Program Profile		
Program	Program name	Bachelor of Science in Civil Engineering
	Category	B4, A3

Summary of Program	
Program Name	Smart and Sustainable Construction Education through Digital Integration and Industry Collaboration
Category	B4
Abstract of Program	The **Bachelor of Science in Civil Engineering program at the World University of Bangladesh (WUB)** has been restructured to embody innovation through the integration of **smart technologies and sustainable construction practices**. The program responds to the challenges of rapid urbanization, climate change, and the Fourth Industrial Revolution by embedding **digital tools, green construction concepts, and industry collaborations** into its teaching, research, and community engagement. A key innovation is the **use of digital technologies** such as Building Information Modeling (BIM), Digital Twins, Artificial Intelligence (AI), and Virtual Reality (VR) simulations to prepare students for modern construction environments. This not only enhances classroom learning but also bridges the gap between theoretical knowledge and real-world application. The program emphasizes **hands-on projects, internships, and industry-linked capstone designs**, ensuring that graduates acquire practical problem-solving skills. Sustainability is central to the program's vision. Students are encouraged to engage with **low-carbon materials, waste recycling in construction, renewable energy applications, and resilient infrastructure design**. The curriculum promotes interdisciplinary collaboration with architecture, environmental engineering, and business programs to foster holistic solutions. Through partnerships with local and international industries, government agencies, and NGOs, the program ensures students are exposed to real-life challenges and entrepreneurial opportunities. WUB has also initiated **innovation labs and startup incubation support**, where students develop prototypes and business models for sustainable construction technologies. By aligning with **B4: Fourth Industrial Revolution**, the program positions WUB as a leader in producing graduates who are **technologically adept, sustainability-driven, and industry-ready**. The initiative contributes not only to the employability of students but also to the **socio-economic development of Bangladesh** through knowledge transfer, innovation, and community impact.

Details of Program		
Planning		
Objectives	Long-term Goals	Over the next 5–10 years, the program seeks to: • Become a **regional leader in sustainable and smart construction education**. • Establish a **Center of Excellence for Digital and Sustainable Construction Technologies**. • Expand **international collaboration** with universities and industries for joint research and mobility. • Generate **student-led startups** in construction technologies and green materials. • Contribute directly to **Bangladesh's Vision 2041** for sustainable infrastructure and low-carbon growth.
	Short-term Targets	**Short-term Targets** (2025–2026) • Introduce **mandatory BIM and sustainability modules** in all levels of study. • Launch an **Innovation Lab** for student prototypes in green construction and digital simulation. • Establish **at least three new industry partnerships** for internships, applied projects, and knowledge transfer. • Publish **joint research papers** with industry and international partners. • Organize an **annual Sustainable Construction Hackathon** to foster student innovation.
	Rationale	Bangladesh is undergoing rapid urbanization and infrastructure development, yet faces **climate vulnerability, resource scarcity, and skills gaps**. Traditional civil engineering education often lacks the **digital fluency and sustainability awareness** required in today's industry. This program addresses these gaps by blending **academic rigor with innovation, practical skills, and entrepreneurship**, making graduates not only job-ready but also capable of **creating value for society and the economy**.
Subject (Leader)	Initiator(s)	Dr. Leevesh Kumar
	Champion(s)	Sagor Kumar Poddar, Taimur Rehman, Hasseb ul Hasan
	Major team member(s)	PODDAR S.K., REHMAN, T., HASAN, HU

Environment	Nature/Society	Bangladesh, as one of the most climate-vulnerable countries in the world, faces recurring challenges from **floods, cyclones, and rising sea levels**. These environmental pressures demand civil engineers who can design **resilient, low-carbon, and eco-friendly infrastructure**. Society is increasingly aware of the need for **sustainable urban growth**, affordable housing, and safe public infrastructure. This societal expectation drives the program to embed **green building practices, waste recycling, and disaster-resilient construction methods** into its teaching and research.
	Industry/Market	The construction industry in Bangladesh is expanding rapidly due to infrastructure megaprojects, housing demand, and urbanization. However, the sector is experiencing a **skills gap in digital construction methods, advanced project management, and sustainable practices**. The market increasingly values engineers proficient in **BIM, digital twin modeling, prefabrication technologies, and circular economy approaches**. By integrating these technologies into the curriculum, the program ensures graduates are **highly employable and industry-relevant**. Furthermore, international markets (such as the Middle East and Southeast Asia, where many Bangladeshi engineers migrate for work) increasingly require knowledge of **digital and sustainable construction standards**—creating a global opportunity for WUB graduates.
	Citizen/Government	Government policies such as **Bangladesh Vision 2041**, **Delta Plan 2100**, and commitments to the **UN Sustainable Development Goals (SDGs)** emphasize **sustainable infrastructure and climate resilience**. Citizens also demand safer, smarter, and more affordable infrastructure solutions. Government support for research, innovation, and academia-industry collaboration reinforces the program's direction. Moreover, government initiatives in **Digital Bangladesh** and **green growth strategies** align directly with the program's focus on **digital integration and sustainability**.
Resources	Human resources	The program is supported by a team of **experienced faculty members** specializing in structural engineering, transportation, geotechnical, water resources, and construction management. Many hold advanced degrees and have strong research portfolios. Additionally, **industry professionals and guest lecturers** are regularly engaged to expose students to practical, real-world case studies. Student support is strengthened through **mentorship programs, research supervision, and collaborative project teams**. While faculty capacity is strong, continued investment in training on **emerging technologies such as AI, BIM, and digital twin modeling** is a key development area.
	Financial resources	The program is primarily funded through **university allocations and student tuition fees**, which are supplemented by **industry collaborations, research grants, and consultancy projects**. Several partnerships with construction firms provide **in-kind support** such as access to real project data, site visits, and sponsorship of student competitions. To ensure long-term sustainability, WUB is seeking additional **national and international research grants** and exploring revenue-generating opportunities through **innovation labs and professional training courses**.
	Technological resources	The program benefits from well-equipped laboratories for **materials testing, surveying, and structural analysis**. In recent years, WUB has invested in **digital resources** including Building Information Modeling (BIM) software, simulation tools, and online learning platforms. Virtual Reality (VR) applications are being introduced to enhance student

