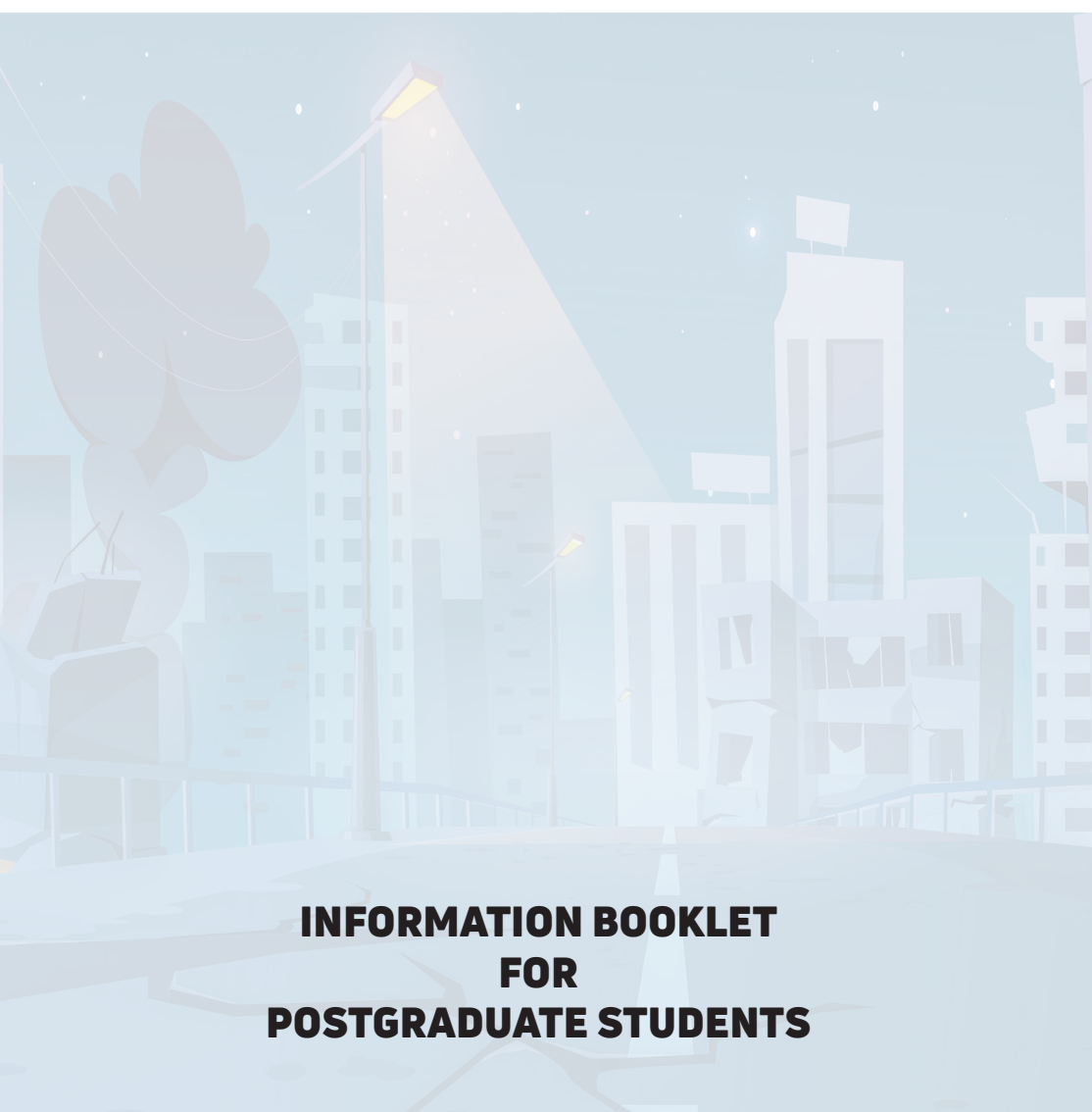




INFORMATION BOOKLET FOR POSTGRADUATE STUDENTS



**BUET-Japan Institute of Disaster Prevention and
Urban Safety (BUET-JIDPUS)**

A stylized, light blue illustration of a cityscape at night. It features several tall buildings, a large tree on the left, and a street with a traffic cone in the foreground. A bright light source, possibly a street lamp, casts a long, warm glow across the scene.

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**BUET-Japan Institute of Disaster Prevention and
Urban Safety (BUET-JIDPUS)**



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(BUET-JIDPUS)

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Ms. Lamia Fairouz

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Preface

The BUET-Japan Institute of Disaster Prevention and Urban Safety (BUET-JIDPUS) rolled out three postgraduate degrees: Master of Science in Disaster Risk Reduction Engineering, abbreviated as M. Sc. Engg. (DRR), Master of Engineering in Disaster Risk Reduction Engineering, abbreviated as M. Engg. (DRR), and Master of Science in Disaster Risk Reduction Science, abbreviated as M. Sc. (DRR), for developing human resources. The primary objective of these programs is to reduce disaster risks and extend the frontiers of disaster management. This achievement has been the result of a remarkable journey, guided by the expertise and dedication of numerous professionals and academicians, aimed at nurturing future leaders and professionals in the field of disaster risk reduction.

Our profound appreciation extends to our predecessors, particularly the late National Professor Dr. Jamilur Reza Choudhury, whose vision emphasized the creation of such academic and institutional opportunities for students, fostering a new resilient generation. The visionary guidelines and encouragements from the current administration of BUET, led by the Honorable Vice-Chancellor Prof. Satya Prasad Majumder and the Honorable Pro-Vice-Chancellor Prof. Dr. Abdul Jabbar Khan, the Committee for Advanced Studies and Research (CASR), the Dean's Committee, the Academic Council, and the Syndicate were all important to bring the three programs to



this stage. The present director and the faculties of the BUET-JIDPUS have streamlined past efforts by achieving the necessary approvals and commencement of the master's program within the academic and administrative framework of BUET. The invaluable contributions of the staff of BUET-JIDPUS are needed in ensuring the institute's smooth operation.

In this long journey, we also extend our gratitude to the former directors and faculty members who played integral roles, dedicating themselves to realizing the institute's visionary objectives. Prof. Dr. Mehedi A. Ansary, the first director of the institute, played his role in its formation, overseeing the delicate links between Japanese funding, the Government of the People's Republic of Bangladesh participation and industry involvement during the project development phase. This continued until the project evolved into an institute at BUET, under the revenue budget during the tenure of Prof. Dr. Munaz Ahmed Noor. Furthermore, Prof. Dr. Tahmeed Malik AL-Hussaini spearheaded a subproject of the Higher Education Quality Enhancement Project (HEQEP) for the development of course curriculum, and Prof. Dr. Raquib Ahsan overseen the formulation of the rules and regulations for the postgraduate programs.

Since our establishment, we have been steadfast in our commitment to nurturing scholars and professionals, equipping them with the knowledge and expertise they need to confront the intricate challenges posed by natural and man-made disasters. Our partnership with Japan, a nation renowned for its pioneering advancements in disaster management, has laid the groundwork for this distinctive and transformative academic environment.

As the BUET-JIDPUS embarks on this new era, we present this booklet as a testament to our unwavering pursuit of excellence in education and research. This comprehensive booklet outlines the overview, rules and regulations and course contents of the BUET-JIDPUS, serving as a guide for students and their advisors. The booklet



facilitates the seamless execution of academic activities and research opportunities, boasting state-of-the-art laboratory facility designed to empower students with cutting-edge insights and practical skills in disaster risk reduction. It also showcases the exciting research opportunities, and short training courses of our esteemed faculty and research scholars, demonstrating our commitment to exploring innovative solutions and pushing the boundaries of knowledge in industry and academia.

Finally, I extend my sincere gratitude to all my esteemed colleagues at the institute, including Ms. Madeha Sattar Khan, Ms. Mushirah Tasnim and Ms. Maria Mehrin, whose unwavering efforts and assistance have been invaluable in preparing this booklet. As we forge ahead in our mission to foster a safer and more resilient world, we invite you to join us on this remarkable journey of academic and intellectual growth with much anticipated collaborations with the industry.

Prof. Dr. A.F.M. Saiful Amin

Director
BUET-JIDPUS



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CHAPTER 1

General Information

1.1

Historical Background

The oldest university in Bangladesh for the study of engineering and architecture is the Bangladesh University of Engineering and Technology (BUET). The history of this institution dates back to the Dhaka Survey School, which was established at Nalgola in 1876 to train surveyors for the Government of Bengal of the British India. The school eventually changed its name to Ahsan Ullah School of Engineering, which offered three-year diploma programs in civil, electrical, and mechanical engineering. The school was transformed into Ahsan Ullah Engineering College (on its current grounds) in 1948 as a Faculty of Engineering under the University of Dhaka, offering four-year bachelor's courses in civil, electrical, and mechanical engineering, with an aim to meet the rising demand for engineers and to expand facilities for advancing engineering education. In 1962, Ahsan Ullah Engineering College was elevated to the rank of university, as East Pakistan University of Engineering and Technology, to establish facilities for postgraduate studies and research. It was renamed as Bangladesh University of Engineering and Technology (BUET) after Bangladesh was born in 1971. BUET has expanded its academic offerings from the original two faculties to seven faculties. Furthermore, to promote knowledge development and human resource growth in various fields of engineering and technology, eight institutes were subsequently established within evergrowing BUET.



