of an effective risk mitigation action;
- Reduction of risk in all types of built structures and ensuring that the future constructions are seismically safe;
- Developing initiatives for the mitigation of earthquake risk in the rural areas with emphasis on the provision of realistic, doable, affordable, simple methods and methodologies; and
- Enhancing the level of disaster preparedness by increasing public awareness and promoting collective prevention.

10. Publications:

- Publication of 48 Books, 241 Research Report, 1041 Papers and 25 Maps.
- Publication of Quarterly Journal of Seismology and Earthquake Engineering (JSEE), 17 issues.
- Publication of Quarterly IIEES Research Bulletin, 63 issues.