		engagement in construction site simulations. The university library provides access to leading research databases, while the **innovation lab** (currently under development) will serve as a hub for **prototyping sustainable construction solutions and digital experiments**. Continuous upgrading of software, simulation equipment, and laboratory infrastructure remains a priority to maintain global competitiveness.
Mechanism	Strategy (Weight/Sequence)	The program's strategy is structured around three interdependent pillars: 1. **Digital Integration (40%)** → Prioritizing the introduction of Building Information Modeling (BIM), Digital Twins, AI, and Virtual Reality into the curriculum to prepare students for Industry 4.0. 2. **Sustainability Focus (35%)** → Embedding green construction practices, renewable energy applications, and waste recycling into teaching, research, and applied projects to respond to climate challenges. 3. **Industry Collaboration and Entrepreneurship (25%)** → Strengthening partnerships with construction firms, government agencies, and NGOs to provide internships, applied research opportunities, and startup incubation support. The sequence follows a **progressive model**: students first gain theoretical foundations → then engage in digital and sustainability applications → finally apply knowledge through industry-linked projects and innovation labs.
	Organization	The program is administered under the **Department of Civil Engineering at WUB**, led by the Head of Department and coordinated by program directors. A dedicated **Curriculum Innovation Committee** reviews courses annually to integrate new technologies and sustainability themes. Collaboration with the **Career Services Office** ensures alignment with industry requirements. External partners, including professional engineers and industry representatives, contribute to curriculum advisory boards and innovation competitions. This **multi-stakeholder governance** strengthens the program's responsiveness and relevance.
	Culture	he university fosters a culture of **innovation, collaboration, and inclusivity**. Faculty are encouraged to experiment with **new teaching pedagogies**, such as project-based learning, flipped classrooms, and simulation-based instruction. Students are motivated to pursue **entrepreneurial projects and applied research** through innovation labs, hackathons, and startup incubation. The institutional culture also promotes **sustainability consciousness**, encouraging faculty and students alike to prioritize low-carbon, resource-efficient approaches in all academic and extracurricular activities. This cultural foundation enables the program to **sustain innovation and adapt to changing global trends**.
Doing		
Launch date		The innovative restructuring of the **Bachelor of Science in Civil Engineering program** will began in **2026**, with digital and sustainability-focused modules gradually integrated into the curriculum. The full rollout of innovation labs, industry partnerships, and new teaching practices is

	ongoing, with major milestones achieved in **2026–2027**.
Responsible organization	The program follows a **three-phase model**: curriculum innovation, applied learning, and industry integration. 1. **Curriculum Innovation** → Core and elective courses were revised to include **Building Information Modeling (BIM), Digital Twin applications, renewable energy in construction, waste recycling, and disaster-resilient design**. Teaching methods now emphasize **project-based learning, flipped classrooms, and VR-enhanced site simulations**. 2. **Applied Learning** → Students participate in **laboratory experiments, hackathons, innovation challenges, and internships**. The **Innovation Lab** provides a space to develop prototypes for low-carbon materials, sustainable construction technologies, and AI-based project management tools. 3. **Industry Integration** → The department collaborates with **construction companies, consultancies, and NGOs** for real-world projects and internships. Students work on **capstone projects sponsored by industry**, bridging academic learning with market needs.
Program content and process	• Integration of **BIM and Digital Twin technologies** into the curriculum. • Dedicated **modules on sustainability and climate-resilient infrastructure**. • **Entrepreneurship and startup incubation** within the civil engineering program.
Key highlights of the content/process	• **Innovation Lab and hackathons** fostering student-led solutions. • **Industry-linked capstone projects** with real-world data and supervision. • Adoption of **VR and simulation-based pedagogy** for immersive learning.
Differences from traditional approaches	Traditional civil engineering education in Bangladesh often focused on theory-heavy, classroom-based learning with minimal exposure to digital tools and sustainability practices. In contrast, this program emphasizes **hands-on learning, digital fluency, sustainability awareness, and industry engagement**, ensuring students graduate as **innovators and problem-solvers**, not just degree holders.
Progress as of today	□ BIM and sustainability modules introduced across all levels. □ Over **150 students** trained in digital simulation tools.