The BUET campus is located in the center of Dhaka. A small distance separates the residence halls from the academic buildings on its beautiful campus. The university underwent significant infrastructure development along with academic expansion over the years. Construction of various buildings, such as the Dr. Jamilur Reza Choudhury Civil Engineering Building, Library, Auditorium Complex, E.M.E. Building, and Shahid Smrity Hall, were completed between 1968 and 1979. In 1986, the university inaugurated its first girls' hall, the Sabekun Nahar Sony Hall, and constructed a hall in honor of Dr. M. A. Rashid, the founding Vice-Chancellor. The expansion works continued in the following years, with the construction of the Academic Council Building, the Department of Urban and Regional Planning Building, and an office building for the Controller of Examinations. In 2009, financial support was provided by the Government of Japan, which led to subsequent initiatives from the Government of Bangladesh and resulted in the establishment of BUET-Japan Institute of Disaster Prevention and Urban Safety (BUET-JIDPUS) in Palashi. Recently, a new hall, Bangamata Sheikh Fojilatunnesa Mujib Hall, has been constructed to provide accommodation for the increasing number of female students at BUET.

Bangladesh University of Engineering and Technology has reached its current status as a result of many years of unwavering effort by the students, faculties, officials, and staff. Its reputation as a perfect institution and a representation of outstanding accomplishment has grown not just within the borders of Bangladesh but also far beyond.

A special mention is here to the students, teachers, officers, and staff of this university who joined in our historic war of independence. Among those, students and staff who sacrificed their lives as martyrs in the liberation war are listed.

Name	Identity	Hall/Workplace
Iqbal Ahmed	Reg No. 68077	Suhrawardi Hall
A. K. Sharafuddin Ahmed (Dulal)	Reg No. 68052	Ahsan Ullah Hall
Mufti Mohammed Kashed	Reg No. 67147	Titumir Hall
Mohammed Ahsanul Habib	Reg No. 66234	Titumir Hall
A. K. M. Aminul Islam	Reg No. 69185	Titumir Hall
Salauddin Ahmed Chowdhury	Reg No. 66270	Nazrul Islam Hall
Abu Selim Shahiduzzaman	Reg No. 66128	Sher-e-Bangla Hall
Abul Kashem Molla	Reg No. 68386	Suhrawardi Hall
Abu Ahmed Asadullah	Reg No. 68155	Sher-e-Bangla Hall
Shamsuddin Ahmed	Reg No. 67253	Titumir Hall
Mohammed Habib Ullah	Reg No. 68150	Titumir Hall
Mohammed Golam Nobi	Reg No. 6828	Titumir Hall
Jalal Uddin Ahmed	Reg No. 67298	Titumir Hall
Mohammed Mahfuzul Haque	Reg No. 67298	Nazrul Islam Hall
Mohammed Bodiul Alam	Reg No. 66102	Ahsan Ullah Hall
Mohammed Anwarul Azim	Reg No. 67032	Ahsan Ullah Hall
Mohammed Rafiq Uddin Ahmed (Bulbul)	----	Ahsan Ullah Hall
Mohammed Abdus Sobhan Akhanda	Lab Attendant	Mechanical Department
Abdus Sobhan	Gardener	Suhrawardi Hall
Sri Shiddipodo Ghosh	Steno-typist	Students Directorate



1.2

Academic Activities

The University has eighteen teaching departments. All departments, except for Department of Humanities, offer degree programs; however, some offer postgraduate degrees only.

The faculties of Chemical and Materials Engineering, Civil Engineering, Electrical and Electronic Engineering, and Mechanical Engineering offer undergraduate courses that typically last four years and lead to a Bachelor of Science in Engineering degree. Meanwhile, the faculty of Architecture and Planning offers a five-year Bachelor of Architecture degree and a four-year Bachelor of Urban and Regional Planning degree. The university has expanded its focus to include postgraduate studies and research. Many departments offer M.Sc. Engg. and M. Engg. degrees, and some departments now offer Ph.D. degrees. The faculty of Architecture and Planning also offers postgraduate degrees in architecture (M. Arch.) and urban and regional planning (MURP). The university collaborates with various organizations, such as UN Organizations, the Commonwealth Secretariat and University Grants Commission (UGC) to undertake research programs. Additionally, the university leverages its teachers' expertise and laboratory facilities to provide updated engineering and technological knowledge to various organizations in the country. The university is dedicated to continuously enhancing its research facilities, staff positions, and course curriculum to meet the nation's technological challenges.

The list of faculties and institutes along with the offered degrees is given.

Faculty of Post Graduate Studies

Faculty of Chemical and Materials Engineering

Department of Chemical Engineering	UG and PG
Department of Material and Metallurgical Engineering	UG and PG

Department of Petroleum and Mineral Resources Engineering	PG
Department of Nanomaterials and Ceramic Engineering	UG and PG

Faculty of Science

Department of Chemistry	PG
Department of Mathematics	PG
Department of Physics	PG

Faculty of Civil Engineering

Department of Civil Engineering	UG and PG
Department of Water Resources Engineering	UG and PG

Faculty of Mechanical Engineering

Department of Mechanical Engineering	UG and PG
Department of Naval Architecture and Marine Engineering	UG and PG
Department of Industrial and Production Engineering	UG and PG

Faculty of Electrical and Electronic Engineering

Department of Electrical and Electronic Engineering	UG and PG
Department of Computer Science and Engineering	UG and PG
Department of Biomedical Engineering	UG and PG

Faculty of Architecture and Planning

Department of Architecture	UG and PG
Department of Humanities	-
Department of Urban and Regional Planning	UG and PG

Institutes

Institute of Water and Flood Management	PG
Institute of Appropriate Technology	PG
Institute of Information and Communication Technology	PG
Accident Research Institute	-
BUET-Japan Institute of Disaster Prevention and Urban Safety	PG
Institute of Nuclear Power Engineering	PG
Institute of Energy and Sustainable Development	-
Institute of Robotics and Automation	-



1.3 University Administration

Chancellor	Mohammed Shahabuddin Honorable President of the People's Republic of Bangladesh
Vice-Chancellor	Prof. Dr. Satya Prasad Majumder
Pro-Vice-Chancellor	Prof. Dr. Abdul Jabbar Khan

University Syndicate

Chairman	Prof. Dr. Satya Prasad Majumder, Vice- Chancellor, BUET
Members	Prof. Dr. Abdul Jabbar Khan, Pro-Vice- Chancellor, BUET Director General, Directorate of Secondary and Higher Education, Dhaka Director General, Directorate of Technical Education, Dhaka Dean, Faculty of Chemical and Materials Engineering, BUET Dean, Faculty of Civil Engineering, BUET Prof. Dr. Shah Abdul Latif, Former Member, Bangladesh Public Service Commission, Agargaon, Dhaka Prof. Dr. A.A.M.S Arefin Siddique, Former Vice-Chancellor, University of Dhaka Mr. Md. Abu Yousuf Miah, Additional Secretary (University Division), Secondary and Higher Education Department, Ministry of Education, Dhaka Mr. Ajoy Das Gupta, Freedom Fighter and Ekushey Medal Awarded Journalist Dr. Jamal Uddin Ahmed, Former President, The Institute of Chartered Accountants of Bangladesh

Members

Prof. (Retd.) Dr. S.M. Anowara Begum,
Freedom Fighter, Department of
Political Science, Jagannath University

Deans of Faculties

Faculty of Post Graduate Studies	Prof. Dr. Abu Rayhan Md. Ali
Faculty of Chemical and Materials Engineering	Prof. Dr. Mohammad Tamim
Faculty of Science	Prof. Dr. Jiban Podder
Faculty of Civil Engineering	Prof. Dr. Md. Shafiul Bari
Faculty of Mechanical Engineering	Prof. Dr. Md. Ehsan
Faculty of Electrical and Electronic Engineering	Prof. Dr. Md. Shafiqul Islam
Faculty of Architecture and Planning	Prof. Dr. Ishrat Islam

Heads of the Departments

Department of Chemical Engineering	Prof. Dr. Md. Shahinoor Islam
Department of Materials and Metallurgical Engineering	Prof. Dr. A. K. M. Bazlur Rashid
Department of Nanomaterials and Ceramic Engineering	Prof. Dr. A. S. M. A. Haseeb
Department of Chemistry	Prof. Dr. Al-Nakib Chowdhury
Department of Mathematics	Prof. Dr. Nazma Parveen
Department of Physics	Prof. Dr. Mohammed Abdul Basith
Department of Petroleum and Mineral Resources Engineering	Prof. Dr. Mohammed Mahbubur Rahman
Department of Civil Engineering	Prof. Dr. Md. Zakaria Ahmed
Department of Water Resources Engineering	Prof. Dr. Nasreen Jahan
Department of Mechanical Engineering	Prof. Dr. Muhammad Ashiqur Rahman
Department of Naval Architecture and Marine Engineering	Prof. Dr. Md. Shahidul Islam
Department of Industrial and Production Engineering	Prof. Dr. Syed Mithun Ali
Department of Electrical and Electronic Engineering	Prof. Dr. Md. Aynal Haque
Department of Computer Science and Engineering	Prof. Dr. Mahmuda Naznin



Department of Biomedical Engineering	Prof. Dr. Muhammad Tarik Arafat
Department of Architecture	Prof. Dr. Mohammed Zakiul Islam
Department of Humanities	Prof. Dr. Mizanur Rahman
Department of Urban and Regional Planning	Prof. Dr. Afsana Haque

Directors of Institutes, Centers and Others

Institute of Water and Flood Management (IWFM)	Prof. Dr. A.K.M. Saiful Islam
Institute of Appropriate Technology (IAT)	Prof. Dr. A K M Monjur Morshed
Institute of Information and Communication Technology (IICT)	Prof. Dr. Md. Rubaiyat Hossain Mondal
Accident Research Institute (ARI)	Prof. Dr. Md. Shamsul Hoque
BUET-Japan Institute of Disaster Prevention and Urban Safety (BUET-JIDPUS)	Prof. Dr. A.F.M. Saiful Amin
Institute of Nuclear Power Engineering (INPE)	Prof. Dr. Mohammad Jahangir Alam
Institute of Energy and Sustainable Development (IESD)	Prof. Dr. Farseem Mannan Mohammedy
Directorate of Advisory, Extension and Research Services (DAERS)	Prof. Dr. Mohammad Arif Hasan Mamun
Directorate of Students' Welfare (DSW)	Prof. Dr. Md. Mizanur Rahman
Directorate of Planning and Development (DPD)	Prof. Dr. Khan Mahmud Amanat
Directorate of Continuing Education (DCE)	Prof. Dr. Mohammad Nasim Hasan
Centre for Environmental and Resource Management (CERM)	Prof. Dr. Mafizur Rahman
Center for Regional Development Studies (CRDS)	Prof. Dr. Ishrat Islam
Bureau of Research, Testing and Consultation (BRTC)	Prof. Dr. Sarwar Jahan Md. Yasin
International Training Network Centre (ITN)	Prof. Dr. Tanvir Ahmed
Institutional Quality Assurance Cell (IQAC)	Prof. Dr. Kazi Bayzid Kabir
Information and Communication Technology Cell (ICT Cell)	Prof. Dr. Rifat Shahriyar

Research and Innovation Centre for
Science and Engineering (RISE)

Institute of Robotics and Automation,
BUET (IRAB)

Prof. Dr. Muhammad Anisuzzaman
Talukder

Prof. Dr. Shaikh Anowarul Fattah

Provosts of Residential Halls

Ahsan Ullah Hall

Nazrul Islam Hall

Titumir Hall

Sher-e-Bangla Hall

Suhrawardy Hall

Shahid Smritiy Hall

Sabekun Nahar Sony Hall

Dr. M.A. Rashid Hall

Bangamata Sheikh Fojilatunnesa
Mujib Hall

Prof. Dr. Md. Rafi Uddin

Prof. Dr. Md. Abdul Alim

Prof. Dr. Mohammad Abu Sayem Karal

Prof. Dr. Md. Shakhawat Hossain Firoz

Prof. Dr. Mohammad Al Amin Siddique

Prof. Dr. Md. Abdur Rouf

Prof. Dr. Fahmida Gulshan

Prof. Dr. Shameem Ahmed

Prof. Dr. Rowshan Mamtaz

Administrative Officers

Registrar

Comptroller

Controller of Examinations

Librarian

Chief Engineer

Chief Medical Officer

Prof. Dr. Md. Forkan Uddin

Prof. Dr. Pran Kanai Saha

Prof. Dr. Mohammed Imamul Hassan
Bhuiyan

Prof. Dr. A. B. M. Alim Al Islam

Engr. Dr. A.K.M. Jahangir Alam

Dr. Abu Hena Abid Zafr

A Brief Campus Tour



BUET-Japan Institute of Disaster Prevention and Urban Safety



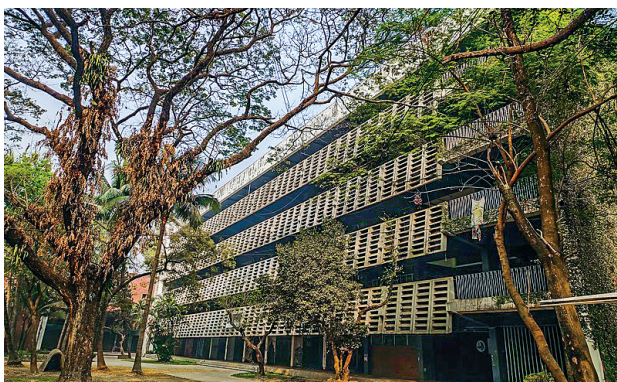
Dr. M. A. Rashid Administrative Building



Central Cafeteria and Auditorium Complex



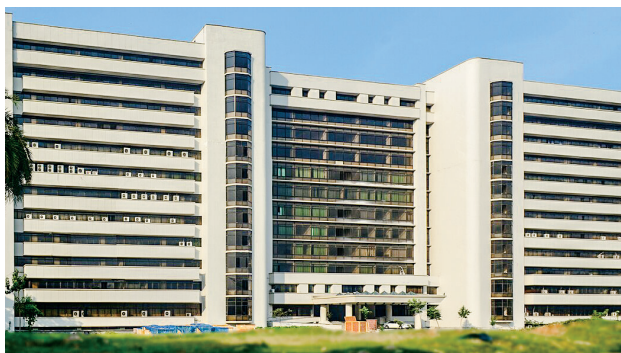
Dr. Jamilur Reza Choudhury Civil Engineering Building



Architecture Building



URP Building



ECE Building



EME Building



Institute Building



1.4

Facilities in BUET Campus for Students

1.4.1

Accommodation Facilities

There are nine residential halls within the university: six for undergraduate male students, one for full-time postgraduate male students and two for undergraduate and post-graduate full-time female students. The majority of university students reside in these halls. The residence halls are all located on campus and close to the main academic buildings. There are dining facilities, furnished rooms, and recreational opportunities in every residential hall. For students living in the Dhaka city, the university offers commuter bus services.

1.4.2

Medical Facilities

A medical center with basic healthcare facilities is located on the university campus. The facility is equipped with contemporary medical technology. Physicians treat and prescribe medication there. The Medical Centre provides free care and medication to students. If a student has been absent due to illness for a maximum of three weeks, he/she should promptly contact his/her course instructor(s) or course coordinator(s) to arrange for makeup exams or assignments. To request this, the student must provide a medical certificate issued by the university medical officer. If the student's absence from the university is justifiable, a medical certificate from a registered medical practitioner (with the registration number displayed clearly on the certificate) will also be accepted.



1.4.3

Sports/Recreational Facilities

At BUET, sports and recreation are an integral component of student life. Inter hall tournaments in football, basketball, and cricket are often held. There are playgrounds, tennis courts, basketball courts, a squash court and a gymnasium. All residence halls provide ample facilities for indoor games. Throughout the year, students participate in a variety of cultural programs. Special cultural weeks are organized in each hall. The university features a 1,200-seat auditorium complex.

1.4.4

Extracurricular Facilities

There is a diversified list of clubs available for BUET students to join. There are 32 clubs dedicated to the promotion of various sports, science, literature, and culture. Teachers with expertise in their respective professions are recruited as moderators to ensure the appropriate direction of each club's activities. The Directorate of Students' Welfare (DSW) organizes an annual club fair where clubs demonstrate their accomplishments and recruit new members.



CHAPTER 2

BUET-Japan Institute of Disaster Prevention and Urban Safety

2.1

Introduction

Every Country is vulnerable to disasters. These disasters, either natural or man-made pose a threat of significant damage to life, property and infrastructure. It is essential to have effective strategies in place for disaster prevention and management. To address the issues, the BUET-Japan Institute of Disaster Prevention and Urban Safety (BUET-JIDPUS) was established by the Syndicate of BUET on December 30, 2009, as a development project of the Government of Bangladesh. Over time, the project expanded its scope to include other areas of disaster prevention and management, such as urban safety. In 2011, the project was upgraded to an institute. Its aim is to provide a hub for education, research and training in the field of disaster prevention and urban safety, with the goal of reducing the risk of disasters in Bangladesh. The institute seeks to assist the government in properly managing calamities as well as enhancing and maintaining safety of the existing infrastructure. In addition to this, it works to raise both awareness and technical understanding on the reduction of risks posed by disasters. Moreover, this institute provides advising and consultancy services to public and private entities.

2.2

Vision and Mission

Vision

The vision of BUET-JIDPUS is to serve as a national reference center for teaching, learning, research and awareness development in the field of disaster risk reduction and urban safety assurance, complementing BUET's mission of contributing to national policymaking in the area leading to Bangladesh's socio-economic development.

Mission

- To strengthen the capacity of professionals in Bangladesh in the fields of
 - Infrastructure management and structural health monitoring
 - Disaster management and prevention
 - Urban safety
- To strengthen other local agencies on the above-mentioned fields through training and dissemination of information
- To promote collaboration with other national and international universities and research organizations
- To conduct research, testing and consultancy services in the field of disaster prevention and urban safety

2.3

Administration

The institute is governed by the Board of Governors (BOG), led by the Honorable Vice-Chancellor of the university as the chairman. The

institute is headed by a director. It's academic, research and training programs are monitored by the Research and Academic Committee (RAC), consisting of the director, all professors, associate professors, assistant professors and other members as outlined in the approved BUET-JIDPUS Rules and Regulations.

2.4

Faculty Members

A. F. M. Saiful Amin
Professor and Director

Education: Ph.D., Saitama University, Japan (2001); M.Sc. Engg. (Civil & Structural), BUET (1998); B.Sc. Engg. (Civil), BUET (1996)

Research Interests: Structural engineering, Structural mechanics, Continuum mechanics, Thermodynamics, Thermophysics, Modeling nonlinear material behavior under large deformation, Experimental mechanics, Finite element implementation of constitutive models, Cement chemistry.

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Md. Aminul Islam
Assistant Professor

Education: B.Sc. Engg. (Civil), BUET; M.Sc. Engg. (Civil & Structural), BUET; [on leave]

Research Interests: Structural Engineering, Earthquake Engineering, Structural Dynamics, Structural Health Monitoring, Nondestructive Testing, Vulnerability Assessment of Structure, Large Scale Experimental Testing.