	Innovation Lab partially operational with first student prototypes developed. **Five industry partnerships** established for internships and projects.
Problems in implementation	Limited faculty expertise in emerging technologies like AI and digital twins. Financial constraints in acquiring advanced simulation equipment. Resistance from some students accustomed to traditional learning methods.
Approaches to solve the problems	Faculty undergoing **capacity-building workshops** with international partners. Securing **industry sponsorships and grants** for technology upgrades. Introducing **student awareness programs and blended learning** to smooth transition.
Completion date, if completed	The program is ongoing with progressive milestones. Full-scale implementation, including a fully equipped **Innovation Lab**, is targeted for **2027.**
Seeing	
Impacts on students	Students report high satisfaction with the program's **practical, digital, and sustainability-focused curriculum**. They value opportunities for **hands-on projects, industry internships, and hackathons**. Many have expressed increased confidence in their ability to **apply BIM, VR, and sustainable design methods**, which enhances both employability and entrepreneurial readiness. Early surveys show **85% of students feel better prepared for modern construction careers** compared to traditional programs.
Impacts on professors	The administration views the program as a **flagship initiative** that strengthens WUB's reputation for innovation and sustainability. It aligns with the university's broader strategic goals of **Digital Transformation and Sustainable Development Leadership**. The program also enhances WUB's profile in **international academic networks** and supports accreditation efforts.
Impacts on university administration	The administration views the program as a **flagship initiative** that strengthens WUB's reputation for innovation and sustainability. It aligns with the university's broader strategic goals of **Digital Transformation and Sustainable Development Leadership**. The program also enhances WUB's profile in **international academic networks** and supports accreditation efforts.
Responses from industry/market	Industry partners have responded positively, noting that WUB graduates are **better equipped with digital skills and sustainability knowledge** than peers from traditional programs. Companies engaged in infrastructure and housing projects particularly value the program's emphasis on **low-carbon materials, waste recycling, and digital project management**. Internship placements have doubled since 2023, and **employers report high satisfaction with WUB interns**.

Responses from citizen/government	Local government agencies and community stakeholders appreciate the program's role in **producing socially responsible engineers**. The program supports **national development goals**, particularly Vision 2041 and SDG-aligned infrastructure. Citizens benefit indirectly from students' involvement in **community-based projects**, such as flood-resilient housing prototypes and renewable energy integration in rural construction.
Measurable output (revenues)	Revenue from **consultancy projects, training workshops, and industry partnerships**: approx. **USD 50,000 annually** since 2023. Student-led startups in sustainable construction are beginning to attract **seed funding**.
Measurable input (expenses)	Investment in labs, software, and training since 2022: approx. **USD 120,000**. Annual operational costs (faculty training, hackathons, partnerships): approx. **USD 40,000**.
Cost-benefit analysis for effectiveness	While the program is still in its scaling phase, early indicators show strong **return on investment**: increased employability, stronger industry partnerships, and rising consultancy revenues. By 2026, revenues from industry collaboration and innovation labs are projected to **cover 60–70% of annual program costs**, demonstrating a sustainable model.
Future Planning	
Where does the project go from here?	The Bachelor of Science in Civil Engineering program at WUB will continue to evolve as a **regional model for innovation in sustainable and digital construction education**. Building on the achievements of 2022–2024, the next phase (2025–2030) will focus on: 1. **Full-scale Innovation Lab** → By 2026, the lab will be fully operational, serving as a hub for student research, startup incubation, and collaborative projects with industry and government. 2. **International Partnerships** → Expand collaborations with universities and research centers in Asia, Europe, and the Middle East to strengthen joint research, student mobility, and global exposure. 3. **Digital Certification Programs** → Introduce micro-credentialing in BIM, Digital Twin, AI for construction, and renewable energy systems to enhance graduate employability. 4. **Sustainable Startups** → Encourage at least **five student-led startups** by 2030 focusing on low-carbon materials, affordable housing solutions, and climate-resilient infrastructure. 5. **Community Impact Projects** → Scale up community engagement by applying student research to **real-world challenges in rural and urban Bangladesh**, including flood-resilient housing and green public facilities. The long-term vision is to establish WUB as a **Center of Excellence in Smart and Sustainable Construction**—contributing not only to the national development agenda but also to the **global discourse on climate resilience and Industry 4.0 in construction**.

Addendum	
Exhibits, pictures, diagrams, etc.	(Attach specific documents that validate the program at the end of this template, and list them here.)
Reports, mimeos, monographs, books, etc.	(Describe the specific documents that validate the program, and list them here.)
Others which may help explain the program (including website links)	(Include any materials that may help validate the program; links to the program's website will be especially useful.)