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Tasnim Tarannum Isaba
Assistant Professor

Education: MURP, BUET; BURP, BUET; [on leave]

Research Interests: Disaster Risk Reduction and Management, Policy Implementation, Community Resilience to Disasters, GIS based Management of Disaster, Climate Change and Adaptation, Regional Planning, Environmental Management

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Shamontee Aziz
Assistant Professor

Education: M.Sc. Engg. (Civil & Geotechnical), BUET (2020); B.Sc. Engg. (Civil), BUET (2017); [on leave]

Research Interests: Earthquake Engineering, Nature Based Solutions for Slope Stability, Geo-environmental Engineering, Geo- hazard Mitigation Dynamic Soil Characterization, Liquefaction, Soil and Water Remediation

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Assistant Professor

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Joya Rani Mallick
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Madeha Sattar Khan
Lecturer

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Research Interests: Earthquake Engineering, Performance Based Bridge Design, Disaster Risk Reduction, Structural Resilience, Evacuation Modelling, Climate Change and Adaptation

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Research Interests: Disaster Risk Reduction, Evacuation Modelling, Environmental Engineering, Transportation Modelling, Air Pollution and Modeling, Climate Change and Adaptation

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Maria Mehrin
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Education: BURP, BUET (2022)

Research Interests: Disaster Risk Reduction and Management, Climate Change and Adaptation, Community Resilience to Disasters, Environmental Management

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2.5 Officers and Staff

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Md. Anowarul Islam

Sr. Office Attendant
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Marful Hasan

Cleaner
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Mrs. Mahela Begum

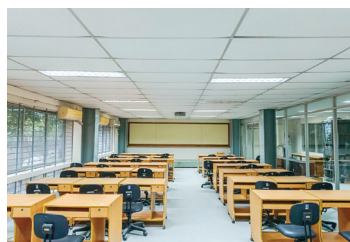
Cleaner
+8801937107383

2.6

Classroom and Laboratory Facilities

BUET-JIDPUS has spacious classrooms, to accommodate a moderate number of students, on the ground floor and second floor. These well-designed learning spaces are equipped with modern lecture facilities, providing an optimal environment for enhanced student engagement.

BUET-JIDPUS is equipped with a number of laboratories to pursue routine academic programs, research, testing and consultancy. Presently there are four laboratories in the institute named Earthquake Engineering Laboratory, Geotechnical & Geophysical Testing Laboratory, Computational & Simulation Laboratory and Non-destructive Testing Laboratory. Students of other departments can also use laboratory facilities of the institute and vice versa with justifications.



BUET-JIDPUS Classrooms

Earthquake Engineering Laboratory

The dynamic testing facility has approximately 110 square metre of floor area and the most sophisticated testing facilities for structures and soil. The lab possesses an L-shaped reaction wall, 5 m reaction frame, strong floor, overhanging 10-ton crane facility and 8 m of free vertical space. The instruments of the laboratory are useful to simulate earthquakes and determine the dynamic properties of structures and soil.

Static and dynamic structural simulation, artificial earthquake simulation, estimation of the dynamic properties of structures and soil liquefaction testing are typically conducted.

Geotechnical and Geophysical Testing Laboratory

There are some sophisticated instruments for dynamic soil property determination. Equipment for basic soil property determination are also available.



Ground Penetration Radar



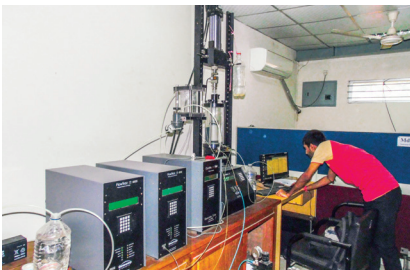
Microtremor Test



Cone Penetration Test



Ferroscan Test



Triaxial Test



Shake Table Test



Column Test by Actuator



Eccentric Mass Vibrator

The geotechnical and engineering properties of soil are typically determined in this laboratory, as well as delineating soil stratigraphy, soil's dynamic properties, shear and compressional wave depth versus velocity profiles, gradation of soil, plastic limit and liquid limit.

Computational and Simulation Laboratory

It has the server version software for education, research and professional services (ArcGIS, ETABS, Kaleida Graph, Mathematica, MATLAB, Origin, PLAXIS 2D and 3D, SAP2000, SCPT Bundle), with computers, multimedia facilities, broadband internet and networking.

Non-destructive Testing (NDT) Laboratory

For existing condition assessment of structures without destruction, NDT instruments are useful. Detection of buried utilities, metallic and non-metallic targets in concrete structures, detection and positioning of reinforcement along with a crack's depth determination in slab, beam and column are typically studied.

Detection of foundation thickness and reinforcement in foundation, dynamic property determination of soil and structures, vulnerability assessment and retrofitting of building, concrete strength determination and seismic micro zonation are also examined.

2.7

Laboratory In-charges

Different laboratory in-charges are responsible for managing the various laboratories of the BUET-JIDPUS.

Laboratories	Laboratory In-charges
Earthquake Engineering Laboratory	Md. Jasim
Geotechnical & Geophysical Testing Laboratory	Md. Azader Rahman
Computational and Simulation Laboratory	Md. Jasim
Non-destructive Testing Laboratory	Md. Haroonor Rashid

2.8

Testing and Consultancy

The BUET-JIDPUS provides a range of testing and consultancy services to support its mission of reducing disaster risk and promoting urban safety. These facilities are designed to support research, education and training programs aimed at enhancing the capacity of individuals and organizations to respond to and mitigate the impact of disasters.

The testing facilities available at BUET-JIDPUS are designed to possess state-of-the-art technology and equipment, allowing for the assessment of various components of disaster risk and urban safety, such as infrastructure, buildings and transportation systems. These facilities enable researchers and practitioners to assess and evaluate various mitigation measures and response strategies. Researchers can also develop and implement practical solutions to reduce the risk of disasters.

The consultancy services offered by BUET-JIDPUS support organizations and individuals in the development and implementation of disaster risk reduction and urban safety programs. These services include expert advice, training on risk assessment, planning, implementation of mitigation measures and emergency response recovery actions.

Testing Services

Non-destructive Test

- Utility scans (underground pipe detection)
- Determination of the existence and thickness of mat foundation and grade beam
- Reinforcement checking of structures (bridges and buildings)
- Void detection in concrete
- Compressive strength test of concrete
- Structural crack detection and crack measurement
- Carbonation test of concrete
- Natural frequency determination of soil and structure
- Determination of shear and compressional wave velocity of soil mass

Geotechnical and Geophysical Test

- Cone penetration test
- Seismic cone penetration test
- Downhole seismic/PS-logging test
- Earth resistivity test
- Natural frequency determination of soil
- Continuous soil profile determination
- Tri-axial test
- Consolidated drained compression test
- Consolidated undrained compression test
- Unconsolidated undrained compression test
- Consolidated undrained extension test
- Consolidated drained extension test

- Unconsolidated undrained extension test
- Cyclic tri-axial test
- Unconfined compression test
- Sieve analysis and specific gravity test
- Liquid limit and plastic limit test

Earthquake Engineering Related Test

- Artificial simulation of earthquake motion in structures and soils by shake table
- Behavior of structures under pseudo-dynamic loading provided through actuator
- Determination of displacement capacity of structure
- Determination of acceleration capacity of structure
- Fatigue test of concrete

Consultancy Services

BUET-JIDPUS is providing expert advices and sharing technical knowledge since the very beginning of its journey in several national and international projects focusing on disaster assessment, mitigation and community preparedness.

Consultancy services include –

- Detailed Engineering Assessment (DEA) and design vetting of civil engineering structures
- Structural health monitoring
- Multi-level assessment of structural safety against earthquakes
- Earthquake-resistant design of buildings
- Cost estimation of civil engineering structure
- Certification on structural stability of civil engineering structures
- Retrofitting/strengthening of existing structures/structural members
- Seismic hazard analysis
- Micro zonation mapping for seismic exposure assessment formulation at the local level

- Contingency plan for earthquakes
- Plans for temporary shelter, evacuation routes, emergency health facility and institutional setup
- Assessment of socioeconomic vulnerability to earthquakes
- Assessment of vulnerability to fire hazards
- Formulation of community-based disaster risk reduction strategies
- Land cover modeling
- GIS and RS mapping of disaster susceptibility
- Development of warning systems
- Planning and coordination of training and workshops on disaster prevention, preparedness and response

2.9

Library Facilities

The BUET-JIDPUS library aims to stock valuable resource for both students and faculty members. The library holds a range of books, magazines, manuals and journals related to the field of disaster risk reduction and urban safety. These resources are carefully curated to provide students and teachers with a comprehensive understanding of the latest developments, theories and best practices in their field. The BUET-JIDPUS is connected to the BUET central library, granting students the ability to access e-books as well as utilize the central library's services and facilities.

CHAPTER 3

Research & Development

The research focus of BUET-JIDPUS is on different aspects of disaster prevention and urban safety. The institute aims to develop innovative solutions and technologies to reduce the impact of natural and man-made disasters. The BUET-JIDPUS conducts research on various aspects of disasters, including risk assessment, disaster preparedness and response, recovery and reconstruction. It also focuses on urban safety, particularly in the areas of transportation and infrastructure, with the aim of improving the safety and resilience of cities. The institute has carried out several research and consultancy projects in collaboration with national and international organizations. There is a list of some activities conducted by the BUET-JIDPUS in recent years.

3.1

Research & Industry Interactions

Earthquake Early Warning of Bangladesh

Time Period July 2022 to November 2023

Bangladesh is a seismically active region, making it vulnerable to earthquakes, which can cause significant damage and loss of life. The country's weak building codes and inadequate infrastructure increase its susceptibility to severe consequences from earthquakes. Early warning systems have been effective in mitigating the impact

of earthquakes. These systems provide advance warning to people in the affected areas, allowing them to take protective measures, such as evacuating buildings and seeking shelter. The BUET-JIDPUS has undertaken the development of an earthquake early warning system in Bangladesh, with funding provided by the Research and Innovation Centre for Science and Engineering (RISE).

The project objectives:

To assess the existing earthquake detection system in Bangladesh.

To compare the existing system with sophisticated systems used in Japan and other advanced countries.

To investigate potential options for expanding the existing system.

To develop an earthquake early warning system that is safe, sustainable and compatible with the fourth industrial revolution.

Evaluation of Liquefaction Potential Index and Severity Mapping of Rangpur City Corporation

Time Period 2020-2021

The Liquefaction Potential Index (LPI) is a crucial factor in determining the risk of liquefaction in an area, which can cause significant damage to buildings, roads and other structures. This project aimed to investigate the LPI of different Wards in Rangpur City Corporation and prepare a liquefaction severity map of the city. A liquefaction severity map can aid policymakers and legislators in informed land use planning and development of their towns.

The project objectives:

To investigate the Liquefaction Potential Index (LPI) of different wards in Rangpur City Corporation.

To prepare a liquefaction severity map of Rangpur City Corporation based on the LPI values.

To use the severity map to inform land use planning and development decisions by legislators and policymakers.

Classify the severity level of each ward as moderate, moderate to severe, or severe based on the field and laboratory test results.

National Resilience Program: Vulnerability Assessment of Earthquake Risk at Ward Level, Developing Contingency Plans, Preparing Training Modules and Imparting Training for Rangpur City Corporation and Tangail, Rangamati and Sunamganj Pourashavas

Time Period 2019-2022

Given that earthquakes are sudden and can cause significant damage, it is essential to adopt an inclusive earthquake risk management approach to minimize losses. To ensure an effective response to a severe earthquake event, it is necessary to have a local level plan that includes contingency plans based on soil characteristics, structural analysis of buildings and the socio-economic context. In this regard, the National Resilience Program (NRP) under the Ministry of Disaster Management and Relief (MDMR) of the Bangladesh government has initiated efforts to develop a minimum preparedness package for earthquake preparedness in cities.

The project objective:

To formulate a community based earthquake preparedness and management plan in Rangpur City Corporation and Tangail, Sunamganj and Rangamati Pourashavas.

Assessment of Seismic Exposure, Building & Socio-economic Exposure Assessment and Contingency Planning for Ward 14 of Mymensingh Municipality

Time Period April, 2017- September, 2017

Funded by the UNDP, BUET-JIDPUS conducted this project in association with the Department of Urban and Regional Planning and Department of Civil Engineering. Because of the unabated growth of human settlement and other economic activities, the earthquake risk of the Mymensingh Municipality is growing. Considering the earthquake threat of ward 14 of Mymensingh Municipality, the project's scope was the assessment of seismic exposure, assessment of building conditions and assessment of the socioeconomic context.

The project objectives:

To assess the seismic exposure of ward 14, Mymensingh Municipality area.

To assess the building conditions, including a technical recommendation for the existing structures depending on diverse risks.

To explore the socioeconomic vulnerability of study area.

To formulate a contingency plan based on a community-based risk-reduction approach.

Development of Post-Graduate Research and Degree Programs in Disaster Risk Reduction at New Institute on Disaster Prevention and Urban Safety

Time Period 2014-2016

This subproject of the Higher Education Quality Enhancement Project (HEQEP) was funded by the University Grants Commission (UGC)

of Bangladesh and the World Bank. The aim is to develop course curriculum for postgraduate degree programs (Master's/ Ph.D./ Diploma) related to disaster reduction. Various specific research tasks on disaster risk assessment have been conducted with state-of-the-art equipment of the institute under this project.

The project objectives:

Developing an Earth model for deterministic seismic hazard assessment studies of Bangladesh.

Developing expertise on the use of various geophysical and geotechnical investigation techniques.

Improving procedures for health/vulnerability assessment of existing civil infrastructure (buildings and bridges).

Developing risk assessment procedures for different disasters, including earthquakes, landslides, cyclones, floods and the impacts of climate change.

Research related to human response during and the immediate aftermath of a disaster, particularly human evacuation and safety aspects.

Developing Dynamic Web-GIS Based Early Warning System for the Communities at Landslide Risks in Chattogram Metropolitan Area, Bangladesh

Time Period 2014-2015

The project was funded by the U.S. Agency for International Development (USAID) in association with National Aeronautics and Space Administration (NASA) and assisted by the International Centre for Integrated Mountain Development (ICIMOD). The aim of this project is to develop a dynamic early warning system for

landslide-vulnerable communities in the Chattogram Metropolitan Area (CMA), Chattogram, Bangladesh.

The project objectives:

To establish the nature of relationships among landcover change, rainfall, climate change and landslide disaster.

To produce landslide susceptibility maps of Chattogram City.

To study human adaptation to landslide risks under the condition of rapid urbanization and torrential rainfall.

To assess community needs for effective implementation of early warning system for landslides.

To create a web-based dynamic model to generate early warnings for people living in landslide-vulnerable zones of Chattogram City.

3.2

Conferences, Symposiums and Others

Seminars in Observing the International Disaster Risk Reduction Day at BUET-JIDPUS, 2023

BUET-JIDPUS organized two seminars on 3rd October and 7th October, 2023 in observing the International Disaster Risk Reduction Day (13th October). The first seminar was on "Seismic Assessment Concept and Visual Rating Method for Prioritization of Detailed Evaluation of RC Building" where the distinguished speakers talked about employing a Visual Rating Method to quickly categorize structures based on observable damage indicators, thus facilitating targeted interventions to enhance overall seismic resilience of RC structures. The second seminar was on "Urban Resilience: An Approach to be Embedded in Planning and Designing of Built Environment". This seminar focused

on embedding resilience principles in urban planning and cities to enhance their adaptability, absorb shocks, and promote sustainable development, thus fostering long-term well-being.

The postgraduate students of BUET-JIDPUS and a good number of industry professionals attended the seminars.

International Symposium on Disaster Risk Reduction: Toward A Disaster-Resilient Bangladesh through Integrated Cooperation, 2021

A two-day long symposium, the International Symposium on Disaster Risk Reduction: Toward a Disaster-Resilient Bangladesh through Integrated Cooperation, was organized by the BUET-JIDPUS on October 12 and 13, 2021, online on the Zoom platform.

The inauguration ceremony on October 12, 2021, marked the start of a significant symposium. Prof. Dr. Satya Prasad Majumder, honorable Vice-Chancellor, BUET, graced the ceremony as the chief guest along with Prof. Dr. Abdul Jabbar Khan, Pro-Vice-Chancellor, BUET, as the special guest. Participants from academia in the national and international arena attended the symposium. Personnel from governmental and non-governmental agencies, such as the Bangladesh Army, Dhaka Mass Transit Company Limited, Power Cell of Power Division, Ministry of Power, Energy & Mineral Resources Rajdhani Unnayan Kartripakkha, Bangladesh Meteorological Department and United Nations Development Program were present and exchanged ideas during the sessions.

International Conference on Disaster Risk Management (ICDRM 2019)

The International Conference on Disaster Risk Management 2019 (ICDRM 2019) was the second international conference organized by the BUET-JIDPUS in association with Department of Architecture, Department of Urban and Regional Planning, Institute of Water and Flood Management of BUET, Urban Resilience Project: RAJUK

Part and Bangladesh Fire Service and Civil Defense (BFSCD). The conference aimed to address multidimensional issues related to disaster risk management by focusing on engineering, technology, social and policy aspects. ICDRM 2019 covered six themes, including Hazard, Vulnerability and Risk Assessment (HVRA); Adaptation, Prevention and Mitigation (APM); Warning, Preparedness and Awareness (WPA); Emergency Management, Recovery and Rehabilitation (EMR); Mainstreaming Disaster Management (MDM) and Climate Change (CC). Notable speakers from around the world attended the conference.

Symposium On “Safety in Garment Industry, Five Years after Rana Plaza”, 2018

The symposium, Safety in the Garment Industry, Five Years after Rana Plaza, was conducted by the BUET-JIDPUS in association with Bangladesh Network office for Urban Safety (BNUS), BUET on April 30, 2018, to discuss different aspects of safety management in the Readymade Garments (RMG) sector of Bangladesh. The symposium was attended by distinguished guests, including Her Excellency Leoni Cuelenaere, the Ambassador of the Kingdom of Netherlands to Bangladesh. Representatives from Department for Inspection of Factories and Establishments (DIFE) and Fire Service and Civil Defence (FSCD) also attended the event.

The symposium had two sessions in which 12 papers were presented and discussed. The papers covered various topics, including institutional and policy aspects of safety, fire safety, boiler safety scenarios, technical issues such as in-situ concrete strength, electrical safety guidelines and computer modeling of fire safety. The symposium provided an opportunity for researchers and experts from reputed research institutes, international organizations and BUET faculties to share their ideas and experiences to improve safety in the RMG sector of Bangladesh.

International Conference on Disaster Risk Mitigation (ICDRM 2017)

In association with the Civil Engineering Department, BUET-JIDPUS organized its first conference, the International Conference on Disaster Risk Mitigation 2017 (ICDRM 2017). This conference was organized as a component of the HEQEP subproject CP-3140 of the BUET-JIDPUS.

The primary objective of the conference was to explore the application of engineering and technology in assessing and mitigating the risks associated with natural disasters. In addition, the conference also welcomed discussions on the social and policy aspects necessary to implement effective mitigation procedures. The event intended to bring together experts, such as scientists, engineers, planners and disaster management professionals from Bangladesh and other parts of the world to discuss disaster prevention and mitigation. With a focus on civil engineering applications, including remote sensing, the conference aimed to disseminate the latest information, exchange experiences and ideas and contribute to efforts aimed at mitigating the threat of disasters both in Bangladesh and globally.

3.3

Short-courses & Trainings

Technical Knowledge Exchange Between Nepal and Bangladesh on Advanced, Cost- Effective and Climate-Resilient Bridge Structures Funded by the World Bank

Time Period 2018

A 16-person team visited the BUET-JIDPUS for a 10-day knowledge exchange program. The team included Nepalese engineers from the Department of Roads of Nepal, bureaucrats, Nepalese contractors

and two representatives from the World Bank. This program included classroom training sessions focusing on both theoretical and computer applications. Resource persons from BUET, LGED, and RHD were also associated with this knowledge exchange program. A half-day meeting between contractors of Bangladesh and Nepal was also held in order to share the construction practices of the two countries. Field visits were also an important part of the activities. A day-long visit to the Bangabandhu bridge site was arranged. Participants visited the construction and the structure of the bridge. Visits to other small bridges in and around Dhaka were arranged. The participants visited the pedestrian bridge at Rayerbazar and Dhanmondi, bridges under construction at Purbachal and the newly constructed arch bridges at Uttara in the third phase. Finally, meetings with officials of the Roads and Highways Department and Local Government Engineering Department were held. The closing and certificate awarding ceremony took place on October 1, 2018. The then honorable Vice-Chancellor of BUET, Prof. Dr. Saiful Islam, was present as the chief guest of the closing ceremony. Ms. Oceane Keou, Transport Specialist from the World Bank, was present as a representative of the World Bank.

Training Course on “Fundamentals of Earthquake-Resistant Design and Retrofitting of Reinforced Concrete Buildings”

Time Period 2018

A nine-day long training course, the “Fundamentals of Earthquake-Resistant Design of Reinforced Concrete Buildings”, was held February 15 to March 3, 2018, at the BUET-JIDPUS. The training course was conducted by BUET faculties. Participants from various institutions included engineers from RAJUK, DIFE and different consultancy firms as well as faculty members of BUET. The training course consisted of 48 hours of lecture which was split into two parts: structural aspects and geotechnical aspects. During these sessions,

the topics covered by the resource persons included seismic site exploration, seismic hazard and geophysical investigation, soil dynamics, dynamic testing of soil and structures, fundamental dynamics of structures, earthquake-resistant design according to the updated version of Bangladesh National Building Code (BNBC) and retrofitting of structures.

Training Program on “Geotechnical and Earthquake Engineering Field Investigation Technologies and Laboratory Tests” for RAJUK Officials and Engineers (Phases 1 & 2)

Time Period 2018

This training program was arranged for the engineers of the Urban and Resilience Project: RAJUK Part. It focused on the geotechnical investigations and earthquake engineering field tests. There were three parts of the training: classroom lectures, practical demonstrations and field visits. The resource persons were from the BUET- JIDPUS. There were two phases in which two different groups of engineers participated in the training program, which was a good opportunity to introduce young engineers to sophisticated testing facilities, such as the cone penetration test, ground penetrating radar test, down-hole seismic test, microtremor test and electrical resistivity test.

Training Program on “Use of PLAXIS Software on Geotechnical Problem”

Time Period 2017

On January 23, 2017, BUET-JIDPUS organized a training program focused on utilizing PLAXIS Software for addressing geotechnical challenges at the BUET-JIDPUS facility. The training program had participation from a total of 20 individuals, comprising a professor, a lecturer, and M.Sc. students from BUET.

Training Program on “Seismology and Seismic Hazard Assessment”

Time Period 2017

A day-long training program on “Seismology and Seismic Hazard Assessment” was held on February 16, 2017, at the BUET-JIDPUS. The event was jointly organized by BUET-JIDPUS in collaboration with the University of Trieste, Italy. The training program was attended by 32 participants, including students and faculty members from different universities and representatives from different organizations.

Training Course on “Introduction to GIS Programming and Algorithms”

Time Period 2017

A two-day training course on “Introduction to GIS Programming and Algorithms” was organized and conducted by BUET-JIDPUS on December 22 and 23, 2017. People from multidisciplinary areas participated in the course, including faculty members from DU, DUET, BUP, MIST, IUB, Sonargaon University, BAU and BUET, as well as professionals from RAJUK and IWFM. The training course consisted of eight 1.45 hour-long sessions, covering fundamentals of Python programming language, basic GIS data operations and geometric algorithms.

Training on “Shake Table, Actuator and EMV Operation and Maintenance”

Time Period 2016

The BUET-JIDPUS installed a shake table in February 2016 and provides testing facilities and performs research work in this field. A training program on shake table, actuator and eccentric mass vibrator (EMV) operation and maintenance, was held at the BUET-JIDPUS on January 28–30, 2016. In this training, the focus area was

the operation, maintenance and analysis of the data obtained from the shake table, actuator and EMV.

Training on “Remote Sensing and GIS for Natural Hazard Assessment”

Time Period 2015

A training course titled “Remote Sensing and GIS for Natural Hazard Assessment” took place at BUET-JIDPUS from March 7 to April 1, 2015. The certificate-awarding ceremony of the training program was held on April 5, 2015, at 6:30pm at the Lecture Hall of the BUET-JIDPUS. The esteemed presence of Prof. Khaleda Ekram, the Vice-Chancellor at that time, honored the program as the chief guest. Additionally, deans from various faculties of BUET attended the event as special guests.

Training on “Rapid Response Training for Earthquakes”

Time Period 2015

The BUET-JIDPUS organized the training titled “Rapid Response Drill for Earthquakes” on December 8, 2015, at 4:30pm, jointly with Bangladesh Fire Service & Civil Defense (FSCD). A total of 105 nominated teachers, students and officers from various departments of BUET participated in this three-hour training. FSCD showed some ways to minimize the damage and losses of life from fire hazards and earthquakes. FSCD officers also showed some rescue methods and techniques for using fire extinguishers.

Training Program on “Structural Vulnerability Assessment and Structural Health Monitoring”

Time Period 2015

BUET-JIDPUS, in collaboration with the University of British Columbia (UBC) Okanagan, Canada, organized a full-day training

session titled “Structural Vulnerability Assessment and Structural Health Monitoring” on December 26, 2015. The training program was attended by 44 participants, including students and faculty members from different government and non-government organization. During the training program, Prof. Khaleda Ekram, the Honorable Vice-Chancellor of BUET at the time, graced the event with her presence. The training program ended with a discussion session and certificate awarding.

Training Course on “Fundamentals of Earthquake-Resistant Building Design”

Time Period 2015

The BUET-JIDPUS offered a training course for civil engineers on the “Fundamentals of Earthquake-Resistant Building Design” on February 26–28, 2015. This was a three-day course focusing on topics varying from engineering seismology to structural design to computational models.



CHAPTER 4

Academic Programs

4.1

Degrees Offered

The BUET-JIDPUS offers the following postgraduate degrees:

Master of Science in Disaster Risk Reduction Engineering, abbreviated as M. Sc. Engg. (DRR)

Master of Engineering in Disaster Risk Reduction Engineering, abbreviated as M. Engg. (DRR)

Master of Science in Disaster Risk Reduction Science, abbreviated as M. Sc. (DRR)

4.2

Focus of Study

The curriculum of disaster risk reduction is focused on the following aspects:

Basic disaster management knowledge

Hazard analysis, assessment and mitigation

Vulnerability assessment and risk reduction

Geotechnical and structural aspects of disasters

Tools and techniques



A short description of the aspects is provided in following five broad sections:

Basic Disaster Management Knowledge

Basic and applied knowledge is essential in addressing disaster risk reduction from the realistic perspective of sustainable development using various tools and techniques. The goal of this component is to familiarize and develop the level of understanding of students' knowledge with respect to the occurrences of disasters and their management issues. This knowledge will sharpen the ability of the students to work on hazard identification, susceptibility and risk reduction.

Hazard Analysis, Assessment and Mitigation

The primary cause of vulnerability and risk that results in a catastrophic disaster is any hazard. The level of preparedness in relation to capacity enhancement for risk reduction is promoted by understanding and analyzing the danger in terms of magnitude, intensity and frequency. The goal of this subject field is to improve theoretical and analytical understanding in addressing the reduction of structural and non-structural vulnerability. Students learn the fundamentals of a specific hazard, hazard characteristics and hazard profiling, as well as the steps and techniques utilized in hazard analysis and mitigation, from this section.

Vulnerability Assessment and Risk Reduction

The risk management phase involves several critical components, including mitigation, prevention, preparedness, prediction and early warning. The objective of this subject field is to comprehend hazards, tools and techniques for hazard analysis and assessment, as well as vulnerability assessment to mitigate and decrease risks. This includes risk reduction strategies such as creating generic and scenario-based risk models for major natural disasters, as well as climate-risk

modeling and adaptation. After completing this section, students will have necessary knowledge and abilities to conduct vulnerability and risk assessments, establish hazard-specific and multi-hazard risk reduction/mitigation plans and execute technical and community-based early warning measures. This aspect places a strong emphasis on practical applications for risk assessment and reduction, enabling students to contribute to the efficient management of risk.

Geotechnical and Structural Aspects of Disaster

Disaster management encompasses diverse topics such as natural disasters (tsunamis, earthquakes and landslides), mitigation, rehabilitation and reconstruction (difficult soils and ground treatment and design against earthquakes and other natural disasters) and many others, including soil dynamics, liquefaction, stability and environmental protection. Buildings, lifelines and infrastructure can be made more resilient by taking structural measures, which are just one part of a larger set of mitigation efforts that also includes studying the frequency and nature of earthquakes and their dynamic responses, and then acting on that information. In this section, students will develop a deeper understanding of how engineers work to protect communities and reduce the impact of disasters linked to geotechnical and structural hazards.

Tools and Techniques

The accurate use of social, scientific and engineering methods is required for the effective assessment of hazards, vulnerability and risk in the context of the disaster reduction paradigm shift. The assessment of risk reduction may be distorted, overestimated or underestimated if tools and methodologies are not applied correctly. To increase the theoretical and practical background of the reduction of structural and non-structural vulnerability, this component includes the best computational and instrumental tools and methodologies currently accessible. Students will be able to understand and apply

the methods and technologies required for a proper risk assessment as well as create a plan for risk reduction after completing courses in this component.

4.3

Entrance Requirements

The following programs specific information has been reproduced from Ordinance, Statutes, Rules and Regulation of BUET.

For admission to the courses leading to a Master's degree (M.Sc. Engg. /M. Engg./ M. Sc.) an applicant:

- a) Must have a minimum GPA of 3.50 out of 5.00 or a first division or equivalent in any one of S.S.C and H.S.C or in equivalent examinations and must not have a GPA less than 2.00 out of 5.00 or a third division or equivalent in any of the aforementioned examinations.
- b) Must have at least 50% marks or a minimum GPA of 2.50 out of 4.0 or its equivalent in B. Sc. Engg. / M.A or M. Sc. or MSS / B. Arch. / BURP in the relevant branch.
- c) Specific requirements for different programs in the institute are spelt out in the following sections.

For admission to the courses leading to the degree of M.Sc. Engg. (DRR)/ M. Engg. (DRR), an applicant must have a Bachelor's degree in Civil Engineering / Water Resources Engineering or its equivalent having a minimum GPA of 2.5 out of 4.0 or its equivalent from any recognized university.

For admission to the courses leading to the degree of M.Sc. (DRR) an applicant must have a four-years Bachelor's degree or a Master's degree with Honors in Urban & Regional Planning/ Environmental Science/Geology/



Geography/ Disaster Management/Disaster Science/Water Resources Development/Architecture (5 years Bachelor's degree) or its equivalent from any recognized university.

4.4

Admission and Registration Procedures

Applications for admission to the concerned programs shall be invited through regular means of advertisement and shall be received by the Registrar.

Submission of Admission Related Documents: A student has to submit all official documents (e.g., transcripts /mark sheets, certificates, testimonials from DSW or Proctor, NOCs) to the institute before the beginning of the first semester of enrollment.

Course Registration: Course registration has to be initiated by the student through the BIIS Portal (<http://biis.buet.ac.bd/>) for approval by Advisor, Director of the institute, and the Registrar. A full-time student must register minimum 12 credit hours (per semester) and may register maximum 15 credit hours (per semester) and a part-time student may register maximum of 9 credit hours (per semester). No late registration will be allowed after two weeks of designated dates of registration. Late registration after this date may only be accepted for thesis/project if the student submits a written appeal to the Registrar through the concerned Director of the Institute and can document extenuating circumstances such as medical problems (physically incapacitated and not able to be presented) from the Chief Medical Officer (CMO) of the University or some other academic commitments which precluded registration prior to the



last date of registration. Students will be charged a certain late registration fee which will not be waived whatever be the reason for late registration.

4.5

Ordinance for Postgraduate Program

4.5.1

Academic Requirements and Regulations

The minimum duration of the M.Sc. Engg., M. Engg. and M.Sc. program shall be three semesters. A candidate for the Master's degree must complete all the requirements for the degree within five academic years (session) from the date of the first admission in the respective program.

Academic progress shall be measured in terms of credit hours earned by a student. One credit hour subject shall normally require 14 hours of lecture for one semester; while one credit hour for thesis/ project/ laboratory should normally require 42 hours of work for one semester. The number of credit hours for each subject shall be as specified in the syllabus of the respective department/institute. The credit hour requirement for the master's program shall be as follows:

For the degree of M.Sc. Engg. (DRR), a student must earn a minimum of 36 credit hours including a thesis, for which 18 credit hours shall be assigned.

For the degree of M. Engg. (DRR), a student must earn a minimum of 36 credit hours including a project, for which 6 credit hours shall be assigned.

For the degree of M. Sc. (DRR), a student must earn a minimum of 36 credit hours including a thesis, for which 18 credit hours shall be assigned.

There shall be two categories of students, namely, full-time students and part-time students.

A student may enroll as a part-time student. Students, serving in different organizations, may also be admitted as part-time students with the written consent of the employer. A part-time student may be assigned a maximum of 9 credit hours of course including thesis/project work in any semester.

Full-time students must register for a minimum of 12 credit hours and a maximum of 15 credit hours per semester. A full-time student shall not be allowed to be in the employment of any organization (even as a part-time employee). However, they may be employed as teaching/research assistant at the University. If a full-time student becomes an employee (full-time or part-time) of any other organization in the middle of a semester, he/she may, with the approval of the Director of the Institute and his/her Employer, be allowed to continue as a full-time student for that semester.

A student may be allowed to switch from part-time to full-time or vice versa on the recommendation of the RAC before the commencement of a semester.

The courses of study in different institutes shall be as recommended by the respective RAC and the Faculty/CASR and approved by the Academic Council. The RAC may review the curriculum from time to time and recommend any changes as may be considered necessary. The courses to be offered in any semester shall also be as determined by the relevant RAC.

A student on the recommendation of the RAC and as approved by the CASR may be allowed to transfer a maximum of 9.0 credits of the courses completed by the student at a recognized institution provided that the courses were not taken earlier than five calendar years from the date of his/her first enrolment in the respective program at BUET and that the student obtained a minimum grade point of 3.0 out of 4.0



or its equivalent in such courses and that the courses are equivalent to the approved courses of BUET.

4.5.2 Grading System

Final grades for courses shall be recorded as follows:

Grade	Merit description	Grade points
A (Plus)	Excellent	4.0
A	Very good	3.5
B (Plus)	Good	3.0
B	Average	2.5
C	Pass	2.0
F	Failure	0.0
I	Incomplete (for theory courses)	-
S	Satisfactory	-
U	Unsatisfactory	-
W	Withdrawn	-
X	In Progress (for thesis/project)	-

Courses in which the student gets F grades shall not be counted towards credit hour requirements and for the calculation of Grade Point Average (GPA).

The C grades, up to a maximum of two courses, may be ignored for calculation of GPA at the written request of the student to the Director of the Institute on the recommendation of the Supervisor/ Advisor, provided that the student has fulfilled the total course credit hour requirement in the remaining subjects with a minimum GPA of 2.75.

When a course is repeated for improvement, higher grade shall be counted for calculation of GPA.

Performance in all the subjects including all the F grades shall be reflected in the transcript. Grade I is given only when a student is unable to sit for the examination of a course at the end of the semester because of circumstances beyond his/her control. He/ She must apply to the Director of the Institute within one week after the examination to get an I grade in that course. It must be completed within the next two semesters, otherwise, the I grade becomes an F grade. He/ She may, however, be allowed to register without further payment of tuition fees for that course.

Satisfactory or Unsatisfactory- used only as final grades for thesis/project and non-credit courses. An X grade shall be recorded for thesis/project continuation. If, however, thesis / project is discontinued, an I grade shall be recorded.

Students may enroll for non-credit course(s) termed as audit course(s) on recommendation of his/her thesis/project Supervisor and Director of the Institute.

A student shall withdraw officially from a course within two working weeks of the commencement of the semester or else his grade in that course shall be recorded as F unless he/she is eligible to get a grade of I. A student may be permitted to withdraw and change his/her course within the specified period with the approval of his/her Adviser, the Director of the Institute and the respective teacher(s) concerned. In that case his/her grade in the courses registered shall



be recorded as 'W' in his Academic Record but shall not be reflected in the transcript.

Numerical markings may be made in answer scripts, tests etc., but all final grading to be reported to the Controller of Examinations shall be in the letter grade system as detailed below:

90% and above	:	A (Plus)
80% to below 90%	:	A
70% to below 80%	:	B (Plus)
60% to below 70%	:	B
50% to below 60%	:	C
Below 50%	:	F

4.5.3

Qualifying Requirements

The qualifying requirement for graduation is that a student must earn a minimum grade point of 2.65 based on the weighted average in course work.

Two courses may be repeated for improvement with the prior approval of the Director of the Institute on the recommendation of the Supervisor/Advisor. Such approval shall be reported to the RAC.

A student obtaining F grade in a course may be allowed to repeat the course with the prior approval of the Director of the Institute on the recommendation of the Supervisor/Advisor. Such approval shall be reported to the RAC.

A student shall not be allowed to continue the program if he/she obtains a total of three or more F grades in one or more than one subjects taken together, during the course of his / her studies. If at the end of the second or any subsequent semester, the cumulative



GPA falls below 2.5, he/she shall not be allowed to continue in the program.

Caution money may be refunded if the student withdraws officially from all the courses including project or thesis at the end of his academic program and the amount will be determined from the statement of clearance from all Departments/ Institutes/ Offices.

4.6

Financial Assistance for Postgraduate Students

The University provides financial assistance in the form of Teaching Assistantship (TA) and Fellowship to a limited number of postgraduate students each year. However, limited number of full-time Master's students of the institute is awarded fellowships only. Fellowship recipients must be enrolled as full-time students and are not permitted to engage in any other employment during the duration of their fellowship. They work under the guidance of a teacher of the institute. Enquiries regarding fellowship may be made at the office of the Director, Advisory, Extension and Research Services (DAERS) of BUET.



CHAPTER 5

Outline of Postgraduate Courses

DP 6001 Multi-Hazard Risk Assessment and Mitigation

3 Credits

Natural Hazards & Man-made Hazards, Hazard Assessment, Risk Analysis for Different Hazards, Elements at Risk Assessment, Obtaining Spatial Data for Risk Assessment, Risk Based Zoning, Vulnerability Assessment, Risk Management, Forecasting and Warning

DP 6003 Remote Sensing and GIS for Disaster Mitigation

3 Credits

Introduction to Spatial Information Engineering for Disaster management, Principle of Remote Sensing: Optical Sensors, SAR, LIDAR Images, Image Processing and Analysis, Principle of Geographic Information System: Geo-spatial and Thematic Data Analysis, GPS and Field Surveying, Data Integration and Database Generation, Spatial Analysis and Visualization; Advanced Mapping Technology: UAV, MMS, Field Sensor Network; Space- Based Technology for Disaster and International Collaborations; Location Based Service: Web GIS, Geo-Portal, Early Warning System



DP 6005 Wind-Induced Disaster Mitigation

3 Credits

Application of Meteorology in Wind Engineering, Turbulence Effects and Aero-Elasticity, Basics of Wind Resistant Design, Engineering Models for Wind Load & Wind Structure Interaction, Wind Induced Vibrations of Structures, Control and Mitigation of Wind Induced Vibrations of Structures Especially Tall Buildings and Bridges, Strengthening of Rural Houses, Design of Structures for Cyclone Prone Areas

DP 6007 Risk Analysis and Uncertainty Modeling

3 Credits

Definition of risk, functional modeling and analysis techniques, probabilistic risk assessment procedure, risk methods, risk acceptance, assessment of failure likelihood, consequence assessment, risk benefit assessment, uncertainty sources and types, modeling uncertainty, risk analysis and decision making under uncertainty, collection of data, expert-opinion elicitation, human-machine interface, sources and types of knowledge and ignorance, uncertainty sources and types for engineering systems, probability models, statistical models, fuzziness, fuzzy sets, fuzzy logic, fuzzy arithmetic, imprecise probabilities, uncertainty measures, uncertainty reduction

DP 6009 Earthquake Disaster Mitigation

3 Credits

Plate Tectonics, Active Faults, Seismic Waves, Seismographs, Earthquake Magnitude and Intensity, Seismic Hazard Assessment, Deterministic and Probabilistic Seismic Hazard Assessments, Ground



Motion Attenuation Relationships, Seismic Hazard Maps and their uses for Earthquake Disaster Mitigation; Tsunami: Causes and Nature of Tsunami, Characteristics of Tsunami Waves, Tsunami Warning System, Tsunami Hazard Maps, Tsunami Risk Mitigation Measures, Earthquake-Induced Ground Failures: Soil Liquefaction & Mitigation Measures, Earthquake-Induced Landslides, Surface Rupture along Fault; Seismic Vulnerability of Buildings and Structures: Lessons Learned from Past Earthquakes, Seismic Vulnerability of Different Building Classes, Strengthening and Mitigating Seismic Risk, Seismic Loss Estimation, Strategies for Earthquake Protection

DP 6011 Risk and Reliability in Geotechnical and Structural Engineering

3 Credits

Introduction and Definition of Risk and Reliability; Constructing multivariate distributions for soil parameters; Evaluating reliability in geotechnical engineering; Maximum likelihood principle and its application in soil liquefaction assessment; Bayesian analysis for learning and updating geotechnical parameters and models with measurements; Practical reliability analysis and design by Monte Carlo Simulation; Evolution of geotechnical risk analysis; Verification of geotechnical reliability using load tests and integrity tests; Reliability and risk analysis in Structural Engineering: first order reliability method (FORM), Seismic reliability analysis of structures and infrastructures; Reliability based design: Practical procedures, geotechnical and structural examples, and insights

DP 6013 Urban Fire Hazard Mitigation and Safety Planning

3 Credits

Fire hazard in urban areas: Fuel/structure modification, Water supply, Emergency services, Emergency evacuations, Minimizing fire loss,



Firefighter safety; Development of fire mitigation policies; Post event recovery and maintenance; Mandatory elements of the general plan: Land use, Housing, Circulation, Conservation, Open space, Safety, Related planning and regulatory tools

DP 6015 Community Based Disaster Mitigation

3 Credits

Major activities and concepts related to disaster mitigation; Community-based approaches to disaster mitigation; A communication model; Community preparedness programs; Community disaster resilience programs and community assessment tools; Developing partnerships and connecting with the public

DP 6017 Land Use Planning Using Remote Sensing and GIS

3 Credits

Introduction to Geographic Information Systems (GIS) and Remote Sensing (RS); Basic Land-use classifications with GIS software; Use of satellite technology for thermal remote sensing and temperature monitoring; Creation of 3D landscape models from drone surveys; Advanced classification of landscapes from street-level to district level; Introduction to declassified satellite imagery; Working with declassified data: registration and geometric corrections; Quantifying urban expansion and land-use change with mixed satellite data sources; Object-Oriented classification of urban landscapes with Corona data

DP 6101 Structural Aspects of Earthquake Resistant Design

3 Credits

Primary and Secondary Effects of Earthquake; Causes for Earthquake; Period of Vibration; Effects of Earthquake on Vertical Structures;

Inertia due to earthquake; Earthquake effects on Buildings; Modes of Vibration due to Earthquake Forces; Effects of Earthquakes on Stress distribution; Earthquake Resistant Design Concept and Philosophy: Requirements of structural safety, Concepts of ductility, deformability and damageability, Concept of isolation

DP 6103 Non-destructive Methods for Structural Evaluation and Structural Health Monitoring

3 Credits

Principal non-destructive (NDT) methods for structural evaluation: Ultrasonic Pulse Velocity, Seismic Tomography, Impact-Echo, Ground Penetrating Radar (GPR), Electrical Resistivity of Concrete; Relevant physical principles of continuum mechanics, electrical engineering, acoustics and elastic wave propagation underlying the experimental methods; Structural health monitoring (SHM): Level of SHM, Necessity, SHM components, Sensor data acquisition and interrogation and ultrasonic digital signal processing, Pattern recognition, Case studies: SHM in dams and bridges; Laboratory demonstrations on selected topics

DP 6105 Experimental Methods for Structural Evaluation and Rehabilitation

3 Credits

Experimental Structural evaluation: Testing facilities and technical equipment; Arrangement of sensors, Application of equivalent forces and ground motion in pseudo static and dynamic testing; Load and displacement relationship for full-scale testing of structural elements (RC columns, masonry wall); Damping devices, Prediction of capacity curves and material properties and parameters; Model testing for rehabilitation: Experimental investigation of design and retrofitting strategies using small scale structural models; Testing of elements and interpretation of failure mechanism



DP 6107 Emerging Technologies for Structural Rehabilitation

3 Credits

Experimental investigation of design and retrofitting strategies using small scale structural models; Testing of elements and interpretation of failure mechanism, derivation of structural layout and simplified models of representative building types, damage prognosis and comparison with observed response; Fragility functions

DP 6201 Flood Control and Mitigation

3 Credits

Background and causes of flood problem in Bangladesh; Flood damage: Flood induced riverbank erosion; Flood control policies: Post-disaster recovery, Indigenous flood-adjustment strategies, Sustainable floodplain development policy; Flood control measures: Mitigation of flood damage, Structural and Non- structural measures, Land use, zoning and risk assessment, Flood induced erosion control, Low cost measures; Flood forecasting and warning systems; Research, education and exchange of knowledge; Public awareness, preparedness and participation

DP 6203 Coastal Water Disaster Mitigation

3 Credits

Introduction to disaster; Coastal water disasters; Lessons from the previous Coastal water Disasters: Methodology and Description of Basic Tsunami Parameters, Storm Surge Due to 2008 Cyclone Nargis in Myanmar and Post-cyclone Preparedness Activities, Observations and Numerical Simulation of Storm Surge due to Cyclone Sidr 2007 in Bangladesh; Assessments of Vulnerability; Mitigation Measures (Structural Measures): Stability and Disaster Mitigation Effect of

Wave-Dissipating Concrete Blocks of Detached Breakwaters Against Tsunami Waves, Breakwater Damage and the Effect of Breakwaters on Mitigation of Inundation Extent During Tsunamis: Case Study of The 2011 Great East Japan Earthquake and Tsunami, The New ASCE Tsunami Design Standard; Mitigation Measures (Soft Measures): Cost-Efficient Design of Multilayer Safety Systems Against Large-Scale Coastal Disasters, Wave Reduction in Mangrove Forests; Post-Disaster Reconstruction; Climate Change Influence on Coastal Disasters

DP 6401 Seismology and Geotechnical Aspects of Earthquake Engineering

3 Credits

Introduction to engineering seismology; Causative mechanisms of earthquakes and ground motion attenuation relationships; Dynamic properties of soils; Geotechnical seismic hazards and their mitigation; Response of soils to seismic loading; Liquefaction of soil deposits; Analysis and design of slopes and embankments for seismic loading

DP 6403 Geotechnical Applications of Slope Protection, Settlement Control & Erosion Control

3 Credits

Slope stability analyses: Macro stability of a slope, Stability analysis for infinite slopes (with and without seepage), Stability analysis for finite slopes (with plane and circular failure surfaces, Method of slices, Bishop & Morgenstern's solution with seepage, Morgenstern's method for rapid drawdown, Spencer's solution with seepage); Shallow slope movement: Types of movement, Factors in slope movement, Slope movement assessment; Erosion: Types of erosion, Factors in erosion, Erosion assessment, Sensitivity of factors, Erosion control management; Control measures: Bank protection, Slope



reinforcement, Vegetation covers, Temporary slope drainage and other measures; Slope erosion design: Universal Soil Loss Equation and other conventional methods; Settlement control: By deep and mass soil mixing in clayey soil, Use of geotechnical instruments

DP 6405 Field Evaluation of Site Condition

3 Credits

Determination of effects of earth deformations and strong ground shaking had on structures; Measurement of cracks, fault widths, uplift, subsidence, tilting, or warping; Examination and documentation of surface expressions of the causative fault; Drawing of relevant geologic cross-sections; Inspection and assessment of the performance of engineered structures with respect to strong ground motion and earth deformations such as settlement, liquefaction, ground cracking, landslides, and ground offset; Documentation of undamaged sites, sites near the threshold of failure, and good performance of structures, noting types of soils

Courses Offered by other Departments and Institute

In addition, the students can also earn credits from the following courses or the equivalent courses:

CE 6117 Structural Dynamics and Seismic Design of Structures, CE 6411 Earthquake Engineering, and CE 6407 Soil Dynamics (offered by the Department of Civil Engineering)

Plan 6153 Disaster Management in Planning (offered by the Department of Urban and Regional Planning)

WFM 6201 Hazards and Risk Analysis, WFM 6311 Climate Change Risk Management, and WFM 6305 Coastal Zone Management (offered by the Institute of Water and Flood Management)







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